SHIMANE UNIVERSITY

Doctoral Thesis

Metamorphism of garnet amphibolite and pelitic schist from the Upper Unit of the Makbal Complex, Kyrgyz Northern Tian-Shan

by

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ABSTRACT

The Makbal Complex in the Kyrgyz Northern Tian-Shan is located in the western segment of the Central Asia Orogenic Belt (CAOB). The Kyrgyz Tian-Shan Mountains extend from east to west, separating the Kazakhstan plate to the north and the Tarim plate to the south. The metamorphic rocks of the Makbal Complex are divided into the two major units, Akdzhon and the Scharkyrak Groups, based mainly on the metamorphic conditions. The structural lower Akdzhon Group contains of HP and UHP metamorphic rocks, whereas the Scharkyrak Group mainly consists of low grade metamorphic rocks of greenschists facies. The Akdzhon Group was further divided into the structurally lower Makbal Formation and the upper Neldy Formation. The Makbal Formation is composed mainly of meta-quartzite and pelitic schist with a minor amount of garnet-chloritoid-talc schist, eclogite, amphibolite, mafic schist and marble. The Neldy Formation is composed mainly of pelitic schist with subordinate marble and meta-quartzite, and lens and layer of eclogite and amphibolite. The lithotypes of the Neldy Formation vary from pelitic schists with or without garnet to HP eclogites. The peak metamorphic conditions of the eclogite and the garnet-chloritoid-talc schist are 510–610 °C and 2.2–2.8 GPa of the Makbal Formation and eclogite are 550–610 °C and 2.2–2.5 GPa of the Neldy Formation. Several geochronological studies of the Makbal Formation have been performed so far. A CHIME monazite age of garnet-chloritoid-talc schist yielded 481 ± 26 Ma. SHRIMP U-Pb zircon ages of the eclogites gave 509 ± 7 Ma and 498 ± 7 Ma as the peak metamorphic age. However, with regard to the Neldy Formation, only a Sm-Nd age of 526 ± 9.5 Ma was reported from a HP eclogite.

This study mainly focuses to establish the petrology, geochronology and P-T evolution of low-grade metamorphic rocks in the Neldy Formation. I petrologically examine the garnet and chloritoid-bearing pelitic schist (KG1244), garnet-free pelitic schist (KG1251; KG1252B) and the

garnet amphibolite (KG1252A), and reveal their metamorphic P-T conditions and K-Ar ages of the pelitic schist in the Neldy Formation.

The garnet-free pelitic schists (KG1251; KG1252B) consist mainly of phengite, chlorite and quartz, with small amounts of albite, titanite, calcite, rutile and carbonaceous matter. The peak metamorphic conditions are roughly constrained as T< 630 °C and P = 0.9–1.7 GPa. The garnet and chloritoid-bearing pelitic schist (KG1244) consists mainly of white mica (phengite-core and muscovite-rim), chlorite and quartz, with minor amounts of garnet, chloritoid, albite, tourmaline, zircon, monazite, titanite, rutile, calcite and carbonaceous matter. The peak metamorphic conditions are estimated as T = 485–545 °C and P = 1.2–1.5 GPa (high-P/T metamorphism), followed by a low-P/T metamorphism of T = ca. 500 °C and P > 0.3 GPa. The garnet amphibolite (KG1252A) consists mainly of amphibole, garnet, epidote, plagioclase and quartz, with a small amount of chlorite, biotite, paragonite, phengite, muscovite, K-feldspar, titanite, ilmenite and calcite. The peak metamorphic conditions are estimated as T = 575 ± 29 °C and P = 1.4 ± 0.3 GPa (high-P/T metamorphism). The high-P/T metamorphism is followed by the low-P/T metamorphism of ca. T = 600 °C and P = 0.4 GPa.

A K-Ar age as the peak metamorphic age for the garnet-free pelitic schist (KG1251) is obtained as 524 ± 13 Ma, and it is almost identical to the previously reported peak metamorphic ages (ca. 500 Ma) of eclogites and garnet-chloritoid-talc schists in the Makbal Complex. A K-Ar white mica age of 474 ± 12 Ma for the garnet and chloritoid-bearing pelitic schist (KG1244) is obtained, and it is similar to the age of the Ordovician granitic intrusions at ca. 460 Ma.

The peak metamorphic conditions of the garnet-free pelitic schist, the garnet-chloritoid-talc schists, the pelitic schist and the garnet amphibolite are < 630 °C at 0.9–1.7 GPa, and 485–545 °C at 1.2–1.5 GPa and 575 ± 29 °C at 1.4 ± 0.3 GPa, respectively. The peak metamorphic conditions of the garnet amphibolite of the Kaindy Formation in the Sharkyrak Group have been reported as

620 °C and 1.4 GPa. These comprise a group of relatively low-pressure metamorphic rocks. In contrast, the metamorphic conditions of the HP and UHP metamorphic rocks such as the eclogites and the garnet-chloritoid-talc schists in the Akdzhon Group were estimated to be 530–580 °C and 2.8–3.3 GPa (garnet-chloritoid-talc schist), ~510 °C and 2.8 GPa (coesite-bearing eclogite) and 520–610 °C and 2.2–2.5 GPa (eclogite). These suggest that the peak metamorphic conditions of the Neldy pelitic schists, garnet amphibolite and the Kaindy garnet amphibolite are significantly lower in pressure compared with the previously reported eclogites and garnet-chloritoid-talc schists, which are located in the lower tectono-structural levels of the Makbal Complex, i.e. lowermost parts of the Neldy Formation and the Makbal Formation. These results clearly indicate that the conventional division of the Akdjon Group, i.e. the Makbal and the Neldy Formations, has no longer geotectonic significance. Therefore, based mainly on the metamorphic pressure the Makbal Complex can be divided into two tectonometamorphic units, structurally lower relatively high-pressure metamorphic unit and structurally upper relatively low-pressure metamorphic unit. We have adopted, hereafter, these names of the tectonometamorphic units, as the Lower Unit and the Upper Unit of the Makbal Complex.

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CHAPTER 1

INTRODUCTION

1.1 Geological framework

The Kyrgyz Tien-Shan Mountains are divided into three tectonic units; the Northern Tien-Shan, Central (or Middle) Tien-Shan and Southern Tien-Shan (Fig. 1). The Northern Tien Shan, which represents the deformed margin of the Caledonian Paleo-Kazakhstan continent; The Middle Tien Shan, which represents a Late Paleozoic volcano-plutonic arc; and The Southern Tien Shan, which is an intensely deformed fold and thrust belt that formed during the final closure of the Paleo-Turkestan ocean. HP–UHP metamorphic rocks occur at three localities in the Kyrgyz Tien-Shan. The Makbal and Aktyuz Complexes occur within the Northern Tien-Shan, and the Atbashy Complex is located in the Southern Tien-Shan (Bakirov et al., 1978, 1998; 1999; 2014; Sobolev et al., 1986; Tagiri et al., 1995; Satybaev et al., 2018).

The Makbal Complex is located in the Kyrgyz Northern Tian-Shan and composed of a variety of HP-UHP metamorphic rocks. It was divided into two major units, i.e. the structurally lower Akdjon Group and the upper Sharkyrak Group on the basis of lithology (Nikolaev, 1933). The Akdjon Group consists of the tectonostratigraphically lower Makbal Formation and the upper Neldy Formation (Medvedeva, 1960) (Fig. 2).

The Makbal Formation is composed mainly of meta-quartzite with a minor amount of garnet-chloritoid-talc schist, pelitic schist, eclogite, amphibolite derived from eclogite, mafic schist and marble (Bakirov, 1978; Bakirov et al., 1987; 1998; 2017; Tagiri et al., 2010). Eclogite occurs as lense or block within the matrix of meta-quartzite and pelitic schist. Garnet-chloritoid-talc schists are concordantly intercalated in meta-quartzites. Coesite and pseudomorph after coesite have been found from the garnet-chloritoid-talc schists and occasional meta-quartzite and eclogite

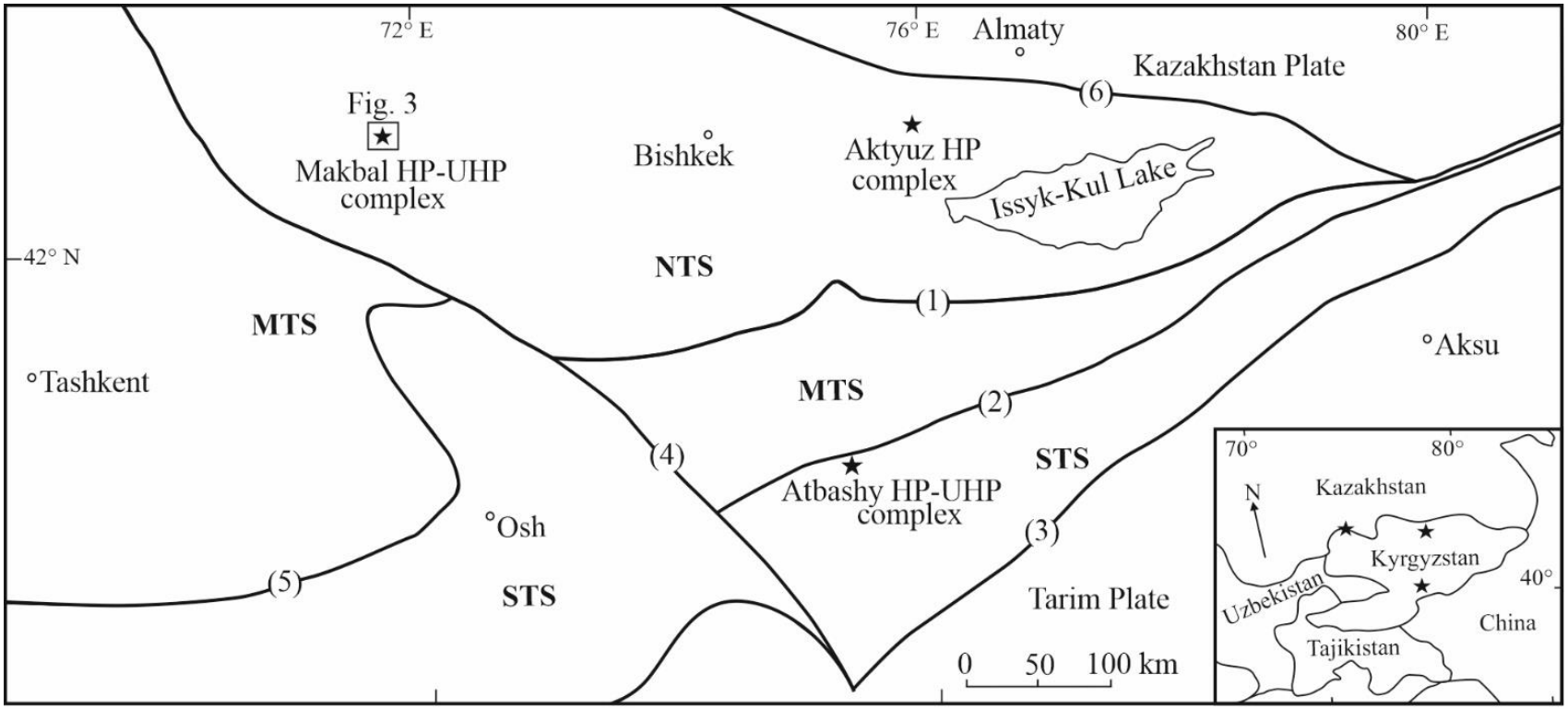


Fig. 1 Tectonic outline of the Kyrgyz Tien-Shan (after Bakirov and Maksumova, 2001). Localities of HP-UHP rocks are indicated by stars. The Kyrgyz Tien-Shan Mountains extend from east to west, separating the Kazakhstan Plate to the north and the Tarim Plate to the south. They are divided into three tectonic units: NTS-Caledonian Northern Tien-Shan: MTS-Caledonian-Hercynian Middle Tien-Shan; STS-Hercynian Southern Tien-Shan, bounded by major fault zones are the Main Tectonic Line (1), the Atbashy-Inylchek Fault (2), the North Tarim Fault (3), the Talas–Fergana Fault (4), the South Fergana Fault (5) and the Djalair-Naiman Suture (6).

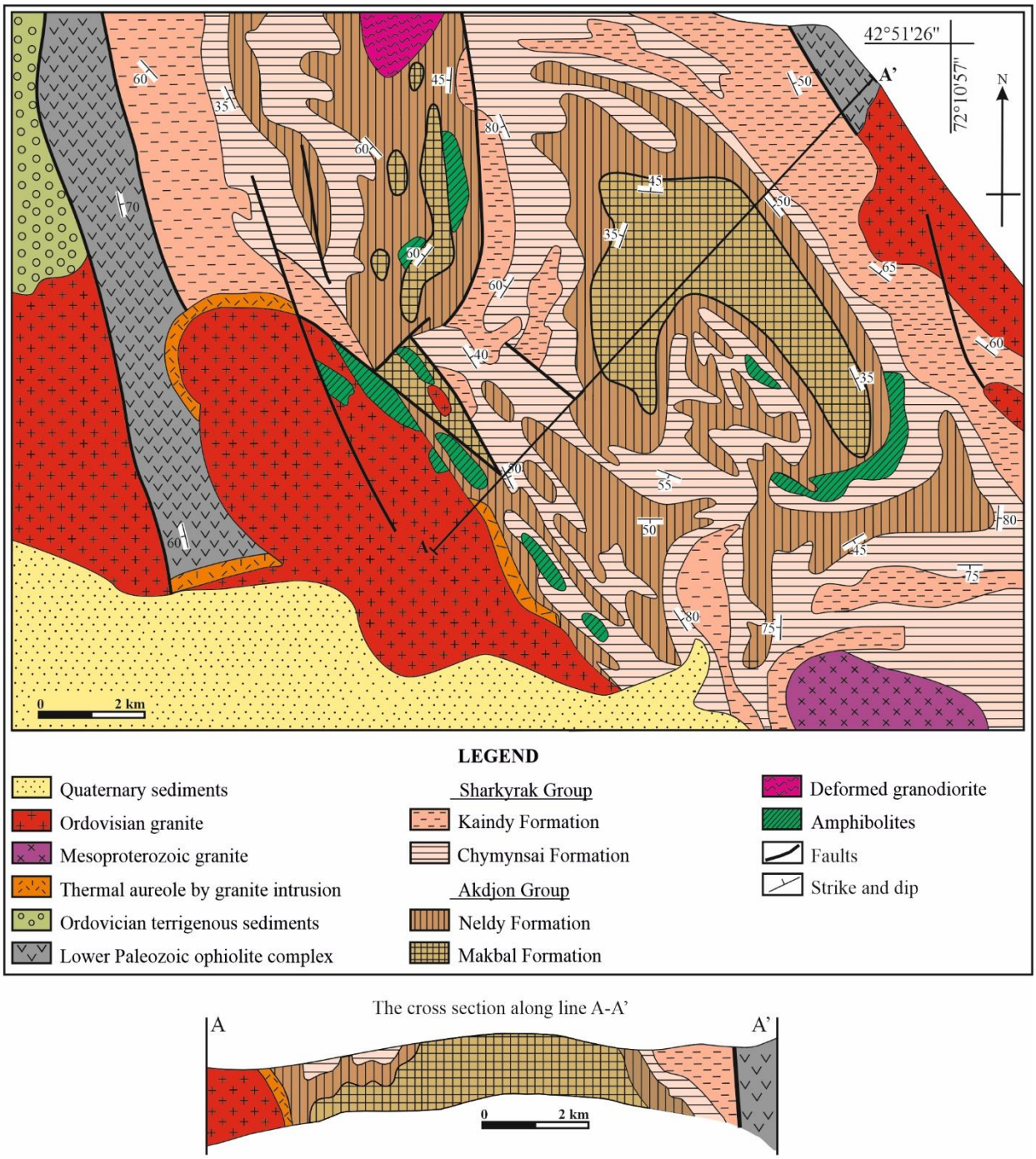


Fig. 2 Geological map of the Makbal HP-UHP Complex (after Bakirov et al., 1987). The Makbal Complex is composed of the structurally lower Akdjon Group and the upper Scharkyrak Group.

in the Makbal Formation (Tagiri and Bakirov, 1990; Tagiri et al., 2010; Orozbaev et al., 2015) (Figs. 2 and 3).

The Neldy Formation is composed mainly of apparently low-grade pelitic schists (garnet-mica schist) with lenses and layers of high-grade eclogites, amphibolites, marbles and meta-quartzites. The lithotypes of the Neldy Formation vary from pelitic schists with or without garnet to HP eclogites. However, in the Neldy Formation, coesites and/or pseudomorphs after coesite have not been found so far (Bakirov et al., 1987; 2017) (Figs. 2 and 3). The metamorphic conditions of the high-grade eclogites are estimated as 550–610 °C and 2.2–2.5 GPa (Togonbaeva et al. 2010a).

The Sharkyrak Group is composed of low-grade metamorphic rocks, and it is subdivided into the structurally lower Chymynsai Formation and the upper Kaindy Formation. The Chymynsai Formation is composed of various types of marble and interlayering meta-quartzite, and the Kaindy Formation is composed mainly of pelitic schist with a small amount of meta-quartzite, marble and amphibolite (Bakirov et al., 1987; 2017) (Figs. 2 and 3).

Several geochronological studies of the Makbal Formation have been performed. A CHIME monazite age of garnet-chloritoid-talc schists yielded 481 ± 26 Ma (Togonbaeva et al., 2009). SHRIMP U-Pb zircon ages of eclogites gave 509 ± 7 Ma and 498 ± 7 Ma as the peak metamorphic ages (Konopelko et al., 2012). However, with regard to the Neldy Formation, only a Sm-Nd age of 526 ± 9.5 Ma from a HP eclogite has been reported (Togonbaeva et al., 2010b).

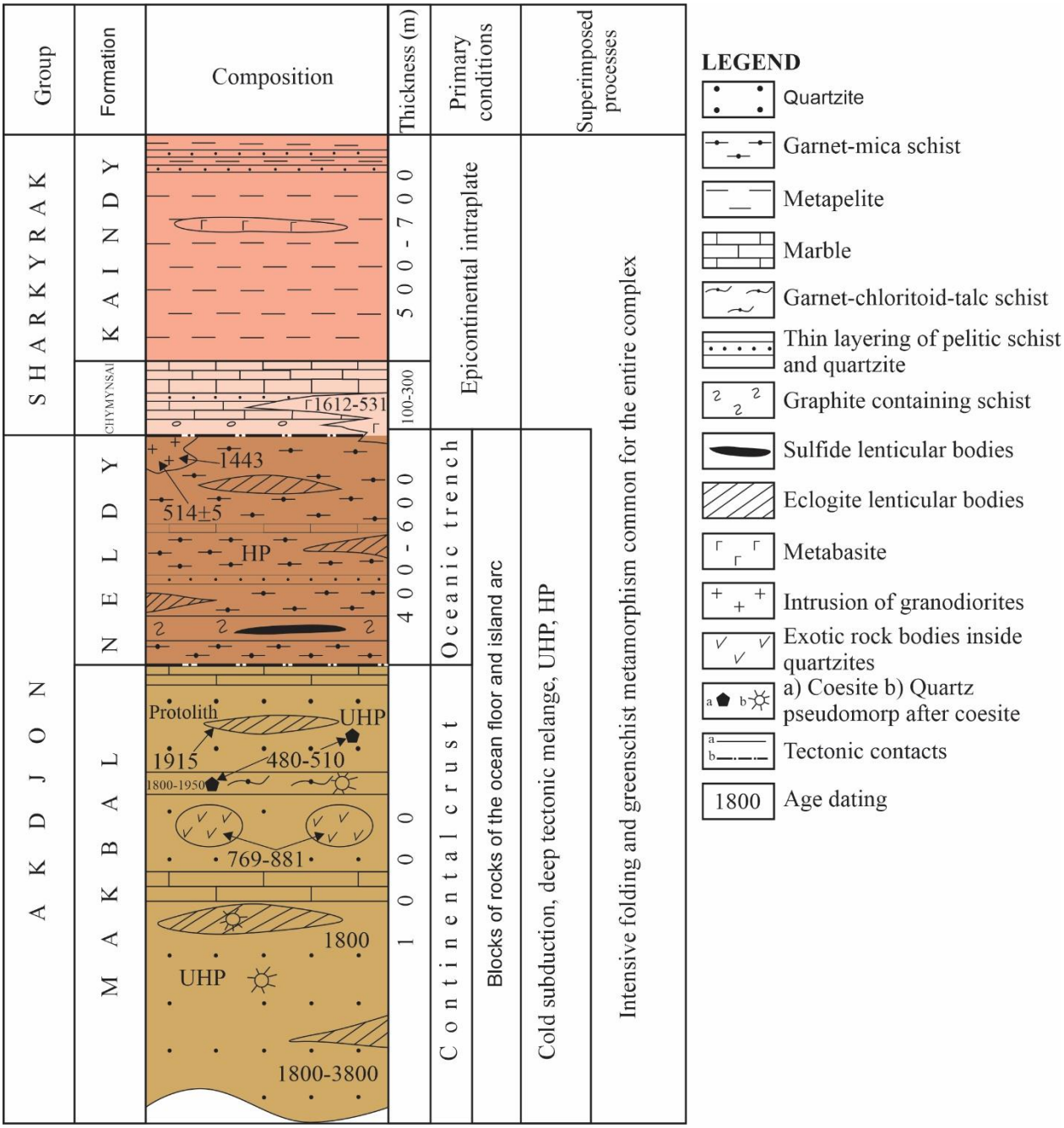


Fig. 3 Stratigraphic column of metamorphic rocks of the Makbal Complex
Numbers in the column show ages (Ma) dated (after Bakirov et al., 1987; 2017).

1.2 Aims of the study

In the Makbal Formation, P-T conditions and geochronology of the HP-UHP rocks have been well studied. On the other hand, no such studies for the apparently low-grade pelitic schists and garnet amphibolite of the Neldy Formation have been carried out.

This study mainly focuses to establish the petrology, geochronology and P-T evolution of low-grade metamorphic rocks in the Neldy Formation. Especially, the Neldy pelitic schist and garnet amphibolite are analyzed and their P-T conditions are revealed using available geothermobarometers.

The aims of this study are as follows:

1. To reveal the metamorphic P-T evolution of the low-grade metamorphic rocks of the Neldy Formation in the Makbal Complex;
2. To determine the age of the low-grade pelitic schists by K-Ar method;
3. To suggest the tectono-metamorphic division of the Makbal Complex;

1.3 Significance of this study

The petrological and geochronological studies of the low-grade pelitic schists and garnet amphibolite (HP metamorphic rocks) will reveal the mode of occurrence of the UHP metamorphic rocks in the Makbal Complex. The results of the present study are taken as a basis for further discussion of the subduction and subsequent exhumation model of the Makbal HP/UHP Complex.

1.4 Terminology

The abbreviations used for minerals and end-member are mainly based on Whitney and Evans (2010). A full list is given in Table 1.

Table 1. Abbreviations of the minerals and endmembers used in this thesis (Whitney and Evans, 2010)

Mineral abbreviation			
Actinolite	Act	Muscovite	Mus
Almandine	Alm	Paragonite	Prg
Amphibole	Amp	Plagioclase	Pl
Albite	Alb	Phengite	Ph
Barroisite	Brs	Pyrope	Prp
Calcite	Cal	Quartz	Qz
Chlorite	Chl	Rutile	Rt
Chloritoid	Cld	Spessartine	Sps
Epidote	Ep	Titanite	Ttn
Garnet	Grt	Tourmaline	Tur
Grossular	Grs	White mica	Wm
Magnesiohornblende	Mhb		

CHAPTER 2

PREVIOUS STUDY

2.1 Tectonic frame-work

The Tian-Shan Mountain extends eastwest for about 2.500 km from Uzbekistan, Tajikistan, Kyrgyzstan, and Kazakhstan to northwestern China, occurs along the south-western margin of the CAOB and marks the final collision between the Tarim and Siberian cratons (Ao et al., 2010; Sengör et al., 1993; 1996 Xiao et al., 1994; 2010). The Tian-Shan Mountain was interpreted as collisional belt between the Central Tian-Shan (including the Yili Block) and Tarim Blocks (Windley et al., 1990; Gao et al., 1998). The tectonic subdivision of the Tian-Shan Mountain and adjacent regions into four distinct domains, the Kazakhstan (including the Northeastern Tien Shan)-Yili Block, the Northern Tian-Shan, the Central Tian-Shan Arc Terrane (including the Middle Tien Shan), and the Southern Tian-Shan Accretionary Complex (including the South Tien Shan) (Fig. 1; Gao et al., 2009; Xiao et al., 2013; Rojas-Agramonte et al., 2011; Windley et al., 2007).

The Kyrgyz Tien-Shan Mountains are divided into three tectonic units; the Northern Tien-Shan, Central (or Middle) Tien-Shan and Southern Tien-Shan (Figs. 2 and 3). The Northern Tien Shan, which represents the deformed margin of the Caledonian Paleo-Kazakhstan continent; The Middle Tien Shan, which represents a Late Paleozoic volcano-plutonic arc; and The Southern Tien Shan, which is an intensely deformed fold and thrust belt that formed during the final closure of the Paleo-Turkestan ocean. HP–UHP metamorphic rocks occur at three localities in the Kyrgyz Tien-Shan. The Makbal and the Aktyuz Complexes occur within the Northern Tien-Shan, and the Atbashy Complex is located in the Southern Tien-Shan (Bakirov et al., 1974, 1998; Sobolev et al., 1986; Tagiri et al., 1995).

2.2 Geology

The Makbal Complex was recognized in the early study of Medvedeva (1960; 1961), Bakirov (1978) and Kushev and Vinogradov (1978). Early study of the Makbal Complex as an example of zoned regional metamorphism, which affected a normal stratigraphic sequence (Medvedeva, 1961) are still expressed in some recent works (Demina et al., 2005).

The Makbal Complex composed of a variety of HP-UHP metamorphic rocks. It was divided into two major units, i.e. the structurally lower Akdjon Group and the upper Sharkyrak Group on the basis of lithology (Nikolaev, 1933). The Akdjon Group consists of the tectonostratigraphically lower Makbal Formation and the upper Neldy Formation (Medvedeva, 1960) (Fig. 3). The Sharkyrak Group is composed of low-grade metamorphic rocks, and it is subdivided into the structurally lower Chymynsai Formation and the upper Kaindy Formation (Bakirov et al., 1987; 2017).

2.2.1 The Makbal Formation

The Makbal Formation is composed mainly of meta-quartzites with a minor amount of pelitic schists, garnet-chloritoid-talc schists, eclogites, mafic schists and marbles (Bakirov, 1978; Bakirov et al., 1987, 1998; Tagiri et al., 2010). The garnet-chloritoid-talc schists are concordantly intercalated in meta-quartzites. The protolith of the garnet-chloritoid-talc schists were formerly regarded as latteric clay (Bakirov et al., 2008) or pelitic rock (Tagiri et al., 2010). However, whole rock major and trace element signatures of the garnet-chloritoid-talc schists suggest a metasomatized protolith from altered oceanic crust or volcaniclastic material from a magmatic arc (Meyer et al., 2014).

Coesite and quartz pseudomorph after coesite have been found as inclusion in garnets from the garnet-chloritoid-talc schists and occasional eclogites and meta-quartzites (Tagiri and Bakirov,

1990; Tagiri et al., 2010; Orozbaev et al., 2015). The pelitic schist and the garnet-chloritoid-talc schist layers contain lenticular bodies of eclogites and garnet amphibolites.

Polyphase mineral aggregates composed of clinozoisite + kyanite + quartz ± chlorite ± paragonite ± phengite have been found within garnet and in the matrix of talc-garnet-chloritoid schists from the Makbal ultrahigh-pressure complex in the northern Kyrgyz Tian-Shan. These mineral textures are interpreted as pseudomorphs after lawsonite, and reconstructed the compositions of polyphase mineral aggregates of clinozoisite + kyanite + quartz, consistent with lawsonite (Orozbaev et al., 2015).

2.2.2 The Neldy Formation

The Neldy Formation is composed mainly of low-grade pelitic schists with subordinate marbles and meta-quartzites, and lenses and layers of high-grade eclogites and amphibolites. The apparent metamorphic grade of the Neldy Formation varies from low-grade garnet-free pelitic schists to HP eclogites (Bakirov et al., 1987).

2.2.3 The Sharkyrak Group

The Sharkyrak Group is composed of low-grade metamorphic rocks such as garnet-free pelitic schists. The mineral assemblage of the pelitic schists is similar to that of the Neldy garnet-free pelitic schists. The Sharkyrak Group is subdivided into the structurally lower Chymynsai Formation and the upper Kaindy Formation on the basis of lithology. The Chymynsai Formation is composed of various types of marbles and interlayering meta-quartzites, and the Kaindy Formation is composed mainly of pelitic schists with a small amount of meta-quartzites, marbles and amphibolites (Bakirov et al., 1987, 2017).

2.3 Metamorphism

2.3.1 The Makbal Formation

The maximum stability field of chloritoid is quoted from Wei and Powell (2004), the graphite-diomond transition curve from Kennedy an Kennedy (1976), quartz-coesite transition line from Mirwald and Massone (1980) and the maximum stability limits of chloritoid and the stability field of glaucophane+chloritoid in the NKFMASH (Wei and Song, 2008) yielded the peak metamorphic conditions of the garnet-chloritoid-talc schists have been estimated as ~560 °C and 2.8 GPa (Tagiri et al., 2010). The P–T pseudosections for the garnet-chloritoid-talc schist were calculated in the MnCKFMASHT model system using Perple_X yielded the peak metamorphic conditions as ~580 °C and 2.85 GPa (Meyer et al., 2014). The selected mineral reactions from the calculated petrogenetic grids in the NKFMASH (with Qz and H_2O in excess) (Wei and Powell, 2004) and NCKFMASH (with Ms, Qz and H_2O in excess) (Wei and Powell, 2004) system yielded the peak metamorphic conditions of the garnet-chloritoid-talc schists have been estimated as 530-580 °C and 2.8-3.3 GPa (Orozbaev et al., 2015) Petrological study demonstrated that lawsonite was stable during the prograde to the UHP peak stage (P = 28–33 kbar and T = 530–580 °C) and decomposed to the polyphase mineral aggregates during isothermal decompression around P = 16–20 kbar and T = 510–580 °C (Orozbaev et al., 2015).

P–T pseudosections for two mafic rock types calculated in the model system MnNCKFMASHT using Theriak–Domino estimated peak metamorphic conditions of the eclogites are ~560 °C and 2.4 GPa (Meyer et al., 2013). The garnet-clinopyroxene geothermometer of eclogites gives are 290–660 °C and 2.0–2.8 GPa (Tagiri et al., 2010).

2.3.2 The Neldy Formation

The average P-T modes estimation of the THERMOCALC for garnet, omphacite, amphibole and epidote in the Neldy Formation eclogites are estimated as of T = 550-610 ºC and P = 22-25 kbars (Togonbaeva et al., 2010) (Fig. 4). Eclogites have evidence of two metamorphic events (1) the precursor metamorphic event (amphibolite facies) and (2) eclogite metamorphic event. Eclogite metamorphic event is divided into three stages. 1) Prograde stage (epidote-blueschist facies/epidote-amphibolte facies) 2) Peak stage (eclogite facies) and 3) Retrograde stage (epidote-amphibolite facies/green schist facies).

2.3.3 The Sharkyrak Group

Garnet amphibolites (Rojas-Agramonte et al., 2013) attempted to obtain an insight into the P-T evolution by means of pseudosection calculations in the system NCFMASHTO using PERPLE_X (Connolly and Kerrick, 1987). Garnet amphibolites yielded the peak metamorphic conditions of 620 °C at 1.4 GPa (Rojas-Agramonte et al., 2013) (Fig. 5).

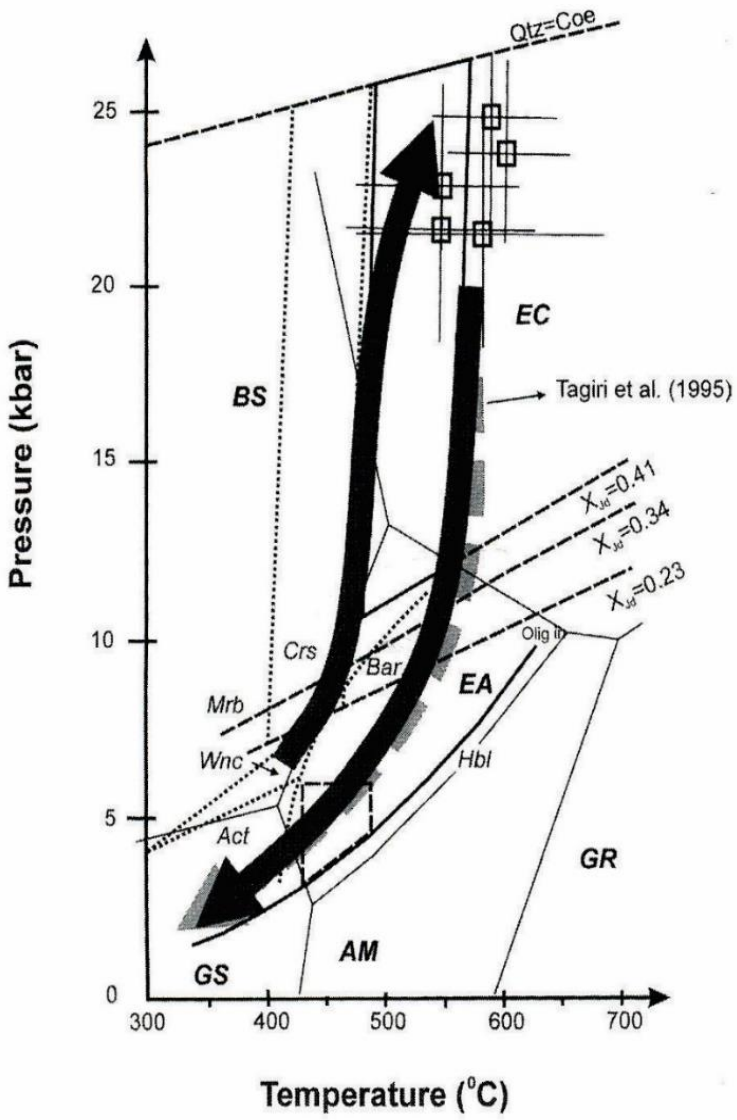


Fig. 4 Metamorphic evolution in the Neldy eclogites (Togonbaeva et al., 2010). EC, eclogite facies; GL, glaucophane schist facies; EA, epidote-amphibolite facies; AM, amphibolite facies; GS, greenschist facies; GR, granulite facies

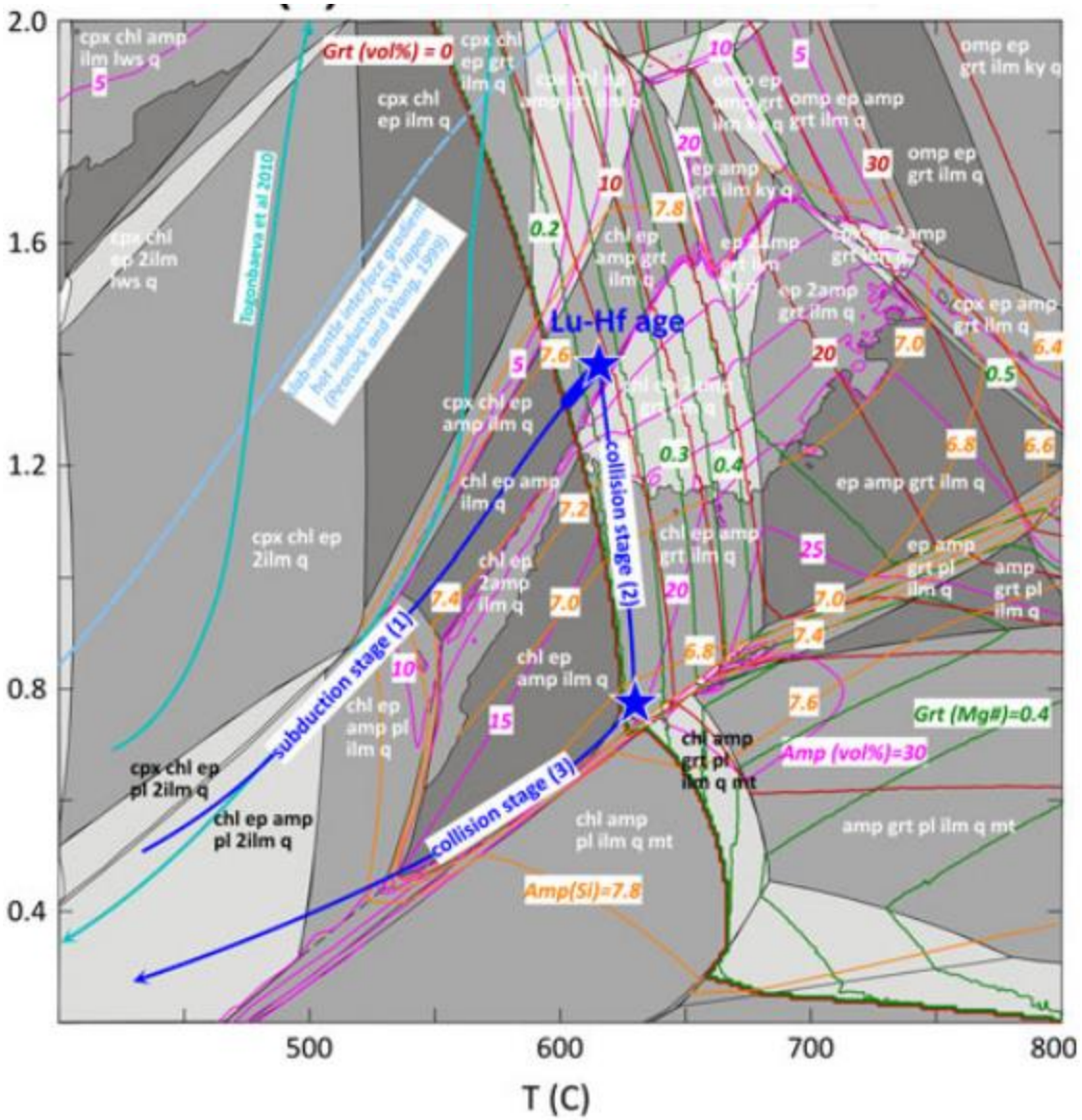


Fig. 5 Pseudosections and isopleths of mineral composition and abundance generated with Perple_X for Kaindy garnet amphibolite. For comparison, the P–T paths for eclogites from Neldy Formation proposed by Togonbaeva et al. (2010).

2.4 Geochronology

2.4.1 The Makbal Formation

A SHRIMP U-Pb zircon age of the coesite-bearing garnet-chloritoid-talc schists from the Makbal Formation yielded 502 ± 10 Ma (Konopelko et al., 2012). Monazites occurring in the matrix yield a CHIME age of 481 ± 26 Ma, and those included in porphyroblastic garnets yield the similar age of 480 ± 56 Ma (Togonbaeva et al., 2009). These two ages are well consistent with each other, suggesting that the matrix monazite age of 481 ± 26 Ma may represent the peak metamorphic age of the UHP metamorphism in the Makbal area. A Sm-Nd garnet age of the garnet-chloritoid-talc schists is 475 ± 4 Ma and this age is interpreted as an average growth age of garnet during prograde to-peak metamorphism (Meyer et al., 2014), but it is younger than the suggested peak metamorphic age, 500–480 Ma. Tagiri et al., (2010) reported K-Ar phengite age of 509 ± 13 Ma of the garnet-chloritoid-talc schist and they regarded it as cooling age. However, this is a little bit older than, or similar to the peak metamorphic age.

The rims of metamorphic zircon from the Makbal HP eclogite yield SHRIMP U-Pb ages of 509 ± 7 Ma and 498 ± 7 Ma, which are regarded as the peak metamorphic age (Konopelko et al., 2012). K-Ar paragonite age of 482 ± 17 Ma of the HP eclogite is interpreted as cooling age (Tagiri et al., 1995). K-Ar ages of biotite (769 ± 19 Ma) and phengite (717 ± 18 Ma) were reported for pelitic schists, while a K-Ar amphibole age of 881 ± 22 Ma is obtained for a mafic schist (winchite schist), suggesting allochthonous blocks in a stratified tectonic melange (Tagiri et al., 2010).

2.4.2 The Neldy Formation

A Sm-Nd ages of garnet was applied to the Neldy eclogite and it yielded mineral isochron age of 526 ±9.5 Ma, as the age of the peak eclogitic conditions (Togonbaeva et al., 2010b).

2.4.3 The Sharkyrak Group

A Lu-Hf age of garnet was applied to the garnet amphibolite (470.1 ± 2.5 Ma) (Rojas-Agramonte et al., 2013).

2.5 The granitic body

Several granitic bodies occur in the Makbal area (Figs. 6 and 7). Granitic body distributed in the southwestern part of the Makbal area yielded a SHRIMP U-Pb zircon age of 456 ± 3 Ma (Rojas-Agramonte et al., 2013), and the similar K-Ar amphibole age of 463 Ma was reported (Apayarov, 2007). These suggest Ordovician magmatic age of the granitic body. These granitic body is geochronologically post-metamorphic, and geologically the granitic body in the southwestern part gives a contact metamorphism to the HP-UHP metamorphic rocks of the Makbal Complex (Bakirov et al., 1987). Tagiri et al., (2010) reported considerably younger K-Ar orthoclase age of 399 ± 10 Ma and they suggested cooling age in the Devonian (closure temperature of orthoclase is 110–200 °C, Shibata et al., 1990; Kaneoka, 1998).

This granitic body is geochronologically post-metamorphic and geologically it gives a contact metamorphism to the HP-UHP metamorphic rocks of the Makbal Complex (Figs. 6 and 7) (Bakirov et al., 1987). The roof plane of the granitic body is subhorizontal, and, therefore, the apparent thermal effect is detected considerably far from the contact at the land surface. The granitic body in the southeastern part of the Makbal area, named the Karajylga granite, is supposed to be Mesoproterozoic (Konopelko et al., 2012; Rojas-Agramonte et al., 2013; Meyer et al., 2013) or Neoproterozoic in age (Bakirov et al., 1987). TIMS U-Pb zircon age of 1131 ± 4 Ma (Degtyarev et al., 2011; 2013) and 1120 Ma and 1087 Ma (Apayarov, 2007), and similar SHRIMP U-Pb zircon age of 1102 ± 7 Ma and 1094 ± 8 Ma (Kröner et al., 2013), suggest Mesoproterozoic age of the granite. Apayarov (2007) reported two different younger K-Ar amphibole ages of 554 Ma and 477

Ma, and an Rb-Sr age of 473 Ma that is similar to the latter of the K-Ar ages. Tagiri et al., (2010) reported K-Ar orthoclase age of 389 ± 10 Ma, and it is similar to the K-Ar oligoclase age of granitic body in the southwestern Makbal area. A deformed granitic body (biotite-amphibole granodiorite) in the northwestern part of the Makbal area shows SHRIMP U-Pb zircon age of 514±5 Ma (Fig. 7), which coincides with the peak metamorphic age of the HP-UHP metamorphic rocks of the Makbal Complex (Konopelko et al., 2012). Therefore, this granite is a member of the protolith of the Makbal Complex. The rims of the zircon grains yield an age of 447± 11 Ma (Konopelko et al., 2012), which is similar to the SHRIMP age of 456 ± 3 Ma (Rojas-Agramonte et al., 2013) for the granitic body in the southwestern part of the Makbal area. The granitic body in the northeast part of the area has been suggested magmatic ages of the Devonian (Bakirov et al., 2017; Konopelko et al., 2012; Meyer et al., 2013; Klemd et al., 2015) or Ordovician (Bakirov et al., 1987). Apayarov (2007) reported TIMS U-Pb zircon age of 457 Ma similar to the age of Ordovician granitic body in the southwestern part of the Makbal area. This granitic body is geochronologically thought to be postmetamorphic, however, the thermal aureoles are not shown in the geologic map (Fig. 7; Bakirov et al., 1987).

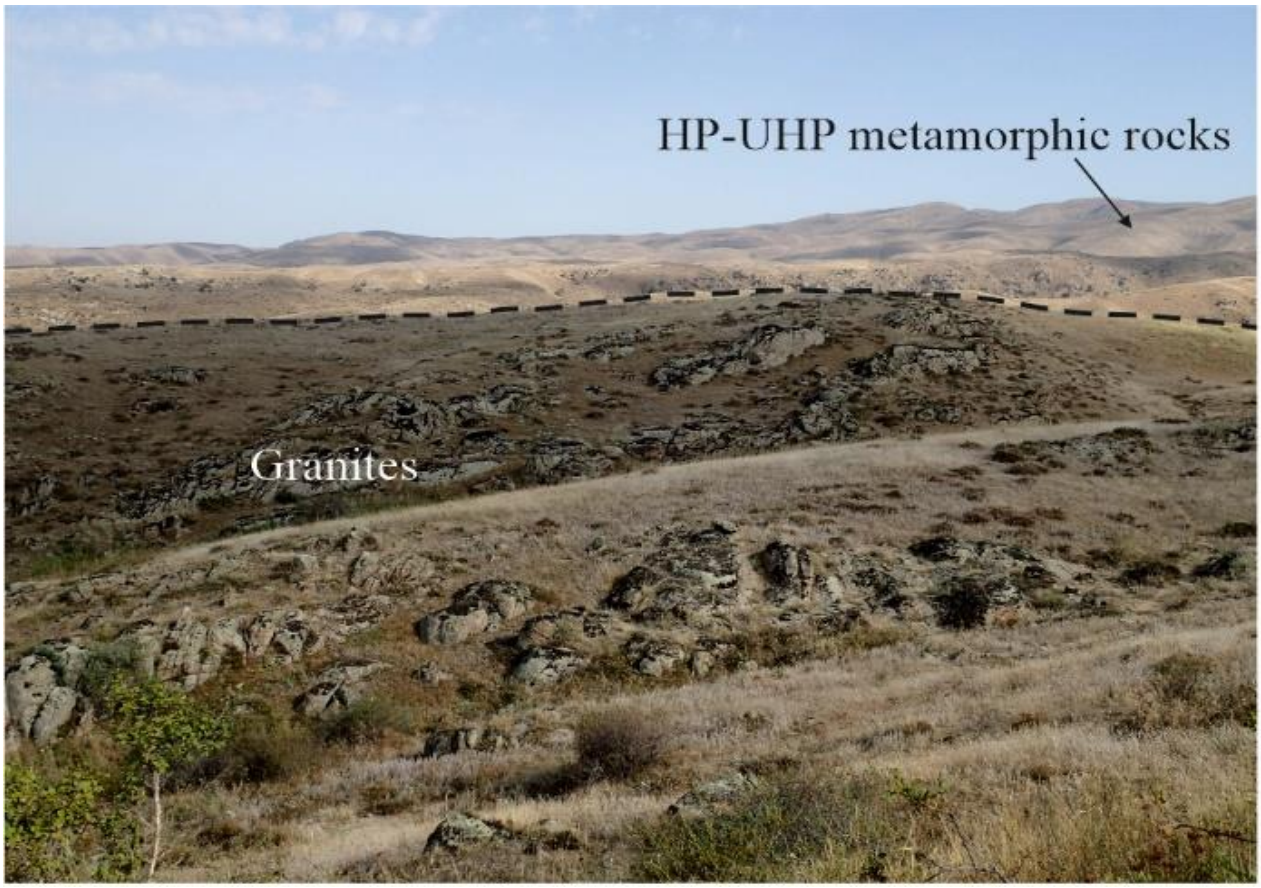


Fig. 6 Photograph of the exposures of granitic rocks in the southwestern part of the Makbal area. The broken line indicates the boundary between granitic rocks and HP-UHP metamorphic rocks.

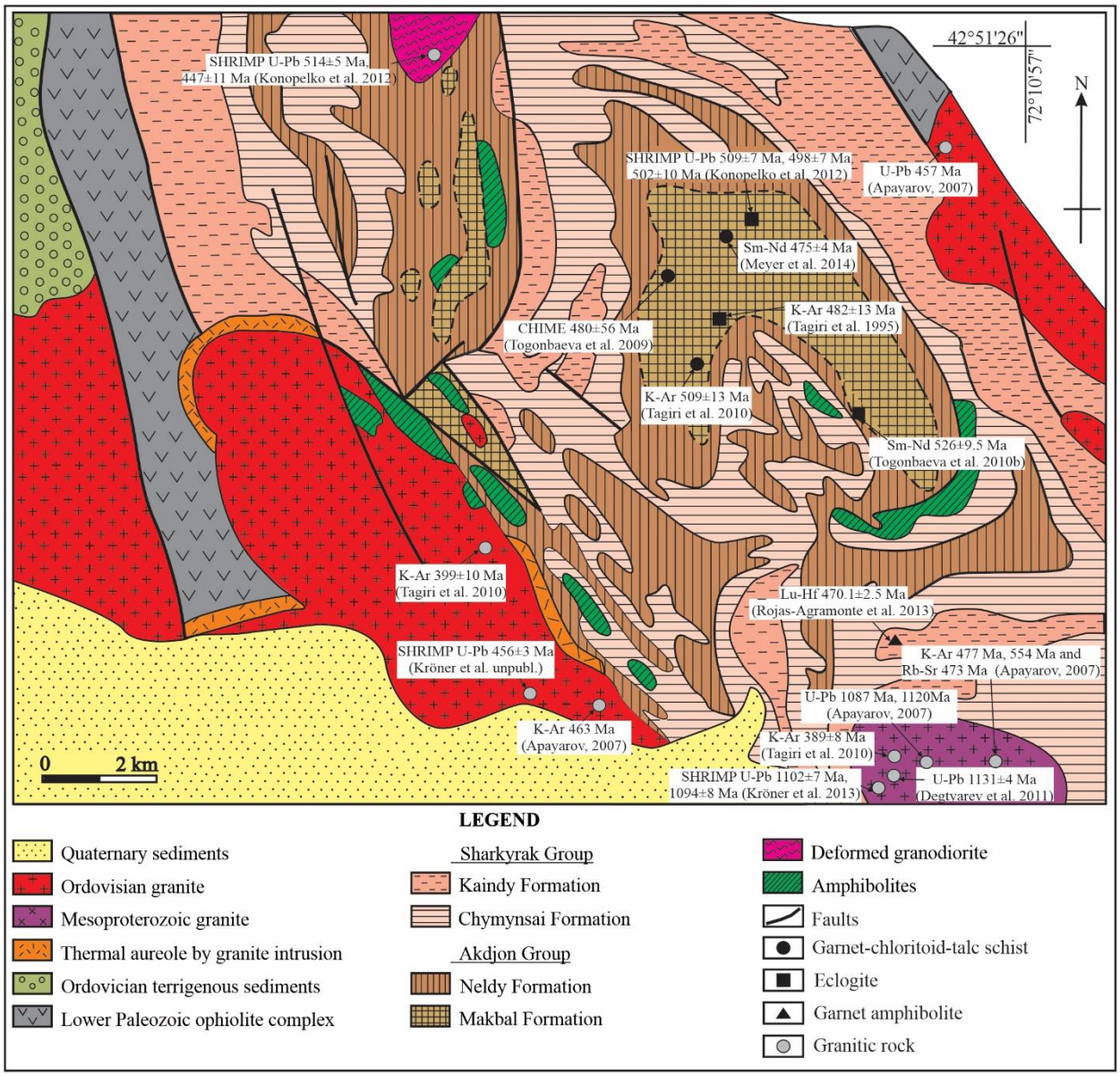


Fig. 7 Geological map of the Makbal HP-UHP Complex (after Bakirov et al., 1987). The Makbal Complex is composed of the structurally lower Akdzhon Group and the upper Scharkyrak Group.

2.6 Geochemistry

The major element compositions of the three eclogite samples from the Makbal Fomation vary considerably and the three eclogite have a basaltic to basaltic andesite composition with SiO_2 ranging between 44.8 and 51.7 wt.%, TiO2 between 1.02 and 1.39 wt.%, and low Na_2O and K_2O contents between 0.56 and 0.88 wt.% and 0.06 and 0.76 wt.%, respectively. The eclogites in the AFM shows a significant depletion of alkalis and enrichment in MgO (Meyer et al., 2013)

Garnet-chloritoid-talc schist from the Makbal Formation shows the high MgO, Fe_2O_3 and low CaO and alkali element concentrations can explained by a pervasively altered mafic igneous rock rather than a sedimentary rock. Especially, the low concentrations of the highly fluid-mobile elements such as K2O (0.31 wt%), Na_2O and CaO (0.53 wt%) and trace elements like Rb and Sr indicate significant removal of these elements (e.g. Humphris and Thompson, 1978; Mottl and Holland, 1978; Seyfried and Mottl, 1982). Such hydrothermal alteration is typically associated with oceanic basins rather than mafic dyke injection into continental crust (Meyer et al., 2014).

The chemical composition of garnet amphibolites from the Sharkyrak Group are significantly enriched in Ti and K relative to ophiolitic basalt (Demina et al. 2005). Garnet amphibolite exhibit high FeO^t (12.5–14.6 wt%) and relatively high TiO2 (1.3–1.7 wt%) concentrations. A small negative Eu anomaly suggests plagioclase fractionation (Rojas-Agramonte et al., 2013).

CHAPTER 3

GEOLOGY OF THE MAKBAL COMPLEX AND PETROGRAPHY OF THE METAMORPHIC ROCKS

The Makbal Complex in the Kyrgyz Northern Tian-Shan is defined by Nikolaev (1933), and it is composed of a variety of low- to high-grade metamorphic rocks. The Makbal Complex was divided into two major units, i.e. the structurally lower Akdjon Group and the upper Sharkyrak Group based on their lithology (Bakirov et al. 1987). The Akdjon Group consists of the tectonostratigraphically lower Makbal Formation and the upper Neldy Formation (Medvedeva 1960).

The Makbal Formation is composed mainly of meta-quartzite with a minor amount of garnet-chloritoid-talc schist, pelitic schist, eclogite, amphibolite, mafic schist and marble (Bakirov 1978; Bakirov et al. 1987; 1998; Tagiri et al. 2010) (Fig. 8 and 9). Eclogite occurs as lens or block within the matrix of meta-quartzite and pelitic schist. Garnet-chloritoid-talc schist is concordantly intercalated in meta-quartzite. Coesite and pseudomorph after coesite have been found from the garnet-chloritoid-talc schist, occasional meta-quartzite and eclogite in the Makbal Formation (Tagiri and Bakirov 1990; Tagiri et al. 2010; Orozbaev et al. 2015).

The Neldy Formation is composed mainly of low-grade pelitic schist with lenses and thin layers of high-grade eclogite, amphibolite, marble and meta-quartzite. However, in the Neldy Formation, coesite and/or pseudomorph after coesite have not been found so far (Bakirov et al. 1987; 2017).

The Sharkyrak Group is composed of low-grade metamorphic rocks, and it is subdivided into the structurally lower Chymynsai Formation and the upper Kaindy Formation. The Chymynsai Formation is composed of various types of marble and intercalating meta-quartzite, and the Kaindy

Formation is composed mainly of pelitic schist with a small amount of meta-quartzite, marble and amphibolite (Bakirov et al. 1987; 2017).

During the field work, I have collected totally 14 samples from the Neldy Formation such as eclogites, garnet and chloritoid-bearing schist, garnet-free pelitic schist, quartzite and garnet amphibolite from the Neldy Formation (Table 2). I petrographically described the samples of garnet and chloritoid-bearing schist, garnet-free pelitic schist, garnet amphibolite, marble and quartzite from the Neldy Formation of the Makbal Complex (Figs. 8 and 9).

Table 2. Representative mineral assemblage the Neldy Formation metamorphic rocks.

	Amp	Grt	Omp	Cld	Chl	Ep	Ph	Ms	Ab	Olg	Kfsp	Pg	Bt	Cal	Ttn	Rt	Ilm	Tur	Zir	Qz
Quartzite																				
KG 1231					−		+									−		−		++
KG 1250					−		+									−		−		++
Eclogite																				
KG 1238	++	++	+			+	−							−	−	−			−	+
KG 1240	++	++	+			+	−							−	−	−			−	+
KG 1255	++	++	+			+	−						−	−	−	−			−	+
Garnet amphibolite																				
KG 1245	++	++			+	+	−	−	−	−	−	−	−	−	−		−			+
KG 1252A	++	++			+	+	−	−	−	−	−	−	−	−	−		−			+
Garnet and chloritoid-bearing pelitic schist																				
KG 1242		+		+	++		++	++	+					−	−	−		−	−	++
KG 1244		+		+	++		++	++	+					−	−	−		−	−	++
KG 1246		+		+	++		++	++	+					−	−	−		−	−	++
KG 1248		+		+	++		++	++	+					−	−	−		−	−	++
KG 1249		+		+	++		++	++	+					−	−	−		−	−	++
Garnet-free pelitic schist																				
KG 1251					++		++		−					−	−	−				++
KG 1252B					++	−	++	−	−	−				−	−	−			−	++

++ Major mineral +Minor mineral −Accessory mineral

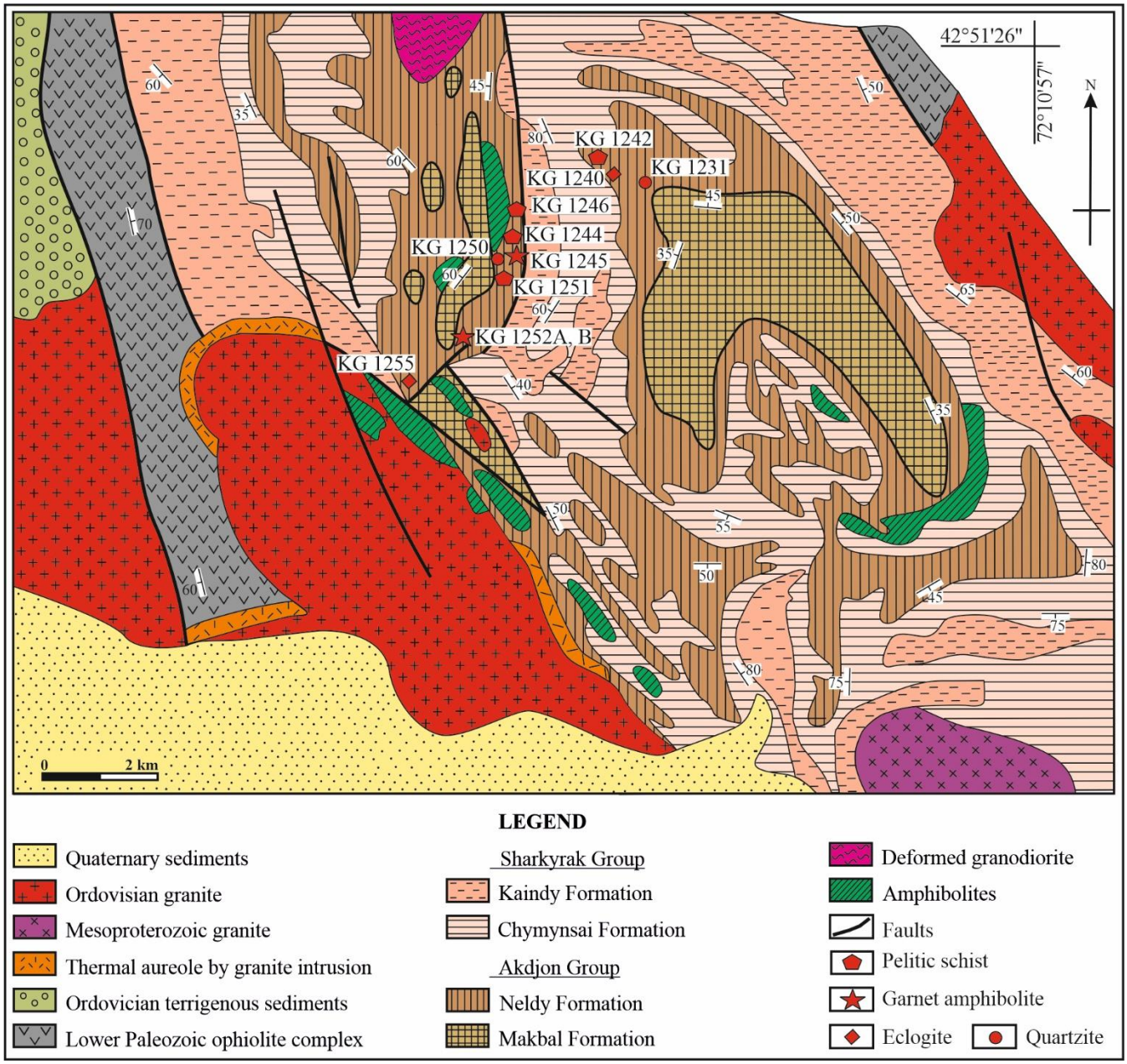
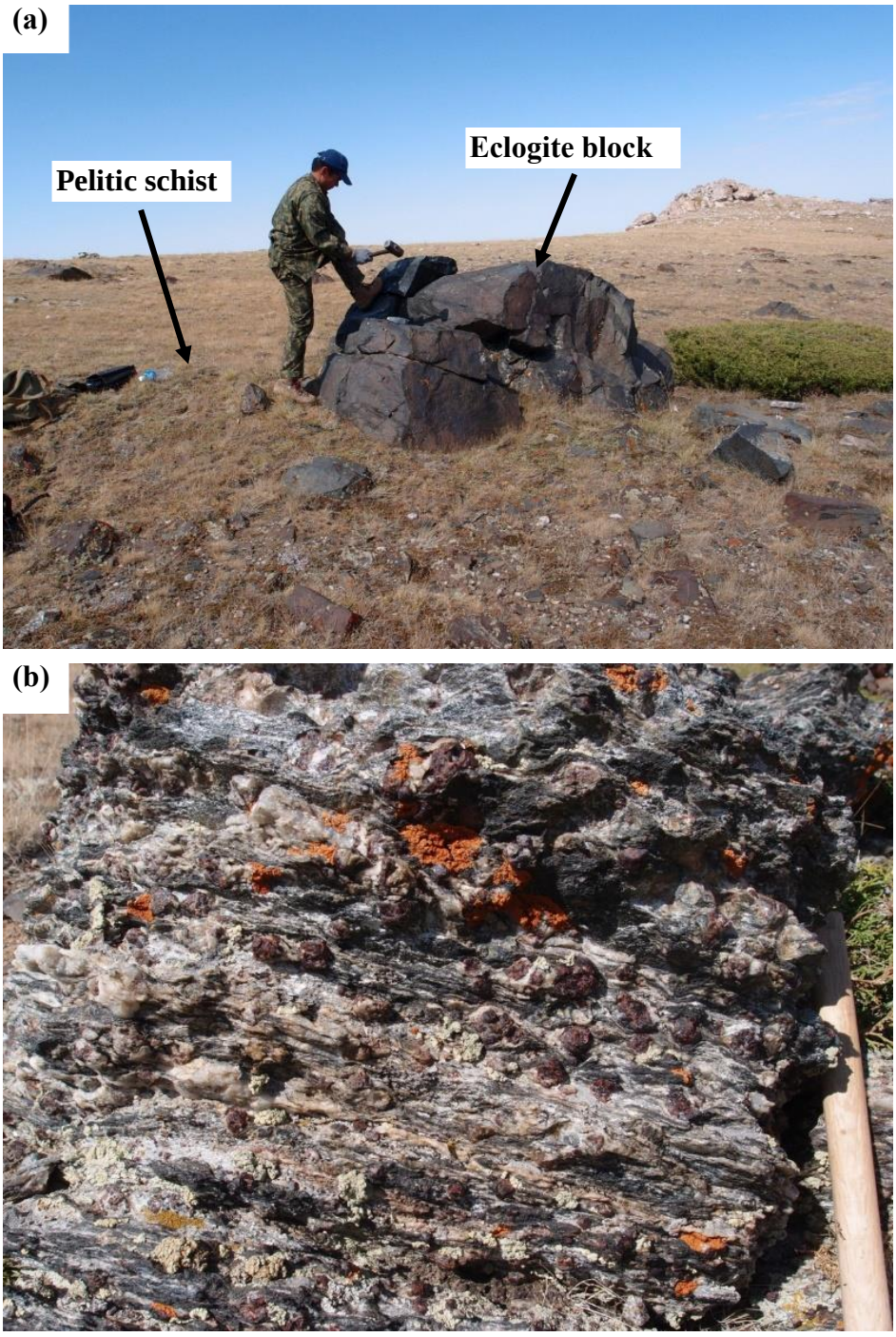


Fig. 8 Geological map of the Makbal HP-UHP Complex (after Bakirov et al., 1987). The Makbal Complex is composed of the structurally lower Akdjon Group and the upper Scharkyrak Group.


(a)
Pelitic schist
Eclogite block
(b)

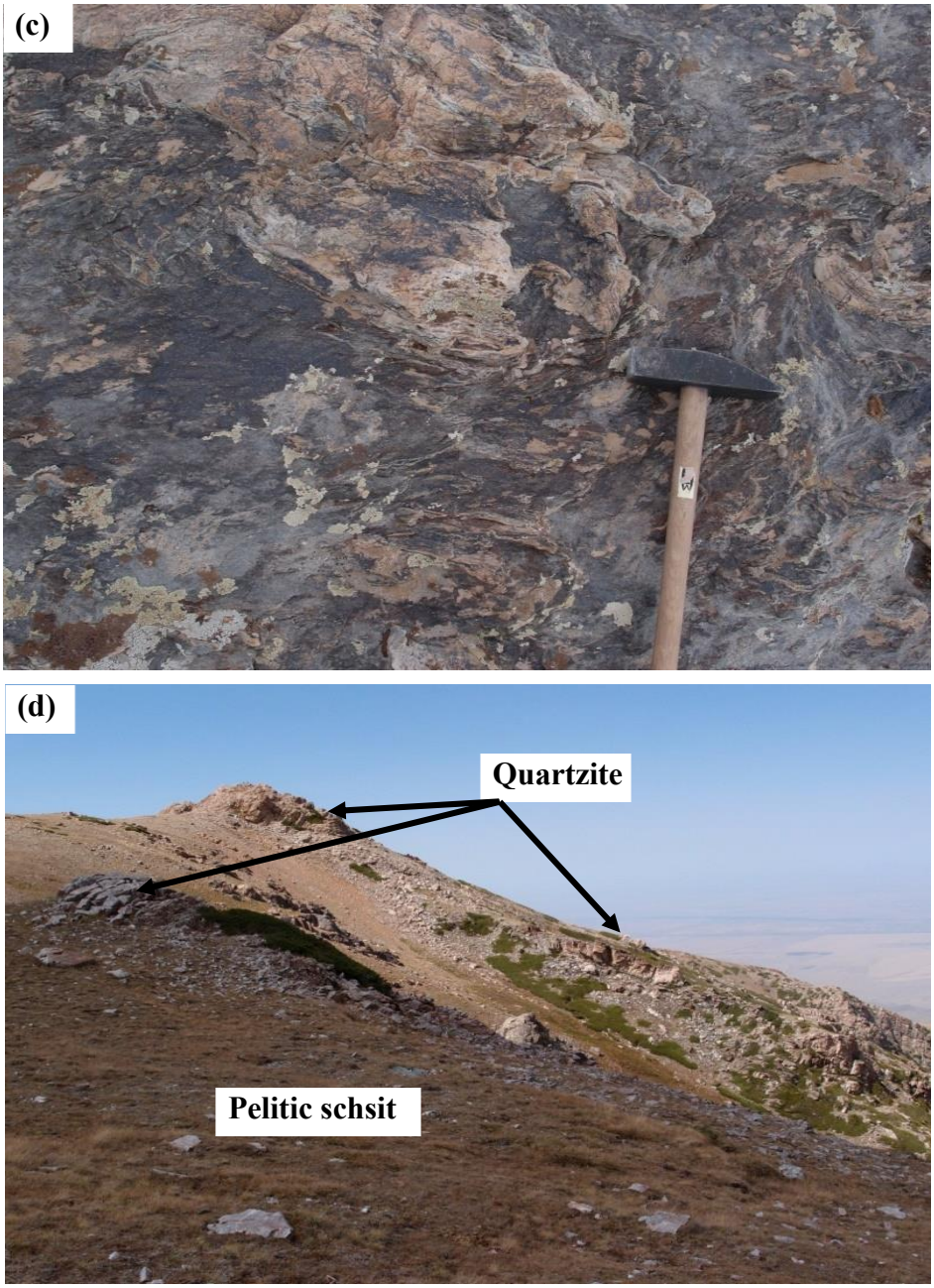


Fig. 9 Filed photos of the Neldy and Makbal Formations (a) A large eclogite block with surrounding pelitic schist. (b) Garnet-mica bearing pelitic schist. (c) Garnet-free pelitic schist (d) Quartzite with surrounding pelitic schist.

In this study, I would like to describe garnet-free pelitic schist (KG1251; KG1252B), garnet and chloritoid-bearing pelitic schist (KG1244) and garnet amphibolite (KG1252A) of the Neldy Formation metamorphic rocks.

3.1 Garnet-free pelitic schist (KG1251; KG1252B)

Garnet-free pelitic schist **(KG1251; KG1252B)** consists mainly of phengite, chlorite and quartz with small amounts of albite, titanite, rutile, calcite and carbonaceous matter (Fig. 10). A schistosity is defined by preferred orientation of phengite and chlorite.

Phengite occurs as subhedral to anhedral tabular crystal up to 0.3 mm across (KG1251; Figs. 10a and 10b, KG1252B; Figs. 11a and 11b), and it shows compositional zoning with subhedral dark core and relatively bright rim in backscattered electron image (BEI). The dark-core gradually changes to the bright rim (KG1251) (Figs. 12a and 12b). The bright-core gradually changes to the dark rim (KG1252B) 13a and 13b).

Schistosity-forming chlorite occurs as subhedral to anhedral tabular grain up to 0.3 mm across.

Albite occurs as subhedral to anhedral grain up to 0.3 mm across, they show a zoning with a dark core to a bright rim defined by BEI (KG1251). Plagioclase occurs as subhedral to anhedral grains up to 0.3 mm across, and it show a zoning with a dark core to a bright rim defined by BEI (KG1252B). The core of plagioclase grains is fractured and plagioclase similar to the rim in chemical composition fills the fractures (Fig. 14a). Epidote in the matrix is subhedral grain up to 0.2 mm (KG1252B) (Fig. 14b). Rutile is partially replaced by titanite.

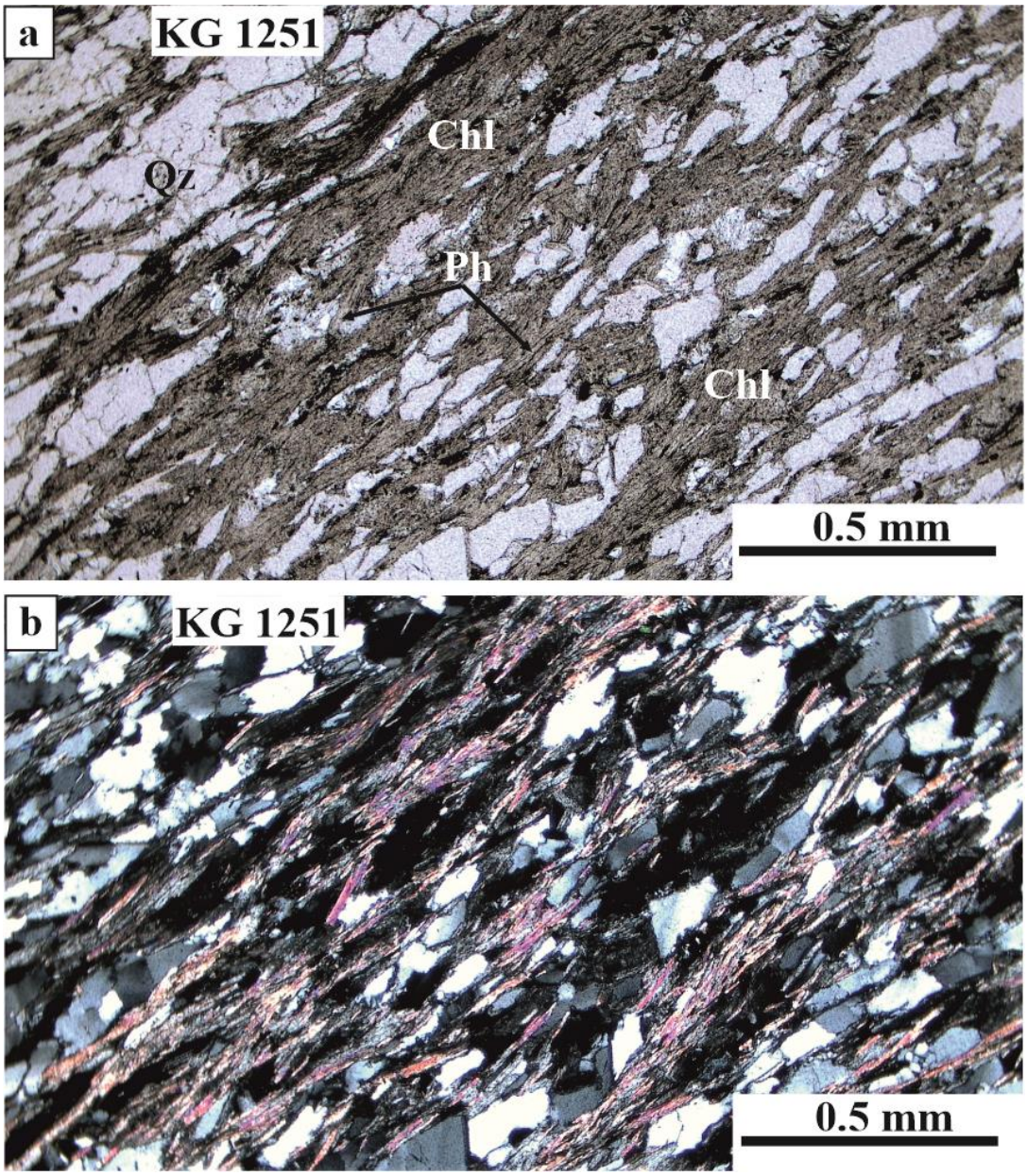


Fig. 10. Photomicrographs showing texture and mode of occurrence of minerals in the garnet-free pelitic schist (KG1251) (a) Schistosity-forming phengite and chlorite in the garnet-free pelitic schist (Open nicol) (KG1251). (b) Cross nicol photograph of the figure 10a.

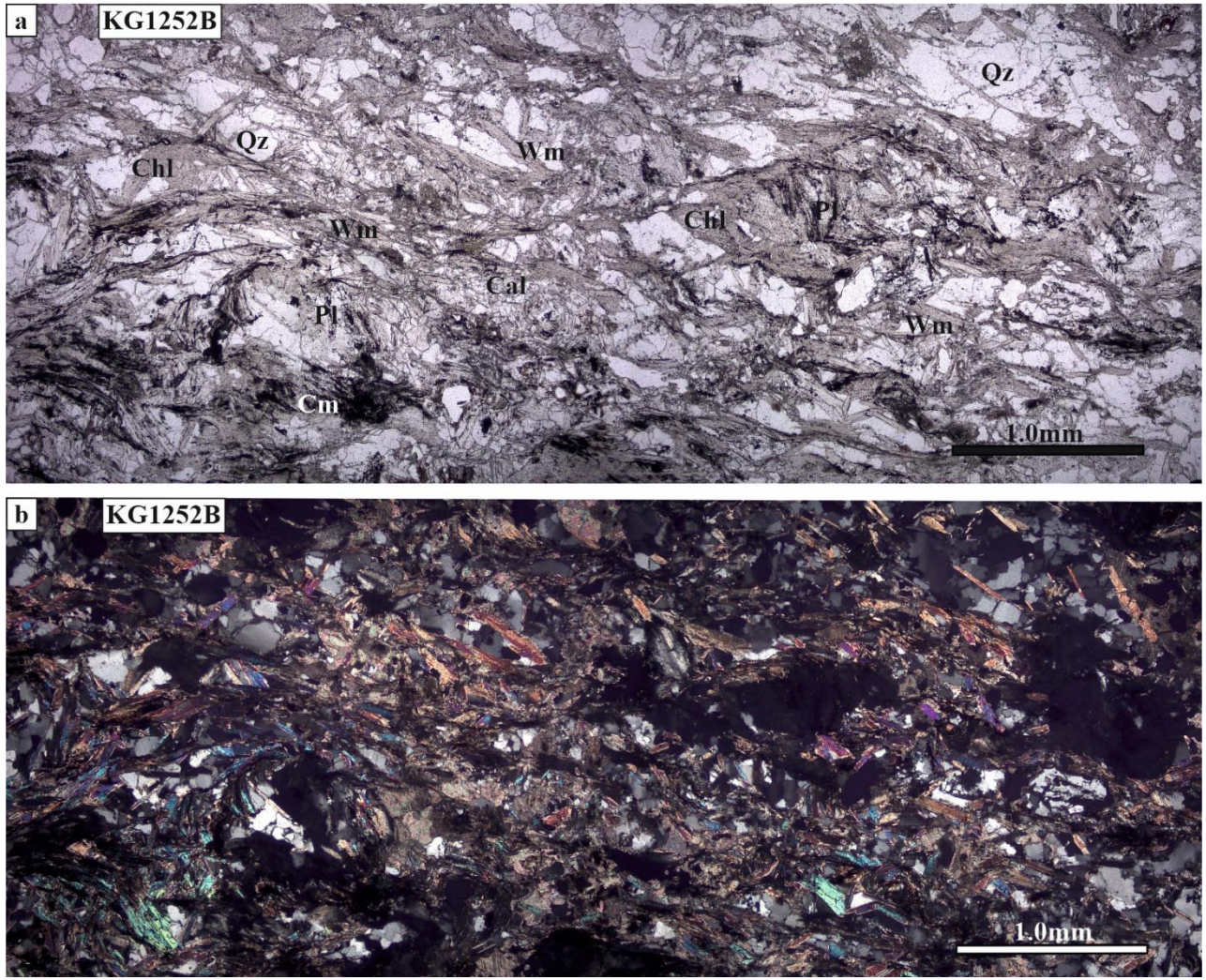


Fig. 11 (a) Schistosity-forming white mica (phengite, muscovite) and chlorite, and matrix minerals of plagioclase (albite, oligoclase), carbonaceous matter, calcite and quartz (KG1252B). (b) Cross nicol photograph of the figure 11a.

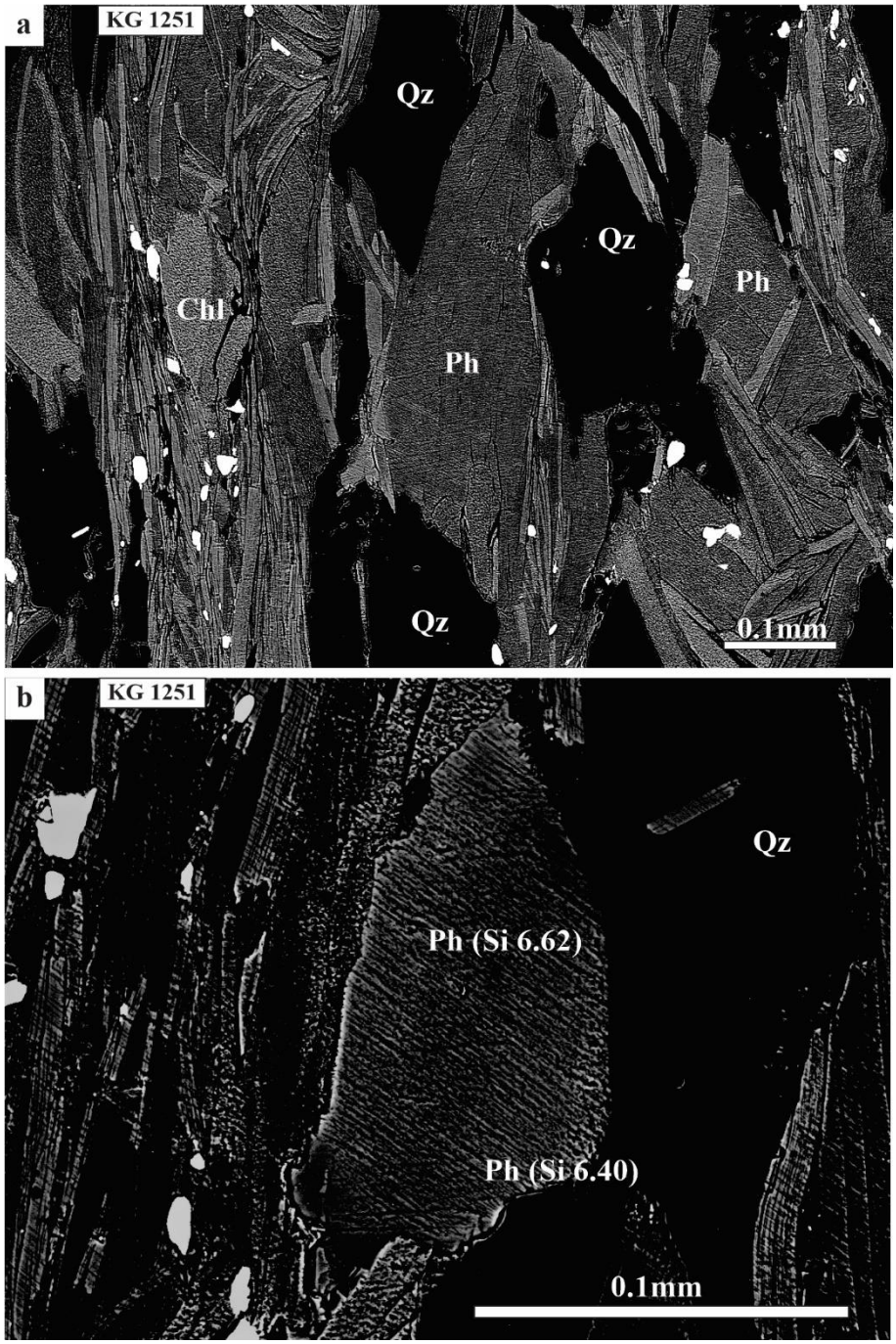


Fig. 12 Backscattered electron images (BEI) showing texture and mode of occurrence of minerals in the garnet-free pelitic schist (KG1251) a) Schistosity-forming phengite and chlorite. b) Schistosity-forming white mica showing high-Si phengite core and low-Si phengite rim.

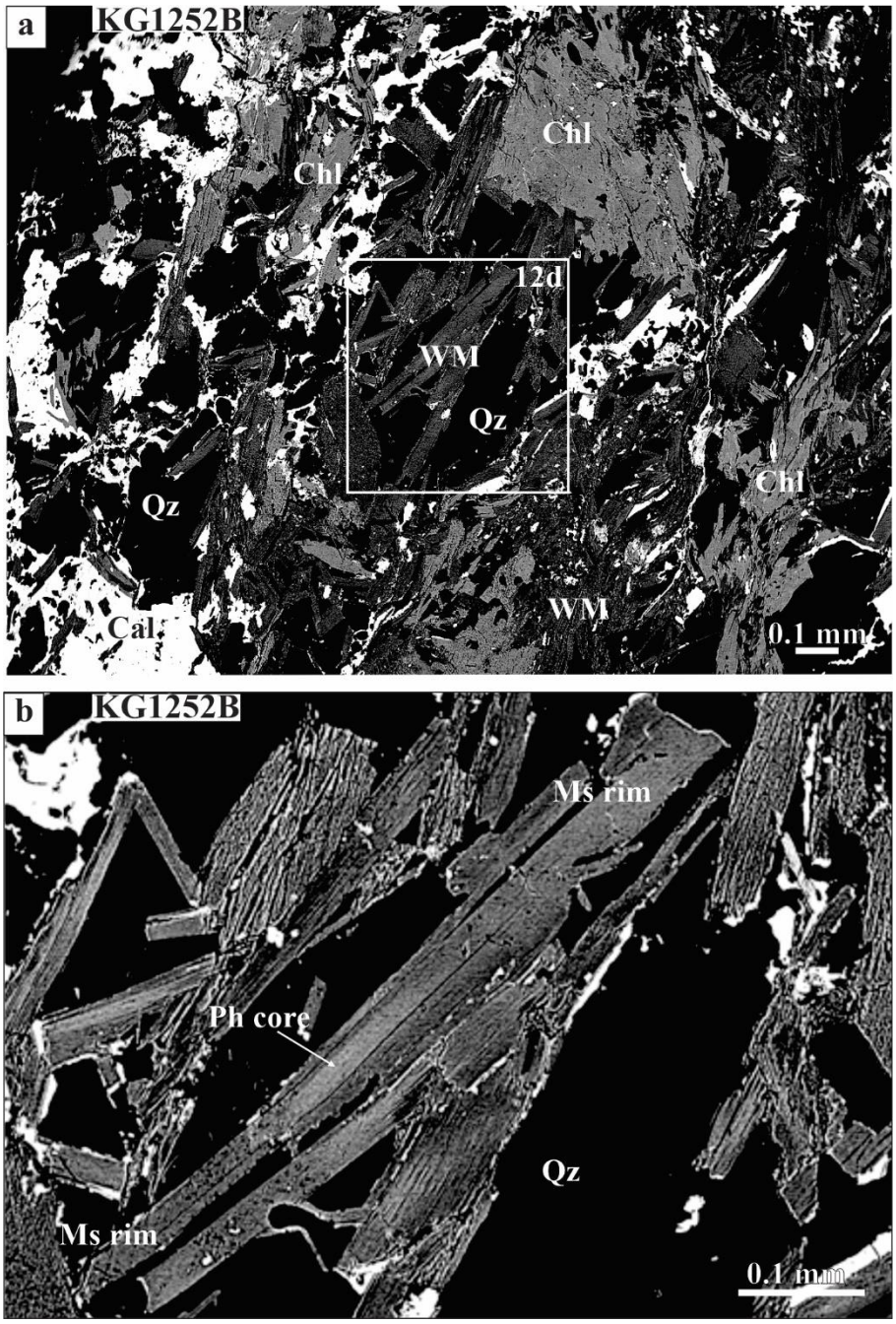


Fig. 13 Backscattered electron images (BEI) showing texture and mode of occurrence of minerals in the garnet-free pelitic schist (KG1252B) a) Schistosity-forming phengite and chlorite. b) Schistosity-forming white mica showing high-Si phengite core and low-Si muscovite rim.

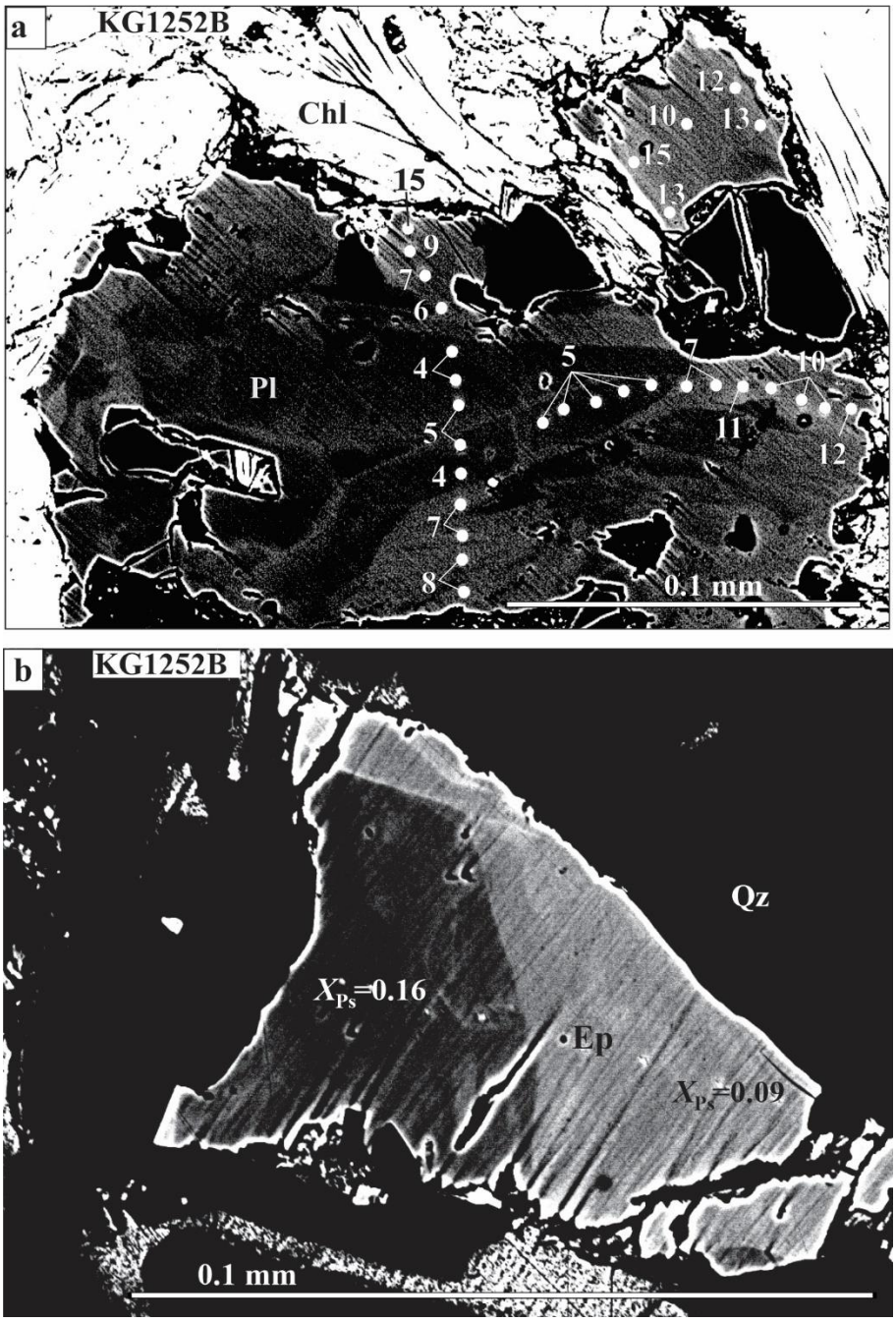


Fig. 14 a) BEI show dark core (low-$An_{4–5}$) is fractured and resorbed and high-$An_{6–15}$ plagioclase fills fractured of low-$An_{4–5}$ plagioclase and overgrown it. b) Matrix epidote showing high-X_{Ps} core and low-X_{Ps} rim.

3.2 Garnet and chloritoid-bearing pelitic schist (KG1244)

Garnet and chloritoid-bearing pelitic schist (KG1244) consists mainly of white mica (muscovite, phengite), chlorite and quartz, with minor amounts of garnet and chloritoid (Fig. 15). Albite, tourmaline, titanite, rutile, zircon, monazite, calcite and carbonaceous matter occur as accessory minerals. A schistosity is defined by preferred orientation of white mica, chloritoid and chlorite. Garnet occurs as subhedral porphyroblasts up to 3 mm across and it is commonly associated with pressure shadows consisting mainly of quartz with small amounts of phengite and chlorite. The internal schistosity of garnet is sigmoidal in shape and it is continuous to the external schistosity in the matrix (Figs. 15a, 15b and 15c). The porphyroblastic garnets contain inclusions of quartz, chloritoid, tourmaline, titanite, calcite and rutile. Most of the garnet grains are intensively fractured and the fractures are filled by muscovite, chlorite and quartz.

The schistosity-forming white micas occur as subhedral tabular crystals up to 1 mm across with a compositional zoning, brighter resorbed core (phengite), and overgrown darker rim (muscovite) (BEI in Figs. 16a and 16b).

Schistosity-forming chlorite occurs as subhedral to anhedral grains up to 0.3 mm across. It shows a zoning with dark core to bright rim, defined by BEI image (Fig. 17f). Two types of chlorite occur in the fracture of the garnet. Light gray chlorite veins are cross-cut by dark gray chlorite veins (Fig. 17g).

Schistosity-forming chloritoid occurs as subhedral crystals up to 0.2 mm across (Figs. 17h and 18a). Chloritoid inclusion up to 0.04 mm in diameter occurs in the porphyroblastic garnet (Fig. 18b). Albite occurs as subhedral to anhedral grain up to 0.3 mm across, and it shows zoning with dark core to bright rim defined by BEI image. Rutile in the matrix is partly replaced by titanite.

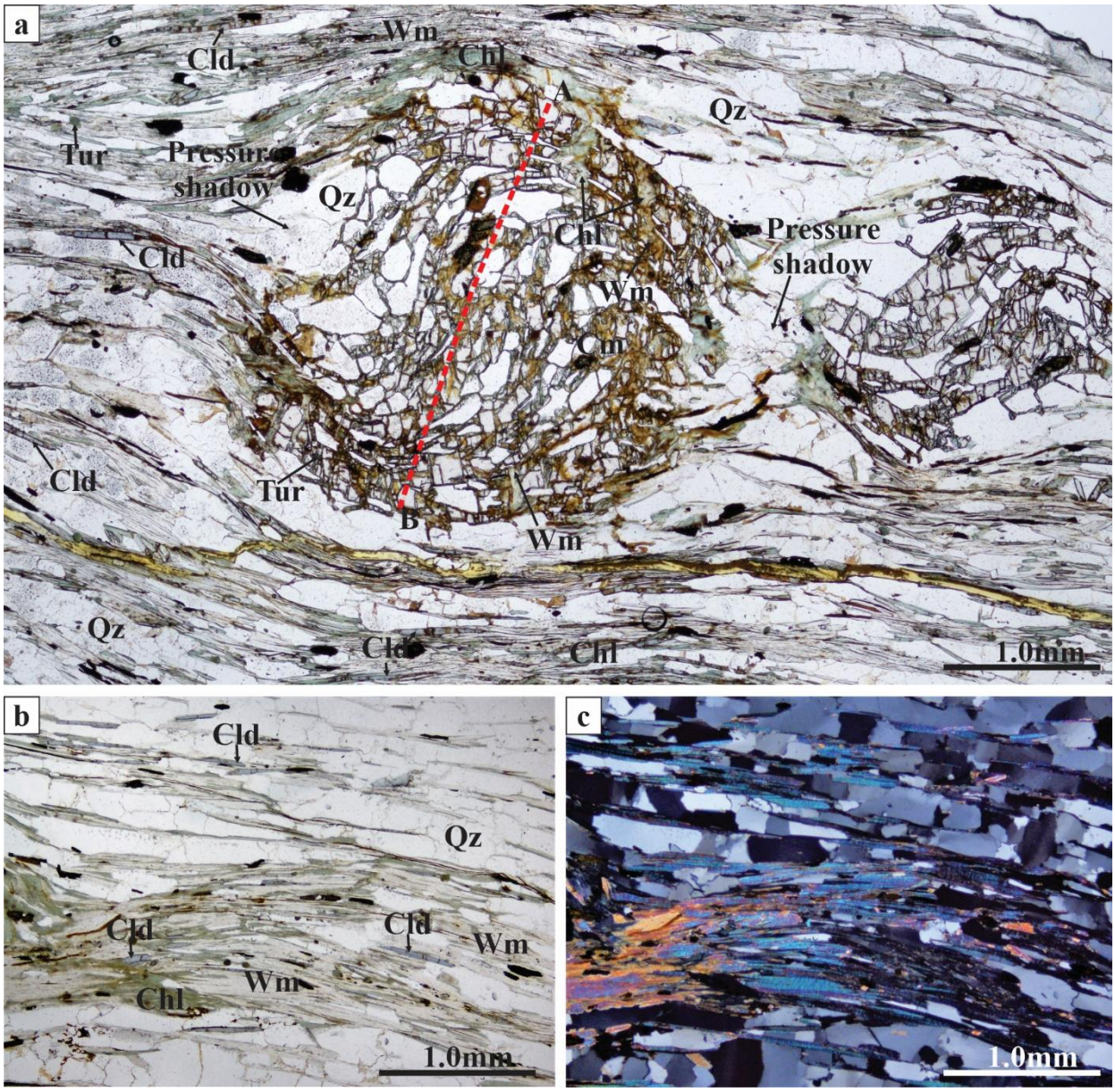


Fig. 15 a) Photomicrograph showing porphyroblastic garnet, schistosity-forming white mica and chlorite, and matrix minerals of chloritoid, tourmaline and quartz. Garnet contains inclusion trails of chloritoid, chlorite, tourmaline, carbonaceous matter and quartz. Chlorite and white mica occur along the fractures of the garnets, and inclusions in the garnets indicate sigmoidal shape. Compositional profile along the line A–B is shown in Fig. 15a. Chlorite replaces garnet along the rim. b) Schistosity-forming phengite, chloritoid and chlorite in the garnet and chloritoid-bearing pelitic schist (Open nicol) (KG1244). c) Cross nicol photograph of the figure 15b.

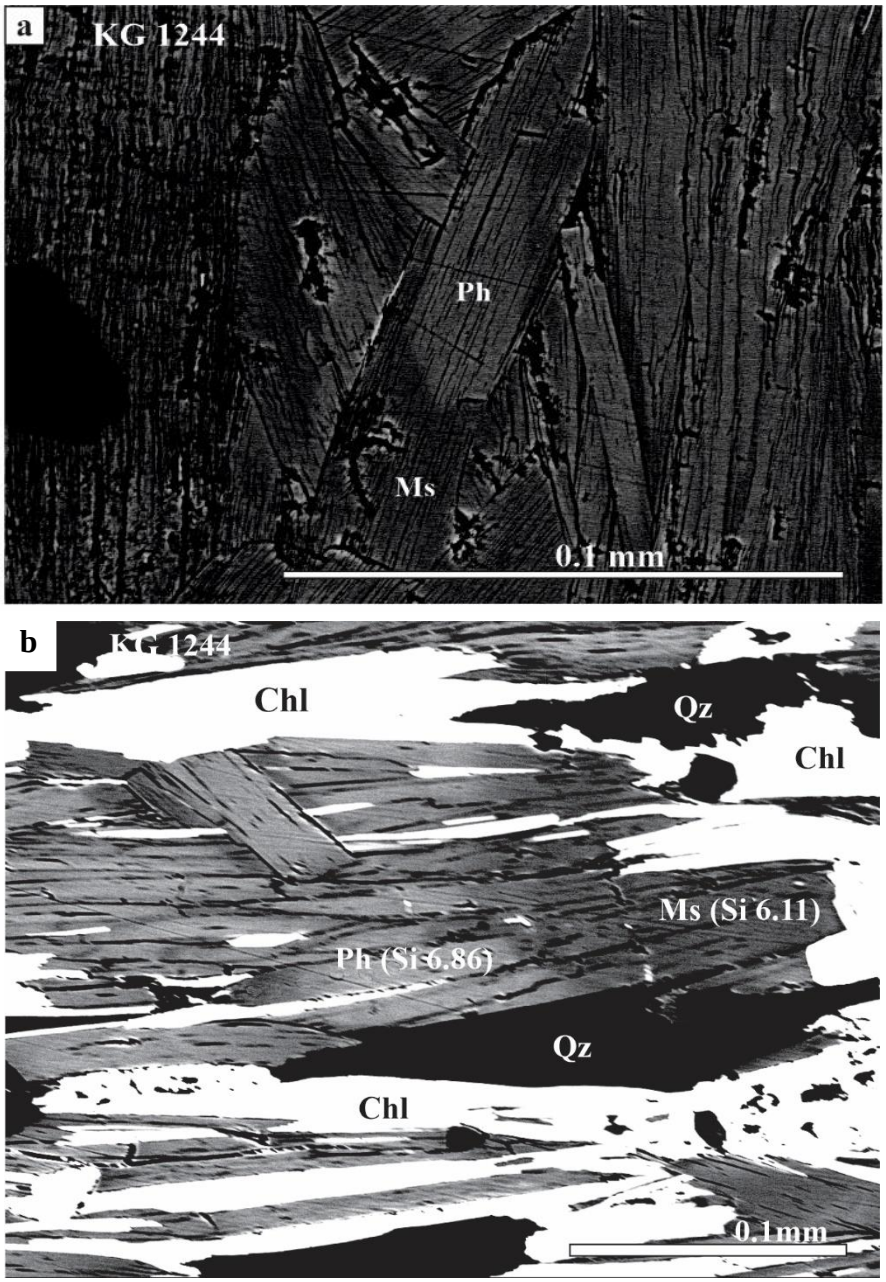


Fig. 16 Backscattered electron images (BEI) showing texture and mode of occurrence of minerals in the garnet and chloritoid-bearing pelitic schist (KG1244). (a) Schistosity-forming white mica showing a zoning from brighter resorb core (phengite) and overgrown darker rim (muscovite) (KG1244). (b) Schistosity-forming white mica showing a zoning from phengite core to muscovite rim.

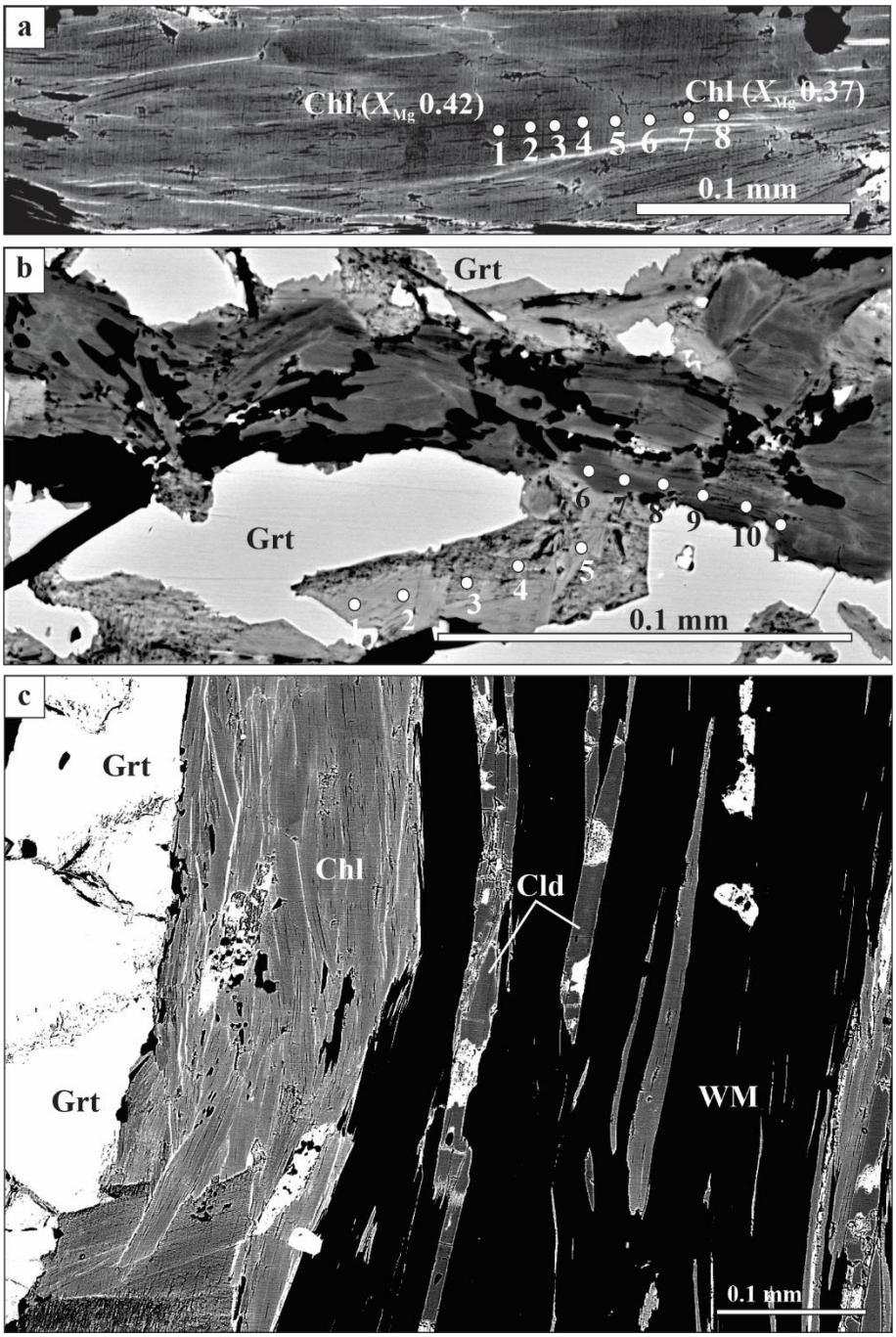


Fig. 17 (a) Chlorite in the matrix shows a zoning with higher-X_{Mg} in the core and lower-X_{Mg} in the rim. (b) Light gray chlorite in the garnet fracture shows lower-X_{Mg} than dark gray chlorite-X_{Mg}. (c) Chlorite replacing porphyroblastic garnet shows a zoning with higher-X_{Mg} in the core and lower-X_{Mg} in the rim.

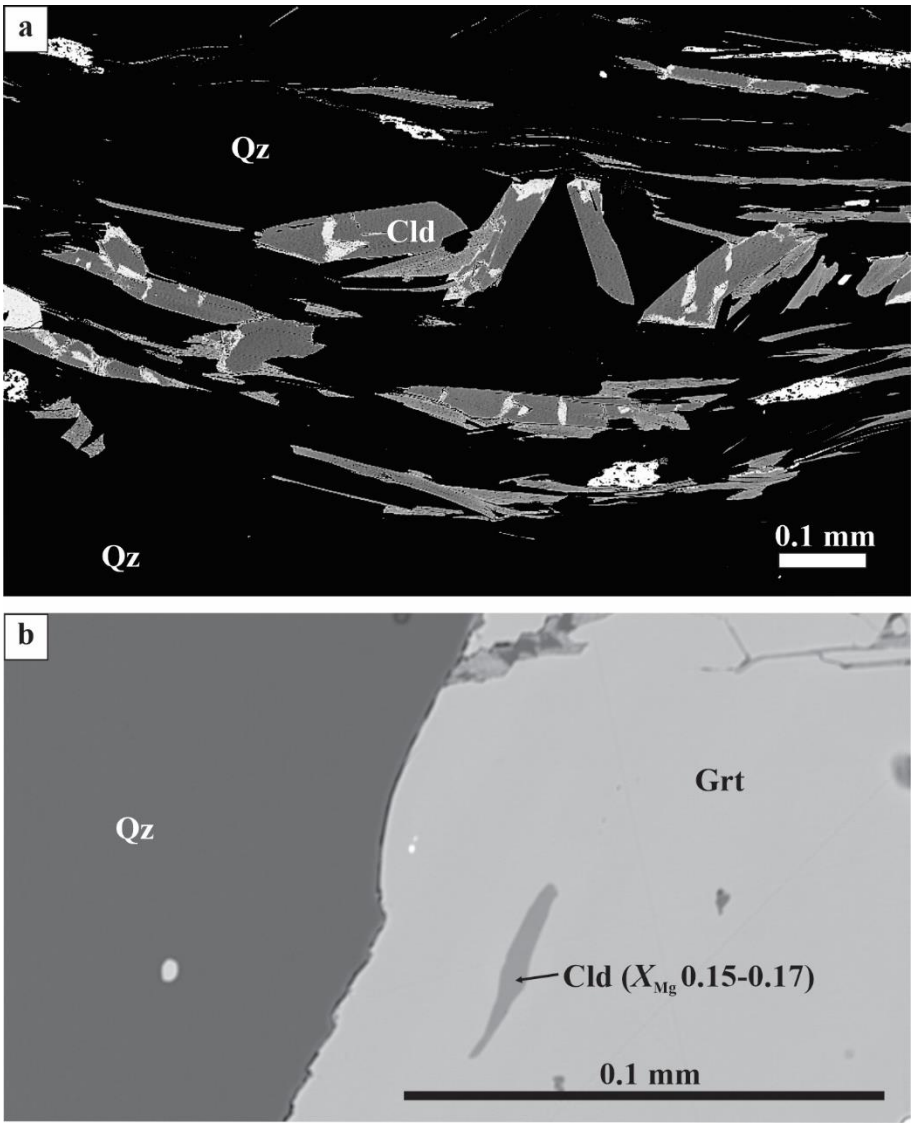


Fig. 18 (a) Schistosity-forming chloritoid occurs as subhedral crystals (b) Chloritoid inclusion in the porphyroblastic garnet.

3.3 Garnet amphibolite (KG1252A)

Garnet amphibolite (KG1252A) consists mainly of amphibole, garnet, epidote, plagioclase and quartz, with a small of amount of chlorite, biotite, paragonite, phengite, muscovite, K-feldspar, titanite, ilmenite and calcite. A schistosity is defined by preferred orientation of amphibole (Fig. 19).

Garnet occurs as euhedral to subhedral porphyroblast up to 2 mm across (Figs. 20a and 20b). The porphyroblastic garnet contains inclusion of amphibole (actinolite), epidote, calcite, titanite, ilmenite and quartz. It also contains polyphase inclusions of epidote + chlorite, epidote + paragonite, muscovite + chlorite + epidote, epidote + chlorite + white mica (phengite core to muscovite rim), chlorite + paragonite + epidote + oligoclase and plagioclase + chlorite + epidote. All of these polyphase inclusions are connected to the outside with fractures. Porphyroblastic garnet is partially replaced by epidote, chlorite and biotite along the rim and cracks (Fig. 21a and 21b).

Amphiboles are found as three modes of occurrence. 1) Discrete inclusion near the core of the porphyroblastic garnet, is of subhedral grain of 0.1 mm across. It has pleochroism of x´ = yellow green and z´ = blueish green (Fig. 22a). 2) Amphibole in the matrix occurs as subhedral grain up to 0.4 mm across and is optically zoned with resorbed core (x´ = pale blueish green, z´ = pale yellowish green) and overgrown rim (x´ = pale blue, z´ = pale yellow) (Figs. 22b, 23a and 23b). Amphibole in contact with porphyroblastic garnet shows distinctive pleochroism of x´ = yellowish green, z´ = dark blueish green (Fig. 24a). 3) Amphibole in the fracture of the porphyroblastic garnet has a pleochroism of x´ = pale yellowish green and z´ = yellowish green.

Plagioclase in the matrix occurs as a subhedral to anhedral crystal up to 0.2 mm across. It shows two-fold zoning by observation using backscattered electron images (BEI) (Fig. 24b). K-feldspar in the matrix occurs as subhedral to anhedral crystal up to 0.1 mm across.

Epidote is found as four modes of occurrences. 1) Epidote included in the garnet occurs as subhedral to anhedral grain up to 0.3 mm across. 2) Epidote occurring in the matrix is subhedral grain up to 0.5 mm across and shows a zoning with fluid inclusion-rich core and fluid inclusion-free rim. 3) Epidote replacing garnet occurs as subhedral grain up to 0.2 mm across. 4) Epidote occurring in the fracture of the porphyroblastic garnet is subhedral to anhedral grain up to 0.1 across.

Chlorite in the matrix occurs as subhedral to anhedral grains up to 0.3 mm across. It shows a zoning with dark core to bright rim defined by BEI. Chlorite replacing porphyroblastic garnet occurs as subhedral to anhedral grain up to 0.1 mm across. Biotite has two modes of occurrence, one occurring in the matrix and the other replacing porphyroblastic garnet. Titanite occurs in the mattrix and as inclusion in garnet and both core and rim of amphibole. Ilmenite occurs in the matrix and as inclusions in the porphyroblastic garnet and amphibole core.

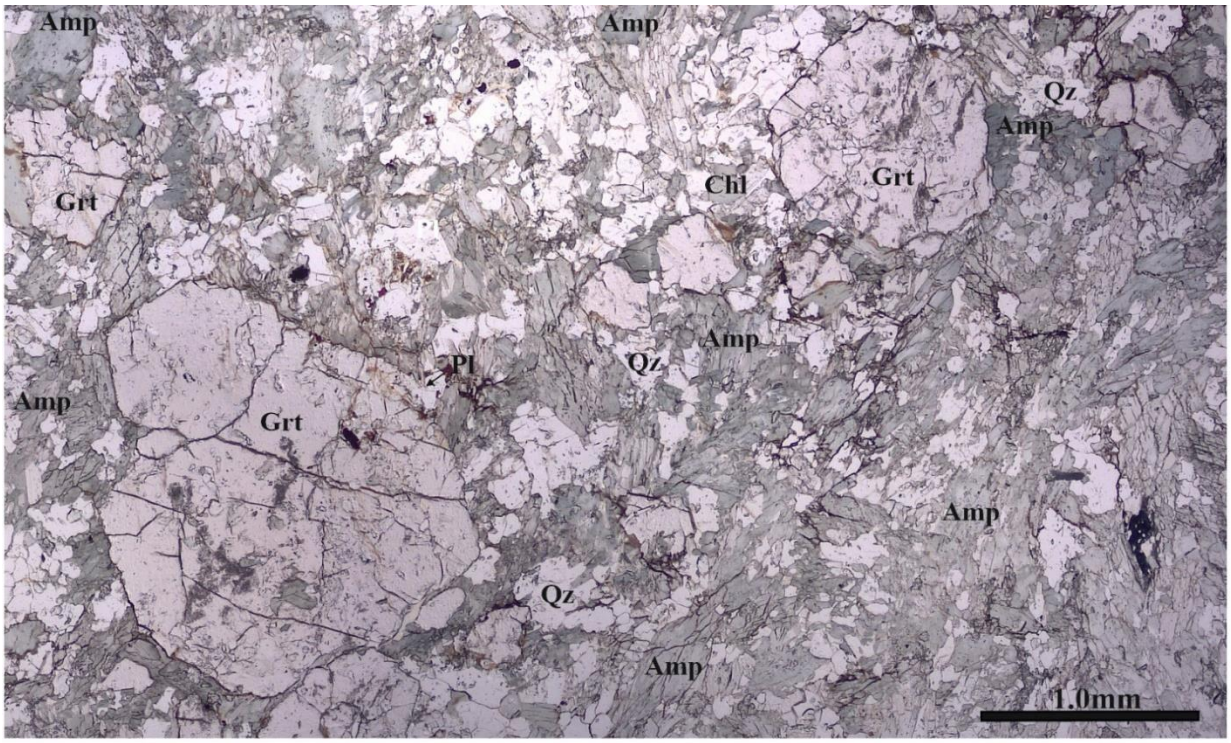


Fig. 19. Photomicrograph showing garnet and matrix minerals of amphibole, plagioclase, epidote, chlorite and quartz, and some garnet grains are replaced by amphibole along the rim.

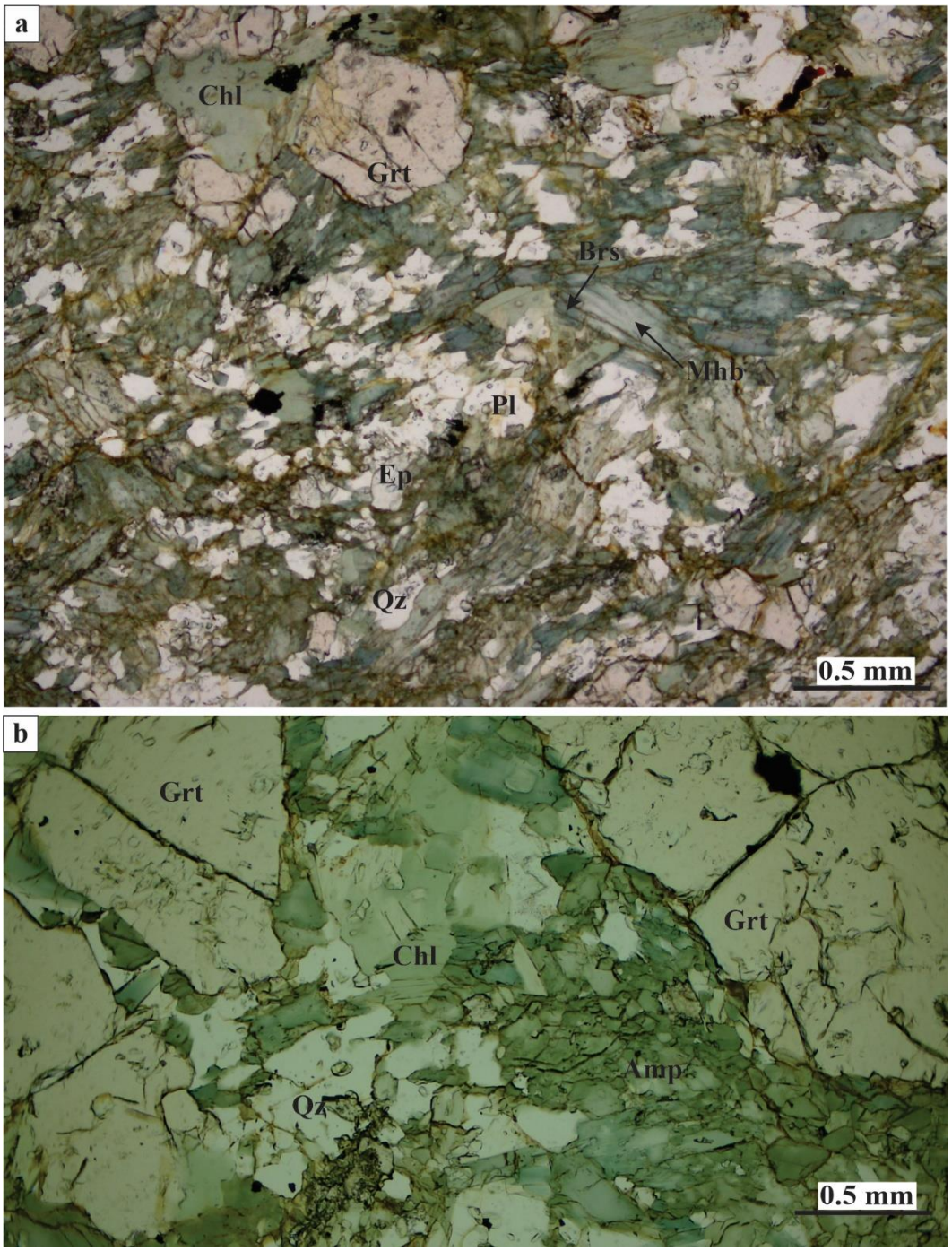


Fig. 20 (a) Matrix minerals of garnet, amphibole (magnesiohornblende, barroisite), chlorite, epidote, plagioclase and quartz. (b) Amphibole (tchermakite, pargasite) replacing garnet and matrix minerals of amphibole, plagioclase, chlorite, epidote and quartz.

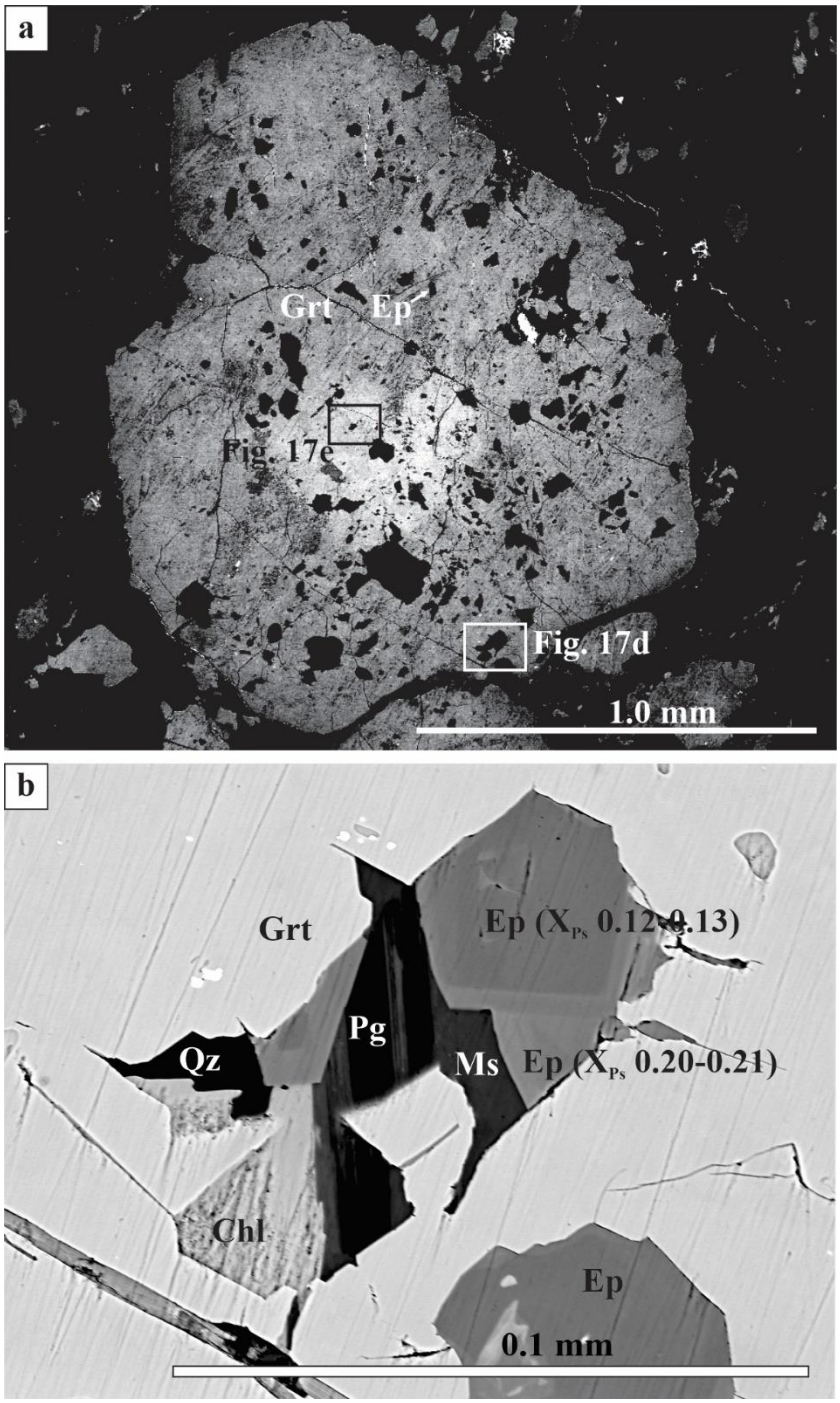


Fig. 21 Backscattered electron images (BEI) showing the texture and the mode of occurrence of minerals in the garnet amphibolite (KG 1252A). (a) Porphyroblastic garnet showing a zoning and the core contains inclusions of amphibole (actinolite), epidote and quartz. Chemical composition profile along the line A–B is shown in Fig. 30. (b) Polyphase inclusion in garnet rim consisting of epidote, paragonite and chlorite.

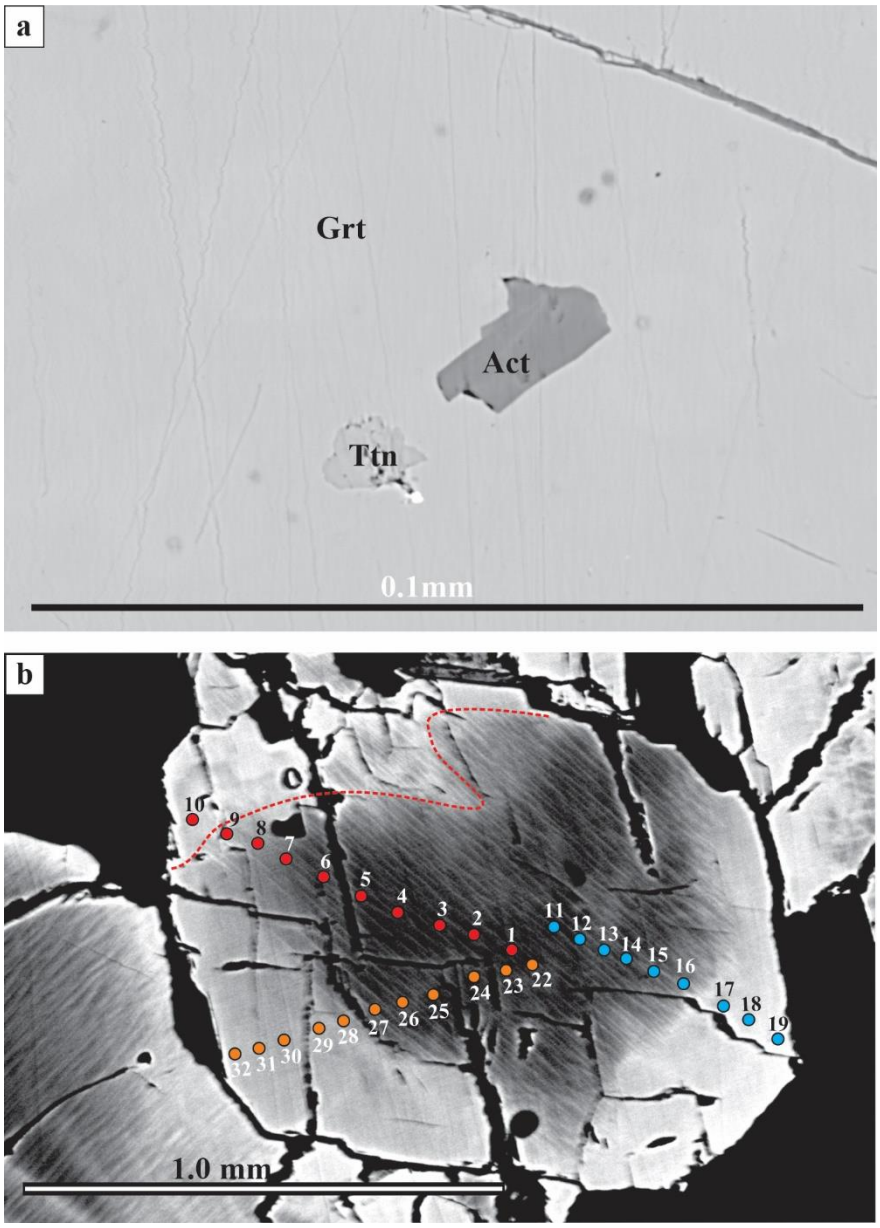


Fig. 22 a) BEI of porphyroblasti garnet core contain inclusion of amphibole (actinolite). b) BEI of Matrix amphiboles show a zoning composed of resorbed core with composition from actinolite, magnesiohornblende to barroisite and overgrown by magnesiohornblende. This amphibole is replaced by magnesiohornblende.

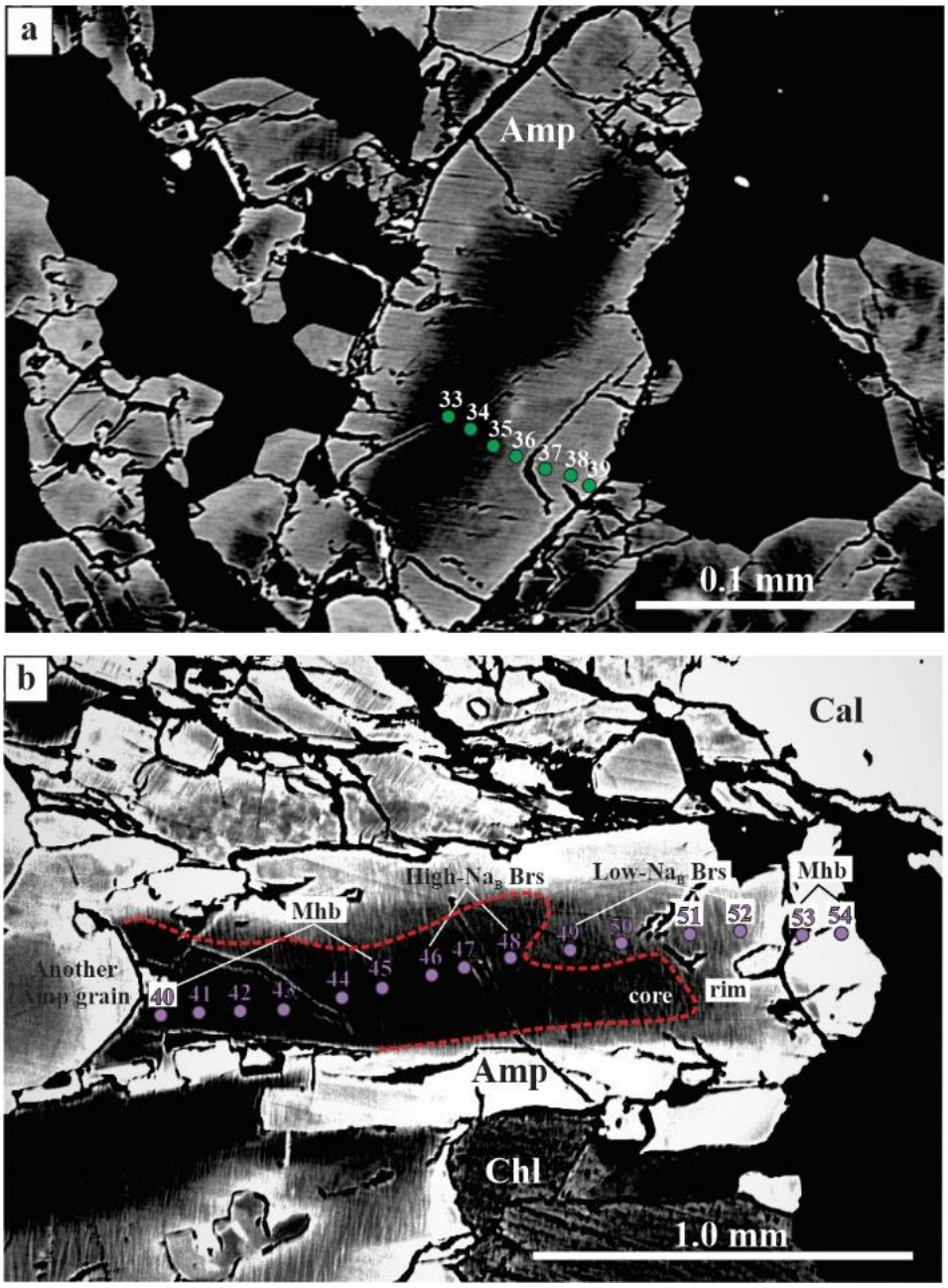


Fig. 23a and b. Matrix amphiboles show a zoning composed of resorbed core with composition from actinolite, magnesiohornblende to barroisite and overgrown by barroisite and magnesiohornblende.

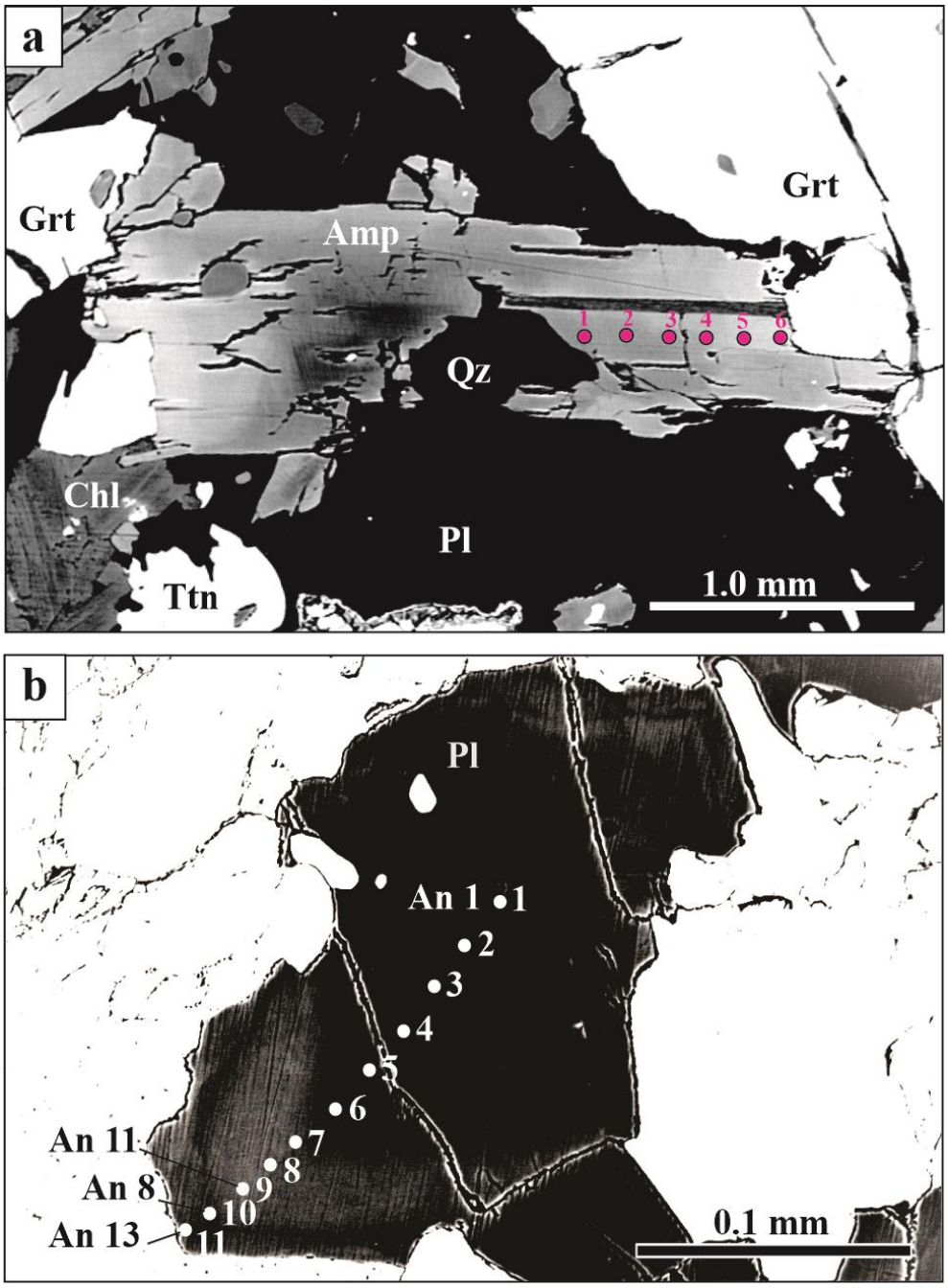


Fig. 24 (a) Matrix amphibole in contact to the rim of garnet is Fe and Al_{IV}-rich composition of tschermakite/ferrotschermakite/ferropargasite. (b) Plagioclase shows two-fold zoning with increasing in anorthite content in the core and again in the mantle.

CHAPTER 4

MINERAL CHEMISTRY

Chemical compositions of the minerals were examined using electron probe microanalyzers (JEOL JXA-8800M and JXA-8530F) installed at the Department of Earth Science, Shimane University. The analytical conditions used for quantitative analysis were 15kV accelerating voltage, 20nA specimen current and 5 μm beam diameter. Correction was carried out using the procedure of Bence and Albee (1968). End-member components of garnet are calculated on the basis of four components; pyrope (X_{Prp}), almandine (X_{Alm}), spessartine (X_{Sps}) and grossular (X_{Grs}). X_{Pyr} = Mg /(Mg + Fe^{2+} + Mn + Ca); X_{Alm} = Fe^{2+} /(Mg + Fe^{2+} + Mn + Ca); X_{Sps} = Mn /(Mg + Fe^{2+} + Mn + Ca); X_{Grs} = Ca /(Mg + Fe^{2+} + Mn + Ca) (Deer et al., 1992). Ferric iron content of garnet is estimated using charge balance Fe^{3+} = 8 – 2Si – 2Ti – Al (O = 12). Ferric iron content in amphibole is estimated as total cations 13 = Si + Al + Ti + Cr + Mg + Fe + Mn for O = 23; 13eCNK method of Leake et al., (1997). Fe^{3+} contents in epidote, phengite, muscovite and chlorite are examined using the AX program (Holland and Powell, 1998). The mineral abbreviations used in the text, tables and figures follow Whitney and Evans (2010).

4.1 Garnet-free pelitic schist (KG1251; KG1252B)

4.1.1 White mica

White mica in garnet-free pelitic schist (KG1251) are compositionally zoned shows only phengite in core and rim, but garnet-free pelitic schist (KG1251) are compositionally zoned difference, core is phengite and rim is muscovite. Schistosity-forming white mica in garnet-free pelitic schist **(KG1251)** are compositionally zoned, Si (6.84–6.40 pfu), Fe^{2+} + Mg (0.88–0.58 pfu) and X_{Mg} (Mg/(Fe^{2+} + Mg) (0.86–0.80) continuously decreasing and X_{Na} (Na/(Na + K) (0.04–0.08) increasing from core to rim (Fig. 25). A representative white mica grain shows continuously

decreasing Si (6.70–6.45 pfu), Fe^{2+} + Mg (0.81–0.68 pfu) and X_{Mg} (0.86–0.81), and increasing X_{Na} (0.06–0.08) from core to rim (Figs. 25 and 26; Table 3).

Schistosity-forming white mica in garnet-free pelitic schist **(KG1252B)** are compositionally zoned from phengite core to muscovite rim. In the core of phengite, Si (7.06–6.30 pfu), Fe + Mg (0.98–0.40 pfu) and X_{Mg} (0.71–0.65) decrease, and X_{Na} (Na /(Na + K)) (0.02–0.12) decreases and then increases toward the rim. In the rim of muscovite, the chemical compositions are almost constant; Si (6.26–6.16 pfu), X_{Mg} (0.67–0.57), Fe + Mg (0.42–0.28 pfu) and X_{Na} (0.08–0.09) (Fig. 25).

4.1.2 Chlorite

Chlorite in the matrix has high higher-X_{Mg} (0.79–0.81) (KG1251). Chlorite in the matrix has lower-X_{Mg} (0.68–0.70) (KG1252B) (Table 4).

4.1.3 Plagioclase

Plagioclase in the matrix is albite (An 5) in composition (only albite; KG1251). A plagioclase grain shows a dark core ($An_{4–5}$) and a bright rim (An_{6-15}) in BEI (albite to oligoclase; KG1252B). The core is fractured and resorbed, and high-An plagioclase fills fracture and overgrows on the resorbed core. This texture clearly suggests two stages of plagioclase growth with a resorption event between them.

4.1.4 Epidote

Epidote in the matrix shows a zoning with increasing of X_{Ps} from core (0.11–0.13) to rim (0.14–0.16) (KG1252B) (Table 4).

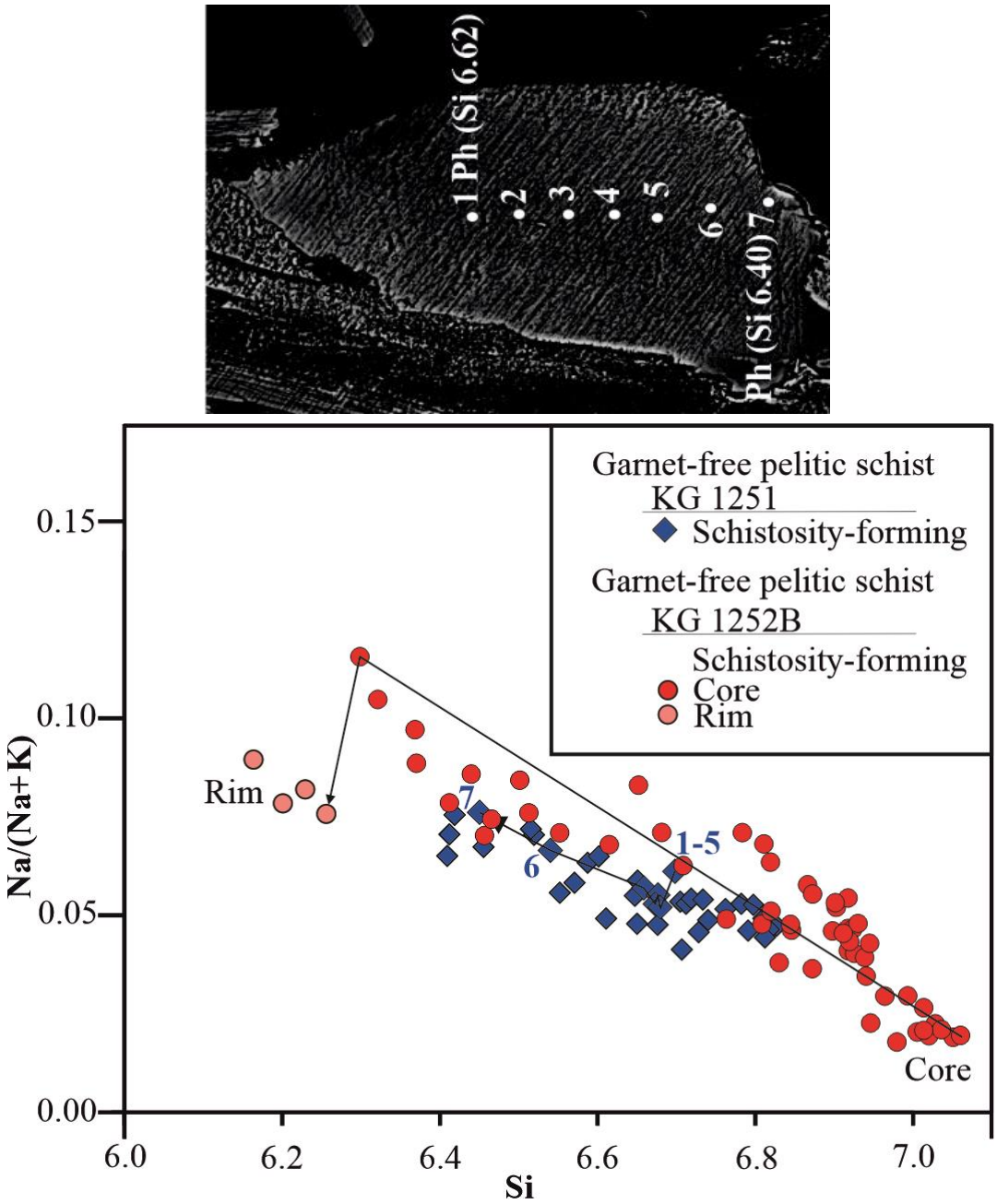


Fig. 25 Chemical compositions of zoned white micas. White micas in the thin section. Arrows indicate zoning trends of the white mica grains.

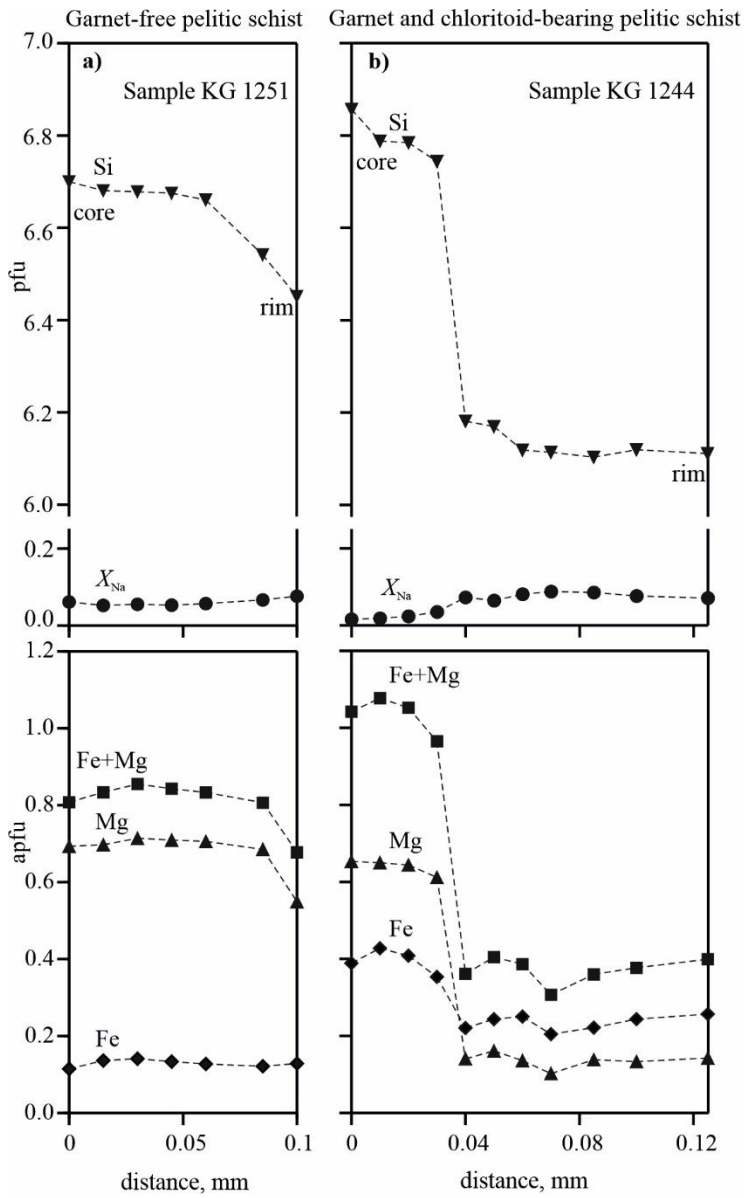


Fig. 26 Compositional profile of white mica, (a) schistosity-forming white micas from the garnet-free pelitic schist (KG1251) and (b) schistosity-forming white micas from the garnet and chloritoid-bearing pelitic schists (KG1244).

Table 3 Representative chemical compositions of white mica and chlorite from the garnet-free pelitic schist (KG1251; KG1252B).

Sample	KG1251						KG1252B								
Mineral	Phengite				Chlorite		Phengite								Muscovite
	matrix				matrix										
	core	core	rim	rim			core	→	→	→	→	→	→	→	rim
SiO_2	51.47	50.73	49.15	48.66	26.98	28.30	52.26	51.86	51.47	50.83	49.70	48.32	47.30	46.92	46.52
TiO_2	0.20	0.24	0.48	0.58	0.05	0.05	0.14	0.15	0.15	0.26	0.33	0.48	0.46	0.37	0.31
Al_2O_3	29.23	28.87	29.51	30.84	21.17	21.90	25.37	25.81	26.50	28.55	31.06	33.06	34.31	34.84	35.12
FeO*	1.05	1.24	1.09	1.16	11.40	10.53	2.20	2.09	1.62	1.89	1.74	1.53	1.34	1.25	2.20
MnO	0.00	0.00	0.07	0.03	0.00	0.07	0.04	0.01	0.01	0.00	0.00	0.00	0.02	0.03	0.01
MgO	3.57	3.55	3.45	2.78	24.72	25.85	3.58	3.55	3.43	2.79	2.34	1.65	1.31	1.41	0.83
CaO	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.04	0.01	0.03	0.00
Na_2O	0.50	0.43	0.55	0.64	0.03	0.02	0.14	0.20	0.29	0.48	0.78	0.66	0.57	0.59	0.66
K_2O	11.59	11.69	11.67	11.71	0.05	0.05	10.08	9.89	9.80	9.60	10.33	10.42	10.54	10.50	10.71
Total	97.61	96.75	95.97	96.40	84.42	86.78	93.81	93.56	93.27	94.41	96.28	96.16	95.86	95.94	96.36
O	22	22	22	22	14	14	22	22	22	22	22	22	22	22	22
Si	6.70	6.68	6.54	6.45	2.74	2.77	7.04	6.99	6.94	6.78	6.54	6.37	6.26	6.20	6.16
Ti	0.02	0.02	0.05	0.06	0.00	0.00	0.01	0.02	0.02	0.03	0.03	0.05	0.05	0.04	0.03
Al	4.49	4.48	4.63	4.82	2.53	2.53	4.03	4.10	4.21	4.49	4.82	5.14	5.35	5.43	5.48
Fe^{3+}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe^{2+}	0.11	0.14	0.12	0.13	0.97	0.86	0.25	0.24	0.18	0.21	0.19	0.17	0.15	0.14	0.12
Mn	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mg	0.69	0.70	0.68	0.55	3.74	3.78	0.72	0.71	0.69	0.55	0.46	0.32	0.26	0.28	0.16
Ca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Na	0.13	0.11	0.14	0.16	0.01	0.00	0.04	0.05	0.08	0.12	0.20	0.17	0.15	0.15	0.17
K	1.92	1.96	1.98	1.98	0.01	0.01	1.73	1.70	1.69	1.63	1.73	1.75	1.78	1.77	1.81
Total	14.06	14.09	14.15	14.15	10.00	9.96	13.81	13.82	13.81	13.82	13.97	13.98	14.00	14.01	13.93
X_{Mg}	0.86	0.84	0.85	0.81	0.79	0.81	0.74	0.75	0.79	0.72	0.71	0.66	0.64	0.67	0.57
X_{Na}	0.06	0.05	0.07	0.08			0.02	0.03	0.04	0.07	0.10	0.09	0.08	0.08	0.09
Fe^{2+}+Mg	0.81	0.83	0.81	0.68			0.97	0.95	0.87	0.76	0.65	0.49	0.41	0.42	0.29

*Total iron as FeO, X_{Mg}=Mg/(Fe^{2+}+Mg), X_{Na}=Na/(Na+K)

Table 4 Representative chemical compositions of chlorite, epidote and plagioclase from the garnet-free pelitic schist (KG1252B).

Sample	KG1252B												
Mineral	Chlorite		Epidote		Plagioclase								
	matrix		matrix		matrix								
			core	rim	core	core	rim	rim	rim	rim	rim	rim	rim
SiO_2	26.50	27.41	38.11	38.07	67.62	67.17	65.97	66.08	66.81	66.04	65.22	64.46	64.48
TiO_2	0.08	0.05	0.17	0.23	0.00	0.01	0.04	0.00	0.00	0.02	0.00	0.00	0.00
Al_2O_3	22.32	21.64	28.54	26.79	19.94	19.99	20.46	20.53	20.31	20.50	21.23	21.35	21.08
FeO*	17.27	16.47	4.72	7.02	0.02	0.05	0.09	0.08	0.03	0.05	0.08	0.10	0.08
MnO	0.14	0.12	0.08	0.14	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
MgO	20.39	21.16	0.05	0.07	0.01	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.01
CaO	0.00	0.00	23.40	22.75	0.84	1.08	1.36	1.47	1.63	1.83	2.27	2.47	3.33
Na_2O	0.02	0.01	0.00	0.01	10.98	10.79	10.89	10.94	10.57	10.55	10.33	10.21	10.25
K_2O	0.01	0.00	0.01	0.03	0.08	0.07	0.07	0.07	0.07	0.10	0.09	0.06	0.09
Total	86.73	86.87	95.07	95.11	99.49	99.14	99.88	99.20	99.43	99.11	99.23	98.65	99.32
O	28	28	25	25	8	8	8	8	8	8	8	8	8
Si	5.39	5.54	6.10	6.17	2.97	2.96	2.93	2.92	2.94	2.92	2.89	2.88	2.87
Ti	0.01	0.01	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Al	5.35	5.15	5.39	5.11	1.03	1.04	1.07	1.07	1.05	1.07	1.11	1.12	1.10
Fe	2.94	2.78	0.63	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mn	0.02	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mg	6.19	6.37	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.00	0.00	4.02	3.95	0.04	0.05	0.06	0.07	0.08	0.09	0.11	0.12	0.16
Na	0.01	0.01	0.00	0.00	0.94	0.92	0.94	0.94	0.90	0.91	0.89	0.88	0.88
K	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Total	19.92	19.88	16.18	16.25	4.98	4.98	5.00	5.01	4.99	5.00	5.00	5.01	5.01
X_{Mg}	0.68	0.70											
X_{Ps}			0.11	0.16									
An					4	5	6	7	8	9	11	12	15

*Total iron as FeO, X_{Mg}=Mg/(Fe^{2+}+Mg), X_{Ps}=(Fe^{3+}/Fe^{3+}+Al)

4.2 Garnet and chloritoid-bearing pelitic schist (KG1244)

4.2.1 Garnet

Porphyroblastic garnets in garnet and chloritoid-bearing pelitic schist (KG1244) have almandine-rich compositions (X_{Alm} 0.68–0.77) with variable amounts of pyrope, spessartine and grossular components (Table 5). The garnet shows a growth zoning with decreasing in spessartine (X_{Sps} 0.12–0.02) and increasing in pyrope (X_{Pyr} 0.04–0.08), and slightly decreasing and subsequently increasing in almandine from core to rim. Grossular shows slightly increasing (X_{Grs} 0.08–0.19) and decreasing (X_{Grs} 0.19–0.16) from core to rim with slight fluctuations (Fig. 27; Table 5).

4.2.2 White mica

Schistosity-forming white mica consists of resorbed phengite core and overgrowing muscovite rim (Figs. 28). The chemical compositions of the white mica vary from core to rim (Si = 6.94–6.10 pfu, X_{Na} = 0.01–0.06, Fe^{2+} + Mg = 1.13–0.30 pfu, X_{Mg} 0.64–0.33) (Fig. 28). The core of a representative white mica grain shows decreasing in Si (6.86–6.74 pfu), Fe^{2+} + Mg (1.08–0.96 pfu) and X_{Mg} (0.63–0.60), and increasing in X_{Na} (0.02–0.03) towards the rim (Figs. 26 and 28; Table 5). The rim of the white mica shows decreasing in Si (6.18–6.10 pfu), Fe^{2+} + Mg (0.40–0.31 pfu) and X_{Mg} (0.40–0.33) to the outermost rim. At the rim, X_{Na} fluctuates between 0.06 and 0.09. There is a large compositional gap between the core and the rim, and it is represented by Si (6.74–6.18 pfu) and X_{Na} (0.03–0.07). Muscovite occurring in the fractures of the porphyroblastic garnet shows Si (6.16–6.27 pfu), Fe^{2+} + Mg (0.23–0.47) pfu), X_{Na} (0.07–0.09) and X_{Mg} (0.24–0.33**)** similar to the compositions of the muscovite rim of the schistosity-forming white micas (Table 5).

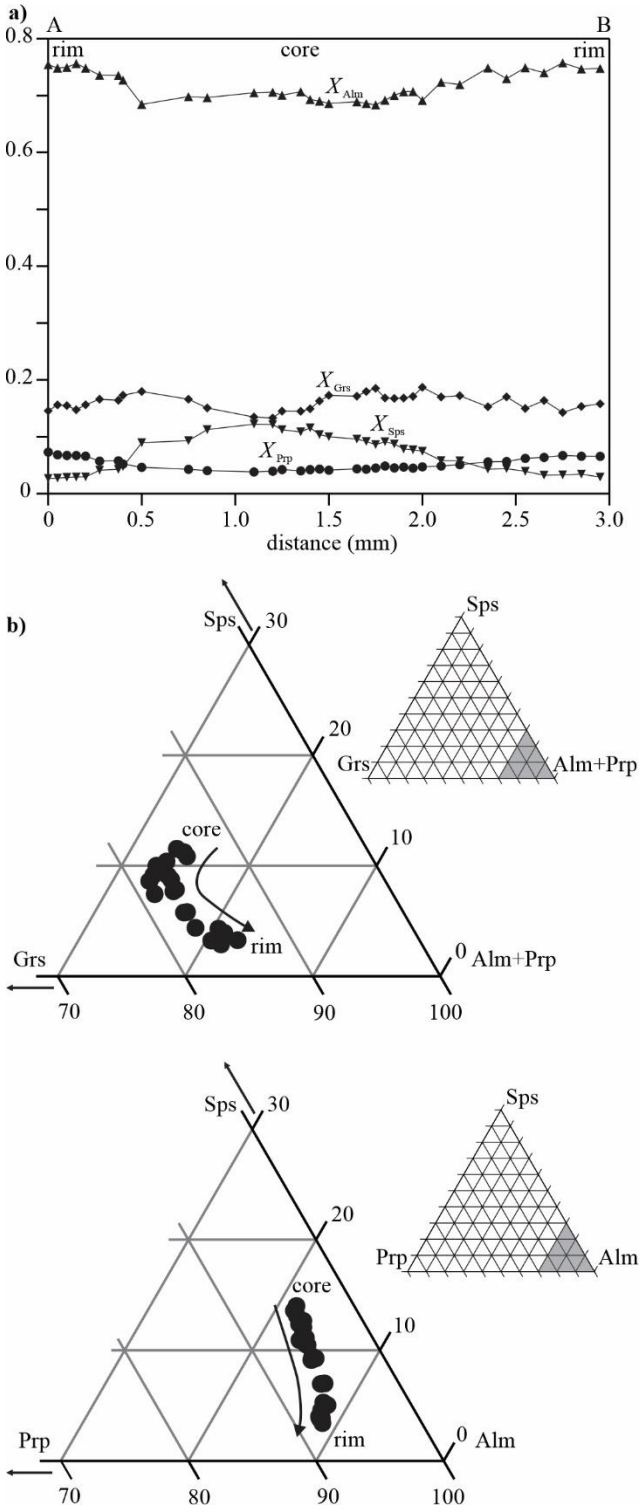


Fig. 27 a) Compositional profile of garnet in the garnet and chloritoid-bearing pelitic schist (KG1244). b) Ternary diagram showing the chemical compositions of the garnet in the garnet and chloritoid-bearing pelitic schist (KG1244). Arrows indicate compositional zoning from core to rim.

Table 5 Representative chemical compositions of white mica (phengite/muscovite), chloritoid, chlorite and garnet from the garnet and chloritoid-bearing pelitic schist (KG1244).

Sample	KG 1244												
Mineral	White mica				Chloritoid		Chlorite				Garnet		
	matrix				matrix	inc Grt	matrix		Grt fracture				
	core	core	rim	rim			core	rim			core	→	rim
SiO_2	51.80	50.68	45.82	45.37	24.07	23.93	25.30	22.78	22.60	22.90	37.33	37.05	37.56
TiO_2	0.19	0.25	0.26	0.18	0.00	0.00	0.07	0.04	0.06	0.01	0.07	0.07	0.09
Al_2O_3	26.75	27.83	34.45	35.04	39.36	39.33	20.20	22.30	21.62	21.28	20.96	20.68	20.90
FeO*	3.51	3.18	1.96	2.28	24.58	25.39	27.41	31.68	31.90	39.15	31.92	31.48	33.88
MnO	0.04	0.02	0.03	0.01	0.24	0.57	0.07	0.10	0.22	0.04	5.36	4.01	1.52
MgO	3.31	3.08	0.70	0.71	2.75	2.07	13.23	9.85	9.13	3.39	0.99	1.22	1.66
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	4.64	5.86	5.39
Na_2O	0.12	0.26	0.55	0.54	0.00	0.01	0.01	0.04	0.06	0.05	0.17	0.03	0.01
K_2O	10.98	10.75	10.77	10.72	0.02	0.03	0.05	0.06	0.04	0.06	0.04	0.05	0.04
Total	96.70	96.05	94.54	94.85	91.02	91.33	86.34	86.85	85.65	86.88	101.48	100.45	101.05
O	22	22	22	22	6	6	14	14	14	14	12	12	12
Si	6.86	6.74	6.18	6.11	1.01	1.01	2.74	2.52	2.55	2.64	2.98	2.98	3.00
Ti	0.02	0.03	0.03	0.02	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01
Al	4.17	4.37	5.48	5.56	1.95	1.95	2.58	2.91	2.87	2.89	1.97	1.96	1.97
Fe^{3+}	0.00	0.00	0.00	0.00	0.03	0.04	0.00	0.07	0.05	0.00	0.09	0.08	0.03
Fe^{2+}	0.39	0.35	0.22	0.26	0.83	0.85	2.49	2.86	2.96	3.78	2.05	2.04	2.23
Mn	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.02	0.00	0.36	0.27	0.10
Mg	0.65	0.61	0.14	0.14	0.17	0.13	2.14	1.62	1.53	0.58	0.12	0.15	0.20
Ca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.50	0.46
Na	0.03	0.07	0.14	0.14	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.00
K	1.85	1.82	1.85	1.84	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.00
Total	13.97	13.99	14.04	14.07	4.00	4.00	9.98	10.01	10.10	9.91	8.00	8.00	8.00
X_{Mg}	0.63	0.63	0.39	0.36	0.17	0.13	0.46	0.36	0.34	0.13	0.05	0.07	0.08
X_{Na}	0.02	0.02	0.07	0.07									
Fe^{2+}+Mg	1.04	1.04	0.36	0.40									
X_{Pyr}											0.04	0.05	0.07
X_{Sps}											0.12	0.09	0.03
X_{Grs}											0.13	0.17	0.15
X_{Alm}											0.71	0.69	0.75

*Total iron as FeO, X_{Mg}=Mg/(Fe^{2+}+Mg), X_{Na}=Na/(Na+K)
Abbreviation: inc Grt, inclusion in garnet

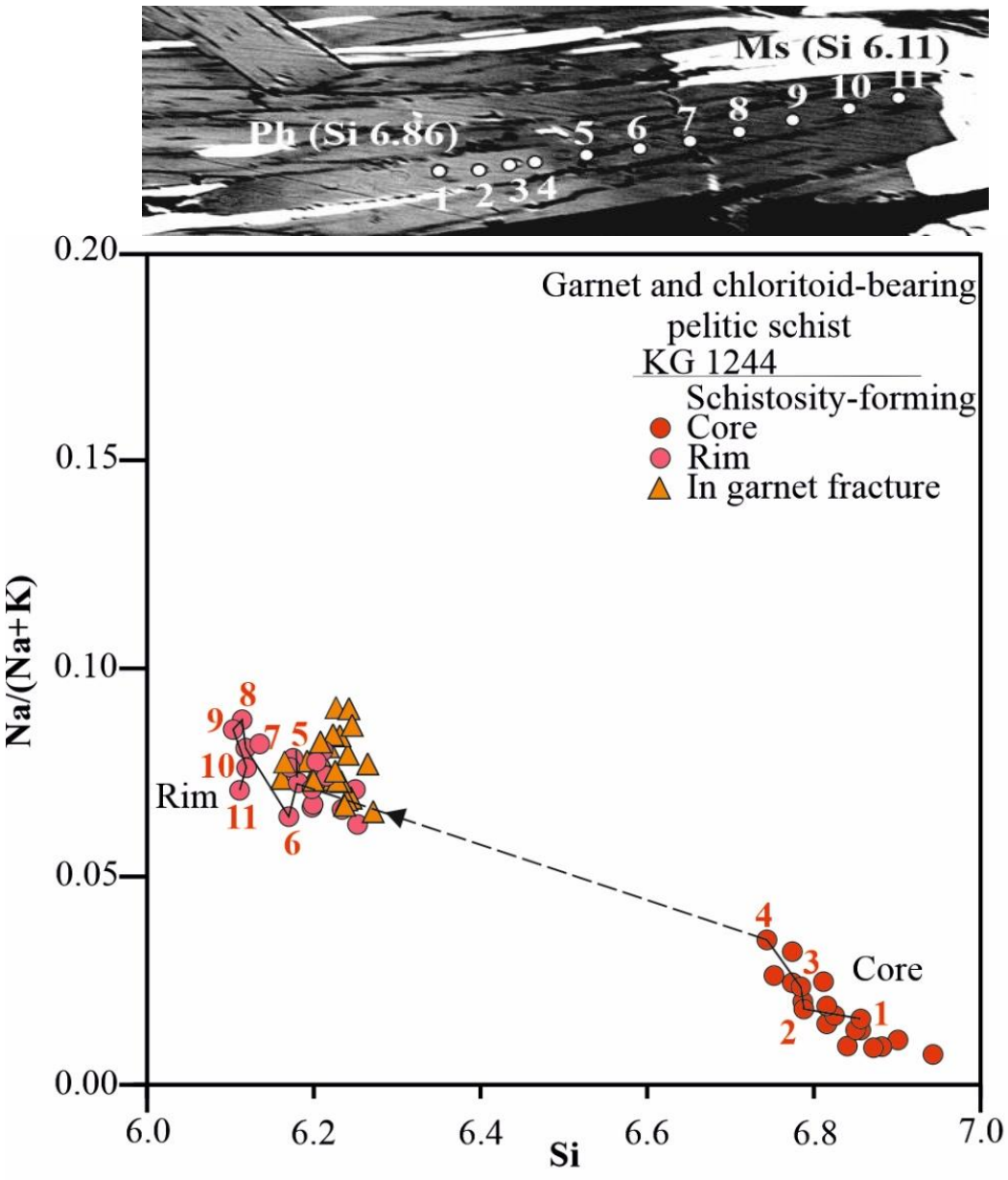


Fig. 28 Chemical compositions of zoned white micas. White micas in the thin section.

4.2.3 Other minerals

Chloritoid inclusion in the porphyroblastic garnet is similar X_{Mg} (0.12–0.17) with schistosity-forming chloritoid (X_{Mg} 0.12–0.18). Chlorite in the matrix shows a zoning with higher X_{Mg} (0.41–0.46) in the core and lower X_{Mg} (0.36–0.40) in the rim (Fig. 29). Light gray (BEI) chlorite in the garnet fracture shows lower X_{Mg} (0.08–0.18) than dark gray chlorite (X_{Mg} 0.28–0.36) (Fig. 29). Albite shows a compositional zoning with increasing anorthite content from core to rim (An_{1-5}).

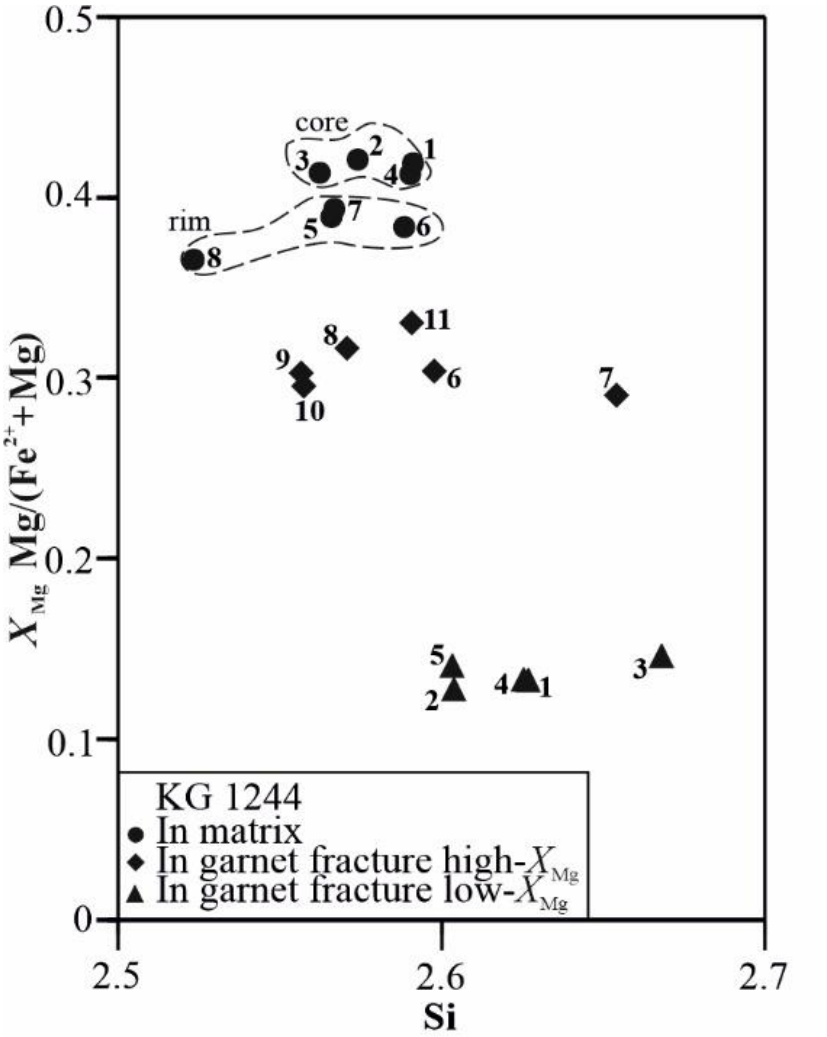


Fig. 29 Chemical compositions of chlorites. Analytical points are shown in figures 17a and 17b.

4.3 Garnet amphibolite (KG1252A)

4.3.1 Garnet

Porphyroblastic garnet shows a zoning with continuously decreasing in spessartine (X_{Sps} 0.23–0.00) and increasing in pyrope (X_{Pyr} 0.01–0.05) from core to rim. Almandine increases (X_{Alm} 0.47–0.65) with slight compositional fluctuation and decrease at the outermost rim (X_{Alm} 0.65–0.62). Grossular slightly increases from core to rim (X_{Grs} 0.29–0.33) with a small peak in the middle (X_{Grs} 0.34) (Figs. 30a and 30b; Table 6).

4.3.2 Amphibole

An amphibole included nearby the core of the porphyroblastic garnet is classified as actinolite Si = 7.54 pfu, Na_B = 0.10 pfu and X_{Mg} [(Mg/(Mg + Fe^{2+})] = 0.69 (Figs. 22a and 31; Table 7). Amphibole in the matrix has a compositional zoning defined by BEI (Figs. 22a, 23a and 23b). The core of the amphibole is zoned from actinolite to magnesiohornblende or barroisite with decreasing Si = 7.71–6.62 and X_{Mg} = 0.80–0.72, and increasing Na_B = 0.10–0.86 (Figs. 24b and 32). The core of the amphibole occurs as resorbed anhedral shape, and it is overgrown by the rim of barroisite to magnesiohornblende with decreasing Si = 6.86–6.48, X_{Mg} = 0.76–0.51 and Na_B = 0.48–0.22 (Figs. 22b, 23a, 243 and 31; Table 7). The compositions of the outermost parts of the core considerably vary in Si (7.01–6.85) and Na_B (0.52–0.86). This is an evidence of resorption of the core before overgrowing of the rim. The rim as well as the core of the amphibole are occasionally replaced by magnesiohornblende with Si = 6.91, Na_B = 0.30 and X_{Mg} 0.66. Amphibole in the matrix contact to the rim of garnet is Fe and Al^{IV}-rich composition of tschermakite/ferrotschermakite/ferropargasite with Si = 6.41–5.88 pfu, Na_B = 0.39–0.14 pfu and X_{Mg} = 0.51–0.25 (Figs. 24a and 31).

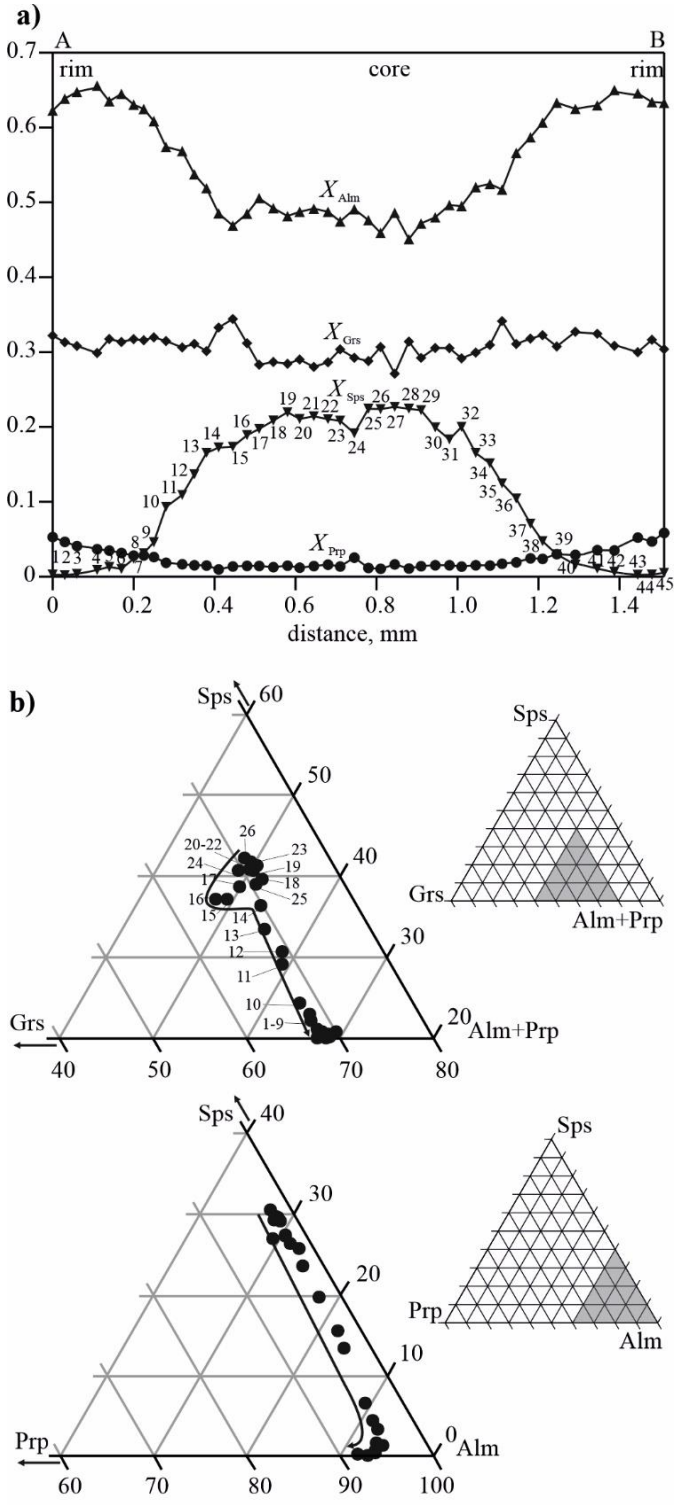


Fig. 30 (a) Compositional profile of zoned garnet in the garnet amphibolite (KG1252A). (b) The chemical composition in the garnet aphibolite (KG1252A). Arrows indicate compositional trends from core to rim of the garnet.

Table 6 Representative chemical compositions of garnet in the garnet amphibolite (KG1252A)

Sample	KG1252					
Mineral	Garnet					
Ana pnt	25	19	18	3	2	1
	core	→	→	→	→	rim
SiO_2	37.03	37.01	36.87	38.00	37.92	37.71
TiO_2	0.17	0.19	0.13	0.10	0.08	0.07
Al_2O_3	20.12	20.03	19.82	20.79	20.72	20.97
FeO*	22.66	22.92	22.39	29.81	29.29	28.77
MnO	9.96	9.75	9.13	0.16	0.09	0.12
MgO	0.29	0.37	0.32	1.04	1.18	1.35
CaO	10.11	9.99	9.94	10.98	11.11	11.41
Na_2O	0.04	0.02	0.04	0.00	0.01	0.01
K_2O	0.05	0.03	0.04	0.05	0.05	0.02
Total	100.43	100.30	98.68	100.93	100.44	100.42
O	12	12	12	12	12	12
Si	2.97	2.98	3.01	3.01	3.01	2.99
Ti	0.01	0.01	0.01	0.01	0.00	0.00
Al	1.90	1.90	1.91	1.94	1.94	1.96
Fe^{3+}	0.13	0.13	0.06	0.03	0.03	0.05
Fe^{2+}	1.39	1.41	1.47	1.95	1.92	1.85
Mn	0.68	0.66	0.63	0.01	0.01	0.01
Mg	0.04	0.04	0.04	0.12	0.14	0.16
Ca	0.87	0.86	0.87	0.93	0.95	0.97
Na	0.01	0.00	0.01	0.00	0.00	0.00
K	0.00	0.00	0.00	0.00	0.00	0.00
Total	8.00	8.00	8.00	8.00	8.00	8.00
X_{Prp}	0.01	0.01	0.01	0.04	0.05	0.05
X_{Alm}	0.47	0.47	0.49	0.65	0.64	0.62
X_{Grs}	0.29	0.30	0.29	0.31	0.31	0.33
X_{Sps}	0.23	0.22	0.21	0.00	0.00	0.00

*Total iron as FeO; Ana pnt, analitical point

Amphibole occurring in the fracture of the porphyroblastic garnet is classified as magnesiohornblende with Si = 7.39–7.46 pfu, Na_B = 0.08–0.15 pfu and X_{Mg} = 0.67–0.65 (Fig. 31).

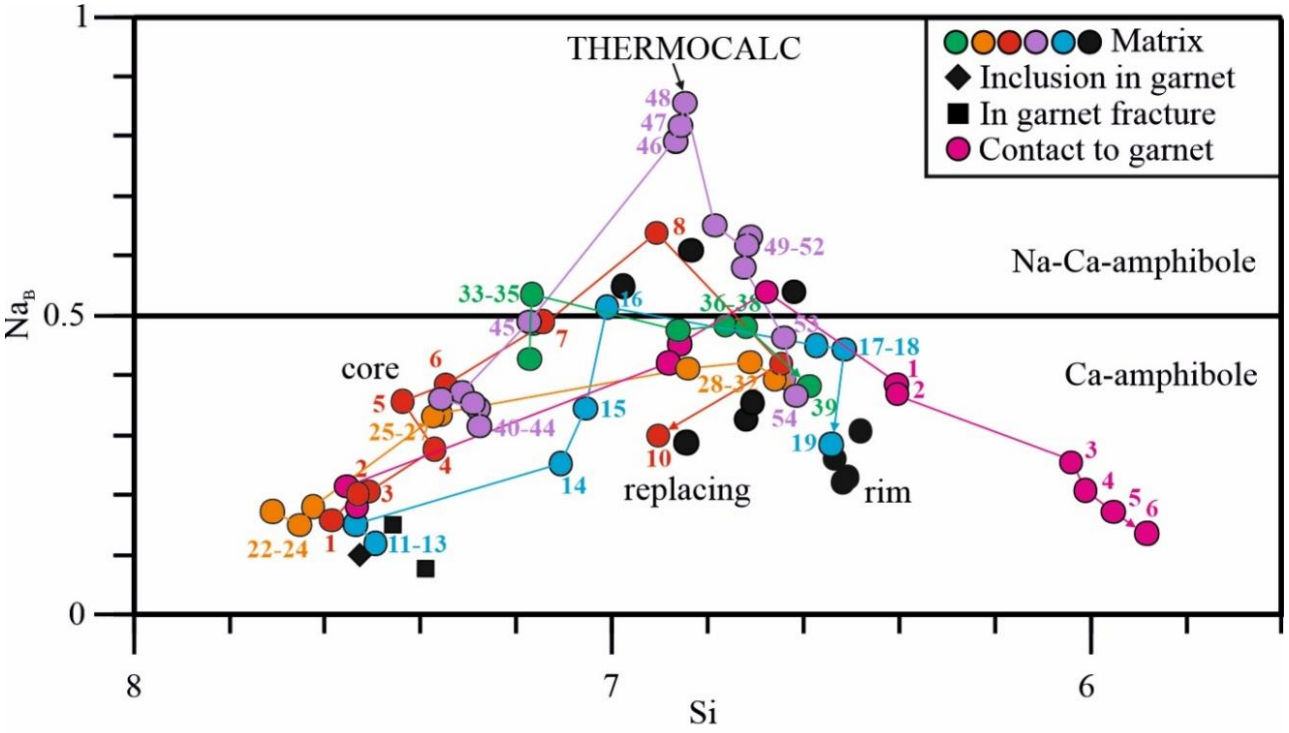


Fig. 31. Chemical compositions of amphiboles in Si-Na_B diagram. Analytical points are shown in the Figs. 23b, 24a, 24b and 25a. The chemical composition of the amphibole numbered 48 is used for THERMOCALC average P-T estimation.

Table 7 Representative chemical compositions of amphibole in the garnet amphibolite.

Analitical pnt			11	15	16	19	1	3	5	6
	In grt c	In g fr	Matrix				Contact to garnet rim			
			core			rim	rim			
	Act	Mhb	Act	Mhb	Brs	Mhb	Ts	Fts	Fprg	Fprg
SiO_2	50.87	49.91	50.95	48.89	49.52	44.23	43.73	40.40	39.28	39.02
TiO_2	0.04	0.05	0.02	0.18	0.21	0.28	0.31	0.17	0.19	0.13
Al_2O_3	5.54	4.68	3.39	8.61	9.12	12.11	15.57	18.39	19.53	20.36
FeO*	13.89	14.52	14.20	13.73	16.07	18.81	17.74	19.38	20.34	21.15
MnO	0.10	0.51	0.48	0.13	0.08	0.12	0.06	0.14	0.15	0.10
MgO	12.28	13.24	13.90	12.95	11.99	8.95	7.75	5.64	4.18	3.61
CaO	11.60	12.12	12.01	10.69	9.68	10.82	10.29	10.90	11.26	11.54
Na_2O	0.59	0.50	0.43	1.27	1.88	1.71	2.08	2.04	1.85	1.65
K_2O	0.14	0.10	0.11	0.13	0.13	0.32	0.53	0.70	0.87	0.82
Total	95.05	95.63	95.49	96.58	98.68	97.35	98.06	97.76	97.65	98.38
O	23	23	23	23	23	23	23	23	23	23
Si	7.56	7.39	7.53	7.06	7.01	6.54	6.41	6.04	5.95	5.88
Ti	0.00	0.01	0.01	0.01	0.02	0.03	0.03	0.02	0.02	0.01
Al^{IV}	0.44	0.61	0.47	0.94	0.99	1.46	1.59	1.96	2.05	2.12
Al^{VI}	0.53	0.21	0.12	0.52	0.53	0.65	1.09	1.28	1.44	1.50
Fe^{3+}	0.00	0.38	0.40	0.70	0.94	0.76	0.51	0.42	0.20	0.23
Fe^{2+}	1.73	1.42	1.35	0.96	0.97	1.57	1.66	2.00	2.38	2.44
Mn	0.01	0.06	0.06	0.02	0.01	0.02	0.01	0.02	0.02	0.01
Mg	2.72	2.92	3.06	2.79	2.53	1.97	1.69	1.26	0.94	0.81
Ca	1.85	1.92	1.90	1.65	1.48	1.72	1.61	1.75	1.83	1.86
Na_B	0.15	0.08	0.10	0.35	0.52	0.28	0.39	0.25	0.17	0.14
Na_A	0.02	0.07	0.02	0.01	0.00	0.21	0.21	0.34	0.37	0.34
K	0.03	0.02	0.02	0.02	0.02	0.06	0.10	0.13	0.17	0.16
Total	15.05	15.09	15.04	15.03	15.02	15.27	15.30	15.47	15.54	15.50
$(Na+K)_A$	0.05	0.09	0.04	0.03	0.02	0.27	0.30	0.47	0.54	0.50
X_{Mg}	0.61	0.67	0.69	0.74	0.72	0.56	0.51	0.39	0.28	0.25

*Total ironas FeO, X_{Mg}=Mg/(Mg+Fe^{2+})

Abbreviations: In grt c, inclusion in garnet; In g fr, In garnet fracture; Analitical pnt, analitical point

Ferric iron is estimated as total cations 13=Si+Al+Ti+Cr+Mg+Fe+Mn (for Oxygen 23);

4.3.3 Plagioclase

Plagioclase shows two-fold zoning with increasing twice in anorthite content; e.g. $An_{1–11}$ in the core and $An_{8–13}$ in the mantle (Figs. 24b and 32). The maximum anorthite content reaches An_{18} at the outermost rim of plagioclase. Plagioclase occurring as polyphase inclusion in the porphyroblastic garnet has a high anorthite content (An_{18}). K-feldspar in the matrix is close to the end-member compositions of $Or_{98–99}$.

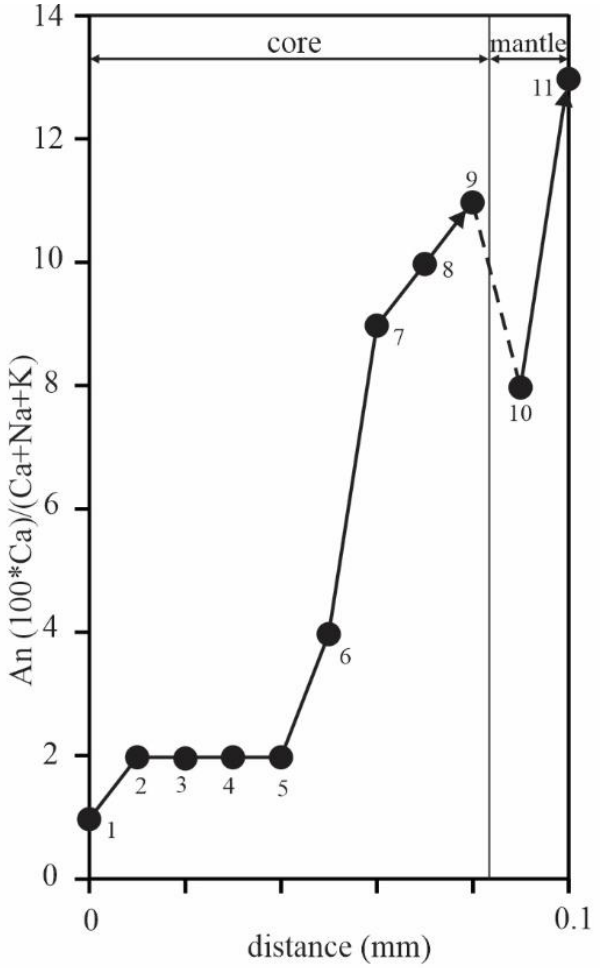


Fig. 32 Chemical compositions of plagioclase from the garnet amphibolite (KG1252A). Analytical points are shown in Fig. 24b.

4.3.4 Other mineral

Discrete epidote inclusions inclusion in the garnet have X_{Ps} ($Fe^{3+}/(Fe^{3+} + Al)$) 0.19–0.24. Epidote occurring as a constituent of the polyphase inclusion in the garnet has X_{Ps} (0.10–0.18). Epidote in the matrix shows a zoning with increasing of X_{Ps} from core (0.17–0.19) to rim (0.21–0.24). Epidote replacing garnet is X_{Ps} 0.11–0.15. Epidote occurring in the fracture of the porphyroblastic garnet has X_{Ps} 0.09–0.15 (Table 8).

Chlorite in the matrix shows compositional zoning with higher X_{Mg} (0.50–0.58) in the core and lower X_{Mg} (0.43–0.47) in the rim. Chlorite replacing garnet with X_{Mg} (0.48–0.53) and similar with X_{Mg} (0.48–0.50) to those occuring in the garnet fracture (Table 8). Chlorite occurring as polyphase inclusion together with epidote, muscovite has X_{Mg} (0.14–0.17) and with epidote, muscovite-phengite X_{Mg} (0.14–0.17)

Paragonite inclusion in garnet has Si 5.84–5.87 and X_{Na} 0.93–0.98, and paragonite occurring as a constituent of the polyphase inclusions in garnet has Si 5.95–5.99. White mica occurring as polyhpase inclusion in garnet together with epidote and chlorite are zoned, phengite core (Si 6.37–6.42 pfu) and muscovite rim (Si 6.03–6.29 pfu). Biotite occur in the matrix has higher X_{Mg} (0.47–0.49) than biotite replacing porphyroblastic garnet (X_{Mg} 0.38–0.43).

Table 8 Representative chemical compositions of epidote, chlorite and white mica in the garnet amphibolite (KG1252A).

Sample	KG1252A												
Mineral	Epidote							Chlorite				Ph	Ms
	In grt		Matrix		R grt		In g fr	Matrix		R grt	In g fr		
	core	rim	core	rim	core	rim		core	rim			core	rim
SiO_2	38.00	37.44	38.04	37.76	39.15	38.35	39.00	24.58	24.78	25.16	27.97	48.15	45.40
TiO_2	0.03	0.06	0.08	0.10	0.07	0.07	0.08	0.04	0.06	0.08	0.07	0.29	0.22
Al_2O_3	25.91	25.38	25.85	24.37	29.54	28.09	26.86	20.14	20.18	20.53	21.05	33.45	34.06
FeO*	8.93	11.16	8.57	10.74	5.00	6.96	7.68	24.00	29.20	24.43	23.65	3.74	3.41
MnO	0.16	0.16	0.09	0.17	0.22	0.11	0.34	0.12	0.17	0.08	0.13	0.02	0.00
MgO	0.03	0.03	0.01	0.01	0.08	0.03	0.00	16.85	12.47	15.62	13.14	0.71	0.81
CaO	23.38	23.23	23.35	22.46	23.55	23.58	23.62	0.00	0.06	0.05	0.23	0.12	0.24
Na_2O	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.43	0.75
K_2O	0.04	0.02	0.00	0.00	0.00	0.01	0.14	0.03	0.01	0.05	0.25	9.68	10.09
Total	96.48	97.48	95.99	95.62	97.61	97.21	97.72	85.77	86.98	86.00	86.49	96.59	94.98
O	25	25	25	25	25	25	25	14	14	14	14	22	22
Si	6.00	5.89	6.03	6.03	6.03	5.97	6.07	2.62	2.70	2.70	2.94	6.35	6.13
Ti	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.03	0.02
Al	4.82	4.71	4.83	4.59	5.36	5.16	4.93	2.53	2.59	2.59	2.61	5.20	5.42
Fe^{3+}	1.17	1.45	1.10	1.42	0.64	0.90	0.89	0.22	0.01	0.01	0.00	0.12	0.11
Fe^{2+}	0.01	0.01	0.03	0.01	0.01	0.01	0.11	1.92	2.65	2.18	2.08	0.29	0.28
Mn	0.02	0.02	0.01	0.02	0.03	0.01	0.04	0.01	0.02	0.01	0.01	0.00	0.00
Mg	0.01	0.01	0.00	0.00	0.02	0.01	0.00	2.68	2.02	2.50	2.06	0.14	0.16
Ca	3.96	3.92	3.97	3.85	3.88	3.93	3.94	0.00	0.01	0.01	0.03	0.02	0.03
Na	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.20
K	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.01	0.03	1.63	1.74
Total	16.00	16.02	15.98	15.93	15.98	16.00	16.02	9.98	10.01	10.02	9.77	13.89	14.09
X_{Ps}	0.19	0.24	0.19	0.24	0.11	0.15	0.15						
X_{Mg}								0.58	0.43	0.53	0.50		
X_{Na}												0.06	0.10

*Total iron as FeO; X_{Ps}=(Fe^{3+} / Fe^{3+} + Al); X_{Mg}=Mg/(Mg + Fe^{2+}); X_{Na}=Na/(Na+K).
Abbreviations: In grt, inclusion in the garnet; R grt, Replacing garnet; In g fr, in garnet fracture; Ana pnt, analitical point.
Fe^{3+} contents in epidote, phengite, muscovite and chlorite are examined using the AX program (Holland and Powell 1998).

CHAPTER 5

MINERAL PARAGENESIS AND METAMORPHIC CONDITIONS

5.1 Garnet-free pelitic schist (KG1251; KG1252B)

White mica in garnet-free pelitic schist (KG1251) are compositionally zoned shows only phengite in core and rim (Si 6.84–6.40 pfu), but garnet-free pelitic schist (KG1251) are compositionally zoned difference, core is phengite and rim is muscovite (Si 7.06–6.30 pfu).

Chlorite has high higher-X_{Mg} (0.79–0.81) (KG1251) and lower-X_{Mg} (0.68–0.70) (KG1252B) in the matrix.

Plagioclase in the matrix show only albite (An_5) (KG1251). A plagioclase grain shows a dark core ($An_{4–5}$) and a bright rim (An_{6-15}) in BEI (albite to oligoclase; KG1252B).

Only in garnet-free pelitic schist (KG1252B) was found epidote in the matrix with increasing of X_{Ps} from core (0.11–0.13) to rim (0.14–0.16).

Based on the texture and mineral chemistry only peak metamorphic condition has been distinguished in the garnet-free pelitic schist (KG1251) and garnet-free pelitic schist (KG1252B) two metamorphic events, first and subsequent second events are distinguished (Fig. 33).

The peak metamorphic conditions of garnet-free pelitic schist (KG1251) are defined by the schistosity-forming minerals of phengite (KG1251 max. Si 6.84 pfu; KG1252B max. Si 7.06 pfu), chlorite (KG1251 X_{Mg}=0.79–0.81; KG1252B X_{Mg} = 0.68–0.70), albite (KG1251 An_5; KG1252B An_{4-5}), rutile and quartz. The absence of garnet and the presence of chlorite suggest that the peak metamorphic temperature did not cross over the garnet-in reaction line (1),

Fe-richer chlorite + quartz = garnet + Mg-richer chlorite + H_2O ------- (1)

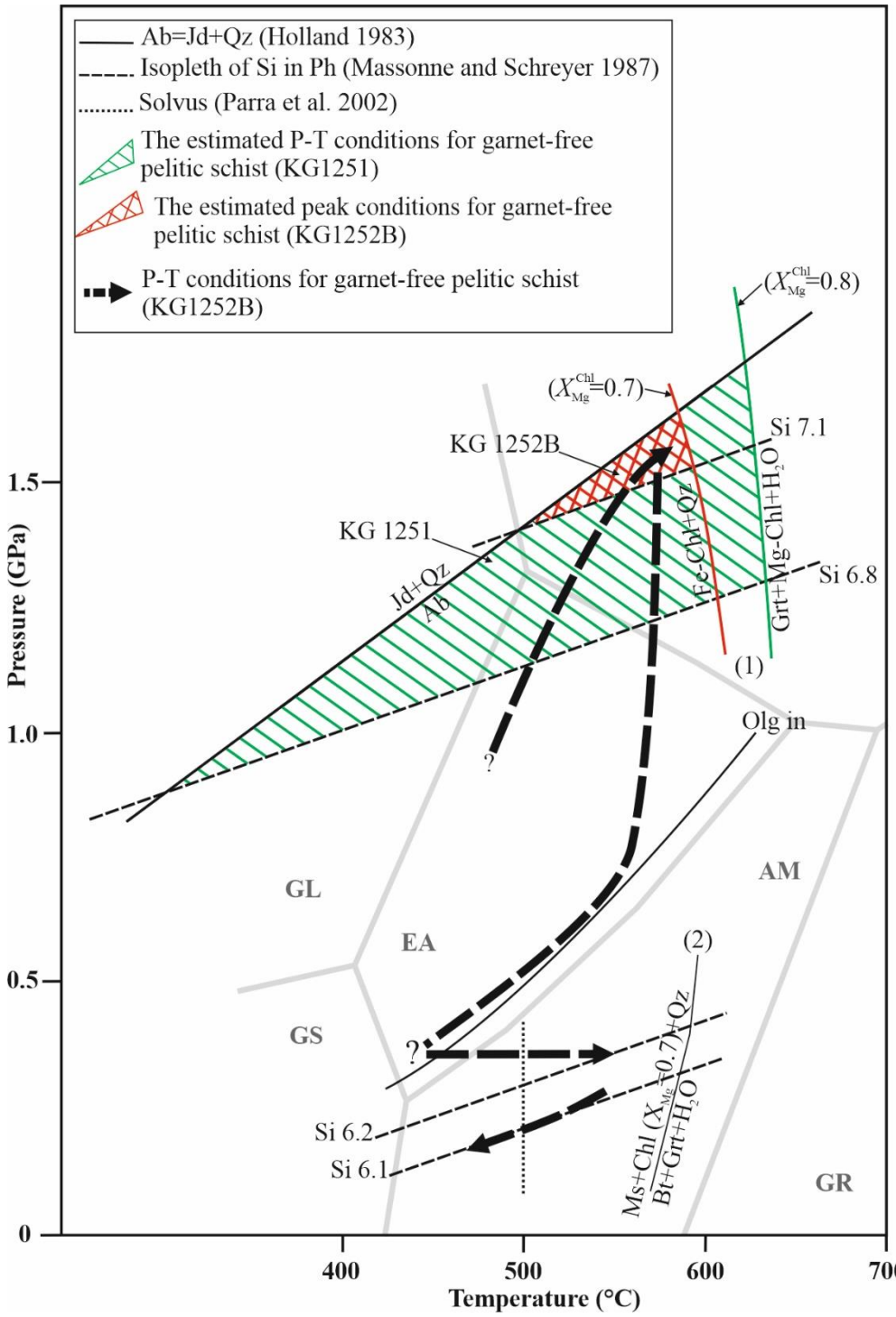


Fig. 33 Estimated P-T conditions for the garnet free-pelitic schist (KG1251; KG1252B). Metamorphic facies boundaries are after Takasu (1989). EC, eclogite facies; GL, glaucophane schist facies; EA, epidote-amphibolite facies; AM, amphibolite facies; GS, greenschist facies; GR, granulite facies.

Using activity models of garnet (Holland and Powell 1998) and chlorite (Holland et al., 1998) garnet-in line of the continuous reaction (1) for rock consisting of Mg-rich chlorite (KG1251 X_{Mg}=0.8; KG1252B X_{Mg} = 0.7) and quartz constraints the maximum temperature of 630 °C (KG1251) and 600 °C (KG1252B) at the minimum pressure obtained by maximum Si content in phengite (KG1251 Si 6.84; KG1252B Si 7.06 pfu; Massonne and Schreyer, 1987). The absence of jadeite and the presence of albite represent the maximum pressure, and constraint of the peak metamorphism as T < 630 °C; P = 0.9–1.7 GPa (KG1251); KG1252B T = 500–600 °C and P = 1.4–1.6 GPa (KG1252B), is obtained (Figs. 33).

The subsequent second events of garnet-free pelitic schist (KG1252B) is defined by the muscovite (Si 6.26–6.16 pfu) overgrown on the matrix phengite and the plagioclase (albite to oligoclase An_{6-15}) overgrown on the matrix albite (An_{4-5}). The absence of garnet and biotite, and the presence of chlorite and muscovite during the second metamorphic event suggest the metamorphic temperature is lower than the following temperature-sensitive reaction (2) (Fig. 33),

muscovite + chlorite + quartz = biotite + garnet + H_2O --------- (2)

This reaction is divariant in the system K_2O-FeO-MgO-Al_2O_3-SiO_2-H_2O. Using activity models of garnet (Holland and Powell 1998), chlorite (Holland et al. 1998) muscovite (Coggon and Holland 2002) and biotite (Powell and Holland 1999), the location of the X_{Mg} isopleth for the observed chlorite composition (highest X_{Mg}=0.7) is calculated using THERMOCALC program (Fig. 33). Si content (6.26-6.16) of muscovite constrains the minimum pressure (Massonne and Schreyer 1987), and the intersection with the reaction line (2) represents the maximum temperature of ~580 °C and the minimum pressure of ~0.4 GPa.

In the absence of paragonite, the maximum solubility of paragonite component into muscovite constrains the minimum temperature by the muscovite-paragonite solvus. The

maximum X_{Na} of muscovite in the second metamorphic event is 0.09, indicating a minimum temperature of ~500 °C using the solvus configuration of Parra et al. (2002). Thus, the peak metamorphic temperature of the second metamorphic event is constrained in the range of 500–580 °C (Fig. 34).

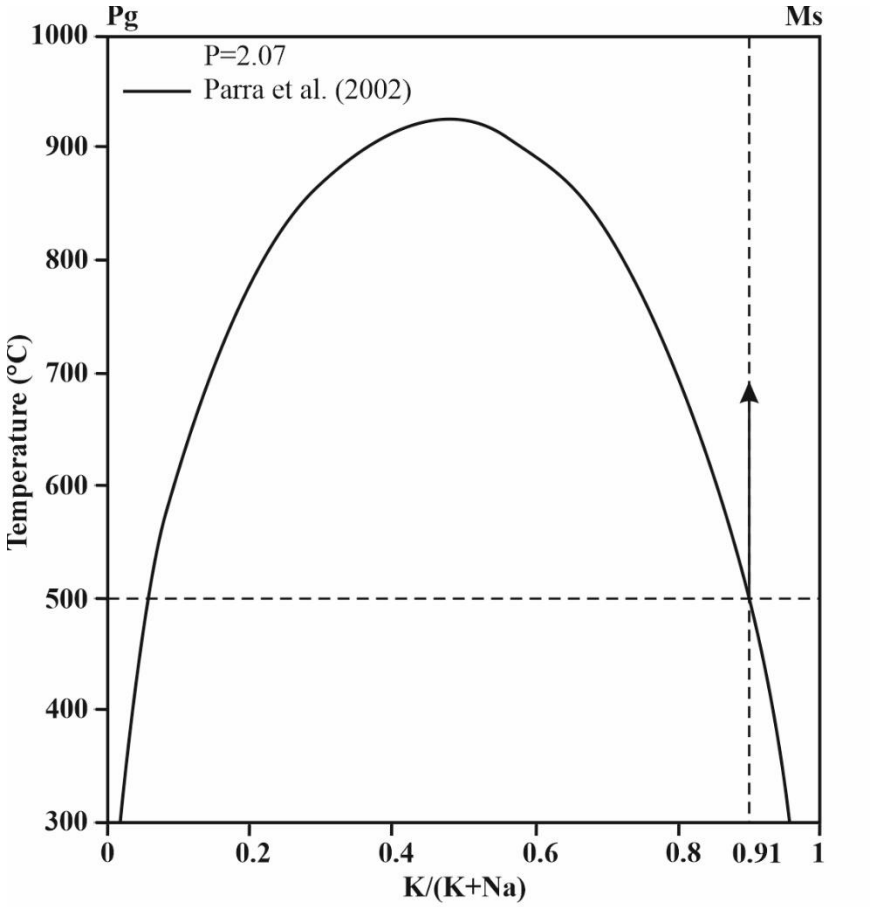


Fig. 34 Paragonite-muscovite solvus in the NKASH system at 2.07 kbar (continuous line) (Parra et al. 2002). The maximum solubility of paragonite component into muscovite constrains the minimum temperature by the muscovite-paragonite solvus in the garnet-free pelitic schist (KG1252B).

5.2 Garnet and chloritoid-bearing pelitic schist (KG1244)

Based on the texture and chemical compositions of the constituent minerals two metamorphic events, i.e. first and second metamorphic events, are distinguished in the garnet and chloritoid-bearing pelitic schists (KG1244).

The first metamorphic event is further divided into the prograde to peak metamorphic stage and the retrograde stage (Fig. 35). The prograde to peak metamorphic stage is defined by garnet (X_{Prp} 0.04–0.08, X_{Sps} 0.12–0.02), minerals included in the garnet such as chloritoid (X_{Mg} = 0.12–0.17), tourmaline, calcite, rutile, ilmenite and quartz, and the matrix minerals of phengite (Si 6.94–6.74), chlorite core (X_{Mg} = 0.41–0.46), chloritoid (X_{Mg} = 0.12–0.18) and albite ($An_{1–5}$).

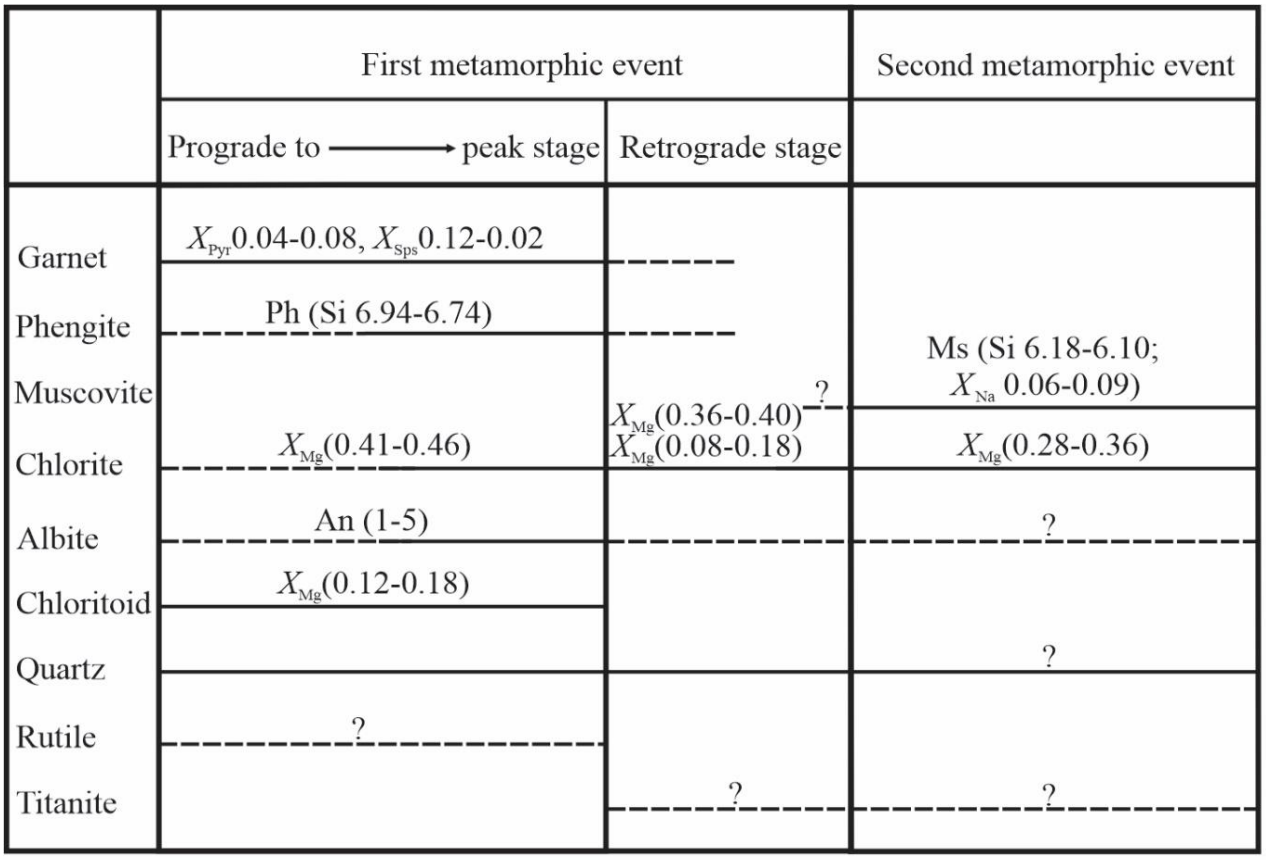


Fig. 35 Mineral paragenesis of the garnet and chloritoid-bearing pelitic schists (KG1244). Solid lines indicate the presence as major constituent and broken lines indicate minor or sporadic occurrence.

The peak metamorphic conditions of the first metamorphic event were estimated by the rim of garnet and the core of schistosity-forming chlorites. The rim of the chlorite is slightly rich in Fe^{2+} compared with the core, and it is supposed to be developed at the timing of the garnets beginning to decompose just after the peak metamorphism. Therefore, it is considered non-equilibrium with the rim of the garnet. The K_D values between the rim of garnet and the core of chlorite range between 0.11 and 0.13. The maximum Si content of schistosity-forming phengite (Si 6.94) indicates a minimum pressure, because biotite and K-feldspar are not identified in the sample (Massonne and Schreyer, 1987). The absence of jadeite and the presence of albite indicate the maximum pressure (Holland, 1983). The garnet-chlorite Fe^{2+} -Mg exchange geothermometer (Grambling, 1990) and the geobarometers describe above suggest the peak metamorphic conditions of 485–545 °C and 1.2–1.5 GPa (Fig. 36; Table 9). According to the petrographic description the rim of the garnet coexists with phengite of the core of schistosity-forming white mica. K_D values of garnet and phengite pairs range between 17 and 21. The garnet-phengite Fe^{2+} -Mg exchange geothermometer (Green and Hellman, 1982) and the geobarometers described above give 505–540 °C and 1.2–1.5 GPa (Fig. 36; Table 9). Phengite core of the white mica experienced resorption after the peak metamorphic stage, and the chemical compositions representing the peak stage were possibly lost or modified during retrograde metamorphism. Therefore garnet-phengite thermometry does not exactly represent the peak metamorphic temperatures.

The retrograde stage of the first metamorphic event is defined by the minerals occurring in the fracture of the porphyroblastic garnets, i.e. chlorite with lower X_{Mg} (0.08–0.18) and quartz. The rim of the schistosity-forming chlorite (X_{Mg} 0.40–0.36) is likely to be developed at the initial stage of the retrograde metamorphism.

The second metamorphic event is defined by muscovite (Si 6.18–6.10 pfu, X_{Na} 0.06–0.09), overgrowing on the resorbed peak stage phengite. Chlorite with higher X_{Mg} (0.28–0.36), muscovite

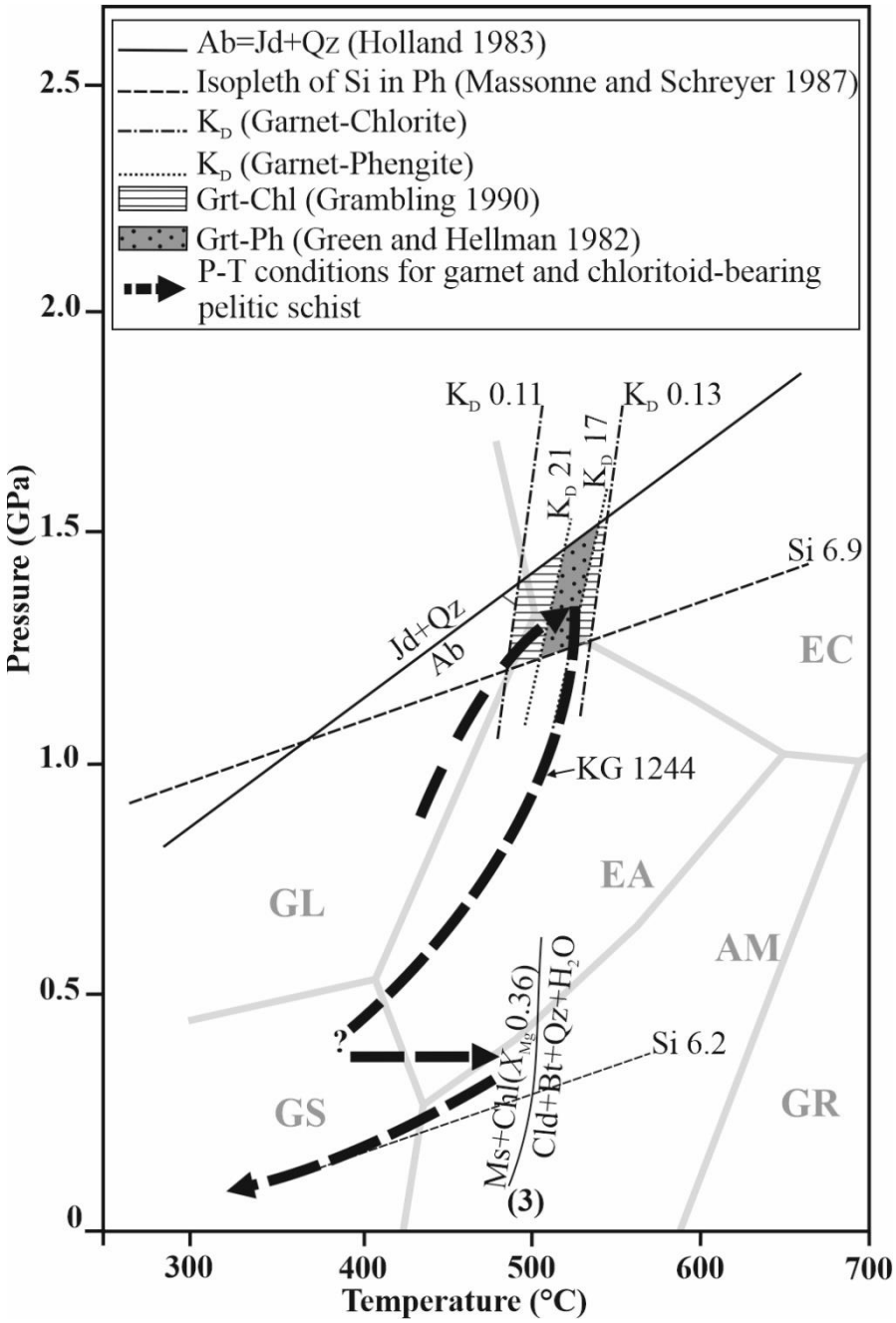


Fig. 36 Estimated P-T conditions for the garnet and chloritoid-bearing pelitic schist (KG1244). Metamorphic facies boundaries are after Takasu (1989). EC, eclogite facies; GL, glaucophane schist facies; EA, epidote-amphibolite facies; AM, amphibolite facies; GS, greenschist facies; GR, granulite facies. K_D isopleths for Grt-Ph and Grt-Chl geothermometers are from Green and Hellman (1982) and Grambling (1990), respectively.

(Si 6.16–6.27 pfu, X_{Na} 0.07–0.09) and quartz occurring in the fracture of the porphyroblastic garnet also represent the minerals stable during the second metamorphic event.

The absence of biotite and chloritoid, and the presence of muscovite and chlorite during the second metamorphic event suggest the metamorphic temperature for this event is lower than the following temperature-sensitive reaction (2) (Fig. 36),

muscovite + chlorite = chloritoid + biotite + quartz + H_2O ----- (3)

The location of the reaction (2) is calculated for KFMASH system using THERMOCALC ver. 3.33 with an updated version of the internally consistent thermodynamic dataset of Holland and Powell (1998). The AX2 program is used to calculate the mineral activity, and the activity of H2O is assumed to be unity. We have used the highest X_{Mg} of chlorite (0.36) and the highest Si contents in muscovite (6.18 pfu) for the calculation of reaction (2). This reaction represents the maximum temperature limit of the second metamorphic event. The Si content of muscovite (max. Si 6.18 pfu) without K-feldspar and biotite indicates a minimum pressure (Massonne and Schreyer, 1987), and the intersection with the reaction (2) represent maximum temperature of about 500 °C and the minimum pressure of about 0.3 GPa (Figs. 36).

In the absence of paragonite, the maximum solubility of paragonite component into muscovite constrains the minimum temperature by the muscovite-paragonite solvus. The maximum X_{Na} of muscovite in the second metamorphic event is 0.09 indicating a minimum temperature of about 500 °C using the solvus configuration of Parra et al., (2002) (Fig. 34). Thus, the reaction (2) and the muscovite-paragonite solvus represent the peak metamorphic conditions of this metamorphic event as about 500 °C and minimum pressure of about 0.3 GPa (Fig. 36).

Table 9 Representative estimated temperatures at 1.3 GPa for the garnet and chloritoid-bearing pelitic schist (KG1244)

	Garnet	Chlorite	Garnet	Chlorite	Garnet	Phengite	Garnet	Phengite
	rim	core	rim	core	rim	matrix	rim	matrix
SiO_2	37.63	25.30	37.62	23.00	37.55	51.52	37.79	50.78
TiO_2	0.25	0.07	0.03	0.07	0.05	0.20	0.05	0.19
Al_2O_3	20.70	20.20	20.85	21.71	20.87	25.89	20.68	26.09
FeO*	34.61	27.41	34.51	28.69	34.57	3.47	33.96	3.68
MnO	0.93	0.07	1.05	0.15	1.05	0.01	1.09	0.03
MgO	1.76	13.23	1.84	11.42	1.78	3.46	1.80	3.31
CaO	4.89	0.00	4.59	0.01	4.61	0.01	4.95	0.01
Na_2O	0.00	0.01	0.01	0.00	0.01	0.19	0.02	0.08
K_2O	0.05	0.05	0.05	0.05	0.04	10.34	0.02	11.05
Total	100.82	86.34	100.55	85.13	100.53	95.09	100.36	95.22
O	12	14	12	14	12	22	12	22
Si	3.01	2.74	3.02	2.56	3.02	6.91	3.03	6.85
Ti	0.02	0.01	0.00	0.01	0.00	0.02	0.00	0.02
Al	1.95	2.58	1.97	2.85	1.98	4.09	1.97	4.15
Fe^{3+}	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00
Fe^{2+}	2.32	2.49	2.32	2.64	2.32	0.36	2.28	0.41
Mn	0.06	0.01	0.07	0.01	0.07	0.00	0.07	0.00
Mg	0.21	2.14	0.22	1.89	0.21	0.69	0.22	0.67
Ca	0.42	0.00	0.39	0.00	0.40	0.00	0.43	0.00
Na	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.02
K	0.01	0.01	0.01	0.01	0.00	1.77	0.00	1.90
Total	8.00	9.97	8.00	10.00	8.00	13.92	8.00	14.02
K_D	0.11		0.13		21		17	
P GPa	1.3		1.3		1.3		1.3	
T°C	485		545		505		540	

*Total iron as FeO

5.3 Garnet amphibolite (KG1252A)

Based on petrographic observation and mineral chemistry, two distinct metamorphic events, first and second metamorphic events, are recognized in the garnet amphibolite (KG1252A). The first metamorphic event is further divided into prograde to peak and retrograde stages (Fig. 37).

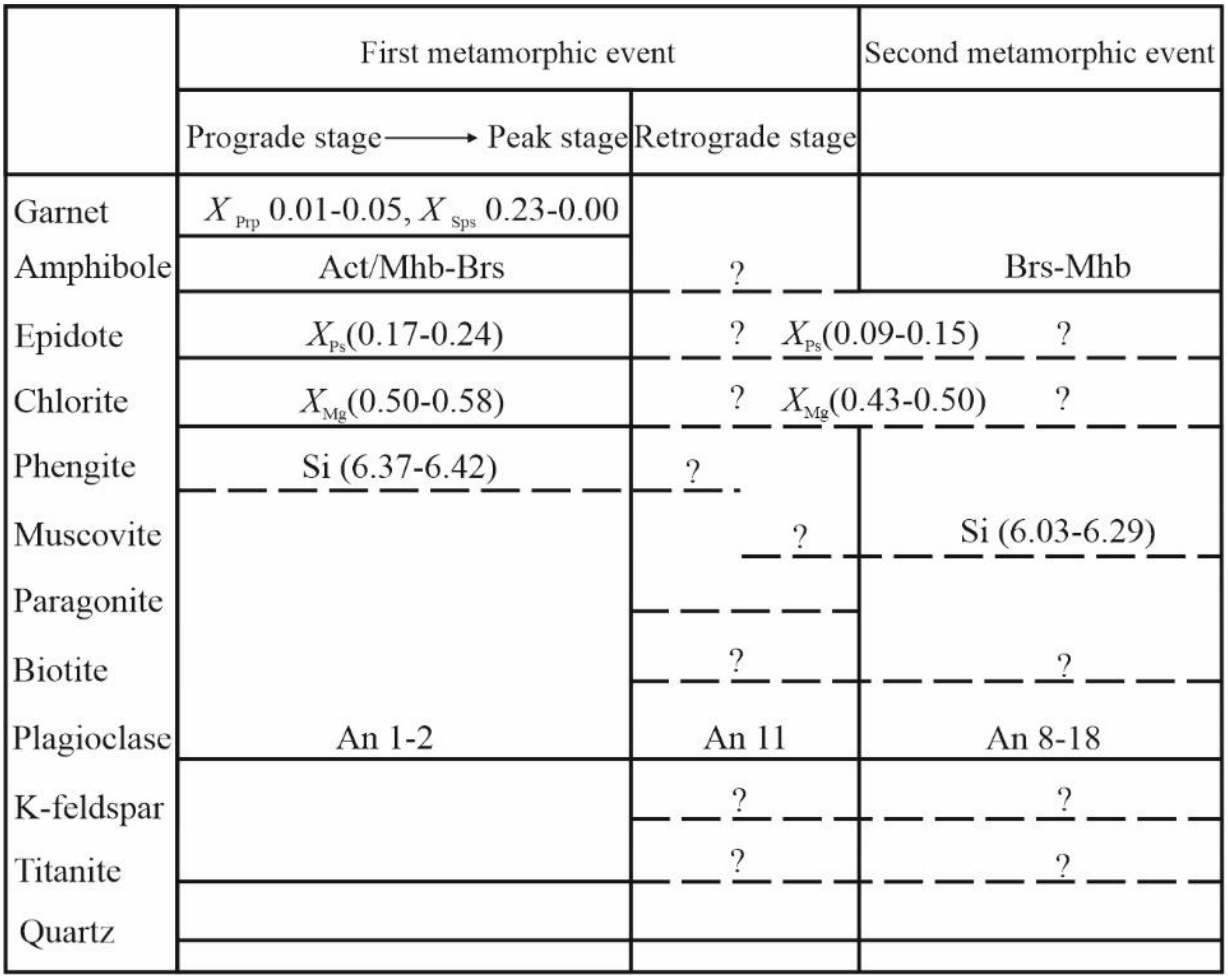


Fig. 37 Mineral paragenesis of the garnet amphibolite (KG1252A). Solid lines indicate the presence of major constituents, broken lines indicate minor or sporadic mineral occurrences.

2-fold zoning, i.e. core and rim (mantle), of amphibole and plagioclase is the most important evidence to distinguish the first and the second metamorphic events. Amphibole displays resorption-overgrowth texture, and the rims of amphibole and plagioclase show a prograde type zoning.

The prograde to peak stage of the first metamorphic event is defined by porphyroblastic garnet (X_{Prp} 0.01–0.05, X_{Sps} 0.23–0.00), mineral inclusions in the garnet such as amphibole (actinolite), epidote (X_{Ps}=0.19–0.24), phengite (Si=6.37–6.42), titanite, calcite and quartz, and the core of matrix amphibole (actinolite to magnesiohornblende-barroisite), plagioclase core ($An_{1–2}$), epidote (X_{Ps}=0.17–0.24) and chlorite (X_{Mg}=0.50–0.58) in the matrix.

Amphibole and plagioclase in the matrix show two-fold zoning of the core and the rim. The core and rim of these matrix minerals are considered to be stable during the first and the second metamorphic events, respectively.

The peak metamorphic conditions of the first metamorphic event were estimated by the maximum Si of the phengite (Si 6.42) indicates a minimum pressure, because biotite and K-feldspar are not identified in the peak paragenesis (Massonne and Schreyer, 1987). The absence of jadeite and the presence of albite constrain the maximum pressure (Holland, 1983).

The amphibole-plagioclase geothermometer (Holland and Blundy, 1994) and the pressure constraints describe above give 580–595 °C and 0.8–1.6 GPa.

THERMOCALC (v. 3.33) (Powell and Holland, 1994) with an updated version of the internally consistent thermodynamic data set (Holland and Powell, 1998) was used for application of the average P-T calculation mode to estimate the peak P-T conditions of the garnet amphibolite. Quartz and H_2O are present in peak assemblages. The activities of the minerals used for the P-T estimations are obtained using the AX program (Holland and Powell, 1998). In the calculation, the

activity of H_2O is assumed to be unity. End-members with very low activities (< 0.0001) were excluded from the calculation. If σ_{fit} indices [a measure of the scatter in the residuals (e*) of the enthalpies and activities of each end-member] exceeded the value allowable for 95% confidence in the P-T result, then the most suspect activity (largest e*) was removed before the calculation was re-run (Dale and Holland, 2003). A THERMOCALC calculation for the peak stage garnet rim (X_{Prp} 0.05, X_{Sps} 0.00, X_{Grs} 0.32) + amphibole core (barroisite: Al^{IV} 1.15, Na_B 0.86) + matrix epidote (X_{Ps} 0.24) + matrix chlorite core (X_{Mg} 0.58) of the garnet amphibolite yields P-T conditions of T = 575 ± 29 °C and P = 1.4 ± 0.3 GPa. The correlation between the uncertainties on pressure and temperature -0.447 and a goodness-of-fit parameter describing the averaging of equilibria 1.60 (Fig. 38; Table 10).

It is difficult to distinguish minerals formed during the retrograde stage of the first metamorphic event and the second metamorphic event. In the core of plagioclase, the An content increases from albite (An_{1-2}) to oligoclase (An_{4-11}). Thus the initial retrograde P-T path is constrained by the oligoclase-in line (Maruyama et al. 1983), and nearly isothermal decompression path is displayed (Fig. 38).

The minerals developed in the fracture of the porphyroblastic garnet, i.e. amphibole (magnesiohornblende), chlorite X_{Mg} (0.48–0.50) and epidote (X_{Ps} 0.09–0.15), and matrix chlorite rims are developed after the peak metamorphic stage, but it is impossible to distinguish between the retrograde stage just after the peak metamorphism and the second metamorphic event (Fig. 38). The second metamorphic event is defined by amphibole (magnesiohornblende Na_B 0.48–0.22) overgrowing on the resorbed core of the amphibole, muscovite (Si 6.03–6.29), plagioclase rim (An_{18}) and quartz. Pressure constraints by Si of muscovite (Massonne and Schreyer, 1987) and NaM_4 of calcic amphibole (Brown, 1977), and the amphibole-plagioclase geothermometer

(Holland and Blundy, 1994) indicate the peak metamorphic conditions of the second metamorphic event of T = 600 °C and P = 0.4 GPa (Figs. 38).

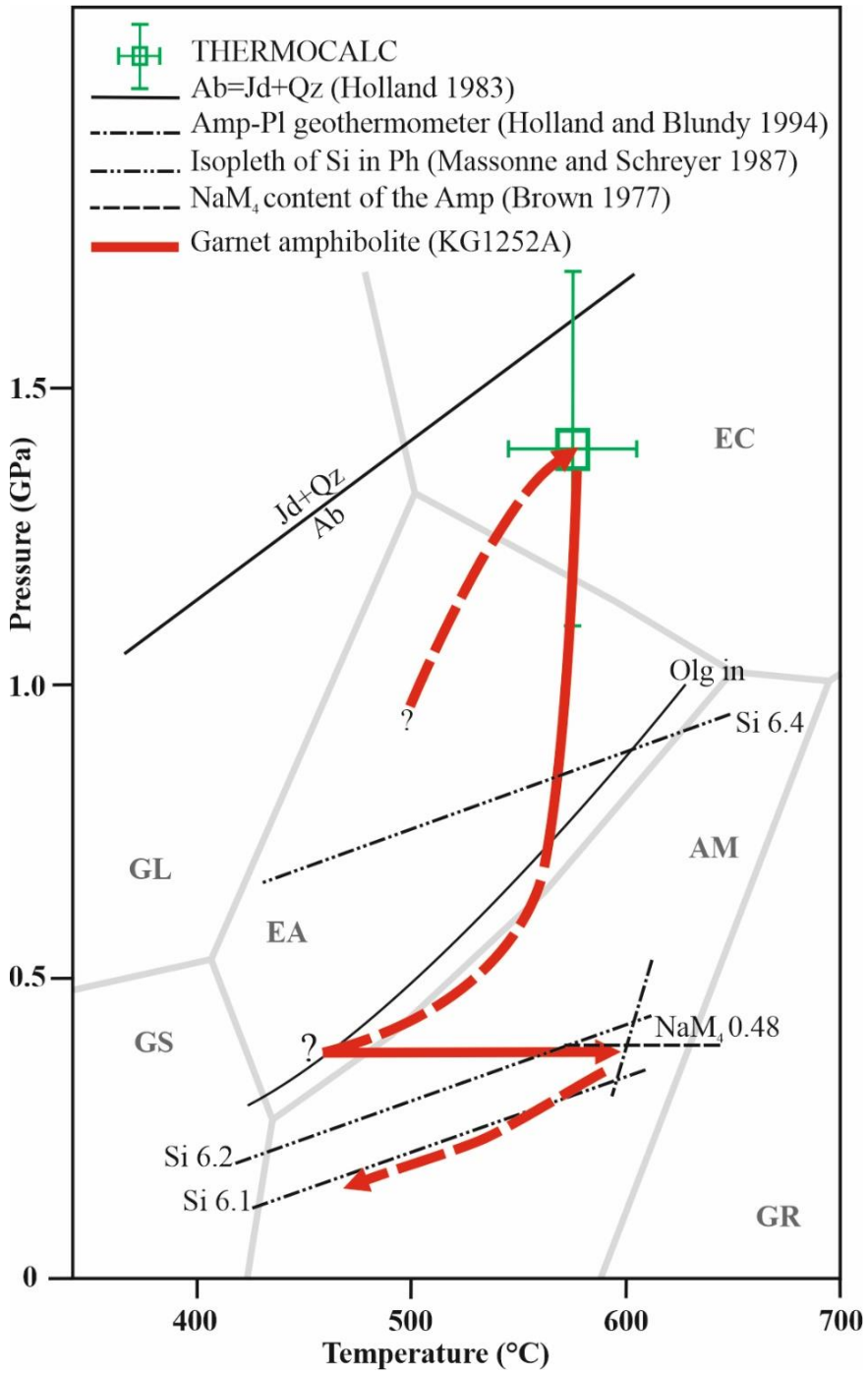


Fig. 38 Estimated P-T conditions for the garnet amphibolite (KG1252A). P-T boundaries of the metamorphic facies are after Takasu (1989). The oligoclase-in (Olg-in) line is from Maruyama et al., (1983). Jd+Qz=Ab reaction is from Holland (1983). EC, eclogite facies; GL, glaucophane schist facies; EA, epidote-amphibolite facies; AM, amphibolite facies; GS, greenschist facies; GR, granulite facies.

Table 10 Independent set of reactions of THERMOCALC calculations for peak stage

Reactions
82pyrope + 144clinozoisite + 27tremolite + 12clinochlore = 16grossular + 147tschermakite
4grossular + 9tschermakite + 6quartz = 4pyrope + 12clinozoisite + 3tremolite
19tschermakite = 14pyrope + 16clinozoisite + 3tremolite + $8H_2O$
74grossular + 25almandine + 18daphnite + 147quartz = 78clinozoisite + 33ferroactinolite
102pyrope + 144clinozoisite + 27tremolite + 12daphnite = 16grossular + 20almandine + 147tschermakite
T=575 ℃ SD (T)=29 P=1.4 GPa SD (P)=0.3 Corr. -0.447 Sigfit 1.60

SD, standard deviation; Corr, correlation between the uncertainties on pressure and temperature;
Sigfit, a goodnees-of-fit parameter describing the averaging of equilibria (Powell and Holland, 1994)

CHAPTER 6

K-AR AGES OF THE PELITIC SCHIST

6.1 K-Ar age

6.1.1 Analytical methods

K-Ar ages of the white micas were determined by Geospace Science Co., Ltd. The K content of each mineral separates were measured by flame spectrophotometry. Analytical precision was better than 2%. 25 to 30 mg samples were degassed under vacuum at aproximately 100 °C for ten to twelve hours before analysis to reduce atmospheric contamination. Argon was extracted during complete sample fusion in a Mo crucible heated by a radio frequency furnace and mixed with a known amount of ^{38}Ar spike and purified in a pyrex glass extraction line. Measurements were done in static mode with an AEI MS-10 mass-spectrometer with a permanent magnet of 4.1 kG and connected to a computer for data processing. Analytical precision on ^{40}Ar and ^{38}Ar peak heights was higher than 0.5% and 1% on ^{36}Ar.

6.1.2 Chemical compositions of separated white micas and obtained K-Ar ages

Samples of the garnet-free pelitic schist (KG1251) and the garnet and chloritoid-bearing pelitic schist (KG1244) were treated for K-Ar dating. We carefully obtained from the pelitic schist matrix, hand-crushed, and sieved to separate grains coarser than 0.075 mm (sieve #200). White mica were separated by hand-picking and were concentrated using an isodynamic separator and paper shaking.

Chemical compositions of the minerals separates were verified by electron probe microanalyzers (EPMA) (JEOL JXA-8800M and JXA-8530F). White micas were separated from the garnet-free pelitic schist (KG1251) and the garnet and chloritoid-bearing pelitic schist

(KG1244) for K-Ar age dating. Chemical compositions of separated white mica grains and K-Ar ages obtained are shown in Fig. 39 and Tables 11.

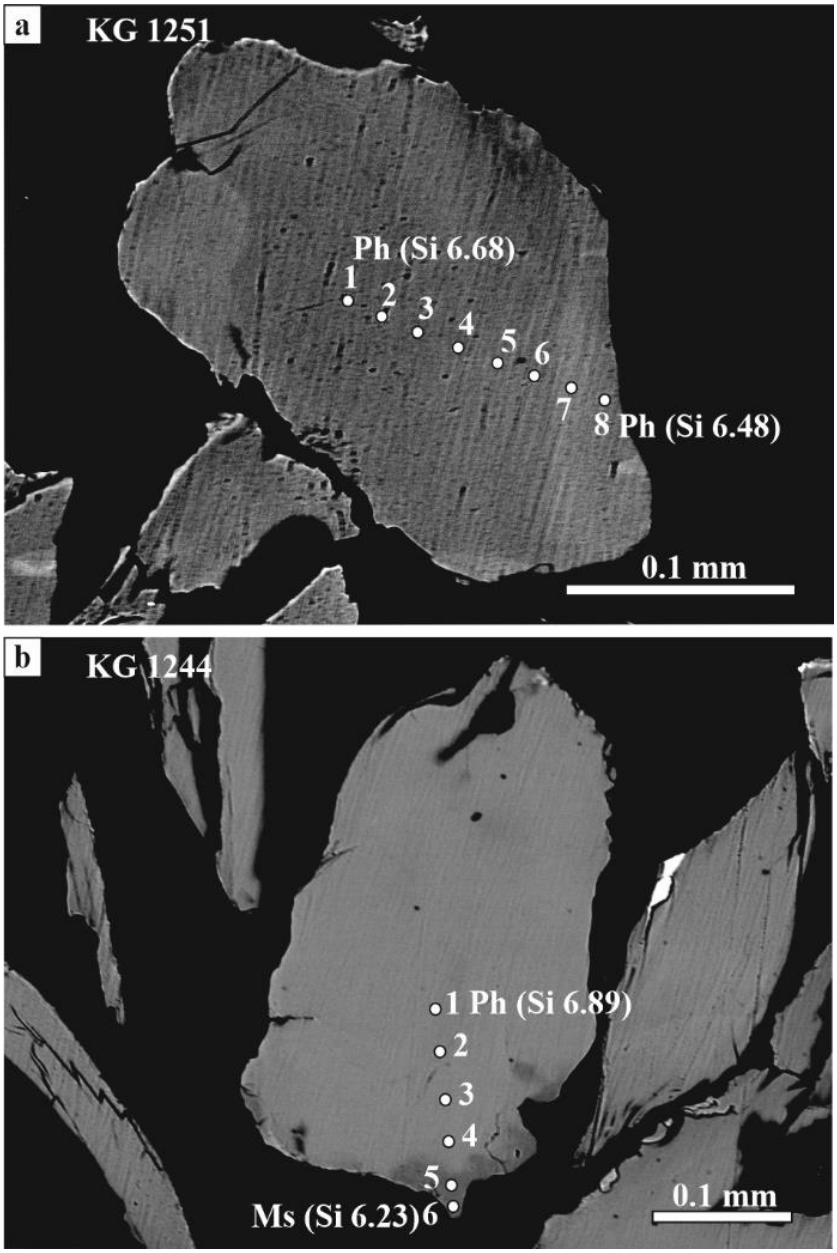


Fig. 39 (a) Separated white mica grain shows a slight zoning (KG1251). (b) Separated white mica showing a zoning from phengite core to muscovite rim (KG1244).

The white micas in the garnet-free pelitic schist (KG1251) are of phengite in composition and Si contents range 6.68–6.48 pfu (X_{Na} 0.05–0.08, Fe^{2+} + Mg 0.76–0.60 pfu, X_{Mg} 0.82–0.79) (Figs. 39 and 40). A phengite core of the white mica from the garnet and chloritoid-bearing pelitic schist (KG1244) has Si ranging 6.89–6.84 pfu (X_{Na} 0.01–0.02, Fe^{2+} + Mg 1.07–1.02 pfu, X_{Mg} 0.61–0.62), and a muscovite rim has Si ranging 6.26–6.23 pfu (X_{Na} 0.08–0.07, Fe^{2+} + Mg 0.45–0.35 pfu, X_{Mg} 0.37–0.39) (Figs. 39 and 40; Table 11). The compositions of white mica grains separated from the samples are highly consistent with the white micas in thin sections, and hence are representative of the mineral population in the garnet-free pelitic schist and garnet and chloritoid-bearing pelitic schist for the K-Ar dating (Fig. 41).

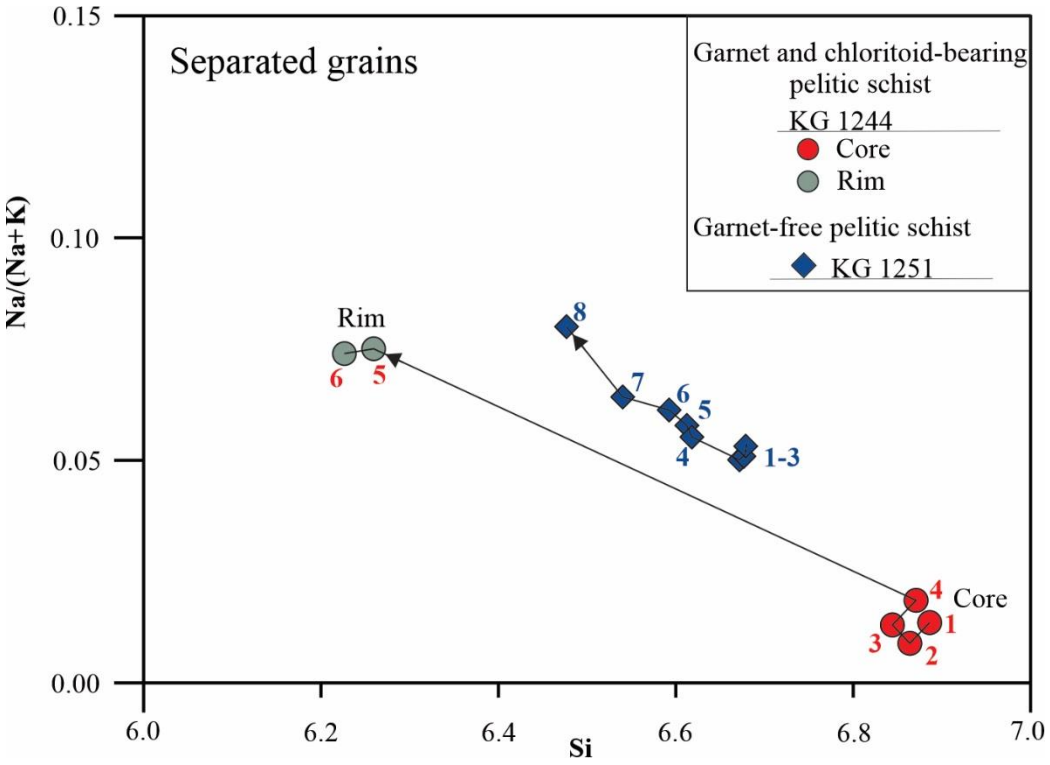


Fig. 40 Chemical compositions of separated phengites from the garnet-free pelitic schist (KG1251) and white micas from garnet and chloritoid-bearing pelitic schist (KG1244). Analytical points are shown in figures 39a and 39b. Arrows indicate Si contents decreasing from core to rim.

Table 11 Representative chemical compositions of separated white micas from garnet-free pelitic schist (KG1251) and garnet and chloritoid-bearing pelitic schist (KG1244)

Sample	KG 1251					KG 1244				
Mineral	Phengite					White mica				
	core	→	→	→	rim	core	core	core	rim	rim
SiO_2	50.85	50.71	49.96	49.58	48.39	51.11	51.13	50.96	45.90	45.88
TiO_2	0.23	0.25	0.32	0.39	0.64	0.23	0.22	0.21	0.35	0.28
Al_2O_3	29.34	29.36	30.09	30.53	30.85	25.96	26.06	26.00	32.87	33.79
FeO*	1.26	1.19	1.21	1.13	1.10	3.59	3.71	3.52	2.50	1.90
MnO	0.00	0.00	0.03	0.02	0.00	0.01	0.06	0.01	0.00	0.00
MgO	3.20	3.14	2.93	2.92	2.40	3.14	3.29	3.22	0.82	0.69
CaO	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.42	0.40	0.48	0.50	0.62	0.10	0.07	0.14	0.59	0.58
K_2O	11.37	11.31	11.24	11.11	10.83	11.07	11.15	11.09	10.97	10.91
Total	96.67	96.37	96.26	96.18	94.83	95.21	95.68	95.15	94.00	94.03
O	22	22	22	22	22	22	22	22	22	22
Si	6.68	6.68	6.60	6.55	6.48	6.89	6.86	6.87	6.26	6.23
Ti	0.02	0.02	0.03	0.04	0.06	0.02	0.02	0.02	0.03	0.03
Al	4.55	4.56	4.68	4.75	4.87	4.13	4.12	4.13	5.28	5.41
Fe^{3+}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe^{2+}	0.14	0.13	0.13	0.13	0.12	0.40	0.42	0.40	0.29	0.22
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Mg	0.63	0.62	0.58	0.57	0.48	0.63	0.66	0.65	0.17	0.14
Ca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na	0.11	0.10	0.12	0.13	0.16	0.03	0.02	0.04	0.16	0.15
K	1.91	1.90	1.89	1.87	1.85	1.90	1.91	1.91	1.91	1.89
Total	14.04	14.01	14.03	14.04	14.02	14.00	14.02	14.02	14.10	14.07
X_{Mg}	0.82	0.82	0.81	0.82	0.79	0.61	0.61	0.62	0.37	0.39
X_{Na}	0.05	0.05	0.06	0.06	0.08	0.01	0.01	0.02	0.08	0.07
Fe^{2+}+Mg	0.76	0.75	0.71	0.70	0.60	1.03	1.07	1.04	0.45	0.35

*Total iron as FeO, X_{Mg}=Mg/(Fe^{2+}+Mg), X_{Na}=(Na/(Na+K)

The white mica concentrates separated from the garnet-free pelitic schist (KG1251) and the garnet and chloritoid-bearing pelitic schist (KG1244) yielded ages of 524 ± 13 Ma and 474 ± 12 Ma, respectively (Fig. 41). The K-Ar white mica (muscovite) ages are generally interpreted to date last cooling through the closure temperature of argon system in the grain (ca. 350–430 °C; Purdy and Jäger, 1976; McDougall and Harrison, 1988; Blanckenburg et al., 1989; Kirschner et al., 1996).

Sample No.	Material analyzed	Isotophic Age (Ma)	Rad. ^{40}Ar (scc/gx10^{-5})	%Rad. ^{40}Ar	%K
KG 1251	Phengite	524±13	15.6 15.5	97.5 98.7	6.59 6.58
KG 1244	Phengite/ Muscovite	474±12	17.7 17.8	98.5 97.8	8.43 8.43

Fig. 41 K-Ar analytical data of white mica for garnet-free pelitic schists (KG1251) and garnet and chloritoid-bearing pelitic schists (KG1244) of the Makbal Complex.

6.2 Interpretation of the K-Ar ages

The peak metamorphic temperature of the garnet-free pelitic schists (KG1251) is loosely constrained as < 630 °C, at pressure of 0.9–1.7 GPa, and it is similar to or higher than the closure temperature of muscovite in the K-Ar system (350–430 °C; Purdy and Jäger, 1976). Therefore, the K-Ar age of 524 ± 13 Ma obtained by the present study represents approximate peak metamorphic age or cooling age (Fig. 42).

The white mica from the garnet and chloritoid-bearing pelitic schists (KG1244) yielded a K-Ar age of 474± 12 Ma. This age is obviously younger than that of garnet-free pelitic schist. The garnet and chloritoid-bearing pelitic schist experienced two distinct metamorphic events, high-P/T metamorphism (T = 485–545 °C, P = 1.2–1.5 GPa) and subsequent low-P/T metamorphism (T =

about 500 °C, P > 0.3 GPa). The estimated temperature of the low-P/ T metamorphic event is considerably higher than the closure temperature of white mica. Most of the argon is expected to be released from the white micas during the second metamorphic event. Therefore, 474 ± 12 Ma for the garnet and chloritoid-bearing pelitic schist is likely to be cooling age after the temperature peak of the second metamorphic event (Fig. 42).

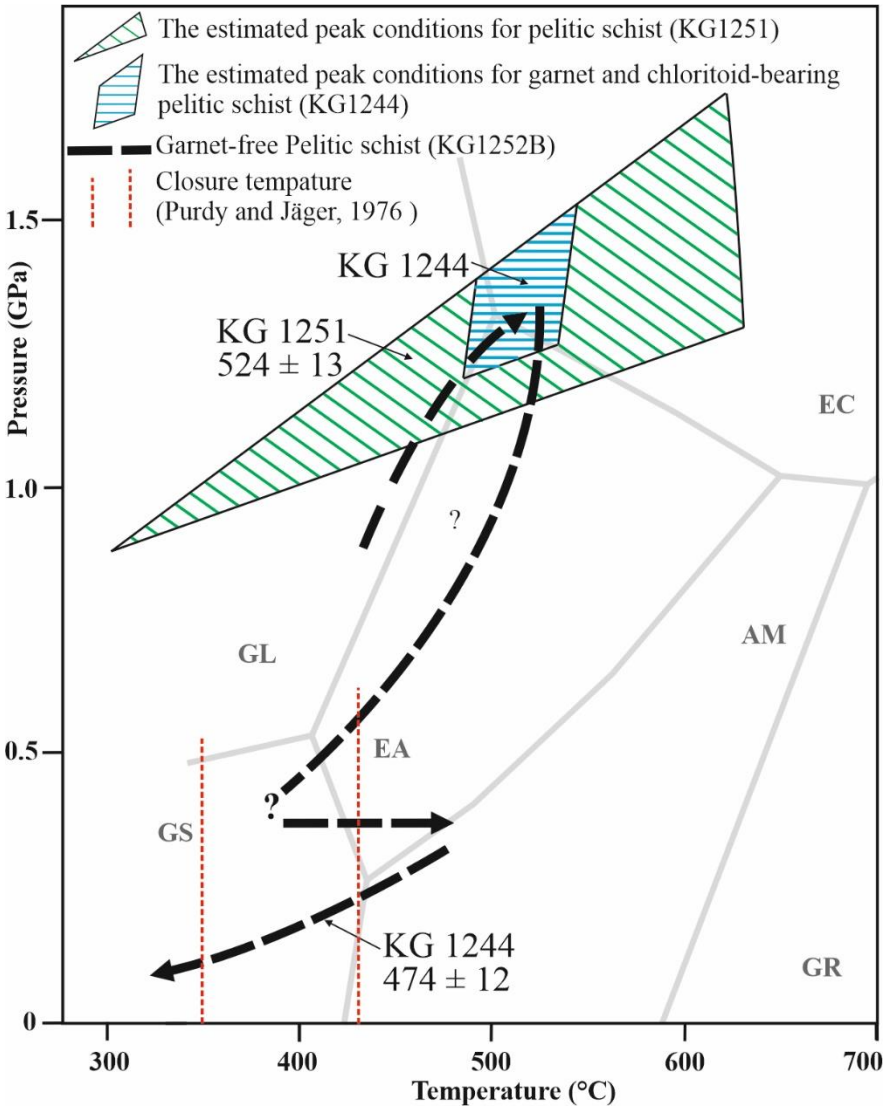


Fig. 42 P-T conditions and K-Ar age dating for the garnet-free pelitic schist (KG1251) and the garnet and chloritoid-bearing pelitic schist (KG1252B). Closure temperature (350–430 °C) of argon system in the grain is from Purdy and Jäger (1976).

CHAPTER 7

DISCUSSION

7.1 Metamorphic P-T evolution of the Neldy Formation

Based on textural relationships, mineral paragenesis and pressure-temparature (P-T) evaluation, pelitic schist and garnet amphibolite was suffered 2-types of metamorphic P-T evolution in the Neldy Formation, i.e., 1-type; the single metamorphic event; 2-type: Two metamorphic events. The single event has been distinguished only in the garnet-free pelitic schist (KG1251). The two metamorphic events type has been distinguished in the garnet-free pelitic schist (KG1252B), garnet and chloritoid-bearing pelitic schist (KG1244) and garnet amphibolite (KG1252A).

The peak metamorphic condition of the garnet-free pelitic schist (KG1251) estimated as T < 630 °C and P=0.9–1.7 GPa is obtained (Fig. 43).

The estimated condition of the (T < 630 °C and P=0.9–1.7 GPa) garnet-free pelitic schist (KG1251) are similar peak metamorphic condition as T = 500–600 °C and P = 1.4–1.6 GPa of garnet-free pelitic schist (KG1252B), estimated P-T condition T = 485–545 °C and P = 1.2–1.5 of garnet and chloritoid-bearing pelitic schist (KG1244) and estimated P-T condition T = 575 ± 29 °C and P = 1.4 ± 0.3 GPa of garnet amphibolite (KG1252A).

The peak metamorphic conditions of the apparently low-grade garnet-free pelitic schist (KG1251, KG1252B) in the Neldy Formation are roughly constrained as T < 630 °C and P = 0.9–1.7 GPa. The estimated P-T range wholly includes the P-T conditions of the apparently high-grade garnet and chloritoid-bearing pelitic schist (KG1244) (Fig. 43). These imply that the garnet-free pelitic schist is not necessarily lower in metamorphic grade than the garnet and chloritoid-bearing pelitic schist (KG1244).

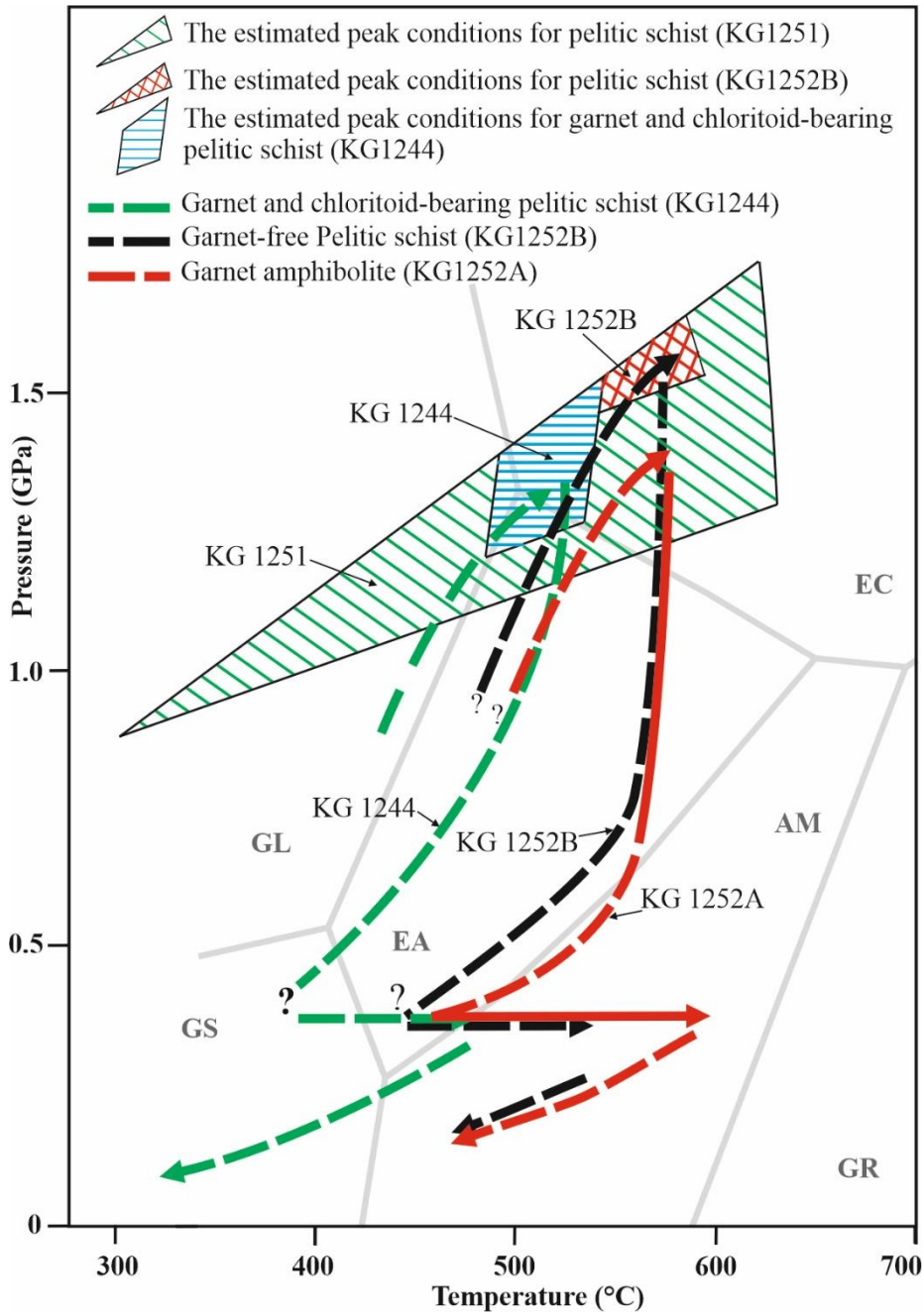


Fig. 43 Estimated P-T conditions for the garnet-free pelitic schist (KG1251; KG1252B), garnet and chloritoid-bearing pelitic schist (KG1244) and garnet amphibolite (KG1252A). P-T boundaries of the metamorphic facies are after Takasu (1989). EC, eclogite facies; GL, glaucophane schist facies; EA, epidote-amphibolite facies; AM, amphibolite facies; GS, greenschist facies; GR, granulite facies.

The X_{Mg} of chlorite in KG1251; KG1252B is considerably high (0.79-0.81) indicating highly Mg-rich bulk rock chemical compositions. This kind of Mg-rich compositions easily prevents the occurrence of garnet and chloritoid which prefer Fe-rich bulk rock compositions. This is probably reason why garnet doesn't appear even of the possible metamorphic temperature is similar or higher than the garnet and chloritoid-bearing pelitic schist (KG1244).

A THERMOCALC calculation for the peak stage garnet rim + amphibole core + matrix epidote + matrix chlorite core of the garnet amphibolite (KG1252A) yields P-T conditions of T = 575 ± 29 °C and P = 1.4 ± 0.3 GPa, succeeded by retrogression at greenschist facies condition (Fig. 43). The obtained P-T conditions are located at the transition between the epidote-amphibolite facies and the eclogite facies (Fig. 43). The mineral assemblage of this stage has no omphacite (index mineral of eclogite facies), but it is established that the appearance of omphacite in mafic rocks is restricted to relatively high bulk rock $(CaO + Na_2O)/(FeO + MgO)$ ratio at the transitional facies conditions (Endo et al. 2012).

The determined K-Ar age of 524 ± 13 Ma for the garnet-free pelitic schist (1251) represents the peak metamorphic age or cooling age after the peak conditions. This age is similar to the peak metamorphic age of ca. 500 Ma for the HP and UHP metamorphic rocks of the eclogites and the garnet-chloritoid-talc schists in the Makbal and the Neldy Formations (Togonbaeva et al., 2009; 2010b; Konopelko et al., 2012). The metamorphic ages of ca. 500 Ma probably represent the age of HP and UHP metamorphism throughout the Makbal and the Neldy Formations in the Akdjon Group.

The second metamorphic event of garnet and chloritoid-bearing pelitic schist (KG1244) is defined by muscovite overgrowing on the resorbed peak stage phengite, chlorite and muscovite occurring in the fracture of the porphyroblastic garnet are estimated as ~500 °C and P = 0.3 GPa. The garnet and chloritoid-bearing pelitic schist (KG1244) estimated P-T conditions are slightly

lower in temperature than 500−580 °C and 0.4 GPa of the garnet free-pelitic schist (KG1252B). The second metamorphic event of garnet-free pelitic schist (KG1252B) is defined by the muscovite overgrown on the matrix phengite and the plagioclase (albite to oligoclase An_{6-15}) overgrown on the matrix albite (An_{4-5}) and estimated P-T condition T = 600 °C and P = 0.4 GPa of the garnet amphibolite (KG1252A). The second metamorphic event of garnet amphibolite (KG1252A) is defined by amphibole overgrown on the resorbed core of the amphibole, muscovite and plagioclase mantle. This kind of low-P/T regional metamorphism first time found in the Makbal Complex.

The determined K-Ar age of 524 ± 13 Ma for the garnet-free pelitic schist (1251) represents the peak metamorphic age or cooling age after the peak conditions. This age is similar to the peak metamorphic age of ca. 500 Ma for the HP and UHP metamorphic rocks of the eclogites and the garnet-chloritoid-talc schists in the Makbal and the Neldy Formations (Togonbaeva et al., 2009; 2010b; Konopelko et al., 2012). The metamorphic ages of ca. 500 Ma probably represent the age of HP and UHP metamorphism throughout the Makbal and the Neldy Formations in the Akdjon Group.

The garnet and chloritoid-bearing pelitic schist (KG1244) experienced two metamorphic events, i.e. high-P/T metamorphism and subsequent low-P/T metamorphism. The peak metamorphic conditions of the former are estimated as 485–545 °C at 1.2–1.5 GPa. This metamorphic event is likely to be coincided with the HP to UHP metamorphism of the eclogites and the garnet-chloritoid-talc schists in the Akdzhon Group at ca. 500 Ma. The low-P/T metamorphic event after the ca. 500 Ma metamorphism is evidenced by the overgrown of muscovite on phengite, and the metamorphic conditions are about 500 °C and > 0.3 GPa. This kind of low-P/T regional metamorphism has never found in the Makbal Complex excepting for the contact metamorphism caused by the Devonian granitic intrusions (Bakirov et al., 1987;

Konopelko et al., 2012). Therefore, muscovite overgrown on phengite in the garnet and chloritoid-bearing pelitic schists (KG1244) is probably developed during reheating due to the granitic magma intrusions. The K-Ar amphibole ages of 463 Ma and TIMS U-Pb zircon age of 457 Ma (Apayarov, 2007), and SHRIMP zircon age of 456 ± 3 Ma (Rojas-Agramonte et al., 2013) are reported from the granitic bodies. These ages are similar to the K-Ar white mica age of 474 ± 12 Ma for garnet and chloritoid-bearing pelitic schists. The heat supply from the granitic bodies at ca. 460 Ma caused almost all or considerable amounts of argon to be released from the white micas, and, therefore, K-Ar age of 474 ± 12 Ma is attained for the age of the contact metamorphism. The rim of the zircon grains from the deformed granitic body in the northwest part of the Makbal area shows an age of 447 ± 11 Ma, and it is overgrown on the core of 514 ± 5 Ma (Konopelko et al., 2012). The rim of the zircon also grew during the contact metamorphism of ca. 460 Ma granitic intrusions.

7.2 Is the garnet amphibolite exposed in the Neldy Formation retrogressed eclogite?

Rojas-Agramonte et al. (2013) suggested eclogites studied by Togonbaeva et al. (2010) are preserved within garnet amphibolites and proposed a near-isothermal decompression path from peak pressure at 2.2–2.5 GPa to amphibolite-facies conditions. The identified a decompression path in the garnet amphibolite, but from much lower pressure (ca. 1.4 GPa) at somewhat higher temperature (ca. 600 °C) and garnet amphibolite rocks represent retrogressed eclogites.

In this study, petrologically documented the garnet amphibolite (KG1252A) and pelitic schist (KG1252B), collected from the same location in the Neldy Formation of the Makbal Complex, and examined their metamorphic evolution. The garnet amphibolite experienced two events of metamorphism, i.e. high-P/T metamorphism and subsequent low-P/T metamorphism. Applying the THERMOCALC average P-T calculation to the peak metamorphic conditions of the first metamorphic event, T = 575 ± 29 °C and P = 1.4 ± 0.3 GPa has been obtained (Fig. 31). The

high-P/T metamorphism is followed by the low-P/T metamorphism of about T = 600 °C and P = 0.4 GPa. This kind of low-P/T metamorphism is probably developed by reheating due to the Ordovician granitic intrusions. The peak metamorphic conditions of the pelitic schist (KG1252B) are estimated as T = 500–600 °C and P = 1.4–1.6 GPa, which followed by low-P/T metamorphism at T = 500–580 °C and P = 0.4 GPa. The estimated P-T path of the pelitic schist are quite similar to those for the garnet amphibolite (Fig. 43). These strongly suggest that the garnet amphibolite are not exotic blocks of retrogressed eclogites within the pelitic matrix. The garnet amphibolte and the pelitic schist share the same metamorphic P-T history.

7.3 Revision of the tectono-metamorphic division of the Makbal Complex, Kyrgyz Northern Tien-Shan

In this study we estimated the peak metamorphic conditions of garnet-free pelitic schist (KG1251; KG1252B) as < 630 °C at 0.9–1.7 GPa, garnet and chloritoid-bearing pelitic schist (KG1244) as 485–545 °C at 1.2–1.5 GPa and garnet amphibolite (KG1252A) as 580–595 °C and 0.8–1.6 GPa in the Neldy Formation. The peak metamorphic conditions of garnet amphibolite of the Kaindy Formation in the Sharkyrak Group have been reported as 620 °C and 1.4 GPa (Rojas-Agramonte et al., 2013). These comprise a group of relatively low-pressure metamorphic rocks (Fig. 44). In contrast, the metamorphic conditions of the HP and UHP metamorphic rocks such as the eclogites and the garnet-chloritoid-talc schists in the Akdzhon Group were estimated to be 530–580 °C and 2.8–3.3 GPa (garnet-chloritoid-talc schist; Tagiri et al., 2010; Meyer et al., 2014; Orozbaev et al., 2015), ~510 °C and 2.8 GPa (coesite-bearing eclogite; Tagiri et al., 2010) and 520–610 °C and 2.2–2.5 GPa (eclogite; Togonbaeva et al., 2010b; Meyer et al., 2013). These suggest that the peak metamorphic conditions of the Neldy pelitic schists and garnet amphibolite

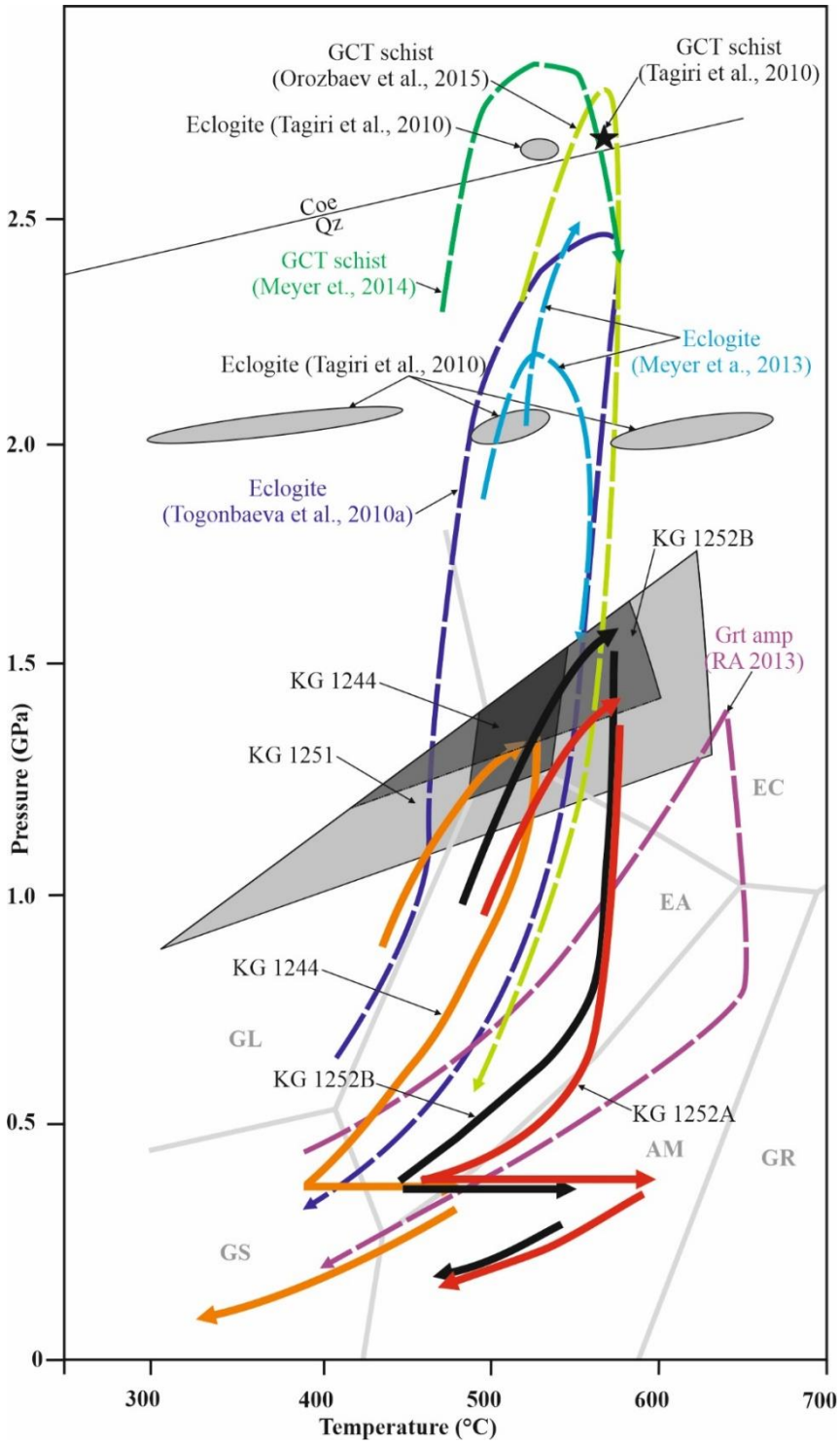


Fig. 44 Summary of the P-T evolution of the metamorphic rocks in the Makbal Complex. GCT schist, Garnet-chloritoid-talc schist; Grt amp, Garnet amphibolite; RA 2013, Rojas-Agramonte et al. (2013); this study samples of garnet-free pelitic schsit (KG1251; KG1252B), garnet and chloritoid-bearing pelitic schist and garnet amphibolite (KG1252A) are also shown.

are significantly lower in pressure compared with the previously reported eclogites and garnet-chloritoid-talc schists, which are located in the lower tectono-structural levels of the Makbal Complex, i.e. lowermost parts of the Neldy Formation and the Makbal Formation. These results clearly indicate that the conventional division of the Akdjon Group, i.e. the Makbal and the Neldy Formations, has no longer geotectonic significance.

Therefore, based mainly on the metamorphic pressure the Makbal Complex can be divided into two tectonometamorphic units, structurally lower relatively high-pressure metamorphic unit including UHP metamorphic rocks and structurally upper relatively low-pressure metamorphic unit. We have adopted, these names of the tectonometamorphic units, as the Lower and Upper Units (Fig. 45).

In contrast, the metamorphic conditions of the HP-UHP metamorphic rocks of the Lower Unit such as eclogites and the garnet-chloritoid-talc schists are estimated as T = 290–660 °C and P = 2.0–2.8 GPa, and T = 530–580 °C and P = 2.8–3.3 GPa, respectively (Tagiri et al., 2010; Togonbaeva et al., 2010a; Meyer et al., 2013; 2014; Orozbaev et al,. 2015). The peak metamorphic conditions of the Upper Unit are about 0.5 GPa lower in pressure than those of the Lower Unit, demonstrating the presence of significant metamorphic and tectonic discontinuity between the Lower and the Upper Units of the Makbal Complex.

After suffered the peak metamorphism the garnet-chloritoid-talc schists, coesite-bearing eclogite and the eclogites, were exhumed isothermally (Togonbaeva et al., 2010b; Meyer et al., 2013; 2014; Orozbaev et al., 2015), suggesting rapid exhumation toward the crustal levels. Relatively low-pressure metamorphic rocks of the Upper Unit pelitic schists were likely to be exhumed synchronously. The HP and UHP metamorphic rocks of the Makbal Complex were uplifted to the shallower crustal levels (ca. 10 km in depth) at least before the granitic magma intrusions at *ca*. 460 Ma.

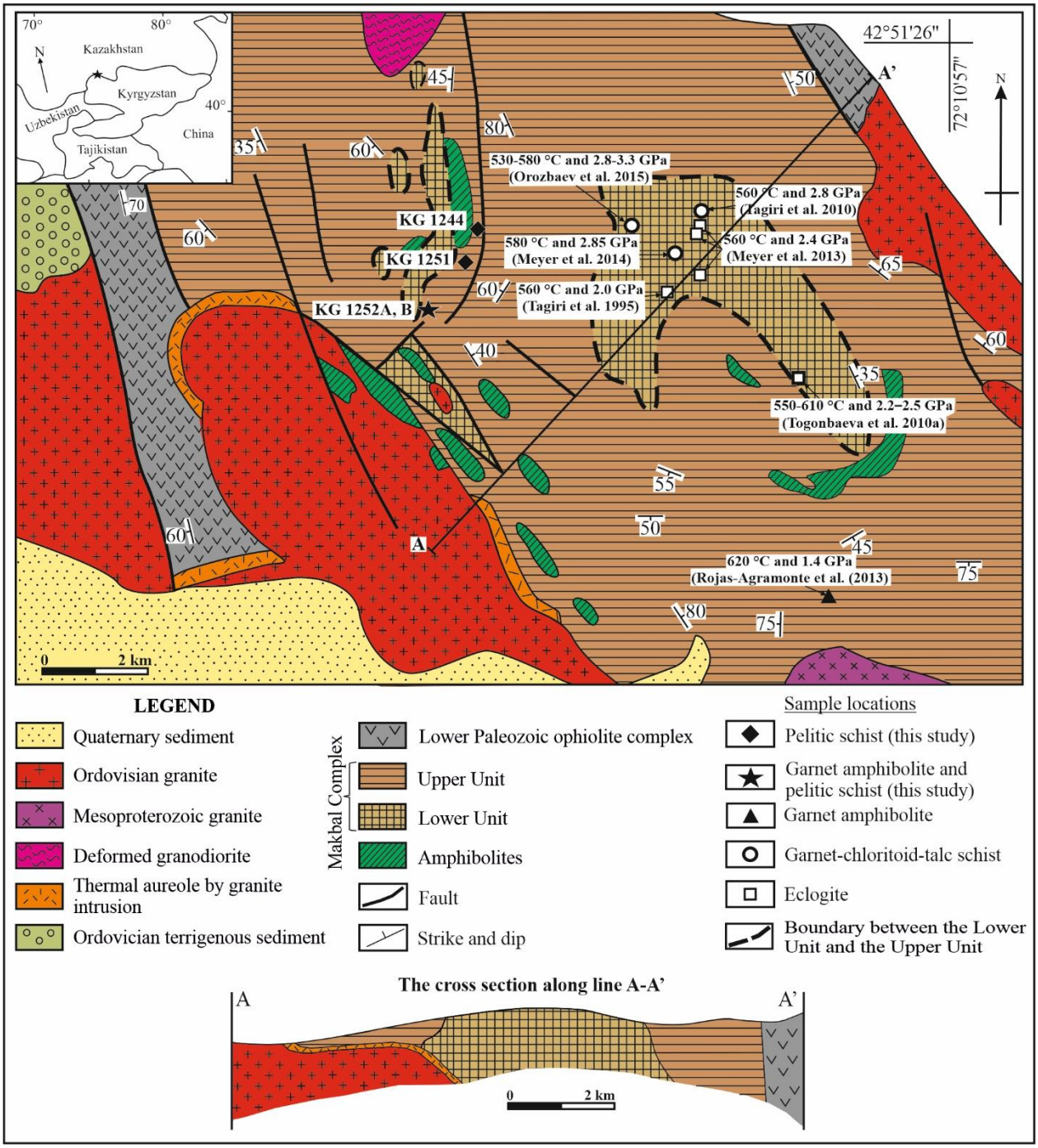


Fig. 45 Tectonic map of the Makbal HP-UHP Complex (modified from Bakirov et al. 1987). The Makbal Complex is composed of the Lower Unit and the Upper Unit. The localities of the eclogite (Tagiri et al. 1995; Togonbaeva et al. 2010a; Meyer et al. 2013), garnet-chloritoid-talc schists (Tagiri et al. 2010; Meyer et al. 2014, Orozbaev et al. 2015), garnet amphibolite (Rojas-Agramonte et al. 2013) and this study samples of garnet-free pelitic schsit (KG1251; KG1252B), garnet and chloritoid-bearing pelitic schist and garnet amphibolite (KG1252A) are also shown.

CHAPTER 8

CONCLUSION

Petrological and geochronological studies for the garnet-free peitic schist, garnet and chloritoid-bearing pelitic schist and garnet amphibolite of the apparently low-grade Neldy Formation metamorphic rocks in the Makbal Complex, Northern Kyrgyz Tian-Shan have been carried out and the following results are obtained.

1. The peak metamorphic conditions of the pelitic schsits in the Neldy Foramtion are constrained as T < 630 °C and P = 0.9–1.7 GPa (KG1251; KG1252B) (garnet-free pelitic schist), T = 485–545 °C and P = 1.2–1.5 GPa (KG1244) (garnet and chloritoid-bearing pelitic schist) and T = 575 ± 29 °C and P = 1.4 ± 0.3 GPa (garnet amphibolite) (KG1252A).
2. The subsequent (second) metamorphic event of low-P/T metamorphism caused by the Devonian granitic intrusions (contact metamorphism).
3. A K-Ar age of the low-grade pelitic schist in the Neldy Formation is obtained. The peak to cooling age of the garnet-free pelitic schist is 524 ± 13 Ma, and it is similar to the previously reported peak metamorphic ages of high-grade metamorphic rocks (eclogites and garnet and chloritoid-bearing pelitic schists) in the Makbal Formation.
4. The garnet amphibolite found in the Upper Unit of the Makbal Complex are not of exotic block as retrogressed eclogite, but of *in situ* lens or layer within the pelitic schist matrix. The estimated P-T path of the garnet amphibolite is quite similar to that for the pelitic schist. These facts strongly suggest that the garnet amphibolite and the pelitic schist share the same metamorphic P-T history.
5. The Lower Unit of the Makbal Complex including the eclogites and garnet-chloritoid-talc schists, which is located in the lower tectono-structural levels of the Makbal Complex is significantly higher in pressure compared with the Upper Unit of the Makbal Complex.

These results indicate that the conventional division of the Akdjon Group, the Makbal and Neldy Formations, has no longer geotectonic significance. A major thrust boundary is probably located between the Lower and Upper Units of the Makbal Complex.

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*: in Russian

**: in Japanese

Table A1 **Chemical compositions of garnets**

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Weight %																								
SiO_2	36.91	36.96	37.40	37.87	37.10	36.56	36.82	36.76	36.95	36.85	36.87	37.12	37.33	36.30	36.78	36.91	37.09	36.86	36.87	36.95	37.11	37.05	37.21	37.58
TiO_2	0.07	0.07	0.07	0.02	0.06	0.09	0.05	0.06	0.13	0.10	0.03	0.03	0.07	0.06	0.07	0.03	0.05	0.11	0.12	0.12	0.09	0.07	0.07	0.10
Al_2O_3	20.53	20.46	20.96	20.86	20.67	20.45	20.31	20.70	20.73	20.47	20.82	21.06	20.96	20.32	20.54	20.38	20.60	20.57	20.45	20.48	20.52	20.68	20.63	20.92
FeO	34.73	34.18	34.56	34.39	33.90	32.99	32.73	32.96	31.07	31.28	30.75	31.18	31.92	31.07	31.03	31.37	31.74	31.04	31.36	31.21	30.95	31.48	31.48	32.52
MnO	1.18	1.20	1.27	1.30	1.29	1.79	1.86	2.07	3.94	4.07	4.89	5.34	5.36	4.83	4.70	5.06	4.58	4.38	4.21	4.03	3.80	4.01	3.85	3.50
MgO	1.83	1.71	1.70	1.71	1.65	1.41	1.43	1.29	1.16	1.06	1.00	0.95	0.99	1.03	0.99	1.05	1.08	1.03	1.09	1.07	1.13	1.22	1.13	1.18
CaO	5.08	5.43	5.45	5.22	5.44	5.71	5.66	5.99	6.24	5.73	5.18	4.65	4.64	4.92	4.96	5.16	5.68	5.99	5.95	6.24	6.45	5.86	5.83	5.94
Na_2O	0.00	0.03	0.00	0.01	0.01	0.02	0.01	0.00	0.02	0.08	0.09	0.09	0.17	0.16	0.10	0.11	0.03	0.04	0.04	0.02	0.03	0.03	0.00	0.02
K_2O	0.05	0.02	0.06	0.02	0.03	0.04	0.04	0.06	0.03	0.03	0.03	0.03	0.04	0.03	0.05	0.02	0.03	0.03	0.04	0.04	0.04	0.05	0.04	0.05
Cr_2O_3	0.00	0.02	0.00	0.00	0.06	0.01	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Total	100.37	100.07	101.46	101.39	100.20	99.06	98.90	99.91	100.29	99.67	99.66	100.43	101.47	98.73	99.21	100.08	100.92	100.04	100.12	100.16	100.12	100.46	100.23	101.80
Cation O=12																								
Si	2.969	2.982	2.975	3.014	2.988	2.980	3.006	2.972	2.977	2.991	2.993	2.995	2.983	2.977	3.002	2.989	2.978	2.982	2.980	2.984	2.994	2.981	3.003	2.985
Ti	0.004	0.004	0.004	0.001	0.004	0.006	0.003	0.004	0.008	0.006	0.002	0.002	0.004	0.004	0.004	0.002	0.003	0.007	0.007	0.007	0.005	0.004	0.004	0.006
Al	1.947	1.945	1.965	1.957	1.962	1.965	1.954	1.972	1.968	1.958	1.992	2.003	1.974	1.964	1.976	1.945	1.949	1.961	1.948	1.949	1.951	1.961	1.962	1.959
Fe	2.337	2.306	2.299	2.289	2.284	2.249	2.234	2.229	2.094	2.123	2.088	2.104	2.133	2.131	2.118	2.125	2.131	2.100	2.120	2.108	2.088	2.118	2.124	2.161
Mn	0.080	0.082	0.085	0.088	0.088	0.124	0.129	0.142	0.269	0.280	0.336	0.365	0.363	0.335	0.325	0.347	0.311	0.300	0.288	0.275	0.260	0.273	0.263	0.236
Mg	0.220	0.205	0.201	0.203	0.198	0.172	0.174	0.156	0.139	0.128	0.121	0.114	0.118	0.126	0.120	0.127	0.129	0.124	0.131	0.129	0.136	0.146	0.136	0.140
Ca	0.438	0.469	0.464	0.445	0.469	0.498	0.495	0.519	0.539	0.498	0.450	0.402	0.397	0.433	0.434	0.448	0.489	0.519	0.515	0.540	0.557	0.505	0.504	0.505
Na	0.000	0.004	0.000	0.001	0.001	0.003	0.001	0.000	0.002	0.012	0.015	0.014	0.026	0.026	0.016	0.016	0.005	0.006	0.006	0.003	0.005	0.005	0.000	0.003
K	0.005	0.002	0.006	0.002	0.003	0.004	0.004	0.006	0.003	0.003	0.003	0.003	0.004	0.003	0.005	0.002	0.003	0.003	0.004	0.005	0.004	0.005	0.004	0.005
Cr	0.000	0.001	0.000	0.000	0.004	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	25	26	27	28	29	30	31	32	33	34	35	1	2	3	4	5	6	7	8	1	2	3	4	5
Weight %																								
SiO_2	36.88	37.60	37.60	37.44	37.58	37.11	37.24	37.44	37.29	37.56	37.97	37.66	37.55	37.62	37.79	37.30	37.49	37.61	37.63	37.76	37.59	37.77	37.33	37.47
TiO_2	0.08	0.09	0.11	0.08	0.07	0.09	0.05	0.08	0.03	0.09	0.07	0.11	0.05	0.03	0.05	0.06	0.08	0.14	0.25	0.08	0.10	0.13	0.04	0.06
Al_2O_3	20.61	20.60	20.96	20.67	20.89	20.81	20.57	20.99	20.87	20.90	20.96	20.83	20.87	20.85	20.68	20.81	20.72	20.88	20.70	21.17	20.88	20.87	20.88	20.82
FeO	32.52	31.84	32.29	33.11	33.72	33.52	33.93	33.92	34.32	33.88	34.29	34.78	34.57	34.51	33.96	33.96	33.70	34.69	34.61	34.70	33.73	33.68	34.08	33.26
MnO	3.39	3.33	2.56	2.57	1.91	1.94	1.73	1.44	1.45	1.52	1.30	1.14	1.05	1.05	1.09	1.07	1.03	1.16	0.93	1.17	1.28	1.12	1.20	1.20
MgO	1.12	1.19	1.22	1.29	1.41	1.42	1.56	1.61	1.68	1.66	1.67	1.84	1.78	1.84	1.80	1.75	1.83	1.77	1.76	1.80	1.78	1.72	1.68	1.70
CaO	5.96	6.60	5.92	6.06	5.35	5.95	5.23	5.76	4.98	5.39	5.61	4.65	4.61	4.59	4.95	4.88	5.13	4.92	4.89	5.11	5.60	5.58	5.57	5.33
Na_2O	0.02	0.05	0.01	0.01	0.00	0.02	0.03	0.03	0.02	0.01	0.00	0.00	0.01	0.01	0.02	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.02	0.01
K_2O	0.03	0.03	0.04	0.03	0.06	0.03	0.03	0.05	0.03	0.04	0.05	0.04	0.04	0.05	0.02	0.03	0.04	0.05	0.05	0.04	0.05	0.06	0.03	0.04
Cr_2O_3	0.00	0.00	0.00	0.02	0.03	0.03	0.02	0.00	0.03	0.07	0.00	0.01	0.03	0.00	0.00	0.01	0.04	0.00	0.03	0.00	0.00	0.03	0.00	0.00
Total	100.61	101.32	100.70	101.28	101.01	100.92	100.38	101.32	100.69	101.10	101.94	101.05	100.55	100.55	100.36	99.86	100.05	101.24	100.85	101.82	101.02	100.93	100.83	99.88
Cation O=12																								
Si	2.968	2.997	3.015	2.988	3.006	2.970	2.997	2.980	2.990	2.997	3.005	3.009	3.014	3.018	3.036	3.012	3.019	2.999	3.014	2.992	2.998	3.016	2.986	3.022
Ti	0.005	0.005	0.006	0.005	0.004	0.006	0.003	0.005	0.002	0.006	0.004	0.007	0.003	0.002	0.003	0.004	0.005	0.008	0.015	0.005	0.006	0.008	0.003	0.004
Al	1.954	1.935	1.980	1.945	1.969	1.963	1.951	1.969	1.972	1.966	1.955	1.962	1.975	1.971	1.959	1.981	1.967	1.962	1.953	1.977	1.963	1.964	1.968	1.979
Fe	2.188	2.122	2.165	2.210	2.256	2.244	2.284	2.258	2.301	2.261	2.269	2.324	2.321	2.316	2.282	2.293	2.270	2.313	2.318	2.299	2.250	2.249	2.279	2.243
Mn	0.231	0.224	0.174	0.174	0.129	0.131	0.118	0.097	0.099	0.103	0.087	0.077	0.072	0.071	0.074	0.073	0.070	0.078	0.063	0.078	0.087	0.076	0.082	0.082
Mg	0.135	0.142	0.145	0.153	0.168	0.169	0.187	0.191	0.201	0.198	0.198	0.219	0.213	0.220	0.215	0.210	0.220	0.211	0.210	0.212	0.211	0.204	0.200	0.205
Ca	0.513	0.564	0.508	0.519	0.459	0.510	0.451	0.491	0.428	0.461	0.476	0.398	0.396	0.394	0.426	0.422	0.443	0.421	0.420	0.433	0.478	0.477	0.477	0.461
Na	0.002	0.007	0.002	0.002	0.000	0.003	0.005	0.005	0.003	0.001	0.000	0.000	0.001	0.002	0.003	0.000	0.000	0.003	0.000	0.000	0.002	0.000	0.002	0.001
K	0.003	0.003	0.004	0.003	0.006	0.003	0.003	0.005	0.003	0.004	0.005	0.004	0.004	0.005	0.002	0.003	0.004	0.005	0.005	0.004	0.005	0.006	0.003	0.004
Cr	0.000	0.000	0.000	0.001	0.002	0.002	0.001	0.000	0.002	0.004	0.000	0.001	0.002	0.000	0.000	0.000	0.003	0.000	0.002	0.000	0.000	0.002	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Table A1 **Chemical compositions of garnets**

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	6	7	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Weight %																								
SiO_2	36.42	36.97	37.30	37.24	37.43	37.30	37.14	37.53	37.13	37.53	37.43	37.50	37.63	37.49	37.21	37.30	37.40	37.62	37.10	37.27	37.03	36.78	37.41	36.92
TiO_2	0.04	0.02	0.04	0.05	0.06	0.07	0.10	0.17	0.08	0.07	0.02	0.03	0.00	0.07	0.08	0.01	0.00	0.06	0.06	0.08	0.05	0.05	0.09	0.06
Al_2O_3	20.34	20.74	20.60	20.45	20.86	20.57	20.27	20.58	20.72	20.81	20.78	20.79	20.87	20.77	20.80	20.81	20.84	20.89	20.95	20.56	20.58	20.61	20.63	20.53
FeO	33.97	33.95	34.34	34.82	34.56	34.99	35.34	35.03	35.71	34.52	35.58	35.27	35.48	34.41	34.61	34.83	35.97	35.48	35.18	35.18	34.31	34.74	35.70	34.43
MnO	1.10	1.15	1.53	1.50	1.64	1.63	1.16	1.04	1.25	1.37	1.49	1.52	1.40	1.23	1.13	1.50	1.45	1.34	1.15	1.04	1.59	1.47	1.41	1.17
MgO	1.72	1.73	1.49	1.50	1.49	1.51	1.69	1.64	1.79	1.47	1.62	1.60	1.68	1.67	1.69	1.52	1.62	1.68	1.73	1.68	1.52	1.55	1.60	1.66
CaO	5.51	5.25	5.05	5.05	5.33	5.24	5.08	5.40	4.59	5.61	4.39	4.65	4.26	5.27	5.23	4.77	4.14	4.38	5.06	4.92	4.77	4.46	4.59	4.89
Na_2O	0.00	0.00	0.03	0.06	0.05	0.06	0.00	0.00	0.07	0.02	0.02	0.04	0.07	0.02	0.02	0.05	0.02	0.00	0.02	0.06	0.02	0.08	0.03	0.06
K_2O	0.05	0.03	0.05	0.02	0.04	0.03	0.06	0.03	0.04	0.05	0.05	0.05	0.05	0.04	0.06	0.04	0.03	0.05	0.04	0.05	0.05	0.03	0.03	0.07
Cr_2O_3	0.06	0.00	0.00	0.07	0.01	0.03	0.02	0.00	0.03	0.00	0.01	0.03	0.02	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.04	0.01	0.02
Total	99.20	99.84	100.42	100.74	101.47	101.43	100.86	101.42	101.41	101.44	101.38	101.48	101.45	100.96	100.82	100.83	101.49	101.49	101.29	100.82	99.92	99.82	101.49	99.81
Cation O=12																								
Si	2.963	2.986	3.003	2.991	2.981	2.976	2.980	2.991	2.961	2.989	2.989	2.990	2.999	2.997	2.979	2.991	2.985	2.999	2.959	2.988	2.997	2.980	2.986	2.987
Ti	0.002	0.001	0.002	0.003	0.004	0.004	0.006	0.010	0.005	0.004	0.001	0.002	0.000	0.004	0.005	0.001	0.000	0.004	0.004	0.005	0.003	0.003	0.005	0.004
Al	1.950	1.974	1.954	1.936	1.958	1.934	1.917	1.934	1.947	1.954	1.956	1.953	1.961	1.957	1.963	1.967	1.960	1.963	1.969	1.942	1.963	1.968	1.941	1.957
Fe	2.311	2.293	2.312	2.339	2.302	2.334	2.371	2.335	2.381	2.299	2.376	2.352	2.365	2.301	2.318	2.336	2.402	2.366	2.346	2.358	2.322	2.354	2.383	2.330
Mn	0.076	0.079	0.104	0.102	0.111	0.110	0.079	0.070	0.085	0.092	0.101	0.103	0.094	0.083	0.077	0.102	0.098	0.090	0.078	0.071	0.109	0.101	0.095	0.080
Mg	0.208	0.208	0.179	0.179	0.177	0.180	0.202	0.195	0.213	0.175	0.193	0.191	0.200	0.199	0.201	0.182	0.192	0.199	0.206	0.201	0.184	0.188	0.190	0.201
Ca	0.480	0.455	0.435	0.435	0.455	0.448	0.437	0.461	0.392	0.479	0.376	0.397	0.364	0.451	0.449	0.410	0.354	0.374	0.432	0.422	0.413	0.387	0.392	0.424
Na	0.000	0.000	0.005	0.009	0.008	0.009	0.000	0.000	0.010	0.002	0.003	0.006	0.010	0.002	0.003	0.007	0.004	0.000	0.003	0.009	0.004	0.012	0.005	0.009
K	0.005	0.004	0.005	0.002	0.004	0.003	0.006	0.003	0.004	0.005	0.005	0.005	0.005	0.004	0.006	0.004	0.003	0.005	0.004	0.005	0.005	0.004	0.003	0.007
Cr	0.004	0.000	0.000	0.004	0.000	0.002	0.001	0.000	0.002	0.000	0.001	0.002	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.001
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1244**			**KG1252A**																				
Analysis No.	23	24	25	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Weight %																								
SiO_2	37.47	37.10	37.05	37.10	36.82	36.86	36.71	35.61	36.52	36.65	36.61	36.39	36.00	36.64	36.47	36.48	36.43	36.69	36.44	36.58	36.56	36.79	36.78	36.62
TiO_2	0.06	0.09	0.08	0.08	0.11	0.14	0.12	6.65	2.19	0.30	0.26	0.21	2.31	0.15	1.74	0.18	0.16	0.15	0.15	0.13	0.18	0.16	0.22	0.16
Al_2O_3	20.86	21.05	20.79	20.95	21.03	21.05	20.89	18.16	19.94	20.72	20.81	20.84	19.89	20.64	19.79	20.52	20.49	20.51	20.45	20.54	20.57	20.26	20.63	20.51
FeO	34.76	34.72	34.17	27.55	27.66	27.96	28.34	23.09	26.07	27.04	26.46	26.43	23.62	24.23	20.60	22.00	21.76	23.02	22.32	22.00	21.56	21.60	22.84	21.85
MnO	1.05	1.15	1.14	0.21	0.13	0.14	0.43	0.48	0.91	1.17	1.61	2.88	3.73	4.98	7.46	8.38	9.54	8.03	8.85	9.51	8.92	9.08	8.18	9.06
MgO	1.71	1.62	1.73	1.28	1.26	1.14	1.00	0.80	0.84	0.73	0.65	0.60	0.59	0.54	0.38	0.52	0.36	0.75	0.52	0.40	0.52	0.47	0.83	0.33
CaO	4.88	4.88	5.00	11.49	11.67	11.31	11.34	15.17	12.65	12.07	12.41	11.50	12.48	11.43	12.22	10.67	10.16	9.85	10.20	10.16	10.40	10.72	10.73	10.60
Na_2O	0.04	0.02	0.03	0.01	0.03	0.00	0.00	0.06	0.00	0.00	0.04	0.05	0.08	0.04	0.03	0.01	0.00	0.00	0.02	0.03	0.06	0.00	0.01	0.03
K_2O	0.02	0.05	0.04	0.05	0.03	0.04	0.03	0.05	0.03	0.03	0.09	0.03	0.09	0.05	0.02	0.01	0.03	0.03	0.04	0.03	0.02	0.05	0.03	0.02
Cr_2O_3	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.12	0.00	0.03	0.15	0.05	0.14	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.12	0.03
Total	100.86	100.68	100.03	98.72	98.74	98.64	98.87	100.20	99.15	98.74	99.08	98.96	98.93	98.72	98.70	98.76	98.93	99.03	98.98	99.38	98.81	99.13	100.36	99.20
Cation O=12																								
Si	2.999	2.976	2.988	2.987	2.963	2.975	2.961	2.865	2.948	2.963	2.947	2.940	2.917	2.967	2.966	2.962	2.961	2.973	2.957	2.959	2.967	2.979	2.937	2.964
Ti	0.004	0.005	0.005	0.005	0.006	0.008	0.007	0.402	0.133	0.018	0.015	0.013	0.141	0.009	0.106	0.011	0.010	0.009	0.009	0.008	0.011	0.009	0.013	0.010
Al	1.967	1.990	1.975	1.988	1.994	2.002	1.986	1.722	1.897	1.973	1.974	1.984	1.900	1.971	1.896	1.964	1.963	1.958	1.956	1.958	1.967	1.934	1.942	1.957
Fe	2.327	2.329	2.305	1.855	1.862	1.887	1.912	1.553	1.760	1.828	1.781	1.785	1.601	1.642	1.401	1.494	1.479	1.560	1.514	1.488	1.463	1.463	1.525	1.479
Mn	0.071	0.078	0.078	0.015	0.009	0.010	0.029	0.033	0.062	0.080	0.110	0.197	0.256	0.341	0.514	0.576	0.657	0.551	0.608	0.652	0.613	0.623	0.553	0.621
Mg	0.205	0.194	0.208	0.154	0.151	0.137	0.120	0.095	0.101	0.088	0.078	0.072	0.072	0.065	0.046	0.063	0.044	0.090	0.063	0.048	0.063	0.057	0.098	0.039
Ca	0.418	0.419	0.432	0.991	1.007	0.978	0.980	1.308	1.094	1.046	1.071	0.995	1.083	0.992	1.065	0.929	0.884	0.855	0.887	0.880	0.904	0.930	0.918	0.920
Na	0.006	0.004	0.005	0.001	0.005	0.000	0.001	0.010	0.000	0.000	0.005	0.007	0.012	0.006	0.004	0.001	0.000	0.000	0.003	0.005	0.009	0.000	0.002	0.005
K	0.002	0.005	0.004	0.005	0.003	0.004	0.003	0.005	0.004	0.003	0.009	0.003	0.009	0.005	0.002	0.001	0.003	0.003	0.004	0.003	0.002	0.005	0.003	0.002
Cr	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.008	0.000	0.002	0.010	0.003	0.009	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.007	0.002
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Table A1 **Chemical compositions of garnets**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	1	2	3	4	5	6	7	8	9
Weight %																								
SiO_2	36.69	36.85	36.77	37.03	36.70	36.72	36.86	37.03	36.97	36.96	37.00	37.01	36.88	36.61	36.76	38.00	37.53	37.58	37.75	37.71	37.41	37.56	37.57	36.99
TiO_2	0.18	0.15	0.15	0.12	0.09	0.13	0.10	0.14	0.14	0.08	0.12	0.09	0.08	0.10	0.12	0.06	0.11	0.10	0.10	0.12	0.14	0.15	0.13	0.14
Al_2O_3	20.65	20.76	20.75	20.75	20.97	20.67	21.00	21.05	20.94	20.73	21.39	21.21	21.05	21.13	21.19	21.78	21.32	21.66	21.39	21.42	21.33	21.15	21.27	20.91
FeO	21.69	22.07	21.83	21.15	24.11	23.03	25.30	25.68	27.85	28.01	28.62	28.41	28.59	28.44	27.69	28.15	28.15	28.28	28.58	28.78	28.32	27.26	28.13	27.89
MnO	9.38	8.11	8.04	7.53	6.60	5.04	3.81	2.32	1.04	0.87	0.52	0.39	0.17	0.10	0.17	0.11	0.16	0.12	0.26	0.38	0.55	0.48	0.72	0.94
MgO	0.32	0.42	0.32	0.31	0.41	0.47	0.50	0.74	0.77	0.74	0.84	0.98	1.17	1.32	1.33	1.69	1.41	1.31	1.20	0.91	0.91	0.80	0.86	1.29
CaO	10.72	11.42	12.07	12.76	11.42	13.32	11.59	12.57	11.49	12.34	11.90	11.33	11.18	11.40	11.78	11.06	11.39	11.65	10.88	11.53	11.74	12.70	11.67	11.33
Na_2O	0.02	0.00	0.00	0.00	0.03	0.02	0.00	0.00	0.02	0.04	0.02	0.00	0.00	0.03	0.00	0.02	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00
K_2O	0.02	0.04	0.04	0.06	0.05	0.04	0.04	0.05	0.03	0.06	0.05	0.03	0.04	0.01	0.02	0.06	0.05	0.04	0.03	0.03	0.02	0.03	0.03	0.05
Cr_2O_3	0.03	0.06	0.05	0.01	0.00	0.03	0.03	0.04	0.00	0.00	0.03	0.01	0.05	0.01	0.00	0.01	0.03	0.05	0.00	0.03	0.00	0.00	0.02	0.00
Total	99.69	99.87	100.01	99.71	100.38	99.47	99.23	99.60	99.24	99.84	100.48	99.46	99.22	99.17	99.06	100.93	100.16	100.79	100.19	100.90	100.44	100.13	100.38	99.53
Cation O=12																								
Si	2.956	2.957	2.945	2.967	2.930	2.944	2.969	2.961	2.974	2.954	2.937	2.966	2.962	2.937	2.948	2.985	2.978	2.963	3.001	2.981	2.968	2.986	2.985	2.960
Ti	0.011	0.009	0.009	0.007	0.005	0.008	0.006	0.008	0.008	0.005	0.007	0.005	0.005	0.006	0.007	0.004	0.006	0.006	0.006	0.007	0.008	0.009	0.008	0.009
Al	1.961	1.963	1.958	1.959	1.974	1.953	1.994	1.984	1.986	1.953	2.000	2.003	1.992	1.998	2.003	2.016	1.994	2.013	2.004	1.995	1.994	1.981	1.992	1.972
Fe	1.462	1.481	1.462	1.417	1.610	1.544	1.704	1.717	1.874	1.872	1.900	1.904	1.920	1.908	1.857	1.849	1.868	1.864	1.900	1.903	1.879	1.812	1.869	1.866
Mn	0.640	0.551	0.545	0.511	0.446	0.342	0.260	0.157	0.071	0.059	0.035	0.026	0.011	0.007	0.011	0.008	0.011	0.008	0.017	0.025	0.037	0.032	0.048	0.064
Mg	0.038	0.050	0.039	0.037	0.049	0.057	0.061	0.088	0.092	0.089	0.099	0.117	0.140	0.158	0.159	0.198	0.167	0.154	0.142	0.107	0.107	0.094	0.102	0.154
Ca	0.925	0.981	1.036	1.095	0.977	1.144	1.000	1.077	0.990	1.056	1.012	0.973	0.962	0.979	1.012	0.931	0.968	0.984	0.926	0.977	0.998	1.082	0.993	0.971
Na	0.002	0.000	0.000	0.000	0.005	0.003	0.000	0.000	0.002	0.006	0.003	0.000	0.000	0.005	0.000	0.003	0.002	0.001	0.000	0.000	0.005	0.000	0.000	0.000
K	0.002	0.004	0.004	0.006	0.005	0.004	0.004	0.005	0.003	0.006	0.005	0.003	0.004	0.001	0.002	0.006	0.005	0.004	0.003	0.003	0.002	0.003	0.003	0.005
Cr	0.002	0.004	0.003	0.001	0.000	0.002	0.002	0.002	0.000	0.000	0.002	0.001	0.003	0.001	0.000	0.000	0.002	0.003	0.000	0.002	0.000	0.000	0.001	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Weight %																								
SiO_2	37.33	37.16	37.37	37.21	37.27	37.17	37.09	37.09	36.94	37.04	36.26	37.08	37.05	36.84	36.71	36.93	37.45	37.13	37.49	37.19	37.16	37.45	37.36	37.66
TiO_2	0.12	0.10	0.69	0.19	0.31	0.17	0.16	0.09	0.12	0.22	4.49	0.20	0.14	0.14	0.10	0.23	0.14	0.14	0.14	0.04	0.13	0.15	0.16	0.11
Al_2O_3	21.17	21.09	20.83	20.94	21.07	21.05	20.68	20.81	20.73	20.50	18.23	20.31	20.72	20.63	20.74	20.49	21.11	20.92	21.08	20.83	21.28	21.08	21.34	21.36
FeO	27.66	26.85	23.85	23.20	22.29	21.81	21.60	22.68	22.45	21.11	19.54	21.61	21.98	21.99	22.04	21.59	22.18	21.51	22.16	23.47	24.47	23.35	24.01	24.86
MnO	1.42	3.19	5.23	6.30	7.97	9.23	9.04	9.51	9.45	9.44	7.91	9.88	9.78	10.63	9.91	9.80	9.09	9.12	9.43	6.98	6.55	5.96	5.39	3.74
MgO	0.67	0.57	0.51	0.42	0.42	0.34	0.36	0.40	0.37	0.31	0.47	0.32	0.44	0.36	0.43	0.34	0.36	0.35	0.34	0.40	0.40	0.44	0.42	0.52
CaO	11.83	11.62	12.35	12.10	11.33	11.31	10.70	9.54	9.82	11.48	12.72	10.78	10.07	9.82	9.82	10.91	10.60	10.80	10.56	11.37	11.11	12.27	11.88	12.57
Na_2O	0.00	0.03	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.01	0.02	0.05	0.00	0.01	0.00	0.00	0.03	0.02	0.04	0.00
K_2O	0.03	0.05	0.05	0.04	0.06	0.04	0.03	0.03	0.02	0.08	0.03	0.04	0.03	0.03	0.03	0.05	0.04	0.04	0.02	0.03	0.04	0.04	0.03	0.03
Cr_2O_3	0.00	0.02	0.02	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.01	0.02	0.02	0.00	0.07	0.00	0.01	0.00	0.00	0.06	0.20
Total	100.2	100.7	100.9	100.4	100.8	101.1	99.66	100.15	99.91	100.18	99.65	100.25	100.26	100.47	99.80	100.39	100.97	100.09	101.21	100.32	101.17	100.77	100.69	101.06
Cation O=12																								
Si	2.974	2.953	2.964	2.964	2.962	2.949	2.987	2.980	2.975	2.966	2.944	2.975	2.970	2.953	2.958	2.955	2.977	2.976	2.975	2.971	2.945	2.970	2.965	2.973
Ti	0.007	0.006	0.041	0.011	0.018	0.010	0.010	0.005	0.007	0.013	0.274	0.012	0.008	0.009	0.006	0.014	0.008	0.008	0.008	0.003	0.008	0.009	0.009	0.007
Al	1.988	1.975	1.947	1.966	1.974	1.968	1.962	1.971	1.968	1.935	1.744	1.920	1.958	1.950	1.970	1.933	1.978	1.976	1.972	1.961	1.987	1.970	1.996	1.988
Fe	1.843	1.784	1.582	1.546	1.482	1.447	1.454	1.524	1.512	1.414	1.327	1.450	1.474	1.475	1.485	1.445	1.475	1.442	1.471	1.568	1.621	1.548	1.594	1.641
Mn	0.096	0.215	0.351	0.425	0.537	0.620	0.617	0.647	0.645	0.640	0.544	0.671	0.664	0.722	0.676	0.664	0.612	0.619	0.634	0.473	0.439	0.400	0.362	0.250
Mg	0.079	0.067	0.060	0.049	0.050	0.041	0.043	0.048	0.044	0.037	0.057	0.038	0.053	0.043	0.052	0.040	0.043	0.042	0.040	0.048	0.048	0.052	0.050	0.062
Ca	1.010	0.989	1.049	1.032	0.965	0.961	0.923	0.821	0.847	0.985	1.107	0.926	0.865	0.844	0.847	0.936	0.903	0.927	0.898	0.973	0.943	1.043	1.010	1.063
Na	0.001	0.005	0.000	0.001	0.004	0.000	0.001	0.000	0.000	0.002	0.000	0.001	0.003	0.002	0.002	0.007	0.000	0.002	0.000	0.000	0.005	0.003	0.007	0.000
K	0.003	0.005	0.005	0.004	0.006	0.004	0.003	0.003	0.002	0.008	0.003	0.004	0.003	0.003	0.003	0.005	0.004	0.004	0.002	0.003	0.004	0.004	0.004	0.003
Cr	0.000	0.001	0.001	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.001	0.001	0.000	0.004	0.000	0.001	0.000	0.000	0.004	0.012
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Table A1 **Chemical compositions of garnets**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
Weight %																								
SiO_2	37.76	37.88	37.94	37.53	37.80	37.84	37.61	37.79	37.71	37.64	37.88	37.76	37.71	37.56	37.66	37.93	37.93	37.86	37.53	37.16	37.22	37.46	37.09	37.21
TiO_2	0.14	0.10	0.22	0.13	0.14	0.12	0.09	0.11	0.11	0.10	0.11	0.10	0.06	0.07	0.05	0.08	0.07	0.04	0.14	0.10	0.10	0.18	0.12	0.08
Al_2O_3	21.15	21.24	21.13	21.32	21.34	21.33	21.46	21.45	21.58	21.46	21.47	21.55	21.49	21.48	21.58	21.63	21.78	21.70	21.52	21.18	21.24	21.27	21.14	21.12
FeO	26.49	25.53	25.74	27.02	27.24	27.53	27.80	28.64	28.49	28.59	28.53	28.60	28.70	27.82	26.76	27.17	27.07	27.77	27.64	27.59	28.54	27.38	27.74	27.69
MnO	2.79	2.32	1.83	1.66	1.16	0.69	0.50	0.34	0.31	0.16	0.16	0.17	0.20	0.14	0.18	0.07	0.19	0.09	0.13	0.30	0.48	0.68	1.15	1.89
MgO	0.58	0.58	0.64	0.67	0.73	0.81	0.81	1.03	1.05	1.10	1.23	1.36	1.46	1.56	1.99	1.83	1.74	1.60	1.16	1.04	0.92	0.76	0.70	0.73
CaO	12.26	12.56	12.88	12.13	12.26	12.30	12.24	11.23	11.49	11.54	10.99	10.97	10.93	10.99	11.11	11.06	11.57	10.98	11.50	11.81	11.37	12.51	11.65	11.60
Na_2O	0.00	0.02	0.03	0.02	0.00	0.02	0.00	0.00	0.02	0.02	0.04	0.03	0.00	0.02	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.02	0.02	0.02
K_2O	0.01	0.02	0.04	0.05	0.03	0.06	0.02	0.05	0.02	0.02	0.04	0.03	0.05	0.03	0.04	0.02	0.06	0.03	0.06	0.01	0.05	0.04	0.03	0.02
Cr_2O_3	0.00	0.01	0.00	0.02	0.02	0.02	0.03	0.01	0.03	0.00	0.04	0.00	0.00	0.01	0.02	0.00	0.02	0.02	0.00	0.04	0.00	0.03	0.04	0.00
Total	101.18	100.26	100.45	100.54	100.73	100.72	100.57	100.63	100.80	100.63	100.48	100.57	100.58	99.69	99.40	99.79	100.41	100.09	99.69	99.21	99.91	100.30	99.68	100.35
Cation O=12																								
Si	2.981	3.010	3.007	2.977	2.991	2.992	2.978	2.993	2.979	2.978	3.000	2.986	2.981	2.989	2.995	3.008	2.989	3.000	2.991	2.980	2.971	2.974	2.970	2.962
Ti	0.008	0.006	0.013	0.008	0.008	0.007	0.005	0.006	0.006	0.006	0.006	0.006	0.003	0.004	0.003	0.005	0.004	0.002	0.008	0.006	0.006	0.010	0.007	0.005
Al	1.968	1.989	1.974	1.993	1.990	1.988	2.002	2.002	2.009	2.001	2.004	2.008	2.002	2.015	2.023	2.021	2.023	2.026	2.021	2.002	1.998	1.990	1.995	1.982
Fe	1.749	1.697	1.706	1.792	1.803	1.820	1.841	1.897	1.883	1.891	1.889	1.891	1.898	1.852	1.780	1.802	1.784	1.840	1.842	1.850	1.906	1.818	1.858	1.844
Mn	0.187	0.156	0.123	0.111	0.078	0.046	0.034	0.022	0.020	0.011	0.011	0.012	0.013	0.009	0.012	0.005	0.013	0.006	0.009	0.020	0.033	0.046	0.078	0.127
Mg	0.068	0.068	0.075	0.079	0.086	0.096	0.096	0.122	0.123	0.129	0.145	0.160	0.172	0.185	0.235	0.216	0.204	0.189	0.138	0.124	0.109	0.089	0.084	0.087
Ca	1.037	1.069	1.094	1.031	1.039	1.042	1.039	0.953	0.972	0.978	0.932	0.930	0.926	0.937	0.947	0.940	0.976	0.932	0.982	1.015	0.972	1.064	1.000	0.989
Na	0.000	0.003	0.004	0.003	0.000	0.004	0.001	0.000	0.003	0.003	0.006	0.004	0.000	0.004	0.000	0.001	0.001	0.000	0.002	0.000	0.000	0.002	0.003	0.002
K	0.001	0.002	0.004	0.005	0.003	0.006	0.002	0.005	0.002	0.002	0.004	0.003	0.005	0.003	0.004	0.002	0.006	0.003	0.006	0.001	0.005	0.004	0.003	0.002
Cr	0.000	0.000	0.000	0.002	0.002	0.001	0.002	0.000	0.002	0.000	0.002	0.000	0.000	0.001	0.002	0.000	0.001	0.001	0.000	0.002	0.000	0.002	0.002	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	58	59	60	61	62	63	64	65	66	67	68	69	70	1	2	3	4	5	6	7	8	9	10	11
Weight %																								
SiO_2	37.05	37.10	37.16	37.19	37.46	37.41	37.30	37.24	37.45	37.49	37.41	37.24	37.01	38.20	37.97	37.59	37.74	37.76	37.59	37.57	37.50	37.41	37.39	37.56
TiO_2	0.14	0.12	0.17	0.17	0.34	0.22	0.15	0.13	0.13	0.17	0.19	0.18	0.19	0.16	0.26	1.16	0.10	0.10	0.09	0.15	0.12	0.15	0.10	0.04
Al_2O_3	20.98	21.03	21.03	20.87	20.94	20.92	21.19	20.98	21.04	20.71	20.94	20.66	20.35	21.87	21.72	21.54	21.60	21.52	21.29	21.30	21.43	21.37	21.19	21.43
FeO	25.98	25.78	24.50	23.49	22.72	22.36	22.38	21.59	21.87	21.81	21.60	21.92	21.62	28.27	28.39	28.19	27.34	28.88	28.09	28.21	28.43	27.36	27.40	27.78
MnO	2.31	2.97	4.35	5.46	6.41	7.80	9.28	9.44	9.20	8.55	8.99	9.98	9.43	0.13	0.18	0.10	0.16	0.20	0.25	0.44	0.56	0.78	1.08	1.02
MgO	0.62	0.53	0.48	0.44	0.35	0.36	0.33	0.38	0.32	0.39	0.42	0.35	0.27	1.68	1.40	1.21	1.10	1.13	0.96	0.88	0.86	0.74	0.86	0.90
CaO	11.80	11.95	12.36	12.02	12.54	11.46	10.70	10.78	10.90	11.20	11.85	10.65	11.36	11.13	11.49	12.07	12.73	11.51	12.03	12.26	11.97	12.61	11.83	11.57
Na_2O	0.00	0.00	0.02	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.01	0.03	0.04	0.01	0.00	0.05	0.00	0.02	0.00	0.03	0.02	0.01	0.00	0.02
K_2O	0.04	0.04	0.02	0.07	0.03	0.04	0.04	0.02	0.04	0.04	0.04	0.06	0.03	0.06	0.03	0.05	0.05	0.02	0.05	0.04	0.03	0.03	0.03	0.03
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.04	0.02	0.01	0.00	0.00	0.00	0.04	0.03	0.05	0.03	0.07	0.00	0.00
Total	98.92	99.51	100.08	99.70	100.80	100.59	101.37	100.57	100.94	100.37	101.44	101.10	100.32	101.51	101.44	101.98	100.82	101.17	100.38	100.93	100.95	100.52	99.87	100.34
Cation O=12																								
Si	2.988	2.978	2.965	2.981	2.972	2.979	2.955	2.971	2.977	2.995	2.954	2.961	2.964	2.985	2.975	2.936	2.971	2.973	2.981	2.966	2.961	2.964	2.983	2.982
Ti	0.008	0.007	0.010	0.010	0.020	0.013	0.009	0.008	0.008	0.010	0.011	0.011	0.011	0.009	0.015	0.068	0.006	0.006	0.005	0.009	0.007	0.009	0.006	0.003
Al	1.994	1.989	1.978	1.972	1.957	1.964	1.978	1.973	1.971	1.950	1.949	1.936	1.921	2.014	2.006	1.983	2.004	1.997	1.990	1.982	1.995	1.995	1.993	2.005
Fe	1.752	1.730	1.635	1.575	1.507	1.489	1.483	1.441	1.454	1.457	1.427	1.458	1.448	1.847	1.860	1.841	1.800	1.901	1.863	1.862	1.878	1.813	1.829	1.844
Mn	0.158	0.202	0.294	0.371	0.431	0.526	0.623	0.638	0.619	0.578	0.602	0.672	0.640	0.009	0.012	0.007	0.011	0.013	0.017	0.030	0.037	0.052	0.073	0.068
Mg	0.075	0.064	0.057	0.052	0.041	0.043	0.039	0.045	0.038	0.046	0.050	0.042	0.032	0.195	0.164	0.140	0.129	0.132	0.114	0.104	0.101	0.088	0.102	0.107
Ca	1.020	1.027	1.056	1.033	1.065	0.978	0.909	0.921	0.928	0.959	1.002	0.908	0.975	0.932	0.964	1.010	1.074	0.971	1.022	1.037	1.013	1.070	1.011	0.984
Na	0.000	0.000	0.002	0.000	0.003	0.005	0.000	0.000	0.000	0.000	0.002	0.004	0.006	0.002	0.000	0.008	0.000	0.003	0.000	0.005	0.002	0.002	0.000	0.003
K	0.004	0.004	0.002	0.007	0.003	0.004	0.004	0.002	0.004	0.004	0.004	0.006	0.003	0.006	0.003	0.005	0.005	0.002	0.005	0.004	0.003	0.003	0.003	0.003
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.003	0.002	0.003	0.002	0.004	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Table A1 **Chemical compositions of garnets**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Weight %																								
SiO_2	37.38	37.26	37.51	37.46	37.89	37.33	37.71	37.14	36.79	36.59	36.94	36.84	36.87	36.80	36.67	32.66	37.70	37.87	37.69	37.28	37.53	37.86	37.64	37.44
TiO_2	0.06	0.10	0.07	0.13	0.08	0.13	0.15	0.17	0.13	0.11	0.10	0.17	0.17	0.15	0.12	23.40	0.10	0.08	0.07	0.09	0.10	0.06	0.05	0.07
Al_2O_3	21.41	21.24	21.34	21.07	21.19	21.04	22.55	20.98	20.68	20.89	20.90	20.52	20.11	20.56	20.60	8.85	21.39	21.73	21.59	21.67	21.64	21.54	21.70	21.39
FeO	27.29	26.34	26.82	24.34	24.48	23.32	22.15	22.53	21.60	21.95	21.77	22.06	20.95	22.21	22.68	11.61	28.57	28.63	28.52	28.88	28.69	28.36	28.23	28.10
MnO	1.58	2.46	3.39	4.60	5.11	5.60	6.57	7.82	9.05	8.73	10.06	9.65	10.31	10.23	9.74	0.25	0.15	0.19	0.17	0.14	0.06	0.11	0.21	0.16
MgO	0.71	0.58	0.60	0.49	0.50	0.42	0.60	0.39	0.36	0.31	0.40	0.44	0.29	0.34	0.46	0.56	1.23	1.30	1.35	0.63	1.63	1.63	1.76	1.84
CaO	11.72	12.35	11.66	12.54	11.77	12.38	11.60	10.98	10.98	11.02	10.18	10.48	11.14	10.15	9.47	22.19	11.59	11.10	11.08	10.50	10.75	11.39	10.70	10.74
Na_2O	0.01	0.02	0.01	0.02	0.03	0.01	0.04	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.00	0.00	0.01	0.00	0.05	0.01	0.02	0.00	0.00
K_2O	0.05	0.05	0.04	0.04	0.06	0.06	0.02	0.04	0.02	0.03	0.05	0.05	0.04	0.04	0.04	0.06	0.03	0.04	0.05	0.03	0.03	0.06	0.04	0.02
Cr_2O_3	0.00	0.02	0.00	0.04	0.04	0.00	0.00	0.03	0.00	0.03	0.04	0.01	0.00	0.02	0.01	0.02	0.00	0.01	0.02	0.03	0.00	0.03	0.00	0.00
Total	100.21	100.42	101.43	100.73	101.14	100.28	101.38	100.09	99.61	99.67	100.42	100.22	99.87	100.50	99.81	99.61	100.75	100.97	100.53	99.29	100.44	101.04	100.32	99.78
Cation O=12																								
Si	2.975	2.960	2.957	2.969	2.994	2.973	2.960	2.973	2.963	2.945	2.956	2.955	2.969	2.949	2.957	2.741	2.978	2.983	2.981	2.997	2.968	2.974	2.976	2.976
Ti	0.004	0.006	0.004	0.008	0.005	0.008	0.009	0.010	0.008	0.007	0.006	0.010	0.010	0.009	0.007	1.477	0.006	0.005	0.004	0.005	0.006	0.003	0.003	0.004
Al	2.008	1.988	1.983	1.969	1.973	1.975	2.086	1.980	1.964	1.982	1.971	1.940	1.908	1.942	1.958	0.875	1.991	2.018	2.012	2.054	2.017	1.994	2.022	2.004
Fe	1.817	1.750	1.768	1.613	1.617	1.553	1.454	1.508	1.455	1.477	1.457	1.479	1.410	1.488	1.530	0.815	1.887	1.886	1.886	1.942	1.897	1.863	1.867	1.868
Mn	0.107	0.165	0.226	0.309	0.342	0.378	0.437	0.530	0.617	0.595	0.682	0.655	0.703	0.694	0.665	0.018	0.010	0.013	0.011	0.009	0.004	0.007	0.014	0.011
Mg	0.084	0.069	0.070	0.058	0.059	0.050	0.070	0.046	0.044	0.037	0.048	0.053	0.035	0.041	0.055	0.070	0.145	0.153	0.160	0.076	0.192	0.191	0.208	0.219
Ca	1.000	1.051	0.985	1.065	0.997	1.056	0.975	0.942	0.948	0.950	0.873	0.901	0.961	0.871	0.818	1.995	0.981	0.937	0.939	0.905	0.911	0.959	0.907	0.915
Na	0.002	0.004	0.002	0.003	0.005	0.001	0.007	0.004	0.000	0.000	0.000	0.001	0.000	0.000	0.005	0.000	0.000	0.001	0.000	0.008	0.002	0.002	0.000	0.000
K	0.005	0.005	0.004	0.004	0.006	0.007	0.002	0.004	0.002	0.003	0.006	0.005	0.005	0.004	0.004	0.007	0.003	0.004	0.005	0.003	0.003	0.006	0.004	0.002
Cr	0.000	0.001	0.000	0.002	0.002	0.000	0.000	0.002	0.000	0.002	0.002	0.001	0.000	0.001	0.000	0.002	0.000	0.001	0.001	0.002	0.000	0.002	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Weight %																								
SiO_2	37.30	37.11	36.98	36.79	37.31	37.29	37.28	37.26	37.08	36.78	37.09	37.09	37.16	36.97	36.98	36.74	37.30	35.97	36.18	36.98	32.20	37.35	37.32	37.49
TiO_2	0.01	0.06	0.13	0.12	0.09	0.06	0.16	0.15	0.07	0.17	0.20	0.21	0.16	0.19	0.18	0.17	0.16	0.13	0.14	0.15	25.57	0.14	0.06	0.14
Al_2O_3	21.58	21.29	21.18	21.03	21.14	21.02	21.14	20.97	21.03	20.91	20.88	20.81	20.78	20.53	20.76	20.94	20.83	20.55	20.90	20.97	8.27	21.22	21.15	21.50
FeO	27.21	28.05	28.49	27.55	28.21	28.44	27.61	25.95	26.60	22.24	22.10	21.95	21.71	21.70	22.48	22.63	22.55	22.18	22.64	23.04	8.34	27.09	28.86	28.67
MnO	0.12	0.13	0.12	0.46	0.61	1.30	1.97	2.53	3.42	8.67	9.10	9.01	9.58	10.15	9.64	10.07	9.68	8.98	7.64	6.55	1.10	1.37	0.56	0.23
MgO	1.92	1.45	1.11	0.84	0.80	0.69	0.65	0.59	0.51	0.38	0.41	0.54	0.45	0.39	0.50	0.36	0.46	0.39	0.42	0.40	0.18	0.62	0.82	1.03
CaO	11.03	11.86	11.78	12.72	12.19	11.76	12.25	12.74	12.09	11.52	11.31	11.17	11.15	10.59	10.56	9.96	9.76	10.79	11.95	11.73	23.26	12.66	11.40	11.67
Na_2O	0.05	0.02	0.00	0.00	0.00	0.01	0.04	0.02	0.02	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.01	0.01	0.00	0.01	0.04	0.01	0.01	0.03
K_2O	0.04	0.07	0.03	0.04	0.05	0.04	0.04	0.03	0.04	0.04	0.03	0.01	0.04	0.05	0.04	0.05	0.04	0.04	0.03	0.04	0.04	0.04	0.05	0.04
Cr_2O_3	0.05	0.02	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.02	0.05	0.03	0.02	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.02	0.03	0.03	0.00
Total	99.30	100.05	99.83	99.55	100.42	100.61	101.13	100.21	100.87	100.73	101.16	100.80	101.06	100.56	101.16	100.92	100.87	99.04	99.88	99.85	99.01	100.53	100.24	100.79
Cation O=12																								
Si	2.970	2.945	2.950	2.942	2.963	2.963	2.945	2.965	2.941	2.929	2.942	2.951	2.950	2.956	2.938	2.931	2.975	2.917	2.901	2.963	2.729	2.963	2.973	2.962
Ti	0.001	0.004	0.008	0.007	0.005	0.004	0.009	0.009	0.004	0.010	0.012	0.012	0.010	0.012	0.011	0.010	0.010	0.008	0.009	0.009	1.629	0.008	0.003	0.008
Al	2.025	1.991	1.991	1.982	1.978	1.968	1.968	1.967	1.966	1.963	1.952	1.951	1.944	1.935	1.944	1.969	1.958	1.964	1.975	1.980	0.826	1.983	1.985	2.003
Fe	1.812	1.861	1.901	1.843	1.874	1.889	1.824	1.727	1.764	1.481	1.466	1.460	1.441	1.451	1.493	1.510	1.504	1.505	1.518	1.544	0.591	1.797	1.923	1.895
Mn	0.008	0.009	0.008	0.031	0.041	0.088	0.132	0.170	0.230	0.585	0.612	0.607	0.644	0.688	0.648	0.681	0.654	0.617	0.519	0.445	0.079	0.092	0.038	0.015
Mg	0.228	0.171	0.132	0.100	0.095	0.082	0.076	0.069	0.060	0.045	0.049	0.064	0.053	0.046	0.059	0.043	0.054	0.047	0.050	0.047	0.023	0.073	0.097	0.121
Ca	0.941	1.008	1.007	1.090	1.037	1.001	1.037	1.086	1.028	0.982	0.961	0.952	0.948	0.907	0.899	0.851	0.834	0.938	1.026	1.007	2.112	1.076	0.973	0.988
Na	0.007	0.003	0.001	0.000	0.000	0.002	0.006	0.003	0.003	0.000	0.001	0.000	0.002	0.000	0.003	0.000	0.002	0.001	0.000	0.001	0.006	0.001	0.002	0.005
K	0.004	0.007	0.003	0.004	0.005	0.004	0.004	0.003	0.004	0.004	0.003	0.001	0.004	0.005	0.004	0.005	0.004	0.004	0.003	0.004	0.004	0.004	0.005	0.004
Cr	0.003	0.001	0.001	0.001	0.002	0.000	0.000	0.000	0.000	0.001	0.003	0.002	0.001	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.001	0.002	0.002	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Table A1 **Chemical compositions of garnets**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	25	26	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Weight %																								
SiO_2	37.16	37.74	36.63	37.13	36.96	37.03	36.79	36.80	36.76	36.47	36.15	36.39	36.46	36.21	36.31	36.55	36.44	36.33	36.19	36.53	36.56	36.69	36.65	36.92
TiO_2	0.08	0.05	0.04	0.04	0.11	0.04	0.08	0.12	0.14	0.13	0.09	0.14	0.10	0.17	0.12	0.15	0.13	0.16	0.18	0.12	0.14	0.12	0.16	0.12
Al_2O_3	21.30	21.85	21.40	21.18	21.10	20.88	20.97	20.88	20.99	20.78	20.45	20.77	20.65	20.68	20.43	20.45	20.38	20.35	20.34	20.55	20.31	20.46	20.57	20.68
FeO	28.72	27.58	28.03	28.05	27.70	28.52	28.44	28.04	27.32	27.77	25.56	24.69	22.74	22.20	22.15	21.56	21.97	22.44	22.10	22.88	21.72	23.44	24.17	24.92
MnO	0.08	0.11	0.15	0.17	0.14	0.15	0.24	0.45	0.77	1.25	2.82	4.11	6.55	7.79	8.66	9.08	9.35	9.00	9.12	7.75	7.01	5.06	4.17	3.56
MgO	1.28	1.99	2.03	1.55	1.43	1.21	1.07	0.89	0.77	0.70	0.61	0.48	0.38	0.38	0.30	0.37	0.35	0.40	0.42	0.35	0.39	0.40	0.49	0.52
CaO	11.23	11.09	10.66	10.88	11.02	11.18	11.01	11.65	12.11	11.55	12.93	12.26	11.85	11.31	10.65	10.97	10.45	10.41	10.27	11.29	12.36	12.69	12.62	12.38
Na_2O	0.00	0.00	0.02	0.01	0.00	0.00	0.02	0.01	0.02	0.01	0.00	0.02	0.03	0.00	0.00	0.06	0.01	0.03	0.00	0.01	0.00	0.00	0.04	0.02
K_2O	0.01	0.03	0.07	0.04	0.04	0.05	0.03	0.01	0.04	0.04	0.06	0.04	0.04	0.02	0.04	0.04	0.03	0.04	0.04	0.05	0.04	0.06	0.04	0.05
Cr_2O_3	0.02	0.03	0.00	0.01	0.00	0.00	0.01	0.01	0.08	0.03	0.03	0.00	0.05	0.00	0.00	0.02	0.00	0.01	0.04	0.00	0.06	0.03	0.02	0.05
Total	99.88	100.46	99.02	99.08	98.51	99.06	98.66	98.87	99.00	98.72	98.69	98.88	98.83	98.78	98.66	99.24	99.10	99.16	98.70	99.52	98.58	98.93	98.92	99.21
Cation O=12																								
Si	2.961	2.972	2.930	2.977	2.981	2.978	2.972	2.968	2.959	2.952	2.923	2.939	2.951	2.938	2.957	2.954	2.956	2.945	2.948	2.945	2.966	2.963	2.957	2.972
Ti	0.005	0.003	0.002	0.003	0.007	0.003	0.005	0.007	0.008	0.008	0.005	0.008	0.006	0.011	0.007	0.009	0.008	0.009	0.011	0.007	0.009	0.007	0.010	0.007
Al	2.001	2.028	2.017	2.001	2.006	1.979	1.997	1.985	1.992	1.983	1.948	1.978	1.970	1.978	1.960	1.949	1.949	1.944	1.953	1.953	1.942	1.947	1.956	1.961
Fe	1.914	1.816	1.875	1.881	1.868	1.918	1.922	1.891	1.839	1.879	1.729	1.668	1.539	1.507	1.509	1.458	1.490	1.521	1.505	1.542	1.474	1.583	1.631	1.677
Mn	0.005	0.007	0.010	0.011	0.009	0.010	0.017	0.031	0.053	0.086	0.193	0.281	0.449	0.536	0.597	0.621	0.643	0.618	0.629	0.529	0.481	0.346	0.285	0.243
Mg	0.152	0.234	0.242	0.185	0.172	0.145	0.128	0.107	0.092	0.084	0.073	0.057	0.046	0.045	0.037	0.044	0.042	0.048	0.051	0.042	0.047	0.048	0.059	0.062
Ca	0.959	0.935	0.914	0.935	0.952	0.963	0.953	1.007	1.044	1.002	1.120	1.061	1.028	0.984	0.929	0.950	0.908	0.904	0.896	0.975	1.074	1.098	1.091	1.067
Na	0.000	0.000	0.002	0.002	0.000	0.000	0.003	0.002	0.003	0.001	0.000	0.003	0.005	0.000	0.000	0.009	0.001	0.004	0.000	0.002	0.000	0.001	0.006	0.002
K	0.001	0.003	0.007	0.005	0.004	0.005	0.003	0.001	0.004	0.004	0.006	0.004	0.004	0.002	0.004	0.005	0.003	0.004	0.004	0.005	0.004	0.006	0.004	0.005
Cr	0.002	0.002	0.000	0.001	0.000	0.000	0.000	0.001	0.005	0.002	0.002	0.000	0.003	0.000	0.000	0.001	0.000	0.001	0.002	0.000	0.004	0.002	0.001	0.003
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Weight %																								
SiO_2	36.64	36.81	36.93	36.73	36.73	36.73	36.67	36.79	36.98	37.00	36.75	36.69	36.82	36.83	36.58	36.58	36.47	36.59	36.45	36.53	36.33	36.45	36.93	37.11
TiO_2	0.11	0.08	0.10	0.07	0.10	0.08	0.09	0.12	0.18	0.10	0.08	0.08	0.10	0.12	0.14	0.12	0.09	0.15	0.21	0.24	0.21	0.17	0.23	0.13
Al_2O_3	20.72	21.08	20.98	21.14	20.87	20.77	21.02	20.89	21.11	20.95	21.10	21.10	20.70	20.84	20.78	20.54	20.54	20.36	20.56	20.16	20.04	20.38	20.72	20.86
FeO	26.21	26.97	27.89	28.01	28.36	28.09	28.54	27.92	27.49	27.63	27.78	28.81	27.96	27.59	25.12	23.30	21.82	21.69	21.32	21.58	21.28	21.79	22.04	23.34
MnO	2.51	1.37	0.69	0.45	0.17	0.20	0.12	0.18	0.15	0.12	0.13	0.21	0.26	1.33	3.14	5.57	7.91	8.84	8.70	8.91	8.97	8.85	8.48	5.63
MgO	0.59	0.75	0.78	0.83	1.10	1.15	1.28	1.28	1.56	1.60	1.34	1.23	0.95	0.73	0.50	0.41	0.36	0.46	0.46	0.30	0.33	0.39	0.43	0.47
CaO	11.95	12.16	11.63	11.75	11.21	11.44	11.37	11.42	11.75	11.03	11.28	10.95	11.53	11.77	12.39	12.08	11.63	10.74	10.79	10.94	11.42	10.55	11.47	11.98
Na_2O	0.00	0.04	0.02	0.00	0.00	0.00	0.03	0.02	0.00	0.04	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
K_2O	0.04	0.03	0.02	0.03	0.04	0.05	0.05	0.03	0.03	0.06	0.03	0.04	0.04	0.03	0.04	0.03	0.04	0.03	0.05	0.05	0.07	0.04	0.04	0.05
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.01	0.00	0.00	0.05	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.02
Total	98.76	99.28	99.05	99.01	98.60	98.51	99.19	98.66	99.25	98.53	98.51	99.16	98.37	99.26	98.70	98.65	98.85	98.90	98.54	98.73	98.66	98.62	100.34	99.58
Cation O=12																								
Si	2.963	2.954	2.974	2.957	2.969	2.969	2.942	2.966	2.957	2.980	2.965	2.949	2.983	2.962	2.959	2.965	2.955	2.968	2.965	2.973	2.956	2.968	2.951	2.979
Ti	0.007	0.005	0.006	0.004	0.006	0.005	0.005	0.007	0.011	0.006	0.005	0.005	0.006	0.008	0.009	0.007	0.006	0.009	0.013	0.014	0.013	0.010	0.014	0.008
Al	1.975	1.994	1.991	2.006	1.988	1.979	1.988	1.985	1.989	1.988	2.006	1.999	1.977	1.975	1.980	1.962	1.962	1.946	1.971	1.933	1.921	1.956	1.951	1.973
Fe	1.773	1.810	1.878	1.886	1.917	1.899	1.915	1.882	1.838	1.861	1.874	1.937	1.895	1.856	1.699	1.580	1.479	1.472	1.450	1.469	1.448	1.484	1.473	1.566
Mn	0.172	0.093	0.047	0.031	0.012	0.014	0.008	0.012	0.010	0.008	0.009	0.014	0.018	0.090	0.215	0.383	0.543	0.607	0.599	0.614	0.618	0.611	0.574	0.383
Mg	0.071	0.089	0.093	0.099	0.133	0.138	0.153	0.153	0.186	0.192	0.161	0.147	0.115	0.088	0.061	0.049	0.043	0.055	0.055	0.037	0.040	0.047	0.051	0.056
Ca	1.035	1.046	1.004	1.014	0.971	0.991	0.978	0.986	1.007	0.952	0.975	0.943	1.001	1.014	1.074	1.049	1.010	0.934	0.941	0.954	0.996	0.920	0.982	1.030
Na	0.000	0.006	0.004	0.001	0.000	0.000	0.005	0.004	0.000	0.006	0.003	0.000	0.000	0.003	0.000	0.001	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000
K	0.004	0.003	0.002	0.003	0.004	0.005	0.005	0.003	0.003	0.006	0.003	0.004	0.004	0.003	0.004	0.003	0.004	0.003	0.005	0.006	0.008	0.004	0.004	0.005
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.001	0.000	0.000	0.003	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Table A1 **Chemical compositions of garnets**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Weight %																								
SiO_2	36.70	36.55	36.87	36.73	36.94	36.90	36.83	37.19	37.00	37.26	37.24	34.95	36.83	36.70	36.68	36.78	36.62	36.53	36.45	36.37	36.92	36.96	37.19	37.07
TiO_2	0.13	0.09	0.13	0.10	0.12	0.05	0.06	0.03	0.08	0.22	0.36	9.98	0.33	0.13	0.12	0.13	0.16	0.19	0.23	0.19	0.15	0.12	0.08	0.15
Al_2O_3	20.99	21.05	20.94	21.12	21.17	21.32	21.46	21.16	21.11	21.13	21.31	15.65	20.98	20.90	20.67	20.73	20.66	20.50	19.97	20.22	20.37	20.53	20.59	20.88
FeO	24.44	25.94	27.59	28.70	28.45	27.96	28.40	27.66	27.88	28.38	28.54	20.29	26.48	23.61	21.68	22.18	22.34	21.96	21.16	21.22	21.81	21.49	22.75	24.28
MnO	4.73	3.23	0.92	0.48	0.23	0.18	0.14	0.18	0.18	0.27	0.22	0.31	2.39	5.77	8.12	8.44	9.20	8.98	9.19	8.98	9.00	8.25	7.36	4.63
MgO	0.43	0.56	0.74	0.90	1.01	1.35	1.53	1.53	1.19	0.92	1.12	0.76	0.67	0.40	0.30	0.32	0.47	0.39	0.28	0.35	0.34	0.39	0.47	0.43
CaO	11.95	12.05	11.54	11.19	11.50	11.52	11.02	11.12	11.89	12.03	11.38	16.61	12.20	12.02	11.54	10.88	9.91	10.65	11.31	11.67	10.60	11.23	11.28	12.07
Na_2O	0.02	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.02	0.01	0.00	0.00	0.00	0.00	0.03	0.05	0.00	0.03	0.03	0.02	0.00	0.00
K_2O	0.02	0.04	0.05	0.05	0.04	0.04	0.03	0.07	0.06	0.01	0.07	0.03	0.06	0.04	0.03	0.04	0.06	0.04	0.05	0.04	0.03	0.04	0.06	0.04
Cr_2O_3	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.06	0.00	0.00	0.04	0.01	0.00	0.00	0.03	0.00	0.06	0.00
Total	99.41	99.54	98.80	99.28	99.45	99.31	99.49	98.98	99.39	100.26	100.25	98.60	99.94	99.63	99.14	99.50	99.50	99.29	98.64	99.07	99.28	99.02	99.83	99.55
Cation O=12																								
Si	2.951	2.932	2.977	2.953	2.960	2.952	2.941	2.982	2.960	2.961	2.960	2.879	2.943	2.947	2.965	2.966	2.957	2.953	2.969	2.944	2.987	2.990	2.985	2.976
Ti	0.008	0.005	0.008	0.006	0.007	0.003	0.003	0.002	0.005	0.013	0.022	0.618	0.020	0.008	0.007	0.008	0.010	0.012	0.014	0.012	0.009	0.007	0.005	0.009
Al	1.989	1.990	1.993	2.001	1.999	2.010	2.020	2.000	1.990	1.979	1.996	1.519	1.976	1.978	1.968	1.971	1.967	1.953	1.916	1.929	1.942	1.958	1.948	1.976
Fe	1.644	1.740	1.863	1.930	1.907	1.871	1.897	1.855	1.865	1.887	1.897	1.398	1.769	1.585	1.465	1.496	1.509	1.485	1.441	1.437	1.476	1.454	1.527	1.630
Mn	0.322	0.219	0.063	0.032	0.016	0.012	0.009	0.012	0.012	0.018	0.015	0.022	0.162	0.393	0.556	0.577	0.629	0.615	0.634	0.616	0.617	0.565	0.500	0.315
Mg	0.052	0.067	0.089	0.108	0.120	0.161	0.182	0.183	0.142	0.109	0.132	0.093	0.080	0.048	0.037	0.039	0.056	0.046	0.034	0.042	0.041	0.046	0.057	0.051
Ca	1.030	1.036	0.998	0.964	0.987	0.987	0.943	0.955	1.019	1.025	0.969	1.466	1.044	1.034	0.999	0.940	0.858	0.922	0.987	1.012	0.919	0.973	0.970	1.039
Na	0.003	0.006	0.003	0.000	0.000	0.000	0.000	0.000	0.001	0.007	0.003	0.001	0.000	0.000	0.001	0.000	0.005	0.008	0.000	0.005	0.005	0.002	0.000	0.000
K	0.002	0.004	0.005	0.005	0.004	0.004	0.003	0.008	0.006	0.001	0.007	0.004	0.006	0.004	0.003	0.004	0.006	0.004	0.005	0.004	0.003	0.004	0.006	0.004
Cr	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.004	0.000	0.000	0.003	0.001	0.000	0.000	0.002	0.000	0.004	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	40	41	42	43	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Weight %																								
SiO_2	36.87	37.06	37.37	37.28	37.30	37.11	36.98	36.79	37.31	37.29	37.28	37.26	37.08	36.78	37.09	37.09	37.16	36.97	36.98	36.74	37.30	35.97	36.18	36.98
TiO_2	0.07	1.18	0.15	0.07	0.01	0.06	0.13	0.12	0.09	0.06	0.16	0.15	0.07	0.17	0.20	0.21	0.16	0.19	0.18	0.17	0.16	0.13	0.14	0.15
Al_2O_3	20.82	20.49	21.21	21.04	21.58	21.29	21.18	21.03	21.14	21.02	21.14	20.97	21.03	20.91	20.88	20.81	20.78	20.53	20.76	20.94	20.83	20.55	20.90	20.97
FeO	28.12	27.55	28.90	27.91	27.21	28.05	28.49	27.55	28.21	28.44	27.61	25.95	26.60	22.24	22.10	21.95	21.71	21.70	22.48	22.63	22.55	22.18	22.64	23.04
MnO	1.37	0.37	0.16	0.14	0.12	0.13	0.12	0.46	0.61	1.30	1.97	2.53	3.42	8.67	9.10	9.01	9.58	10.15	9.64	10.07	9.68	8.98	7.64	6.55
MgO	0.73	0.88	1.18	1.61	1.92	1.45	1.11	0.84	0.80	0.69	0.65	0.59	0.51	0.38	0.41	0.54	0.45	0.39	0.50	0.36	0.46	0.39	0.42	0.40
CaO	11.36	12.32	11.13	11.68	11.03	11.86	11.78	12.72	12.19	11.76	12.25	12.74	12.09	11.52	11.31	11.17	11.15	10.59	10.56	9.96	9.76	10.79	11.95	11.73
Na_2O	0.00	0.00	0.00	0.00	0.05	0.02	0.00	0.00	0.00	0.01	0.04	0.02	0.02	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.01	0.01	0.00	0.01
K_2O	0.04	0.05	0.06	0.03	0.04	0.07	0.03	0.04	0.05	0.04	0.04	0.03	0.04	0.04	0.03	0.01	0.04	0.05	0.04	0.05	0.04	0.04	0.03	0.04
Cr_2O_3	0.05	0.08	0.02	0.00	0.05	0.02	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.02	0.05	0.03	0.02	0.00	0.00	0.00	0.08	0.00	0.00	0.00
Total	99.41	99.98	100.16	99.76	99.30	100.05	99.83	99.55	100.42	100.61	101.13	100.21	100.87	100.73	101.16	100.80	101.06	100.56	101.16	100.92	100.87	99.04	99.88	99.85
Cation O=12																								
Si	2.965	2.962	2.973	2.966	2.970	2.945	2.950	2.942	2.963	2.963	2.945	2.965	2.941	2.929	2.942	2.951	2.950	2.956	2.938	2.931	2.975	2.917	2.901	2.963
Ti	0.004	0.071	0.009	0.004	0.001	0.004	0.008	0.007	0.005	0.004	0.009	0.009	0.004	0.010	0.012	0.012	0.010	0.012	0.011	0.010	0.010	0.008	0.009	0.009
Al	1.973	1.930	1.988	1.973	2.025	1.991	1.991	1.982	1.978	1.968	1.968	1.967	1.966	1.963	1.952	1.951	1.944	1.935	1.944	1.969	1.958	1.964	1.975	1.980
Fe	1.891	1.842	1.923	1.857	1.812	1.861	1.901	1.843	1.874	1.889	1.824	1.727	1.764	1.481	1.466	1.460	1.441	1.451	1.493	1.510	1.504	1.505	1.518	1.544
Mn	0.093	0.025	0.011	0.010	0.008	0.009	0.008	0.031	0.041	0.088	0.132	0.170	0.230	0.585	0.612	0.607	0.644	0.688	0.648	0.681	0.654	0.617	0.519	0.445
Mg	0.088	0.105	0.140	0.191	0.228	0.171	0.132	0.100	0.095	0.082	0.076	0.069	0.060	0.045	0.049	0.064	0.053	0.046	0.059	0.043	0.054	0.047	0.050	0.047
Ca	0.978	1.055	0.949	0.996	0.941	1.008	1.007	1.090	1.037	1.001	1.037	1.086	1.028	0.982	0.961	0.952	0.948	0.907	0.899	0.851	0.834	0.938	1.026	1.007
Na	0.000	0.000	0.000	0.000	0.007	0.003	0.001	0.000	0.000	0.002	0.006	0.003	0.003	0.000	0.001	0.000	0.002	0.000	0.003	0.000	0.002	0.001	0.000	0.001
K	0.004	0.005	0.006	0.003	0.004	0.007	0.003	0.004	0.005	0.004	0.004	0.003	0.004	0.004	0.003	0.001	0.004	0.005	0.004	0.005	0.004	0.004	0.003	0.004
Cr	0.003	0.005	0.001	0.000	0.003	0.001	0.001	0.001	0.002	0.000	0.000	0.000	0.000	0.001	0.003	0.002	0.001	0.000	0.000	0.000	0.005	0.000	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Table A1 **Chemical compositions of garnets**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	21	22	23	24	25	26	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Weight %																								
SiO_2	32.20	37.35	37.32	37.49	37.16	37.74	36.63	37.13	36.96	37.03	36.79	36.80	36.76	36.47	36.15	36.39	36.46	36.21	36.31	36.55	36.44	36.33	36.19	36.53
TiO_2	25.57	0.14	0.06	0.14	0.08	0.05	0.04	0.04	0.11	0.04	0.08	0.12	0.14	0.13	0.09	0.14	0.10	0.17	0.12	0.15	0.13	0.16	0.18	0.12
Al_2O_3	8.27	21.22	21.15	21.50	21.30	21.85	21.40	21.18	21.10	20.88	20.97	20.88	20.99	20.78	20.45	20.77	20.65	20.68	20.43	20.45	20.38	20.35	20.34	20.55
FeO	8.34	27.09	28.86	28.67	28.72	27.58	28.03	28.05	27.70	28.52	28.44	28.04	27.32	27.77	25.56	24.69	22.74	22.20	22.15	21.56	21.97	22.44	22.10	22.88
MnO	1.10	1.37	0.56	0.23	0.08	0.11	0.15	0.17	0.14	0.15	0.24	0.45	0.77	1.25	2.82	4.11	6.55	7.79	8.66	9.08	9.35	9.00	9.12	7.75
MgO	0.18	0.62	0.82	1.03	1.28	1.99	2.03	1.55	1.43	1.21	1.07	0.89	0.77	0.70	0.61	0.48	0.38	0.38	0.30	0.37	0.35	0.40	0.42	0.35
CaO	23.26	12.66	11.40	11.67	11.23	11.09	10.66	10.88	11.02	11.18	11.01	11.65	12.11	11.55	12.93	12.26	11.85	11.31	10.65	10.97	10.45	10.41	10.27	11.29
Na_2O	0.04	0.01	0.01	0.03	0.00	0.00	0.02	0.01	0.00	0.00	0.02	0.01	0.02	0.01	0.00	0.02	0.03	0.00	0.00	0.06	0.01	0.03	0.00	0.01
K_2O	0.04	0.04	0.05	0.04	0.01	0.03	0.07	0.04	0.04	0.05	0.03	0.01	0.04	0.04	0.06	0.04	0.04	0.02	0.04	0.04	0.03	0.04	0.04	0.05
Cr_2O_3	0.02	0.03	0.03	0.00	0.02	0.03	0.00	0.01	0.00	0.00	0.01	0.01	0.08	0.03	0.03	0.00	0.05	0.00	0.00	0.02	0.00	0.01	0.04	0.00
Total	99.01	100.53	100.24	100.79	99.88	100.46	99.02	99.08	98.51	99.06	98.66	98.87	99.00	98.72	98.69	98.88	98.83	98.78	98.66	99.24	99.10	99.16	98.70	99.52
Cation O=12																								
Si	2.729	2.963	2.973	2.962	2.961	2.972	2.930	2.977	2.981	2.978	2.972	2.968	2.959	2.952	2.923	2.939	2.951	2.938	2.957	2.954	2.956	2.945	2.948	2.945
Ti	1.629	0.008	0.003	0.008	0.005	0.003	0.002	0.003	0.007	0.003	0.005	0.007	0.008	0.008	0.005	0.008	0.006	0.011	0.007	0.009	0.008	0.009	0.011	0.007
Al	0.826	1.983	1.985	2.003	2.001	2.028	2.017	2.001	2.006	1.979	1.997	1.985	1.992	1.983	1.948	1.978	1.970	1.978	1.960	1.949	1.949	1.944	1.953	1.953
Fe	0.591	1.797	1.923	1.895	1.914	1.816	1.875	1.881	1.868	1.918	1.922	1.891	1.839	1.879	1.729	1.668	1.539	1.507	1.509	1.458	1.490	1.521	1.505	1.542
Mn	0.079	0.092	0.038	0.015	0.005	0.007	0.010	0.011	0.009	0.010	0.017	0.031	0.053	0.086	0.193	0.281	0.449	0.536	0.597	0.621	0.643	0.618	0.629	0.529
Mg	0.023	0.073	0.097	0.121	0.152	0.234	0.242	0.185	0.172	0.145	0.128	0.107	0.092	0.084	0.073	0.057	0.046	0.045	0.037	0.044	0.042	0.048	0.051	0.042
Ca	2.112	1.076	0.973	0.988	0.959	0.935	0.914	0.935	0.952	0.963	0.953	1.007	1.044	1.002	1.120	1.061	1.028	0.984	0.929	0.950	0.908	0.904	0.896	0.975
Na	0.006	0.001	0.002	0.005	0.000	0.000	0.002	0.002	0.000	0.000	0.003	0.002	0.003	0.001	0.000	0.003	0.005	0.000	0.000	0.009	0.001	0.004	0.000	0.002
K	0.004	0.004	0.005	0.004	0.001	0.003	0.007	0.005	0.004	0.005	0.003	0.001	0.004	0.004	0.006	0.004	0.004	0.002	0.004	0.005	0.003	0.004	0.004	0.005
Cr	0.001	0.002	0.002	0.000	0.002	0.002	0.000	0.001	0.000	0.000	0.000	0.001	0.005	0.002	0.002	0.000	0.003	0.000	0.000	0.001	0.000	0.001	0.002	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11
Weight %																								
SiO_2	36.56	36.69	36.65	36.92	36.64	36.81	36.93	36.73	36.73	36.73	36.67	36.79	36.98	37.06	37.33	36.95	36.85	36.74	37.17	36.98	36.98	37.12	36.96	36.94
TiO_2	0.14	0.12	0.16	0.12	0.11	0.08	0.10	0.07	0.10	0.08	0.09	0.12	0.18	0.07	0.09	0.15	0.16	0.15	0.12	0.09	0.15	0.13	0.15	0.11
Al_2O_3	20.31	20.46	20.57	20.68	20.72	21.08	20.98	21.14	20.87	20.77	21.02	20.89	21.11	20.20	20.08	20.28	20.22	20.02	19.98	20.10	19.70	20.42	20.41	20.35
FeO	21.72	23.44	24.17	24.92	26.21	26.97	27.89	28.01	28.36	28.09	28.54	27.92	27.49	27.80	27.48	27.73	28.40	27.33	27.08	27.22	26.05	27.28	27.15	26.25
MnO	7.01	5.06	4.17	3.56	2.51	1.37	0.69	0.45	0.17	0.20	0.12	0.18	0.15	0.08	0.14	0.28	0.60	1.10	1.34	1.59	1.19	1.83	1.54	2.43
MgO	0.39	0.40	0.49	0.52	0.59	0.75	0.78	0.83	1.10	1.15	1.28	1.28	1.56	1.38	1.16	0.98	0.91	0.72	0.70	0.68	0.77	0.75	0.84	0.70
CaO	12.36	12.69	12.62	12.38	11.95	12.16	11.63	11.75	11.21	11.44	11.37	11.42	11.75	13.14	14.07	14.11	13.94	14.22	14.08	14.32	14.74	13.82	14.53	14.19
Na_2O	0.00	0.00	0.04	0.02	0.00	0.04	0.02	0.00	0.00	0.00	0.03	0.02	0.00	0.00	0.01	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.03	0.00
K_2O	0.04	0.06	0.04	0.05	0.04	0.03	0.02	0.03	0.04	0.05	0.05	0.03	0.03	0.03	0.00	0.03	0.07	0.05	0.01	0.04	0.03	0.04	0.04	0.05
Cr_2O_3	0.06	0.03	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Total	98.58	98.93	98.92	99.21	98.76	99.28	99.05	99.01	98.60	98.51	99.19	98.66	99.25	99.76	100.36	100.52	101.17	100.36	100.48	101.02	99.61	101.40	101.64	101.03
Cation O=12																								
Si	2.966	2.963	2.957	2.972	2.963	2.954	2.974	2.957	2.969	2.969	2.942	2.966	2.957	2.953	2.957	2.926	2.905	2.920	2.952	2.921	2.956	2.922	2.897	2.916
Ti	0.009	0.007	0.010	0.007	0.007	0.005	0.006	0.004	0.006	0.005	0.005	0.007	0.011	0.004	0.005	0.009	0.009	0.009	0.007	0.005	0.009	0.008	0.009	0.007
Al	1.942	1.947	1.956	1.961	1.975	1.994	1.991	2.006	1.988	1.979	1.988	1.985	1.989	1.897	1.875	1.893	1.878	1.876	1.870	1.872	1.856	1.895	1.886	1.894
Fe	1.474	1.583	1.631	1.677	1.773	1.810	1.878	1.886	1.917	1.899	1.915	1.882	1.838	1.852	1.820	1.836	1.873	1.817	1.798	1.799	1.742	1.796	1.779	1.733
Mn	0.481	0.346	0.285	0.243	0.172	0.093	0.047	0.031	0.012	0.014	0.008	0.012	0.010	0.006	0.009	0.019	0.040	0.074	0.090	0.106	0.080	0.122	0.102	0.162
Mg	0.047	0.048	0.059	0.062	0.071	0.089	0.093	0.099	0.133	0.138	0.153	0.153	0.186	0.164	0.137	0.116	0.107	0.086	0.083	0.080	0.092	0.088	0.098	0.082
Ca	1.074	1.098	1.091	1.067	1.035	1.046	1.004	1.014	0.971	0.991	0.978	0.986	1.007	1.121	1.194	1.197	1.177	1.211	1.198	1.212	1.262	1.166	1.221	1.201
Na	0.000	0.001	0.006	0.002	0.000	0.006	0.004	0.001	0.000	0.000	0.005	0.004	0.000	0.000	0.001	0.002	0.003	0.003	0.000	0.000	0.000	0.000	0.005	0.000
K	0.004	0.006	0.004	0.005	0.004	0.003	0.002	0.003	0.004	0.005	0.005	0.003	0.003	0.003	0.000	0.003	0.007	0.005	0.001	0.004	0.003	0.004	0.004	0.005
Cr	0.004	0.002	0.001	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Table A1 **Chemical compositions of garnets**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	1	2	3	4	5	6
Weight %																								
SiO_2	36.84	37.15	37.32	37.05	37.58	37.02	37.22	36.89	36.98	36.76	37.20	36.86	36.91	37.11	37.47	37.18	37.25	37.21	37.65	37.21	37.23	37.28	37.29	37.22
TiO_2	0.12	0.13	0.12	0.10	0.15	0.16	0.16	0.18	0.16	0.19	0.18	0.15	0.14	0.13	0.11	0.10	0.13	0.20	0.08	0.00	0.12	0.10	0.09	0.08
Al_2O_3	20.30	20.07	20.17	20.07	20.23	20.06	19.86	19.65	19.54	19.38	19.57	19.82	19.80	19.70	20.03	20.04	20.29	20.25	20.75	20.63	20.50	20.73	20.71	20.90
FeO	26.76	28.47	26.90	28.14	25.28	24.16	23.14	21.74	22.41	22.49	21.96	20.97	21.84	23.07	28.10	27.86	28.35	28.60	27.81	29.08	28.41	28.26	28.20	28.59
MnO	1.75	1.16	1.43	1.42	2.59	5.29	6.99	8.93	9.99	10.76	9.70	9.76	8.58	6.14	0.85	0.58	0.36	0.20	0.23	0.11	0.54	0.90	1.05	0.12
MgO	0.73	0.77	0.72	0.77	0.62	0.46	0.43	0.48	0.55	0.32	0.37	0.35	0.39	0.42	0.90	0.97	1.00	1.22	1.57	1.63	0.85	0.84	0.78	1.29
CaO	13.85	13.56	14.31	13.06	15.10	14.35	13.60	12.75	11.41	11.41	12.19	12.95	12.82	13.68	13.60	12.96	12.92	13.25	13.67	12.17	13.70	13.39	13.55	12.70
Na_2O	0.06	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.02	0.04	0.00	0.01	0.01	0.00	0.02
K_2O	0.04	0.02	0.03	0.03	0.03	0.02	0.06	0.04	0.04	0.04	0.06	0.04	0.04	0.05	0.04	0.02	0.02	0.03	0.01	0.03	0.06	0.05	0.06	0.04
Cr_2O_3	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.03	0.01	0.00	0.00	0.00
Total	100.46	101.33	101.01	100.66	101.57	101.54	101.47	100.65	101.08	101.37	101.24	100.91	100.52	100.29	101.11	99.72	100.32	100.99	101.81	100.88	101.43	101.55	101.72	100.96
Cation O=12																								
Si	2.923	2.931	2.946	2.943	2.947	2.916	2.939	2.940	2.945	2.928	2.956	2.931	2.945	2.961	2.958	2.974	2.961	2.935	2.933	2.934	2.927	2.928	2.925	2.932
Ti	0.007	0.007	0.007	0.006	0.009	0.009	0.010	0.010	0.010	0.011	0.010	0.009	0.008	0.008	0.007	0.006	0.008	0.012	0.005	0.000	0.007	0.006	0.005	0.005
Al	1.899	1.867	1.876	1.879	1.870	1.862	1.848	1.846	1.834	1.820	1.832	1.857	1.862	1.853	1.864	1.889	1.900	1.883	1.905	1.917	1.900	1.919	1.915	1.941
Fe	1.776	1.878	1.776	1.869	1.658	1.592	1.528	1.449	1.492	1.498	1.459	1.395	1.457	1.539	1.855	1.863	1.885	1.887	1.811	1.917	1.868	1.856	1.850	1.884
Mn	0.118	0.077	0.096	0.096	0.172	0.353	0.468	0.603	0.674	0.726	0.653	0.657	0.580	0.415	0.057	0.040	0.025	0.013	0.015	0.007	0.036	0.060	0.069	0.008
Mg	0.086	0.091	0.085	0.091	0.072	0.054	0.051	0.057	0.065	0.038	0.044	0.042	0.046	0.049	0.106	0.115	0.118	0.143	0.182	0.191	0.100	0.098	0.091	0.151
Ca	1.178	1.146	1.210	1.111	1.269	1.211	1.151	1.088	0.973	0.974	1.038	1.103	1.096	1.170	1.150	1.110	1.100	1.120	1.141	1.028	1.154	1.126	1.139	1.072
Na	0.010	0.000	0.002	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.001	0.003	0.006	0.000	0.002	0.001	0.000	0.004
K	0.004	0.002	0.003	0.003	0.003	0.002	0.006	0.004	0.004	0.004	0.006	0.004	0.004	0.005	0.004	0.002	0.002	0.003	0.001	0.003	0.006	0.005	0.006	0.004
Cr	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	1	2	3	4	5
Weight %																								
SiO_2	37.27	37.26	36.97	36.33	36.95	36.32	36.73	36.27	36.53	36.63	37.26	37.26	37.32	37.57	37.43	37.63	37.63	37.44	37.49	38.40	37.85	38.06	37.69	37.99
TiO_2	0.07	0.06	0.14	0.36	0.15	0.14	0.06	0.11	0.12	0.06	0.13	0.18	0.18	0.10	0.11	0.12	0.07	0.17	0.12	0.04	0.14	0.14	0.06	0.11
Al_2O_3	20.57	20.61	20.35	20.36	20.25	20.15	20.81	20.65	20.39	20.65	20.33	20.25	20.25	20.50	20.57	20.65	20.81	21.10	21.08	21.47	21.25	21.01	21.01	21.10
FeO	27.26	26.28	21.71	22.42	22.55	21.78	22.11	23.17	23.69	23.02	23.35	23.15	24.59	25.88	27.87	28.66	28.39	28.10	28.23	29.20	29.64	29.66	30.22	30.22
MnO	1.45	2.42	6.93	7.57	9.74	9.78	6.53	6.74	6.53	6.57	5.86	5.07	4.14	2.28	1.13	0.29	0.13	0.16	0.16	0.20	0.15	0.15	0.20	0.25
MgO	0.67	0.53	0.35	0.51	0.36	0.36	0.39	0.37	0.50	0.42	0.40	0.27	0.38	0.64	0.72	1.02	1.22	1.18	1.74	2.06	1.61	1.51	1.35	1.16
CaO	14.32	14.31	14.55	13.24	11.52	12.52	13.65	13.55	13.92	13.73	14.25	15.28	14.38	14.46	13.61	13.05	13.26	13.01	13.03	10.71	10.75	10.46	10.61	10.60
Na_2O	0.01	0.06	0.01	0.01	0.01	0.06	0.00	0.01	0.02	0.01	0.00	0.04	0.00	0.00	0.02	0.00	0.01	0.01	0.00	0.03	0.00	0.00	0.02	0.01
K_2O	0.04	0.04	0.05	0.03	0.01	0.04	0.06	0.03	0.04	0.04	0.05	0.05	0.06	0.03	0.02	0.02	0.04	0.04	0.04	0.03	0.04	0.04	0.04	0.05
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
Total	101.66	101.56	101.06	100.82	101.55	101.15	100.33	100.91	101.74	101.13	101.63	101.54	101.30	101.46	101.49	101.43	101.56	101.19	101.89	102.13	101.42	101.04	101.19	101.48
Cation O=12																								
Si	2.923	2.925	2.920	2.885	2.928	2.883	2.921	2.875	2.872	2.895	2.930	2.927	2.943	2.951	2.943	2.957	2.947	2.942	2.918	2.984	2.972	3.003	2.974	2.992
Ti	0.004	0.004	0.008	0.021	0.009	0.008	0.004	0.007	0.007	0.004	0.007	0.011	0.011	0.006	0.007	0.007	0.004	0.010	0.007	0.002	0.008	0.008	0.004	0.006
Al	1.902	1.907	1.895	1.905	1.891	1.885	1.950	1.929	1.890	1.923	1.884	1.875	1.882	1.897	1.906	1.913	1.920	1.954	1.934	1.966	1.967	1.954	1.954	1.958
Fe	1.788	1.725	1.434	1.489	1.495	1.446	1.470	1.536	1.558	1.521	1.536	1.521	1.622	1.699	1.833	1.884	1.859	1.847	1.838	1.897	1.947	1.957	1.994	1.990
Mn	0.097	0.161	0.464	0.509	0.654	0.657	0.440	0.453	0.435	0.440	0.391	0.337	0.276	0.152	0.075	0.019	0.009	0.010	0.010	0.013	0.010	0.010	0.013	0.016
Mg	0.078	0.062	0.041	0.060	0.043	0.043	0.046	0.043	0.059	0.050	0.046	0.031	0.045	0.075	0.085	0.119	0.143	0.138	0.202	0.238	0.188	0.177	0.158	0.137
Ca	1.203	1.204	1.232	1.126	0.978	1.065	1.163	1.151	1.173	1.162	1.200	1.286	1.215	1.217	1.147	1.099	1.112	1.095	1.087	0.892	0.904	0.884	0.897	0.894
Na	0.002	0.009	0.002	0.002	0.001	0.009	0.000	0.002	0.003	0.001	0.001	0.006	0.000	0.001	0.003	0.000	0.002	0.001	0.000	0.004	0.000	0.000	0.002	0.001
K	0.004	0.004	0.005	0.003	0.001	0.004	0.006	0.003	0.004	0.004	0.005	0.005	0.006	0.003	0.002	0.002	0.004	0.004	0.004	0.002	0.004	0.004	0.004	0.005
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Table A1 **Chemical compositions of garnets**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	1	2	3	4	5	6	7
Weight %																								
SiO_2	37.98	37.75	37.41	37.96	37.77	37.83	37.53	37.60	38.18	37.37	37.54	37.93	37.61	37.94	37.67	38.16	37.98	36.89	37.13	37.18	37.28	37.21	37.37	37.27
TiO_2	0.16	0.18	0.16	0.23	0.17	0.23	0.15	0.12	0.12	0.09	0.11	0.11	0.12	0.18	0.12	0.10	0.10	0.07	0.08	0.10	0.11	0.14	0.17	0.21
Al_2O_3	21.00	20.92	20.79	21.22	20.78	20.78	20.88	20.86	21.19	20.92	21.08	21.17	20.98	21.39	21.10	21.28	21.24	20.46	20.65	20.86	20.66	20.76	20.69	20.54
FeO	30.05	30.28	29.81	29.06	26.30	24.32	25.17	26.32	29.48	30.40	29.97	29.85	29.90	29.48	29.71	29.87	28.51	29.80	29.99	29.69	28.98	29.18	26.76	24.49
MnO	0.24	0.52	0.95	1.10	4.46	5.95	5.90	4.60	0.88	0.82	0.50	0.48	0.24	0.20	0.19	0.15	0.18	0.36	0.49	0.50	0.85	1.41	4.27	5.70
MgO	1.07	0.92	0.88	0.81	0.54	0.46	0.47	0.53	0.82	0.94	0.84	0.97	1.11	1.32	1.36	1.53	1.81	1.06	0.91	0.82	0.77	0.71	0.53	0.47
CaO	10.85	10.59	10.32	10.81	10.58	11.66	11.03	11.28	11.15	9.90	10.67	10.30	10.26	10.46	10.15	10.00	10.41	11.01	10.99	11.19	11.45	11.31	11.37	11.44
Na_2O	0.00	0.00	0.00	0.01	0.00	0.01	0.03	0.00	0.00	0.01	0.00	0.01	0.00	0.03	0.02	0.01	0.01	0.01	0.03	0.00	0.03	0.02	0.00	0.02
K_2O	0.02	0.04	0.05	0.02	0.05	0.04	0.04	0.05	0.04	0.04	0.04	0.04	0.03	0.02	0.04	0.04	0.05	0.02	0.05	0.01	0.02	0.06	0.02	0.04
Cr_2O_3	0.05	0.00	0.04	0.02	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.03	0.00	0.02	0.02	0.03	0.00
Total	101.41	101.20	100.40	101.24	100.67	101.27	101.19	101.37	101.85	100.50	100.76	100.87	100.25	101.01	100.36	101.15	100.31	99.68	100.34	100.33	100.16	100.81	101.22	100.20
Cation O=12																								
Si	2.995	2.988	2.986	3.000	3.010	2.994	2.975	2.975	2.998	2.980	2.982	3.007	2.999	2.994	2.995	3.008	3.008	2.960	2.962	2.965	2.978	2.957	2.963	2.982
Ti	0.009	0.010	0.010	0.014	0.010	0.014	0.009	0.007	0.007	0.005	0.007	0.006	0.007	0.011	0.007	0.006	0.006	0.004	0.005	0.006	0.006	0.008	0.010	0.013
Al	1.951	1.952	1.956	1.977	1.952	1.938	1.951	1.945	1.962	1.966	1.974	1.978	1.972	1.989	1.977	1.977	1.982	1.935	1.941	1.961	1.945	1.944	1.933	1.937
Fe	1.981	2.005	1.990	1.921	1.753	1.609	1.669	1.741	1.936	2.028	1.991	1.980	1.994	1.946	1.975	1.969	1.888	2.000	2.001	1.980	1.935	1.939	1.774	1.639
Mn	0.016	0.035	0.064	0.073	0.301	0.398	0.396	0.308	0.058	0.055	0.034	0.032	0.016	0.013	0.013	0.010	0.012	0.024	0.033	0.034	0.057	0.095	0.287	0.386
Mg	0.126	0.109	0.104	0.095	0.064	0.054	0.056	0.063	0.096	0.112	0.100	0.115	0.132	0.156	0.162	0.180	0.213	0.127	0.108	0.097	0.092	0.084	0.063	0.057
Ca	0.917	0.898	0.883	0.915	0.903	0.988	0.937	0.956	0.938	0.846	0.908	0.875	0.877	0.884	0.864	0.845	0.883	0.946	0.939	0.956	0.979	0.962	0.966	0.980
Na	0.000	0.000	0.000	0.002	0.000	0.001	0.004	0.000	0.000	0.002	0.000	0.001	0.000	0.005	0.003	0.002	0.001	0.002	0.004	0.000	0.004	0.004	0.000	0.004
K	0.002	0.004	0.005	0.002	0.005	0.004	0.004	0.005	0.004	0.004	0.004	0.004	0.003	0.002	0.004	0.004	0.005	0.002	0.005	0.001	0.002	0.006	0.002	0.004
Cr	0.003	0.000	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.001	0.001	0.002	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Weight %																								
SiO_2	37.47	37.25	37.19	36.96	37.05	36.70	36.71	37.16	36.78	36.88	36.70	36.99	37.80	37.54	37.09	37.10	37.29	37.31	37.09	37.44	37.24	36.51	36.90	37.17
TiO_2	0.15	0.14	0.15	0.18	0.10	0.10	0.17	0.15	0.15	0.15	0.12	0.09	0.03	0.00	0.13	0.07	0.16	0.07	0.08	0.11	0.10	0.06	0.06	0.10
Al_2O_3	20.53	20.62	20.55	20.33	20.43	20.41	20.13	20.42	20.06	20.51	20.44	20.59	21.08	21.18	20.94	21.10	20.80	21.01	20.94	21.09	20.96	20.83	21.04	21.09
FeO	23.70	23.47	23.35	22.32	20.90	22.43	23.41	23.50	23.22	24.21	23.87	25.08	27.95	27.56	29.44	30.12	29.28	32.00	30.57	30.19	29.03	28.37	29.93	30.31
MnO	8.13	9.88	10.45	11.85	12.67	11.36	10.68	9.95	9.17	9.25	7.22	6.10	1.81	2.05	1.17	0.72	0.55	0.32	0.17	0.18	0.16	0.11	0.19	0.26
MgO	0.38	0.34	0.36	0.36	0.40	0.32	0.39	0.35	0.79	0.32	0.37	0.43	0.91	0.85	0.76	0.87	0.99	1.14	1.21	1.44	1.61	1.92	1.71	1.31
CaO	10.78	9.66	9.39	8.97	9.36	8.88	9.02	9.34	9.15	10.08	10.84	11.03	11.50	11.31	10.97	10.18	11.18	9.55	10.54	10.38	10.39	10.80	10.12	10.44
Na_2O	0.00	0.00	0.01	0.02	0.00	0.05	0.00	0.02	0.03	0.04	0.00	0.00	0.00	0.00	0.01	0.04	0.06	0.01	0.01	0.00	0.03	0.00	0.01	0.03
K_2O	0.03	0.05	0.03	0.03	0.04	0.03	0.02	0.02	0.22	0.04	0.02	0.03	0.04	0.04	0.06	0.04	0.06	0.02	0.05	0.06	0.05	0.04	0.01	0.03
Cr_2O_3	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.03	0.00
Total	101.18	101.44	101.47	101.01	100.93	100.27	100.53	100.90	99.56	101.48	99.57	100.33	101.12	100.52	100.56	100.25	100.37	101.42	100.65	100.90	99.56	98.64	100.00	100.73
Cation O=12																								
Si	2.978	2.962	2.959	2.958	2.962	2.956	2.953	2.972	2.971	2.931	2.961	2.961	2.985	2.982	2.954	2.963	2.967	2.952	2.947	2.962	2.977	2.938	2.941	2.947
Ti	0.009	0.008	0.009	0.011	0.006	0.006	0.010	0.009	0.009	0.009	0.007	0.005	0.002	0.000	0.008	0.004	0.010	0.004	0.005	0.007	0.006	0.004	0.003	0.006
Al	1.923	1.933	1.927	1.918	1.924	1.937	1.908	1.926	1.910	1.921	1.944	1.943	1.962	1.982	1.966	1.986	1.951	1.959	1.960	1.966	1.974	1.975	1.976	1.970
Fe	1.575	1.561	1.554	1.494	1.397	1.511	1.575	1.572	1.568	1.609	1.610	1.678	1.846	1.831	1.960	2.012	1.948	2.117	2.031	1.997	1.940	1.909	1.995	2.010
Mn	0.548	0.666	0.704	0.803	0.858	0.775	0.728	0.674	0.627	0.622	0.494	0.413	0.121	0.138	0.079	0.049	0.037	0.022	0.011	0.012	0.010	0.007	0.013	0.017
Mg	0.046	0.040	0.042	0.043	0.047	0.038	0.046	0.042	0.095	0.038	0.044	0.051	0.107	0.100	0.091	0.104	0.117	0.134	0.143	0.169	0.192	0.231	0.204	0.154
Ca	0.918	0.823	0.800	0.769	0.801	0.767	0.778	0.800	0.792	0.858	0.937	0.946	0.973	0.962	0.936	0.871	0.953	0.809	0.897	0.880	0.890	0.931	0.864	0.887
Na	0.000	0.000	0.001	0.003	0.000	0.008	0.000	0.002	0.005	0.007	0.000	0.000	0.000	0.000	0.001	0.006	0.010	0.001	0.001	0.000	0.005	0.000	0.001	0.004
K	0.003	0.005	0.003	0.003	0.004	0.003	0.002	0.002	0.022	0.004	0.002	0.003	0.004	0.004	0.006	0.004	0.006	0.002	0.005	0.006	0.005	0.004	0.001	0.003
Cr	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Table A1 **Chemical compositions of garnets**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
Weight %																								
SiO_2	36.81	37.40	37.39	37.80	37.06	37.29	37.14	36.76	36.89	36.79	36.79	36.83	38.81	36.57	36.67	36.61	36.91	37.04	37.20	36.23	36.90	37.41	37.54	37.46
TiO_2	0.06	0.10	0.11	0.13	0.15	0.15	0.13	0.14	0.11	0.14	0.17	0.13	0.14	0.09	0.20	0.12	0.14	0.15	0.15	0.14	0.15	0.13	0.05	0.07
Al_2O_3	20.63	20.82	20.78	20.29	20.55	20.73	20.58	20.67	20.38	20.37	20.14	20.43	19.69	20.38	20.41	20.37	20.57	20.63	20.80	20.64	20.42	20.77	20.80	21.11
FeO	31.00	30.00	29.99	28.52	28.44	25.92	25.33	23.47	22.83	23.71	24.33	23.22	21.90	23.24	22.28	23.88	23.47	23.68	25.07	26.65	27.99	29.49	29.99	30.12
MnO	0.25	0.32	0.33	0.74	1.70	4.33	5.90	7.30	8.82	9.31	10.05	10.27	10.25	11.80	11.45	10.66	9.47	9.38	6.98	4.36	2.94	1.26	0.39	0.26
MgO	1.15	1.14	0.97	0.78	0.65	0.51	0.44	0.41	0.36	0.44	0.40	0.36	0.49	0.57	0.33	0.36	0.36	0.33	0.42	0.51	0.63	0.76	0.97	1.09
CaO	10.33	10.46	10.93	12.01	11.50	11.86	11.21	11.08	11.03	9.44	9.09	9.14	9.32	7.94	9.08	8.41	9.91	10.23	10.66	11.17	11.09	11.36	10.63	10.90
Na_2O	0.01	0.01	0.04	0.03	0.00	0.00	0.00	0.03	0.00	0.04	0.01	0.02	0.02	0.06	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.02
K_2O	0.03	0.02	0.03	0.04	0.04	0.04	0.05	0.03	0.05	0.03	0.01	0.05	0.03	0.04	0.02	0.03	0.03	0.03	0.05	0.04	0.04	0.04	0.02	0.04
Cr_2O_3	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00
Total	100.27	100.28	100.57	100.34	100.10	100.82	100.77	99.91	100.48	100.30	100.98	100.46	100.65	100.69	100.45	100.45	100.87	101.46	101.34	99.73	100.18	101.24	100.38	101.07
Cation O=12																								
Si	2.940	2.982	2.974	3.011	2.966	2.963	2.960	2.952	2.952	2.958	2.947	2.960	3.108	2.937	2.950	2.949	2.950	2.943	2.951	2.916	2.956	2.960	2.992	2.962
Ti	0.004	0.006	0.007	0.007	0.009	0.009	0.008	0.008	0.007	0.008	0.010	0.008	0.008	0.006	0.012	0.007	0.009	0.009	0.009	0.009	0.009	0.007	0.003	0.004
Al	1.942	1.957	1.948	1.905	1.938	1.941	1.933	1.956	1.922	1.930	1.901	1.935	1.858	1.929	1.935	1.934	1.937	1.931	1.945	1.957	1.928	1.937	1.954	1.967
Fe	2.071	2.000	1.995	1.900	1.904	1.723	1.688	1.576	1.527	1.594	1.630	1.560	1.466	1.561	1.499	1.609	1.569	1.574	1.663	1.793	1.875	1.952	1.999	1.992
Mn	0.017	0.022	0.022	0.050	0.115	0.291	0.398	0.497	0.598	0.634	0.682	0.699	0.695	0.803	0.780	0.727	0.641	0.631	0.469	0.297	0.200	0.084	0.026	0.018
Mg	0.137	0.135	0.114	0.092	0.077	0.061	0.052	0.049	0.043	0.053	0.048	0.044	0.058	0.068	0.040	0.043	0.043	0.039	0.050	0.061	0.075	0.089	0.116	0.129
Ca	0.884	0.893	0.931	1.025	0.986	1.009	0.957	0.953	0.946	0.813	0.780	0.786	0.800	0.683	0.782	0.726	0.848	0.871	0.906	0.963	0.951	0.963	0.908	0.923
Na	0.002	0.002	0.006	0.004	0.000	0.000	0.000	0.005	0.000	0.006	0.002	0.003	0.003	0.009	0.000	0.001	0.000	0.000	0.003	0.000	0.000	0.001	0.000	0.003
K	0.003	0.002	0.003	0.004	0.004	0.004	0.005	0.003	0.005	0.003	0.001	0.006	0.003	0.004	0.002	0.003	0.003	0.003	0.005	0.004	0.004	0.004	0.002	0.004
Cr	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	1
Weight %																								
SiO_2	37.67	37.69	35.84	35.53	35.44	35.55	36.73	36.65	36.47	36.37	36.52	36.59	36.49	36.13	35.98	35.98	35.75	35.61	36.17	36.00	36.02	36.10	36.29	38.83
TiO_2	0.10	0.10	0.09	0.06	0.11	0.13	0.12	0.13	0.09	0.16	0.07	0.16	0.15	0.19	0.12	0.20	0.13	0.08	0.11	0.08	0.08	0.11	0.10	0.05
Al_2O_3	21.00	21.42	20.53	20.20	20.30	20.18	20.83	20.58	20.52	20.58	20.36	20.27	20.53	20.11	20.23	19.88	20.31	20.08	20.17	20.39	20.35	20.38	20.33	21.43
FeO	29.39	30.06	30.08	30.24	30.14	29.68	30.71	30.51	29.85	28.04	28.38	26.12	24.31	23.18	24.35	22.84	23.34	24.64	23.65	24.58	25.67	27.61	28.63	25.97
MnO	0.12	0.10	0.14	0.14	0.45	0.71	0.17	0.26	0.64	0.93	2.81	4.77	7.14	9.47	10.64	10.66	10.92	10.28	9.23	8.82	5.13	3.18	1.90	0.21
MgO	1.30	1.65	1.57	1.11	1.02	0.84	1.25	1.09	0.92	0.79	0.63	0.46	0.38	0.34	0.33	0.38	0.36	0.68	0.31	0.43	0.46	0.56	0.69	1.73
CaO	10.72	10.42	10.19	10.42	10.59	10.73	10.37	10.41	10.88	11.70	11.10	11.23	10.37	9.64	8.44	9.62	8.46	8.18	9.57	9.58	10.77	10.87	10.61	11.39
Na_2O	0.03	0.00	0.03	0.01	0.01	0.03	0.03	0.00	0.00	0.05	0.02	0.03	0.02	0.02	0.00	0.04	0.01	0.00	0.01	0.02	0.00	0.05	0.00	0.00
K_2O	0.02	0.02	0.04	0.04	0.02	0.03	0.04	0.04	0.03	0.04	0.03	0.02	0.04	0.05	0.03	0.04	0.04	0.06	0.03	0.04	0.05	0.03	0.03	0.03
Cr_2O_3	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00
Total	100.35	101.45	98.51	97.74	98.07	97.88	100.25	99.68	99.40	98.66	99.91	99.65	99.43	99.15	100.12	99.64	99.33	99.60	99.24	99.93	98.53	98.89	98.58	99.66
Cation O=12																								
Si	2.994	2.960	2.904	2.910	2.895	2.911	2.930	2.944	2.939	2.944	2.934	2.948	2.951	2.940	2.912	2.917	2.912	2.893	2.941	2.906	2.935	2.929	2.953	3.080
Ti	0.006	0.006	0.005	0.004	0.007	0.008	0.007	0.008	0.006	0.010	0.004	0.009	0.009	0.011	0.007	0.012	0.008	0.005	0.006	0.005	0.005	0.007	0.006	0.003
Al	1.966	1.982	1.960	1.950	1.954	1.947	1.959	1.949	1.948	1.963	1.928	1.925	1.956	1.928	1.929	1.899	1.950	1.922	1.933	1.940	1.954	1.949	1.950	2.003
Fe	1.953	1.974	2.038	2.071	2.059	2.032	2.049	2.049	2.011	1.898	1.907	1.760	1.644	1.577	1.648	1.548	1.589	1.674	1.608	1.659	1.749	1.873	1.948	1.723
Mn	0.008	0.006	0.009	0.010	0.031	0.049	0.011	0.017	0.044	0.064	0.191	0.326	0.489	0.652	0.729	0.732	0.754	0.707	0.636	0.603	0.354	0.219	0.131	0.014
Mg	0.154	0.193	0.189	0.136	0.124	0.102	0.149	0.131	0.111	0.096	0.075	0.055	0.046	0.041	0.040	0.046	0.044	0.082	0.038	0.051	0.056	0.067	0.084	0.205
Ca	0.913	0.876	0.885	0.914	0.927	0.942	0.887	0.896	0.939	1.014	0.955	0.969	0.898	0.840	0.731	0.835	0.738	0.711	0.834	0.829	0.941	0.945	0.925	0.968
Na	0.004	0.000	0.005	0.001	0.001	0.005	0.004	0.001	0.000	0.007	0.003	0.004	0.003	0.003	0.000	0.007	0.001	0.000	0.001	0.003	0.000	0.008	0.000	0.000
K	0.002	0.002	0.004	0.004	0.002	0.004	0.004	0.005	0.003	0.004	0.003	0.002	0.004	0.006	0.003	0.004	0.004	0.006	0.003	0.004	0.005	0.003	0.003	0.003
Cr	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Total Fe as FeO																								

Table A1 **Chemical compositions of garnets**

Rock type	**Garnet amphibolite**																					
Sample No.	**KG1252A**																					
Analysis No.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Weight %																						
SiO_2	38.70	38.90	38.37	38.49	38.24	38.41	38.29	38.40	38.18	38.39	37.51	38.21	38.04	37.90	38.48	38.02	38.75	38.32	38.43	38.34	38.80	38.53
TiO_2	0.11	0.14	0.24	0.47	0.11	0.12	0.07	0.12	0.13	0.15	0.15	0.16	0.16	0.18	0.17	1.07	0.88	0.13	0.13	0.09	0.11	0.06
Al_2O_3	21.17	21.14	20.99	20.92	21.01	21.09	21.19	21.02	20.79	20.90	20.52	20.71	20.58	20.81	20.80	20.78	21.04	21.14	20.99	21.30	21.29	21.46
FeO	26.01	26.70	25.39	25.11	25.03	24.36	24.13	22.25	20.41	19.68	21.16	20.58	20.48	20.31	22.00	23.12	25.03	26.08	25.76	25.39	26.38	26.35
MnO	0.13	0.29	0.58	0.90	1.59	2.70	3.37	6.16	7.87	9.11	8.31	9.01	8.90	9.34	5.96	3.16	1.33	0.84	0.42	0.19	0.23	0.21
MgO	1.20	1.05	0.75	0.70	0.62	0.55	0.61	0.38	0.37	0.39	0.91	0.59	0.58	0.29	0.43	0.50	0.70	0.71	0.83	1.01	1.39	1.80
CaO	11.46	11.39	11.79	12.67	12.48	12.57	11.56	11.38	11.70	11.10	10.27	10.77	10.79	10.39	11.63	12.13	12.09	12.03	11.54	11.72	11.33	10.60
Na_2O	0.00	0.00	0.03	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.01	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00
K_2O	0.04	0.03	0.02	0.04	0.04	0.02	0.03	0.04	0.01	0.04	0.08	0.04	0.02	0.03	0.07	0.03	0.05	0.07	0.05	0.04	0.04	0.03
Cr_2O_3	0.01	0.03	0.00	0.01	0.00	0.05	0.03	0.00	0.02	0.02	0.00	0.00	0.02	0.00	0.03	0.01	0.03	0.03	0.00	0.04	0.00	0.04
Total	98.84	99.66	98.17	99.31	99.14	99.87	99.29	99.75	99.47	99.79	98.91	100.07	99.59	99.25	99.56	98.81	99.89	99.33	98.59	98.52	99.57	99.07
Cation O=12																						
Si	3.105	3.102	3.105	3.080	3.067	3.061	3.072	3.075	3.066	3.076	3.030	3.055	3.055	3.061	3.086	3.07	3.09	3.07	3.11	3.10	3.09	3.08
Ti	0.007	0.008	0.015	0.028	0.007	0.007	0.004	0.007	0.008	0.009	0.009	0.009	0.009	0.011	0.010	0.06	0.05	0.01	0.01	0.01	0.01	0.00
Al	2.002	1.987	2.002	1.973	1.986	1.981	2.003	1.984	1.968	1.973	1.954	1.952	1.948	1.981	1.966	1.98	1.98	2.00	2.00	2.03	2.00	2.02
Fe	1.745	1.781	1.719	1.681	1.679	1.623	1.619	1.490	1.371	1.319	1.430	1.376	1.375	1.371	1.475	1.56	1.67	1.75	1.74	1.71	1.76	1.76
Mn	0.009	0.019	0.040	0.061	0.108	0.182	0.229	0.417	0.535	0.618	0.569	0.610	0.606	0.639	0.405	0.22	0.09	0.06	0.03	0.01	0.02	0.01
Mg	0.143	0.124	0.091	0.083	0.074	0.065	0.073	0.046	0.044	0.047	0.110	0.071	0.069	0.035	0.051	0.06	0.08	0.08	0.10	0.12	0.17	0.21
Ca	0.985	0.973	1.022	1.086	1.073	1.073	0.994	0.976	1.007	0.953	0.889	0.923	0.928	0.899	0.999	1.05	1.03	1.03	1.00	1.01	0.97	0.91
Na	0.000	0.000	0.004	0.003	0.003	0.003	0.001	0.001	0.000	0.000	0.002	0.000	0.007	0.000	0.000	0.00	0.00	0.00	0.01	0.00	0.00	0.00
K	0.004	0.003	0.002	0.004	0.005	0.002	0.003	0.004	0.001	0.004	0.008	0.004	0.002	0.003	0.007	0.00	0.01	0.01	0.01	0.00	0.00	0.00
Cr	0.001	0.002	0.000	0.001	0.000	0.003	0.002	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.00	8.00	8.00	8.00	8.00	8.00	8.00

Total Fe as FeO

Table A2 **Chemical compositions of amphiboles**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	1	2
	Act	Mhb	Brs	Mhb	Ts	Fts	Fprg	Fprg	Act	Mhb	Mhb	Fts	Ts	Ts	Ts	Ts	Act	Mhb	Mhb	Mhb	Mhb	Mhb	Act	Act
Weight %																								
SiO_2	50.95	48.89	49.52	44.23	43.73	40.40	39.28	39.02	53.42	51.08	51.12	42.46	42.64	42.70	42.65	42.52	52.14	49.26	51.03	49.85	50.84	50.84	53.82	53.21
TiO_2	0.02	0.18	0.21	0.28	0.31	0.17	0.19	0.13	0.00	0.08	0.05	0.39	0.35	0.36	0.35	0.39	0.04	0.12	0.11	0.15	0.00	0.07	0.00	0.04
Al_2O_3	3.39	8.61	9.12	12.11	15.57	18.39	19.53	20.36	1.31	3.04	2.85	13.01	12.59	12.58	12.72	12.84	3.20	6.32	4.67	4.96	3.78	3.73	3.04	2.45
FeO	14.20	13.73	16.07	18.81	17.74	19.38	20.34	21.15	14.60	17.88	17.96	18.98	18.41	17.71	17.87	17.89	15.05	16.35	14.33	17.23	15.24	16.51	11.88	11.70
MnO	0.48	0.13	0.08	0.12	0.06	0.14	0.15	0.10	0.67	0.41	0.36	0.21	0.17	0.05	0.14	0.16	0.18	0.20	0.10	0.09	0.55	0.05	0.05	0.06
MgO	13.90	12.95	11.99	8.95	7.75	5.64	4.18	3.61	15.18	12.72	13.00	8.02	8.62	8.87	8.50	8.63	14.44	12.18	14.94	12.11	13.57	13.26	15.52	16.36
CaO	12.01	10.69	9.68	10.82	10.29	10.90	11.26	11.54	10.92	10.82	10.74	11.23	11.19	10.85	11.05	11.04	11.83	11.87	10.15	11.54	11.82	11.45	11.35	11.68
Na_2O	0.43	1.27	1.88	1.71	2.08	2.04	1.85	1.65	0.50	0.49	0.40	1.71	1.81	1.98	1.96	1.98	0.43	0.77	0.78	0.71	0.56	0.51	0.50	0.44
K_2O	0.11	0.13	0.13	0.32	0.53	0.70	0.87	0.82	0.13	0.09	0.12	0.39	0.38	0.36	0.35	0.38	0.10	0.11	0.10	0.12	0.08	0.12	0.10	0.11
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.01	0.00	0.01	0.02	0.03	0.00	0.02	0.00	0.03	0.00	0.00	0.00	0.00
Total	95.48	96.57	98.67	97.35	98.04	97.75	97.66	98.37	96.75	96.63	96.61	96.41	96.14	95.44	95.61	95.86	97.40	97.17	96.20	96.77	96.43	96.54	96.25	96.04
Cation O=23																								
Si	7.596	7.165	7.158	6.653	6.478	6.097	5.977	5.910	7.834	7.625	7.632	6.490	6.520	6.546	6.538	6.506	7.619	7.290	7.499	7.427	7.541	7.552	7.794	7.744
Ti	0.002	0.020	0.022	0.032	0.035	0.020	0.022	0.014	0.000	0.009	0.006	0.044	0.040	0.041	0.041	0.045	0.004	0.013	0.012	0.016	0.000	0.008	0.000	0.004
Al	0.595	1.487	1.554	2.146	2.718	3.270	3.502	3.633	0.226	0.536	0.502	2.344	2.268	2.273	2.298	2.315	0.552	1.102	0.809	0.870	0.660	0.653	0.519	0.420
Fe	1.770	1.683	1.943	2.366	2.198	2.447	2.588	2.679	1.791	2.233	2.242	2.426	2.355	2.271	2.291	2.289	1.839	2.024	1.761	2.146	1.891	2.051	1.438	1.425
Mn	0.061	0.016	0.010	0.015	0.007	0.018	0.019	0.012	0.083	0.051	0.046	0.027	0.022	0.006	0.019	0.021	0.022	0.025	0.012	0.011	0.069	0.006	0.006	0.008
Mg	3.090	2.829	2.584	2.006	1.712	1.269	0.949	0.816	3.319	2.832	2.893	1.828	1.964	2.027	1.943	1.968	3.144	2.687	3.273	2.690	3.000	2.935	3.351	3.549
Ca	1.918	1.679	1.499	1.744	1.633	1.762	1.836	1.873	1.716	1.730	1.718	1.840	1.833	1.782	1.814	1.810	1.852	1.882	1.598	1.843	1.878	1.823	1.761	1.821
Na	0.123	0.362	0.526	0.498	0.598	0.596	0.547	0.484	0.143	0.142	0.116	0.508	0.536	0.588	0.583	0.589	0.122	0.220	0.221	0.205	0.162	0.147	0.140	0.123
K	0.021	0.025	0.024	0.061	0.099	0.134	0.168	0.159	0.025	0.017	0.022	0.075	0.074	0.069	0.067	0.074	0.019	0.020	0.019	0.022	0.016	0.023	0.018	0.021
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.002	0.001	0.000	0.001	0.003	0.004	0.000	0.002	0.000	0.003	0.000	0.000	0.000	0.000
Total	15.177	15.265	15.318	15.522	15.477	15.614	15.608	15.580	15.137	15.176	15.179	15.585	15.611	15.604	15.597	15.620	15.172	15.265	15.204	15.233	15.217	15.198	15.026	15.114

Total Fe as FeO

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	1	2	3	4	5
	Act	Act	Fprg	Fprg	Fprg	Fprg	Fprg	Fts	Ts	Fts	Act	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Ts	Fts	Fprg	Ts	Ts	Brs	Mhb
Weight %																								
SiO_2	52.72	52.92	39.66	38.90	38.90	38.05	39.09	40.92	42.65	40.96	52.04	50.26	48.73	48.94	50.86	47.93	50.85	32.14	35.51	40.23	43.34	43.43	46.60	47.22
TiO_2	0.00	0.00	0.12	0.10	0.09	0.08	0.06	0.15	0.10	0.10	0.02	0.04	0.06	0.10	0.00	0.09	0.03	0.00	0.04	0.26	0.37	0.37	0.31	0.20
Al_2O_3	3.19	2.82	17.57	18.38	18.21	18.14	18.33	14.80	13.27	14.20	2.74	5.51	6.93	6.97	3.94	9.13	4.62	21.49	20.38	17.11	13.14	13.22	11.47	7.98
FeO	11.72	11.99	18.80	18.58	19.08	19.46	19.12	19.05	19.14	20.57	15.49	13.79	16.86	16.65	16.20	17.66	16.26	32.74	27.53	19.18	17.82	17.78	16.55	17.64
MnO	0.00	0.00	0.12	0.10	0.10	0.06	0.03	0.08	0.12	0.37	0.16	0.10	0.11	0.13	0.40	0.45	0.41	0.31	1.35	0.02	0.05	0.05	0.09	0.59
MgO	15.82	15.96	5.84	5.50	5.46	5.48	5.79	7.52	7.98	6.71	13.88	12.27	11.33	11.29	12.88	10.34	12.78	1.46	0.96	6.24	8.82	8.92	10.50	10.47
CaO	11.63	11.53	10.94	11.06	11.25	11.20	11.02	11.05	11.01	10.94	11.54	11.50	11.37	11.55	11.41	10.77	11.43	7.58	10.85	11.35	11.21	11.25	8.93	11.55
Na_2O	0.50	0.48	1.95	1.95	1.81	1.77	1.94	1.87	1.53	1.21	0.36	0.59	0.85	0.81	0.52	1.22	0.54	0.08	0.03	1.92	1.86	1.85	2.16	0.99
K_2O	0.14	0.14	0.76	0.70	0.57	0.80	0.77	0.45	0.19	0.17	0.10	0.14	0.17	0.13	0.11	0.19	0.12	0.04	0.06	0.53	0.34	0.36	0.12	0.18
Cr_2O_3	0.00	0.02	0.03	0.01	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.03	0.01	0.02	0.01	0.00	0.04	0.00	0.02	0.02	0.00	0.02	0.00
Total	95.72	95.85	95.78	95.29	95.47	95.03	96.13	95.90	96.00	95.22	96.33	94.21	96.42	96.58	96.36	97.78	97.04	95.87	96.70	96.85	96.97	97.23	96.75	96.82
Cation O=23																								
Si	7.699	7.725	6.112	6.026	6.025	5.953	6.014	6.300	6.526	6.379	7.696	7.544	7.277	7.287	7.566	7.088	7.509	5.267	5.657	6.135	6.532	6.526	6.903	7.091
Ti	0.000	0.000	0.014	0.012	0.010	0.010	0.007	0.017	0.012	0.011	0.003	0.004	0.006	0.011	0.000	0.010	0.004	0.000	0.005	0.029	0.041	0.041	0.034	0.023
Al	0.549	0.485	3.192	3.355	3.325	3.344	3.325	2.685	2.393	2.606	0.478	0.974	1.220	1.223	0.691	1.591	0.804	4.151	3.825	3.075	2.334	2.342	2.002	1.412
Fe	1.431	1.464	2.423	2.407	2.471	2.546	2.460	2.453	2.449	2.679	1.916	1.731	2.106	2.072	2.016	2.183	2.007	4.487	3.667	2.446	2.246	2.234	2.050	2.215
Mn	0.000	0.000	0.015	0.013	0.014	0.007	0.004	0.011	0.015	0.049	0.019	0.012	0.013	0.017	0.051	0.056	0.051	0.042	0.182	0.003	0.007	0.007	0.011	0.075
Mg	3.445	3.472	1.342	1.270	1.260	1.278	1.328	1.727	1.820	1.558	3.059	2.745	2.523	2.507	2.856	2.280	2.813	0.357	0.228	1.418	1.981	1.997	2.319	2.344
Ca	1.819	1.803	1.807	1.836	1.867	1.877	1.816	1.824	1.804	1.825	1.829	1.849	1.818	1.842	1.819	1.706	1.809	1.330	1.852	1.854	1.811	1.811	1.417	1.858
Na	0.141	0.134	0.582	0.587	0.544	0.536	0.578	0.559	0.453	0.365	0.104	0.173	0.246	0.235	0.149	0.350	0.155	0.024	0.008	0.568	0.544	0.537	0.621	0.289
K	0.026	0.026	0.150	0.138	0.112	0.160	0.150	0.088	0.037	0.034	0.019	0.026	0.032	0.024	0.021	0.035	0.022	0.008	0.012	0.103	0.064	0.070	0.023	0.035
Cr	0.000	0.002	0.004	0.001	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.003	0.003	0.001	0.003	0.001	0.000	0.005	0.000	0.002	0.003	0.000	0.002	0.000
Total	15.110	15.111	15.641	15.646	15.629	15.713	15.682	15.664	15.511	15.506	15.124	15.063	15.244	15.219	15.172	15.299	15.174	15.672	15.436	15.632	15.563	15.565	15.383	15.342

Total Fe as FeO

Table A2 **Chemical compositions of amphiboles**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8
	Mhb	Mhb	Mhb	Mhb	Brs	Brs	Brs	Brs	Brs	Brs	Brs	Mhb	Mhb	Mhb	Mhb	Ts	Ts	Ts	Fts	Ts	Fts	Mhb	Mhb	Brs
Weight %																								
SiO_2	43.11	43.89	49.93	49.17	49.76	50.04	49.64	49.90	49.40	46.99	46.87	47.79	47.71	46.79	45.86	42.76	43.04	43.67	43.03	43.26	42.22	44.88	44.44	46.02
TiO_2	0.10	0.12	0.07	0.02	0.07	0.06	0.07	0.07	0.06	0.11	0.13	0.05	0.07	0.12	0.13	0.15	0.30	0.32	0.40	0.37	0.25	0.37	0.40	0.32
Al_2O_3	12.07	11.69	7.74	7.80	7.76	7.57	7.82	8.35	8.83	10.77	10.44	9.71	9.16	9.64	10.26	13.21	13.62	13.63	14.04	14.27	15.46	12.31	12.98	11.76
FeO	18.35	17.79	13.51	13.34	12.95	12.29	12.88	13.18	13.52	16.51	15.89	15.51	15.99	15.92	17.04	17.82	19.34	19.34	20.43	18.85	19.61	18.15	16.42	15.97
MnO	0.10	0.20	0.00	0.00	0.09	0.01	0.01	0.06	0.11	0.07	0.06	0.04	0.05	0.09	0.13	0.10	0.11	0.03	0.13	0.00	0.11	0.11	0.05	0.00
MgO	8.65	9.20	13.15	13.21	13.58	13.61	13.53	13.36	12.75	10.94	11.18	11.52	11.79	11.27	10.34	8.60	7.52	7.66	6.99	7.71	7.27	9.30	9.73	10.76
CaO	10.61	10.34	8.12	8.18	7.97	8.07	8.16	7.88	7.67	8.00	7.98	8.30	8.14	8.48	9.43	10.56	10.01	10.09	10.19	10.36	10.55	10.07	9.92	9.28
Na_2O	1.34	1.48	1.64	1.67	1.88	1.93	1.99	2.11	1.86	1.94	1.87	1.65	1.61	1.60	1.50	1.70	1.82	1.73	1.80	2.02	1.96	1.99	2.24	2.21
K_2O	0.34	0.29	0.25	0.27	0.26	0.23	0.22	0.23	0.26	0.09	0.11	0.07	0.06	0.10	0.20	0.39	0.51	0.41	0.51	0.39	0.52	0.35	0.31	0.21
Cr_2O_3	0.00	0.02	0.04	0.00	0.02	0.06	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
Total	94.67	95.01	94.46	93.66	94.32	93.87	94.33	95.14	94.47	95.43	94.53	94.65	94.58	94.01	94.88	95.29	96.266	96.870	97.514	97.224	97.940	97.515	96.516	96.530
Cation O=23																								
Si	6.658	6.725	7.407	7.364	7.382	7.431	7.367	7.344	7.326	7.023	7.053	7.159	7.170	7.094	6.962	6.552	6.560	6.596	6.508	6.509	6.347	6.696	6.648	6.833
Ti	0.011	0.014	0.008	0.003	0.008	0.007	0.008	0.008	0.006	0.012	0.014	0.006	0.008	0.013	0.014	0.017	0.035	0.036	0.045	0.042	0.029	0.042	0.044	0.036
Al	2.198	2.111	1.352	1.377	1.357	1.325	1.367	1.447	1.544	1.898	1.851	1.715	1.622	1.722	1.836	2.385	2.447	2.426	2.502	2.530	2.739	2.164	2.289	2.057
Fe	2.370	2.279	1.676	1.671	1.607	1.526	1.599	1.622	1.677	2.063	2.000	1.942	2.010	2.018	2.163	2.283	2.465	2.442	2.584	2.371	2.465	2.265	2.055	1.982
Mn	0.013	0.026	0.000	0.000	0.011	0.001	0.001	0.008	0.014	0.009	0.008	0.005	0.007	0.012	0.017	0.013	0.014	0.004	0.017	0.000	0.013	0.013	0.006	0.000
Mg	1.992	2.102	2.909	2.950	3.002	3.014	2.993	2.930	2.819	2.438	2.509	2.573	2.642	2.548	2.339	1.965	1.708	1.724	1.577	1.729	1.629	2.068	2.169	2.381
Ca	1.755	1.697	1.290	1.312	1.266	1.284	1.297	1.243	1.218	1.280	1.286	1.331	1.311	1.377	1.534	1.733	1.634	1.633	1.651	1.670	1.699	1.610	1.590	1.476
Na	0.402	0.438	0.472	0.484	0.540	0.556	0.573	0.601	0.535	0.563	0.547	0.479	0.469	0.472	0.441	0.505	0.538	0.506	0.528	0.589	0.570	0.576	0.648	0.636
K	0.068	0.056	0.047	0.052	0.049	0.043	0.041	0.042	0.050	0.017	0.021	0.013	0.011	0.020	0.039	0.076	0.098	0.080	0.098	0.074	0.099	0.066	0.060	0.041
Cr	0.000	0.002	0.005	0.000	0.002	0.007	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000
Total	15.467	15.452	15.166	15.212	15.225	15.195	15.248	15.246	15.189	15.305	15.290	15.224	15.251	15.277	15.345	15.529	15.499	15.448	15.509	15.515	15.590	15.501	15.515	15.441

Total Fe as FeO

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	9	10	11	1	2	3	4	5	6	7	8	9	1	2	3	4	1	2	3	4	5	1	2	3
	Brs	Mhb	Mhb	Ts	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Ts	Act	Act	Act	Act	Act	Act	Act	Mhb	Mhb	Mhb	Mhb	Mhb
Weight %																								
SiO_2	46.42	47.05	46.19	44.11	46.09	48.57	48.33	51.00	49.92	51.38	50.41	44.67	53.71	51.95	53.28	53.51	53.75	54.10	55.08	50.88	47.08	47.46	47.62	50.01
TiO_2	0.34	0.31	0.28	0.36	0.33	0.16	0.15	0.13	0.15	0.12	0.18	0.34	0.01	0.02	0.00	0.00	0.07	0.01	0.01	0.18	0.31	0.26	0.25	0.16
Al_2O_3	11.44	10.61	10.44	13.43	12.35	9.63	9.82	8.00	8.89	7.80	8.20	12.83	0.64	2.11	1.36	1.23	2.91	1.88	1.34	5.86	10.48	10.86	10.07	6.33
FeO	16.73	16.67	18.72	18.71	17.83	17.60	16.62	15.36	16.02	14.83	16.08	18.58	13.50	14.06	13.89	13.66	16.10	16.90	14.73	16.92	18.50	18.39	16.60	15.14
MnO	0.02	0.09	0.16	0.13	0.17	0.17	0.17	0.00	0.01	0.06	0.08	0.11	0.65	0.85	0.61	0.59	0.82	0.76	0.57	0.53	0.33	0.17	0.09	0.10
MgO	10.81	11.00	9.93	8.24	9.11	11.28	10.55	12.54	12.26	13.26	12.08	9.23	15.67	14.23	15.26	15.22	14.02	13.78	15.34	12.73	9.82	9.99	10.66	12.68
CaO	8.84	8.79	8.47	10.41	9.69	8.11	9.15	8.46	7.74	8.22	8.76	9.93	14.34	13.96	14.28	14.10	11.56	11.75	11.66	10.30	9.86	10.21	12.46	13.91
Na_2O	2.21	1.77	1.51	1.95	2.01	1.53	1.50	1.62	1.77	1.65	1.40	1.92	0.20	0.38	0.21	0.26	0.49	0.26	0.28	0.80	1.77	2.03	1.53	0.85
K_2O	0.12	0.12	0.12	0.37	0.15	0.22	0.19	0.22	0.20	0.22	0.21	0.38	0.07	0.09	0.04	0.05	0.07	0.05	0.09	0.13	0.19	0.17	0.13	0.14
Cr_2O_3	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.05	0.00	0.01	0.00	0.00	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02
Total	96.93	96.40	95.82	97.71	97.77	97.26	96.48	97.38	96.96	97.54	97.40	98.00	98.84	97.68	98.93	98.62	99.78	99.48	99.09	98.33	98.33	99.56	99.40	99.34
Cation O=23																								
Si	6.870	6.984	6.968	6.595	6.812	7.143	7.154	7.391	7.286	7.409	7.339	6.642	7.747	7.622	7.689	7.731	7.693	7.791	7.867	7.413	6.944	6.910	6.924	7.237
Ti	0.038	0.035	0.031	0.040	0.037	0.018	0.017	0.014	0.017	0.013	0.020	0.038	0.002	0.003	0.000	0.000	0.007	0.001	0.001	0.020	0.034	0.029	0.027	0.017
Al	1.996	1.856	1.857	2.366	2.152	1.669	1.713	1.367	1.529	1.325	1.407	2.248	0.109	0.366	0.232	0.210	0.490	0.318	0.226	1.006	1.821	1.864	1.726	1.080
Fe	2.071	2.069	2.362	2.340	2.203	2.165	2.057	1.862	1.955	1.789	1.957	2.311	1.629	1.725	1.676	1.650	1.927	2.035	1.759	2.062	2.283	2.239	2.019	1.832
Mn	0.003	0.011	0.020	0.016	0.022	0.021	0.022	0.000	0.001	0.007	0.010	0.014	0.079	0.106	0.074	0.072	0.100	0.092	0.068	0.065	0.041	0.021	0.011	0.012
Mg	2.384	2.433	2.232	1.837	2.008	2.473	2.327	2.709	2.666	2.851	2.622	2.046	3.371	3.111	3.282	3.279	2.991	2.958	3.267	2.766	2.159	2.169	2.310	2.735
Ca	1.402	1.398	1.369	1.668	1.535	1.279	1.450	1.314	1.211	1.271	1.366	1.582	2.217	2.195	2.208	2.182	1.773	1.813	1.785	1.608	1.558	1.593	1.942	2.156
Na	0.634	0.508	0.443	0.564	0.577	0.435	0.431	0.455	0.501	0.460	0.394	0.554	0.055	0.108	0.060	0.073	0.136	0.071	0.076	0.227	0.506	0.574	0.431	0.238
K	0.023	0.022	0.024	0.070	0.029	0.041	0.036	0.040	0.037	0.040	0.039	0.072	0.012	0.017	0.008	0.008	0.013	0.010	0.016	0.024	0.037	0.032	0.025	0.026
Cr	0.000	0.002	0.000	0.000	0.002	0.000	0.000	0.006	0.000	0.001	0.000	0.000	0.007	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003
Total	15.422	15.317	15.306	15.498	15.377	15.242	15.206	15.157	15.202	15.165	15.154	15.509	15.227	15.254	15.229	15.205	15.129	15.089	15.065	15.190	15.382	15.431	15.413	15.337

Total Fe as FeO

Table A2 **Chemical compositions of amphiboles**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	1	2
	Act	Act	Act	Act	Act	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Act	Mhb	Act	Mhb	Brs	Brs	Mhb	Mhb
Weight %																								
SiO_2	53.04	53.12	52.94	53.34	53.71	51.10	51.48	50.32	49.69	50.61	46.52	49.54	50.26	49.23	50.18	50.12	52.81	51.92	52.70	47.00	47.24	47.50	45.04	51.18
TiO_2	0.04	0.06	0.02	0.02	0.05	0.10	0.06	0.11	0.12	0.09	0.23	0.14	0.11	0.20	0.10	0.12	0.04	0.04	0.07	0.21	0.29	0.30	0.32	0.15
Al_2O_3	3.33	2.89	3.10	2.54	2.13	4.92	4.47	5.35	6.27	4.98	9.88	5.82	4.88	6.75	5.66	6.01	2.92	3.69	2.93	10.19	10.92	10.59	11.77	6.01
FeO	13.94	14.31	12.86	12.38	12.00	14.88	14.93	15.20	14.97	14.63	16.76	15.53	15.29	15.75	14.68	14.71	14.12	14.54	13.03	16.74	17.92	18.16	17.74	14.39
MnO	0.10	0.14	0.03	0.13	0.00	0.19	0.11	0.15	0.11	0.23	0.14	0.12	0.22	0.22	0.14	0.15	0.10	0.19	0.25	0.18	0.18	0.17	0.13	0.03
MgO	15.17	15.03	15.33	15.52	16.17	13.80	14.13	13.13	12.76	13.27	10.13	12.34	13.16	12.32	13.11	13.07	14.88	14.54	15.03	10.36	9.83	10.26	9.81	14.02
CaO	14.15	14.17	13.98	14.11	14.69	13.11	13.20	13.42	13.64	13.88	12.84	13.80	13.21	13.27	13.30	13.52	13.43	13.32	13.83	11.26	9.68	9.73	10.66	9.39
Na_2O	0.60	0.50	0.52	0.42	0.33	0.82	0.72	0.73	0.88	0.75	1.50	0.78	0.69	0.94	0.80	0.85	0.52	0.56	0.44	1.55	1.93	1.82	1.84	1.19
K_2O	0.13	0.06	0.10	0.14	0.10	0.15	0.14	0.10	0.14	0.15	0.20	0.22	0.14	0.15	0.14	0.13	0.11	0.10	0.09	0.20	0.12	0.08	0.32	0.20
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.03	0.01	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.02
Total	100.49	100.29	98.88	98.61	99.17	99.09	99.26	98.54	98.57	98.59	98.21	98.28	97.95	98.82	98.12	98.68	98.94	98.92	98.39	97.68	98.11	98.62	97.63	96.57
Cation O=23																								
Si	7.520	7.558	7.583	7.647	7.648	7.383	7.421	7.331	7.241	7.364	6.883	7.270	7.372	7.183	7.324	7.279	7.597	7.496	7.598	6.947	6.950	6.957	6.711	7.472
Ti	0.004	0.007	0.002	0.003	0.005	0.011	0.006	0.012	0.013	0.010	0.026	0.015	0.012	0.022	0.010	0.014	0.005	0.005	0.007	0.024	0.032	0.033	0.036	0.016
Al	0.557	0.485	0.523	0.430	0.358	0.837	0.759	0.919	1.077	0.854	1.724	1.006	0.844	1.160	0.974	1.029	0.495	0.627	0.498	1.776	1.893	1.828	2.067	1.034
Fe	1.653	1.702	1.541	1.484	1.429	1.798	1.800	1.853	1.824	1.780	2.074	1.906	1.876	1.922	1.792	1.787	1.699	1.755	1.572	2.069	2.205	2.224	2.211	1.757
Mn	0.012	0.016	0.004	0.016	0.000	0.023	0.013	0.019	0.014	0.028	0.017	0.015	0.027	0.027	0.017	0.018	0.012	0.023	0.031	0.022	0.022	0.021	0.016	0.004
Mg	3.206	3.188	3.275	3.317	3.432	2.972	3.036	2.852	2.771	2.879	2.234	2.699	2.878	2.679	2.852	2.830	3.191	3.128	3.231	2.282	2.156	2.241	2.180	3.052
Ca	2.149	2.160	2.145	2.168	2.241	2.030	2.039	2.095	2.130	2.164	2.036	2.169	2.076	2.074	2.080	2.103	2.070	2.060	2.137	1.783	1.525	1.526	1.701	1.470
Na	0.166	0.138	0.145	0.118	0.090	0.229	0.200	0.205	0.248	0.212	0.429	0.223	0.195	0.267	0.226	0.238	0.146	0.158	0.124	0.444	0.551	0.518	0.531	0.338
K	0.023	0.011	0.018	0.026	0.017	0.028	0.026	0.019	0.025	0.028	0.037	0.041	0.026	0.028	0.026	0.024	0.020	0.019	0.017	0.037	0.022	0.015	0.061	0.036
Cr	0.000	0.000	0.000	0.000	0.000	0.004	0.002	0.003	0.001	0.000	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.001	0.000	0.001	0.000	0.001	0.003
Total	15.291	15.268	15.235	15.207	15.221	15.314	15.305	15.308	15.343	15.319	15.461	15.344	15.305	15.362	15.303	15.323	15.234	15.273	15.216	15.383	15.358	15.363	15.515	15.181
Total Fe as FeO																								

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7
	Mhb	Mhb	Brs	Mhb	Mhb	Mhb	Fts	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Ts	Fts	Fts	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb
Weight %																								
SiO_2	44.26	46.97	46.13	45.35	44.47	46.25	42.10	43.95	45.99	44.02	44.99	45.29	47.14	44.96	44.00	40.70	40.53	43.92	44.33	45.60	45.88	44.83	49.69	49.81
TiO_2	0.26	0.22	0.30	0.29	0.36	0.18	0.35	0.33	0.26	0.32	0.39	0.30	0.23	0.32	0.37	0.30	0.31	0.28	0.33	0.28	0.26	0.26	0.15	0.13
Al_2O_3	11.73	9.58	11.15	11.51	11.99	9.39	14.75	12.46	10.35	11.62	11.91	11.74	10.27	10.36	12.98	15.87	17.05	11.56	11.55	10.93	10.58	11.38	7.88	8.33
FeO	18.49	18.82	17.96	17.90	18.73	17.92	18.97	17.16	18.24	18.17	17.10	16.95	16.94	18.31	17.80	18.39	18.57	17.36	17.78	16.91	16.52	17.75	17.34	14.94
MnO	0.12	0.24	0.17	0.09	0.13	0.12	0.14	0.13	0.15	0.00	0.05	0.03	0.07	0.06	0.07	0.03	0.14	0.09	0.11	0.04	0.07	0.14	0.15	0.06
MgO	9.19	10.26	9.38	9.66	8.90	10.19	7.53	9.13	9.96	9.28	9.95	10.32	10.64	9.78	9.35	7.41	6.78	9.26	9.54	10.09	10.45	9.39	11.84	12.00
CaO	10.42	9.49	8.85	9.72	10.73	11.20	10.74	10.10	8.67	10.63	9.84	10.24	10.88	11.16	10.37	10.52	10.77	9.04	8.78	8.39	8.49	8.78	6.94	7.49
Na_2O	1.55	1.27	1.97	1.88	1.64	1.15	2.05	1.94	1.73	1.66	2.01	2.05	1.24	1.43	2.06	2.36	2.23	1.56	1.62	1.63	1.68	1.51	1.31	1.67
K_2O	0.36	0.26	0.14	0.25	0.34	0.18	0.47	0.34	0.11	0.26	0.30	0.33	0.25	0.35	0.41	0.51	0.47	0.32	0.32	0.35	0.31	0.34	0.23	0.23
Cr_2O_3	0.07	0.00	0.00	0.03	0.00	0.01	0.00	0.01	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.00
Total	96.45	97.10	96.05	96.67	97.29	96.58	97.11	95.55	95.49	95.95	96.54	97.25	97.70	96.73	97.42	96.10	96.84	94.38	94.37	94.22	94.24	94.38	95.54	94.66
Cation O=23																								
Si	6.702	7.015	6.932	6.802	6.684	6.958	6.378	6.675	6.960	6.693	6.741	6.740	6.953	6.793	6.581	6.230	6.157	6.803	6.799	6.948	6.978	6.864	7.388	7.402
Ti	0.029	0.024	0.034	0.032	0.041	0.020	0.040	0.038	0.030	0.036	0.043	0.033	0.026	0.036	0.042	0.034	0.035	0.033	0.038	0.032	0.030	0.030	0.017	0.015
Al	2.093	1.686	1.975	2.034	2.124	1.665	2.634	2.231	1.847	2.082	2.104	2.059	1.786	1.845	2.288	2.863	3.052	2.111	2.088	1.963	1.896	2.054	1.382	1.459
Fe	2.342	2.351	2.257	2.245	2.355	2.254	2.404	2.180	2.308	2.311	2.143	2.110	2.089	2.313	2.227	2.355	2.359	2.249	2.280	2.154	2.101	2.273	2.156	1.856
Mn	0.015	0.030	0.022	0.012	0.016	0.015	0.018	0.017	0.019	0.000	0.006	0.004	0.009	0.008	0.009	0.004	0.018	0.012	0.014	0.005	0.009	0.018	0.018	0.008
Mg	2.075	2.284	2.102	2.161	1.994	2.286	1.701	2.068	2.248	2.104	2.223	2.290	2.339	2.203	2.086	1.691	1.535	2.137	2.181	2.292	2.369	2.143	2.625	2.659
Ca	1.690	1.519	1.425	1.562	1.727	1.805	1.744	1.643	1.406	1.731	1.580	1.633	1.719	1.807	1.662	1.725	1.752	1.500	1.444	1.370	1.383	1.441	1.105	1.193
Na	0.454	0.368	0.573	0.547	0.479	0.336	0.601	0.570	0.507	0.488	0.585	0.592	0.353	0.417	0.597	0.700	0.657	0.468	0.481	0.480	0.496	0.447	0.378	0.481
K	0.070	0.050	0.026	0.048	0.064	0.035	0.090	0.066	0.022	0.051	0.056	0.063	0.047	0.067	0.078	0.100	0.091	0.063	0.063	0.068	0.060	0.066	0.044	0.043
Cr	0.009	0.000	0.000	0.003	0.000	0.001	0.000	0.001	0.003	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.001	0.000
Total	15.479	15.327	15.346	15.445	15.485	15.375	15.610	15.489	15.350	15.498	15.484	15.524	15.326	15.490	15.571	15.704	15.656	15.375	15.390	15.312	15.322	15.336	15.114	15.116
Total Fe as FeO																								

Table A2 **Chemical compositions of amphiboles**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
	Mhb	Mhb	Mhb	Mhb	Mhb	Brs	Brs	Brs	Brs	Brs	Brs	Fts	Mhb	Mhb	Brs	Brs	Brs	Brs	Brs	Brs	Brs	Brs	Brs	Brs
Weight %																								
SiO_2	52.50	52.41	52.00	52.31	51.91	48.08	47.19	47.54	41.28	41.55	41.49	39.63	45.30	44.69	44.86	47.07	46.68	47.45	47.82	49.01	48.82	48.84	49.28	50.89
TiO_2	0.08	0.09	0.08	0.08	0.04	0.16	0.26	0.26	0.25	0.21	0.22	0.18	0.32	0.33	0.28	0.30	0.26	0.23	0.21	0.16	0.12	0.15	0.15	0.09
Al_2O_3	5.23	5.19	5.80	6.02	7.07	11.31	12.06	11.30	16.97	16.56	16.38	18.50	11.53	11.26	10.60	11.30	11.76	11.59	11.56	9.68	8.83	9.40	8.22	6.13
FeO	13.46	12.90	13.87	12.62	13.82	15.22	15.69	16.65	18.06	18.31	18.84	20.86	17.97	18.41	17.77	17.93	16.75	15.56	15.48	14.42	13.71	13.88	13.35	12.88
MnO	0.01	0.07	0.01	0.00	0.01	0.03	0.06	0.00	0.09	0.02	0.02	0.12	0.09	0.19	0.12	0.12	0.06	0.09	0.04	0.06	0.03	0.08	0.00	0.04
MgO	14.68	14.96	14.17	14.53	13.86	10.75	10.09	10.27	7.10	7.15	7.15	4.80	9.94	9.42	9.76	9.75	10.20	10.58	11.20	12.36	12.65	12.56	13.39	14.62
CaO	8.01	7.92	7.74	7.57	7.00	6.27	6.46	6.33	8.26	8.36	8.41	9.04	9.85	9.51	9.11	7.46	8.18	7.27	7.37	7.32	7.13	7.45	7.59	8.17
Na_2O	1.17	1.09	1.22	1.37	1.80	2.69	2.77	2.61	2.44	2.43	2.20	1.66	1.85	1.70	1.77	2.29	2.22	2.83	2.76	2.28	2.57	2.67	2.29	1.87
K_2O	0.15	0.19	0.20	0.18	0.20	0.29	0.26	0.14	0.53	0.58	0.58	0.69	0.30	0.33	0.23	0.11	0.19	0.20	0.21	0.24	0.21	0.23	0.26	0.19
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.01	0.05	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.01	0.00
Total	95.30	94.81	95.09	94.68	95.70	94.79	94.84	95.09	94.99	95.18	95.27	95.47	97.16	95.86	94.54	96.33	96.28	95.83	96.65	95.54	94.07	95.29	94.54	94.88
Cation O=23																								
Si	7.675	7.681	7.632	7.656	7.558	7.149	7.044	7.096	6.318	6.355	6.353	6.131	6.769	6.787	6.875	7.008	6.935	7.028	7.016	7.220	7.289	7.216	7.314	7.501
Ti	0.009	0.010	0.008	0.009	0.005	0.018	0.030	0.029	0.029	0.024	0.026	0.021	0.036	0.038	0.032	0.033	0.029	0.026	0.023	0.018	0.013	0.017	0.017	0.010
Al	0.901	0.896	1.004	1.038	1.213	1.983	2.122	1.989	3.062	2.985	2.956	3.374	2.030	2.015	1.914	1.983	2.059	2.023	1.999	1.681	1.554	1.638	1.438	1.065
Fe	1.646	1.582	1.703	1.545	1.682	1.892	1.959	2.078	2.311	2.342	2.412	2.698	2.245	2.339	2.277	2.233	2.081	1.927	1.900	1.776	1.712	1.715	1.657	1.587
Mn	0.001	0.008	0.002	0.000	0.001	0.004	0.008	0.000	0.012	0.002	0.002	0.015	0.012	0.025	0.015	0.015	0.008	0.012	0.005	0.007	0.004	0.009	0.000	0.005
Mg	3.200	3.268	3.101	3.171	3.009	2.382	2.246	2.284	1.621	1.630	1.632	1.107	2.215	2.132	2.230	2.164	2.258	2.336	2.449	2.714	2.816	2.766	2.962	3.212
Ca	1.254	1.243	1.217	1.187	1.092	0.999	1.033	1.013	1.355	1.370	1.380	1.498	1.577	1.548	1.496	1.189	1.301	1.154	1.158	1.155	1.140	1.180	1.207	1.290
Na	0.332	0.310	0.347	0.389	0.507	0.775	0.801	0.756	0.725	0.721	0.652	0.499	0.535	0.501	0.527	0.662	0.638	0.812	0.784	0.652	0.744	0.765	0.660	0.535
K	0.028	0.036	0.037	0.033	0.037	0.055	0.049	0.026	0.103	0.112	0.113	0.136	0.057	0.064	0.046	0.020	0.035	0.037	0.040	0.046	0.040	0.044	0.049	0.036
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.001	0.001	0.006	0.000	0.000	0.002	0.000	0.000	0.000	0.003	0.001	0.000
Total	15.046	15.034	15.050	15.028	15.103	15.256	15.290	15.271	15.535	15.544	15.526	15.478	15.476	15.450	15.419	15.308	15.344	15.358	15.373	15.270	15.312	15.352	15.305	15.242

Total Fe as FeO

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	Brs	Brs	Brs	Brs	Brs	Brs	Brs	Brs	Brs	Brs	Ts	Ts	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Brs	Brs	Brs	Brs	Mhb	Mhb
	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8	9	10	11	12
Weight %																								
SiO_2	49.92	49.76	49.30	49.64	49.22	47.71	45.89	45.95	45.13	44.46	43.22	43.01	50.61	52.21	51.64	51.65	50.96	49.95	47.87	47.08	46.15	46.39	46.95	45.26
TiO_2	0.11	0.12	0.12	0.14	0.17	0.20	0.26	0.28	0.25	0.32	0.35	0.30	0.10	0.03	0.05	0.07	0.04	0.09	0.16	0.22	0.25	0.24	0.26	0.29
Al_2O_3	7.10	8.14	7.94	8.54	9.18	10.81	11.48	10.85	10.59	11.38	12.56	12.99	6.55	4.22	4.39	5.06	5.42	7.18	10.10	11.21	11.10	10.33	9.50	10.52
FeO	13.17	13.97	13.45	13.98	14.75	16.65	17.53	18.01	18.74	18.68	18.62	19.01	13.44	12.31	11.90	12.18	12.72	13.71	15.22	16.38	17.03	17.46	18.45	17.01
MnO	0.00	0.02	0.04	0.02	0.05	0.13	0.17	0.15	0.11	0.21	0.07	0.06	0.12	0.06	0.07	0.01	0.01	0.09	0.05	0.09	0.10	0.16	0.16	0.13
MgO	14.06	13.05	13.04	12.87	12.25	10.93	9.93	10.11	9.69	9.24	8.87	8.58	14.26	15.69	15.83	15.43	14.94	13.56	11.54	11.13	10.48	10.53	11.06	10.40
CaO	7.92	7.92	7.54	7.49	7.00	6.97	7.55	7.68	8.60	9.39	9.88	9.97	7.90	9.10	9.34	8.88	8.76	7.97	7.10	7.28	7.14	7.31	7.52	9.33
Na_2O	1.90	1.99	2.11	2.11	2.14	2.18	2.06	1.91	1.78	1.81	1.95	1.96	1.65	0.90	1.18	1.30	1.29	1.63	2.30	2.35	2.12	1.79	1.58	1.70
K_2O	0.26	0.25	0.23	0.25	0.26	0.25	0.20	0.11	0.21	0.34	0.36	0.32	0.19	0.15	0.13	0.17	0.21	0.24	0.22	0.22	0.13	0.08	0.07	0.30
Cr_2O_3	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.02	0.03	0.03
Total	94.43	95.20	93.77	95.04	95.05	95.82	95.05	95.04	95.08	95.83	95.88	96.22	94.81	94.68	94.52	94.75	94.33	94.42	94.56	96.00	94.54	94.29	95.59	94.96
Cation O=23																								
Si	7.407	7.345	7.372	7.332	7.288	7.084	6.931	6.957	6.892	6.767	6.595	6.551	7.475	7.679	7.616	7.594	7.550	7.423	7.160	6.989	6.979	7.044	7.066	6.882
Ti	0.012	0.014	0.013	0.015	0.019	0.022	0.030	0.032	0.029	0.037	0.040	0.034	0.011	0.003	0.006	0.007	0.004	0.010	0.018	0.025	0.029	0.027	0.030	0.033
Al	1.242	1.416	1.399	1.487	1.602	1.892	2.044	1.936	1.905	2.041	2.259	2.333	1.140	0.731	0.762	0.877	0.947	1.258	1.780	1.962	1.979	1.848	1.686	1.886
Fe	1.634	1.724	1.683	1.727	1.826	2.067	2.214	2.281	2.392	2.378	2.376	2.421	1.660	1.514	1.467	1.498	1.576	1.704	1.903	2.033	2.154	2.217	2.322	2.163
Mn	0.000	0.002	0.005	0.003	0.006	0.017	0.021	0.019	0.014	0.027	0.009	0.007	0.015	0.008	0.009	0.001	0.001	0.011	0.006	0.011	0.012	0.021	0.020	0.016
Mg	3.110	2.872	2.907	2.834	2.703	2.420	2.236	2.281	2.206	2.096	2.017	1.948	3.139	3.440	3.480	3.383	3.299	3.004	2.572	2.464	2.364	2.385	2.482	2.359
Ca	1.259	1.252	1.208	1.186	1.111	1.108	1.221	1.246	1.406	1.531	1.615	1.626	1.250	1.434	1.476	1.399	1.390	1.268	1.137	1.158	1.156	1.189	1.213	1.520
Na	0.547	0.569	0.613	0.604	0.614	0.628	0.602	0.560	0.526	0.534	0.576	0.580	0.473	0.256	0.338	0.371	0.370	0.469	0.667	0.676	0.620	0.526	0.462	0.502
K	0.049	0.047	0.044	0.046	0.050	0.047	0.038	0.021	0.041	0.066	0.071	0.063	0.036	0.029	0.024	0.032	0.039	0.046	0.042	0.042	0.026	0.015	0.014	0.057
Cr	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.004	0.004	0.002	0.004	0.004
Total	15.259	15.241	15.244	15.235	15.222	15.286	15.337	15.333	15.410	15.476	15.559	15.568	15.198	15.095	15.178	15.162	15.177	15.195	15.286	15.363	15.324	15.274	15.297	15.421

Total Fe as FeO

Table A2 **Chemical compositions of amphiboles**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	11
	Mhb	Mhb	Mhb	Brs	Brs	Brs	Brs	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Brs	Brs	Brs	Mhb	Mhb	Brs	Brs	Brs	Brs	Brs
Weight %																								
SiO_2	45.12	44.59	45.68	45.68	47.54	47.83	48.81	52.42	52.74	52.46	50.82	49.97	49.39	44.33	46.20	46.15	47.18	47.28	48.29	50.54	50.78	50.96	51.15	48.11
TiO_2	0.37	0.34	0.33	0.34	0.23	0.23	0.19	0.09	0.09	0.08	0.11	0.11	0.17	0.32	0.26	0.29	0.31	0.23	0.26	0.11	0.10	0.10	0.11	0.18
Al_2O_3	11.66	11.68	11.20	11.84	10.84	11.34	10.09	5.31	5.48	5.56	7.86	7.86	8.09	11.46	11.27	10.57	9.96	9.64	9.36	8.25	7.74	7.96	7.72	10.40
FeO	18.39	18.81	18.62	18.66	17.00	16.20	15.23	13.19	12.26	12.65	14.90	17.09	17.61	17.82	16.24	16.47	16.97	16.06	16.08	13.96	13.17	13.19	13.65	14.16
MnO	0.17	0.14	0.19	0.18	0.14	0.07	0.05	0.00	0.03	0.01	0.08	0.14	0.19	0.21	0.08	0.04	0.08	0.18	0.08	0.00	0.04	0.00	0.00	0.01
MgO	9.32	9.21	9.33	9.15	10.44	10.44	11.72	14.88	14.78	14.75	13.21	11.79	11.31	9.81	10.67	10.95	11.29	11.31	11.61	13.19	13.46	13.54	13.62	11.72
CaO	9.59	9.70	9.34	8.35	6.95	6.98	7.78	8.41	8.83	8.48	7.50	7.29	7.53	9.60	8.49	8.58	8.34	8.64	7.96	7.39	7.51	7.42	7.61	7.11
Na_2O	1.78	1.75	1.59	1.79	2.20	2.50	1.91	1.31	1.38	1.42	1.72	1.49	1.28	1.87	2.22	1.98	1.82	1.75	1.75	2.15	2.04	2.43	2.32	2.62
K_2O	0.36	0.35	0.29	0.24	0.21	0.24	0.27	0.20	0.18	0.21	0.26	0.25	0.24	0.32	0.24	0.22	0.10	0.12	0.09	0.21	0.20	0.23	0.21	0.27
Cr_2O_3	0.00	0.00	0.00	0.01	0.00	0.04	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.03
Total	96.76	96.56	96.57	96.22	95.55	95.86	96.05	95.81	95.78	95.61	96.48	95.98	95.79	95.72	95.69	95.25	96.05	95.22	95.46	95.80	95.03	95.85	96.39	94.61
Cation O=23																								
Si	6.781	6.737	6.866	6.866	7.091	7.083	7.180	7.631	7.651	7.635	7.406	7.396	7.351	6.734	6.913	6.947	7.034	7.088	7.184	7.389	7.456	7.426	7.429	7.159
Ti	0.042	0.039	0.037	0.038	0.026	0.026	0.021	0.010	0.010	0.009	0.012	0.012	0.019	0.036	0.029	0.033	0.035	0.026	0.029	0.012	0.011	0.011	0.012	0.020
Al	2.065	2.079	1.984	2.097	1.905	1.979	1.750	0.911	0.937	0.953	1.351	1.372	1.420	2.052	1.987	1.874	1.750	1.703	1.641	1.422	1.339	1.366	1.322	1.824
Fe	2.311	2.377	2.341	2.345	2.121	2.006	1.874	1.606	1.488	1.540	1.816	2.115	2.192	2.264	2.032	2.073	2.115	2.013	2.001	1.707	1.618	1.607	1.657	1.762
Mn	0.022	0.018	0.024	0.022	0.018	0.008	0.006	0.000	0.004	0.002	0.010	0.018	0.023	0.027	0.010	0.005	0.010	0.023	0.009	0.000	0.005	0.000	0.000	0.001
Mg	2.087	2.074	2.090	2.050	2.320	2.304	2.570	3.229	3.197	3.200	2.871	2.601	2.509	2.221	2.381	2.457	2.508	2.528	2.575	2.875	2.946	2.941	2.949	2.600
Ca	1.543	1.570	1.504	1.344	1.111	1.107	1.226	1.312	1.372	1.322	1.171	1.155	1.200	1.563	1.361	1.383	1.332	1.388	1.269	1.158	1.181	1.158	1.184	1.134
Na	0.519	0.513	0.462	0.520	0.637	0.718	0.545	0.369	0.388	0.400	0.485	0.427	0.368	0.550	0.644	0.578	0.525	0.509	0.506	0.610	0.580	0.685	0.653	0.755
K	0.069	0.067	0.055	0.046	0.039	0.045	0.050	0.037	0.033	0.039	0.048	0.047	0.045	0.061	0.045	0.043	0.020	0.022	0.016	0.039	0.038	0.044	0.040	0.051
Cr	0.000	0.000	0.000	0.001	0.000	0.005	0.000	0.000	0.001	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.004	0.000	0.003
Total	15.439	15.474	15.364	15.331	15.269	15.282	15.222	15.106	15.080	15.099	15.172	15.144	15.127	15.509	15.407	15.393	15.329	15.300	15.229	15.213	15.173	15.242	15.245	15.310

Total Fe as FeO

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	Brs	Brs	Brs	Mhb	Brs	Brs	Brs	Mhb	Mhb	Brs	Brs	Brs	Brs	Brs	Brs	Brs	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb
	12	13	14	15	16	17	18	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Weight %																								
SiO_2	47.27	47.32	47.09	46.17	45.00	43.94	44.11	45.66	45.62	48.39	48.42	48.54	48.57	51.99	52.84	52.97	52.91	52.74	52.49	53.28	53.13	52.52	49.80	50.76
TiO_2	0.20	0.23	0.28	0.27	0.33	0.35	0.34	0.34	0.34	0.30	0.29	0.33	0.30	0.08	0.10	0.09	0.12	0.09	0.13	0.09	0.12	0.09	0.23	0.22
Al_2O_3	11.20	11.80	11.92	9.74	11.65	12.01	11.53	12.42	12.75	10.94	11.42	11.42	11.76	7.39	7.01	6.98	6.51	5.76	6.70	6.15	6.18	6.97	9.00	8.35
FeO	14.63	16.00	17.00	18.76	17.67	17.44	17.61	17.60	17.05	17.35	16.79	15.88	15.13	14.22	12.99	13.55	12.95	12.61	12.87	12.75	12.82	13.52	17.13	16.76
MnO	0.03	0.04	0.13	0.21	0.18	0.16	0.13	0.11	0.06	0.05	0.02	0.12	0.05	0.02	0.01	0.07	0.05	0.04	0.08	0.00	0.07	0.01	0.22	0.19
MgO	11.11	10.57	10.38	10.13	9.61	9.37	9.47	9.53	9.91	11.35	11.17	11.30	11.24	14.00	14.45	14.24	14.70	15.11	14.70	15.05	15.04	14.04	11.32	12.09
CaO	6.74	6.78	6.77	8.68	8.91	8.90	9.05	10.02	9.89	8.14	8.20	8.36	8.08	8.42	8.49	8.43	8.99	9.01	9.25	8.83	8.88	8.69	8.12	7.85
Na_2O	2.91	2.66	2.49	1.40	2.01	2.00	1.87	2.03	2.09	2.09	2.27	2.42	2.64	2.05	1.96	1.93	1.77	1.66	1.69	1.65	1.59	1.63	1.50	1.51
K_2O	0.22	0.17	0.14	0.16	0.35	0.39	0.31	0.35	0.33	0.09	0.13	0.17	0.21	0.22	0.23	0.21	0.22	0.18	0.23	0.22	0.23	0.24	0.27	0.25
Cr_2O_3	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.04	0.00	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.04	0.00	0.00	0.00	0.04	0.01	0.04	0.03
Total	94.30	95.56	96.22	95.52	95.72	94.55	94.42	98.09	98.03	98.71	98.73	98.54	98.00	98.42	98.09	98.49	98.26	97.20	98.13	98.02	98.11	97.72	97.63	97.99
Cation O=23																								
Si	7.076	7.024	6.976	7.001	6.806	6.735	6.774	6.742	6.718	7.006	6.993	7.004	7.017	7.421	7.511	7.516	7.519	7.568	7.478	7.571	7.551	7.512	7.267	7.349
Ti	0.023	0.026	0.032	0.031	0.038	0.040	0.040	0.037	0.037	0.033	0.032	0.036	0.032	0.009	0.010	0.010	0.013	0.009	0.014	0.010	0.013	0.010	0.025	0.024
Al	1.976	2.065	2.080	1.740	2.077	2.170	2.087	2.161	2.213	1.867	1.943	1.941	2.001	1.244	1.175	1.167	1.090	0.974	1.124	1.030	1.036	1.174	1.548	1.424
Fe	1.832	1.985	2.106	2.378	2.235	2.236	2.262	2.173	2.099	2.101	2.027	1.916	1.828	1.698	1.544	1.608	1.540	1.514	1.533	1.514	1.524	1.617	2.091	2.029
Mn	0.004	0.005	0.016	0.027	0.023	0.021	0.017	0.014	0.007	0.006	0.002	0.014	0.006	0.002	0.001	0.008	0.006	0.004	0.009	0.000	0.008	0.001	0.027	0.023
Mg	2.479	2.338	2.292	2.290	2.167	2.141	2.167	2.098	2.174	2.449	2.404	2.430	2.422	2.980	3.062	3.011	3.116	3.233	3.123	3.188	3.185	2.994	2.463	2.610
Ca	1.081	1.077	1.075	1.411	1.444	1.462	1.489	1.585	1.560	1.263	1.269	1.292	1.251	1.287	1.293	1.282	1.369	1.386	1.411	1.344	1.352	1.332	1.270	1.218
Na	0.844	0.765	0.716	0.411	0.588	0.595	0.556	0.580	0.597	0.585	0.637	0.676	0.741	0.568	0.541	0.530	0.488	0.461	0.466	0.454	0.439	0.451	0.424	0.423
K	0.041	0.033	0.026	0.031	0.068	0.077	0.060	0.066	0.062	0.017	0.024	0.031	0.038	0.039	0.041	0.039	0.040	0.034	0.042	0.041	0.042	0.044	0.051	0.046
Cr	0.001	0.000	0.002	0.000	0.001	0.000	0.000	0.005	0.000	0.002	0.002	0.003	0.003	0.003	0.003	0.002	0.004	0.000	0.000	0.000	0.005	0.001	0.004	0.003
Total	15.355	15.317	15.322	15.320	15.446	15.476	15.451	15.461	15.468	15.329	15.333	15.342	15.339	15.251	15.181	15.174	15.184	15.183	15.200	15.152	15.156	15.137	15.170	15.148

Total Fe as FeO

Table A2 **Chemical compositions of amphiboles**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	Mhb	Mhb	Mhb	Mhb	Brs	Brs	Mhb	Mhb	Mhb	Mhb	Mhb	Brs	Mhb	Mhb	Mhb	Mhb	Brs	Mhb	Mhb	Mhb	Mhb	Act	Act	Act
	18	19	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10
Weight %																								
SiO_2	49.93	45.92	47.95	47.73	49.47	49.76	53.32	53.78	53.56	53.33	53.39	49.10	48.89	46.49	46.33	46.42	48.00	50.02	51.92	51.94	51.80	53.92	53.22	52.89
TiO_2	0.32	0.41	0.32	0.36	0.26	0.27	0.07	0.07	0.09	0.09	0.09	0.25	0.27	0.36	0.21	0.26	0.19	0.11	0.06	0.07	0.05	0.01	0.06	0.06
Al_2O_3	9.17	11.74	9.49	10.53	10.36	10.58	6.42	6.05	5.76	6.12	6.12	10.63	9.81	10.70	8.31	10.49	10.19	7.76	5.98	5.33	4.79	2.75	3.40	3.70
FeO	17.17	17.63	17.07	17.24	16.28	15.27	12.99	12.81	12.50	12.30	12.85	15.66	16.87	16.77	17.43	19.90	14.46	13.57	13.19	12.31	13.30	12.74	12.70	12.78
MnO	0.19	0.13	0.06	0.14	0.10	0.03	0.00	0.03	0.02	0.03	0.00	0.01	0.13	0.10	0.14	0.23	0.03	0.02	0.04	0.01	0.06	0.07	0.03	0.04
MgO	11.57	9.79	11.41	10.48	11.52	11.70	15.26	15.37	15.62	15.33	15.22	11.82	11.99	10.49	10.90	10.03	12.11	13.65	14.57	14.87	15.21	16.43	16.05	15.78
CaO	7.57	10.21	10.97	10.75	8.35	8.94	9.11	9.30	9.29	9.44	9.10	8.32	8.60	10.45	10.65	7.66	7.98	8.52	9.20	9.32	9.32	10.17	10.14	9.90
Na_2O	1.66	1.69	1.51	1.55	1.91	2.18	1.52	1.48	1.47	1.60	1.47	2.23	1.78	1.85	1.07	1.51	2.29	1.77	1.41	1.29	1.01	0.58	0.74	0.75
K_2O	0.24	0.37	0.23	0.29	0.16	0.17	0.22	0.19	0.20	0.22	0.21	0.13	0.10	0.36	0.14	0.18	0.27	0.26	0.19	0.19	0.14	0.13	0.13	0.17
Cr_2O_3	0.00	0.02	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.01
Total	97.81	97.91	99.05	99.08	98.41	98.89	98.92	99.07	98.50	98.46	98.48	98.14	98.44	97.60	95.18	96.68	95.52	95.69	96.61	95.33	95.68	96.79	96.46	96.07
Cation O=23																								
Si	7.260	6.792	6.984	6.949	7.137	7.124	7.520	7.565	7.572	7.544	7.557	7.091	7.090	6.879	7.050	6.962	7.104	7.343	7.525	7.597	7.586	7.777	7.709	7.694
Ti	0.035	0.045	0.035	0.039	0.029	0.029	0.007	0.007	0.009	0.009	0.009	0.027	0.029	0.040	0.024	0.029	0.021	0.013	0.007	0.008	0.006	0.001	0.007	0.006
Al	1.571	2.047	1.629	1.807	1.762	1.785	1.067	1.003	0.959	1.020	1.020	1.810	1.676	1.866	1.490	1.855	1.777	1.343	1.022	0.919	0.827	0.467	0.581	0.635
Fe	2.088	2.181	2.079	2.099	1.965	1.828	1.532	1.507	1.478	1.455	1.521	1.891	2.046	2.075	2.217	2.496	1.790	1.667	1.599	1.506	1.629	1.537	1.538	1.554
Mn	0.023	0.016	0.007	0.018	0.012	0.003	0.000	0.004	0.002	0.004	0.000	0.001	0.016	0.012	0.019	0.029	0.004	0.003	0.005	0.001	0.007	0.009	0.004	0.005
Mg	2.508	2.158	2.477	2.274	2.477	2.497	3.209	3.223	3.292	3.233	3.212	2.546	2.592	2.314	2.472	2.242	2.672	2.988	3.148	3.243	3.321	3.533	3.465	3.423
Ca	1.179	1.618	1.712	1.677	1.291	1.371	1.376	1.401	1.408	1.431	1.381	1.288	1.335	1.657	1.735	1.232	1.265	1.340	1.429	1.461	1.462	1.571	1.574	1.542
Na	0.467	0.485	0.427	0.439	0.535	0.605	0.417	0.403	0.403	0.440	0.404	0.624	0.500	0.532	0.315	0.439	0.657	0.505	0.395	0.365	0.286	0.163	0.207	0.211
K	0.045	0.070	0.043	0.054	0.029	0.032	0.039	0.034	0.036	0.040	0.038	0.023	0.019	0.069	0.028	0.034	0.051	0.048	0.036	0.036	0.026	0.024	0.023	0.031
Cr	0.000	0.003	0.005	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.003	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.001
Total	15.176	15.415	15.398	15.355	15.235	15.273	15.167	15.145	15.158	15.176	15.144	15.300	15.303	15.447	15.352	15.318	15.341	15.249	15.170	15.136	15.151	15.082	15.108	15.103

Total Fe as FeO

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	Mhb	Brs	Mhb	Mhb	Ts	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Brs	Brs	Brs	Brs	Brs	Brs	Brs	Ts	Ts	Ts	Brs	Brs	Mhb
	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3
Weight %																								
SiO_2	50.00	50.53	44.97	44.17	43.34	51.32	51.74	51.55	52.22	51.47	50.74	47.95	47.64	47.88	47.70	47.02	46.60	46.34	43.42	41.70	41.47	47.12	47.68	49.00
TiO_2	0.17	0.18	0.31	0.32	0.25	0.09	0.14	0.11	0.08	0.09	0.11	0.21	0.21	0.25	0.27	0.27	0.32	0.26	0.34	0.34	0.22	0.32	0.30	0.32
Al_2O_3	7.82	8.68	12.12	12.42	12.68	6.16	5.92	6.01	5.62	5.92	7.26	11.18	11.47	11.66	11.27	11.42	11.52	11.43	12.53	13.58	13.51	13.46	12.49	9.38
FeO	16.10	15.50	18.35	17.96	17.99	14.08	13.85	13.48	13.54	13.55	13.78	14.90	14.65	14.91	15.70	16.94	17.33	18.02	19.22	19.49	19.68	17.37	17.54	16.56
MnO	0.02	0.08	0.12	0.16	0.01	0.10	0.00	0.00	0.05	0.00	0.03	0.13	0.02	0.05	0.05	0.06	0.15	0.16	0.17	0.15	0.09	0.11	0.10	0.10
MgO	12.95	12.20	9.38	9.33	8.98	14.18	14.62	14.76	14.73	14.50	14.09	11.33	11.21	11.09	11.40	10.77	10.18	9.63	8.70	7.71	7.61	9.46	9.74	11.68
CaO	8.15	8.03	9.88	9.85	10.30	8.52	8.64	8.77	8.79	8.78	8.25	7.61	7.30	7.17	7.27	7.50	7.53	7.63	9.94	10.34	10.33	7.64	8.00	9.35
Na_2O	1.69	1.85	1.83	1.87	1.77	1.15	1.30	1.26	1.32	1.35	1.79	2.85	2.93	3.09	2.36	2.23	2.27	2.07	1.73	1.76	1.69	2.74	2.42	1.51
K_2O	0.30	0.27	0.37	0.39	0.32	0.26	0.23	0.17	0.21	0.18	0.26	0.25	0.26	0.25	0.24	0.24	0.20	0.17	0.29	0.53	0.52	0.24	0.17	0.10
Cr_2O_3	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.01	0.00	0.03	0.01	0.03	0.05	0.01	0.03	0.00	0.00	0.00	0.00	0.02
Total	97.19	97.31	97.32	96.46	95.62	95.85	96.44	96.15	96.57	95.84	96.31	96.42	95.69	96.37	96.26	96.46	96.14	95.71	96.36	95.59	95.13	98.46	98.45	98.04
Cation O=23																								
Si	7.306	7.335	6.722	6.664	6.608	7.515	7.523	7.507	7.570	7.525	7.397	7.045	7.038	7.029	7.026	6.965	6.946	6.961	6.603	6.439	6.441	6.850	6.932	7.133
Ti	0.018	0.020	0.035	0.036	0.029	0.010	0.015	0.012	0.008	0.010	0.012	0.024	0.023	0.028	0.030	0.030	0.036	0.029	0.039	0.039	0.026	0.035	0.033	0.035
Al	1.346	1.484	2.135	2.208	2.279	1.063	1.015	1.032	0.960	1.020	1.248	1.936	1.997	2.018	1.957	1.993	2.024	2.023	2.246	2.471	2.473	2.305	2.140	1.609
Fe	1.967	1.882	2.294	2.266	2.294	1.724	1.683	1.642	1.642	1.656	1.680	1.830	1.810	1.830	1.934	2.098	2.161	2.263	2.444	2.517	2.557	2.112	2.133	2.016
Mn	0.003	0.010	0.015	0.020	0.001	0.013	0.000	0.000	0.006	0.000	0.003	0.016	0.002	0.006	0.006	0.007	0.018	0.021	0.022	0.019	0.012	0.014	0.013	0.013
Mg	2.821	2.639	2.090	2.099	2.040	3.095	3.168	3.205	3.184	3.160	3.062	2.481	2.469	2.427	2.503	2.378	2.262	2.155	1.973	1.774	1.763	2.049	2.112	2.535
Ca	1.275	1.249	1.583	1.591	1.682	1.336	1.346	1.368	1.366	1.375	1.288	1.198	1.156	1.128	1.147	1.190	1.203	1.227	1.620	1.711	1.719	1.189	1.246	1.459
Na	0.478	0.520	0.532	0.547	0.523	0.326	0.366	0.356	0.372	0.384	0.506	0.813	0.840	0.880	0.675	0.641	0.656	0.602	0.510	0.528	0.508	0.771	0.682	0.427
K	0.056	0.050	0.070	0.074	0.062	0.049	0.042	0.032	0.038	0.034	0.049	0.047	0.050	0.046	0.045	0.045	0.038	0.033	0.056	0.104	0.102	0.045	0.032	0.018
Cr	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.002	0.000	0.003	0.001	0.003	0.006	0.001	0.004	0.000	0.000	0.000	0.000	0.003
Total	15.270	15.188	15.476	15.506	15.517	15.132	15.159	15.158	15.146	15.164	15.245	15.392	15.385	15.395	15.325	15.350	15.350	15.315	15.517	15.603	15.602	15.371	15.322	15.248

Total Fe as FeO

Table A2 **Chemical compositions of amphiboles**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	4	5	6	7	8	9	10	11	1	2	3	4	5	6	1	2	3	4	5	6	7	8	9	10
	Brs	Brs	Brs	Ts	Ts	Fts	Fts	Fts	Ts	Ts	Fts	Fprg	Fprg	Fprg	Act	Act	Mhb	Brs	Brs	Fts	Fts	Fts	Fts	Fts
Weight %																								
SiO_2	46.84	47.83	49.52	43.16	44.04	42.49	41.50	42.79	43.73	43.75	40.40	40.28	39.28	39.02	53.08	53.03	50.07	47.95	47.99	42.22	40.15	39.67	38.28	37.87
TiO_2	0.35	0.30	0.21	0.36	0.37	0.36	0.30	0.35	0.31	0.35	0.17	0.21	0.19	0.13	0.05	0.06	0.09	0.24	0.22	0.21	0.17	0.14	0.08	0.07
Al_2O_3	12.65	10.94	9.12	15.62	14.66	16.22	16.75	15.53	15.57	14.90	18.39	18.74	19.53	20.36	3.97	4.08	7.81	11.10	11.50	15.38	17.77	17.66	19.39	19.60
FeO	17.58	16.41	16.07	18.61	17.62	18.65	18.75	18.44	17.74	17.55	19.38	19.85	20.34	21.15	12.69	12.80	16.00	16.63	18.00	19.82	20.61	20.36	22.37	23.06
MnO	0.06	0.12	0.08	0.03	0.13	0.11	0.11	0.10	0.06	0.11	0.14	0.09	0.15	0.10	0.05	0.03	0.10	0.07	0.10	0.12	0.11	0.07	0.15	0.09
MgO	9.88	10.86	11.99	7.93	8.45	7.56	6.99	7.59	7.75	8.37	5.64	5.32	4.18	3.61	15.29	15.48	12.36	10.08	9.27	7.00	5.51	5.24	3.50	2.90
CaO	8.47	9.06	9.68	10.27	10.12	10.66	10.76	10.68	10.29	10.40	10.90	11.21	11.26	11.54	10.10	10.11	8.86	8.75	7.29	10.18	10.61	10.85	10.91	11.01
Na_2O	2.40	2.20	1.88	2.39	2.38	2.36	2.37	2.11	2.08	2.16	2.04	1.98	1.85	1.65	0.82	0.84	1.39	2.09	2.37	2.17	2.05	1.89	1.77	1.68
K_2O	0.12	0.11	0.13	0.55	0.47	0.50	0.47	0.42	0.53	0.49	0.70	0.84	0.87	0.82	0.12	0.11	0.24	0.27	0.21	0.49	0.54	0.69	0.76	0.72
Cr_2O_3	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.04	0.01	0.03	0.01	0.02	0.01	0.00	0.00	0.04	0.04	0.00	0.00	0.05	0.00	0.00	0.01	0.00
Total	98.35	97.82	98.67	98.93	98.24	98.92	98.00	98.05	98.05	98.09	97.77	98.53	97.67	98.37	96.16	96.56	96.96	97.18	96.94	97.63	97.51	96.56	97.22	97.00
Cation O=23																								
Si	6.839	6.991	7.158	6.381	6.516	6.297	6.223	6.383	6.478	6.485	6.096	6.051	5.976	5.910	7.708	7.675	7.334	7.050	7.083	6.370	6.108	6.101	5.913	5.883
Ti	0.039	0.033	0.022	0.040	0.041	0.040	0.034	0.039	0.035	0.039	0.020	0.024	0.022	0.014	0.006	0.006	0.010	0.027	0.024	0.023	0.020	0.016	0.009	0.008
Al	2.176	1.884	1.554	2.722	2.556	2.834	2.959	2.730	2.718	2.602	3.270	3.319	3.502	3.633	0.679	0.696	1.348	1.924	2.000	2.735	3.185	3.200	3.530	3.588
Fe	2.146	2.006	1.943	2.301	2.180	2.311	2.352	2.300	2.198	2.175	2.446	2.493	2.588	2.679	1.541	1.549	1.959	2.044	2.222	2.501	2.622	2.619	2.889	2.996
Mn	0.008	0.014	0.010	0.004	0.016	0.014	0.014	0.013	0.007	0.014	0.018	0.012	0.019	0.012	0.007	0.003	0.012	0.009	0.012	0.015	0.014	0.009	0.020	0.012
Mg	2.151	2.365	2.584	1.748	1.865	1.671	1.563	1.689	1.712	1.848	1.269	1.191	0.948	0.816	3.310	3.340	2.699	2.208	2.039	1.574	1.248	1.201	0.806	0.670
Ca	1.325	1.418	1.499	1.626	1.605	1.692	1.729	1.708	1.633	1.651	1.762	1.804	1.836	1.873	1.571	1.567	1.391	1.378	1.153	1.646	1.730	1.787	1.805	1.832
Na	0.680	0.623	0.526	0.684	0.682	0.677	0.688	0.611	0.598	0.621	0.596	0.577	0.547	0.484	0.230	0.236	0.395	0.595	0.677	0.636	0.604	0.564	0.529	0.506
K	0.022	0.021	0.024	0.104	0.088	0.095	0.090	0.080	0.099	0.092	0.134	0.161	0.168	0.159	0.021	0.021	0.045	0.051	0.040	0.095	0.104	0.136	0.150	0.142
Cr	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.004	0.001	0.004	0.002	0.003	0.002	0.000	0.000	0.000	0.005	0.005	0.000	0.000	0.006	0.000	0.000	0.001	0.000
Total	15.386	15.356	15.318	15.611	15.550	15.631	15.652	15.556	15.477	15.530	15.614	15.633	15.607	15.580	15.072	15.097	15.199	15.285	15.251	15.602	15.634	15.633	15.652	15.638

Total Fe as FeO

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	Fts	Fts	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Mhb	Act	Act	Act	Act	Act	Mhb	Mhb	Mhb	Brs	Mhb	Mhb	Mhb	Ts	
	11	12	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	
Weight %																								
SiO_2	37.62	37.77	45.47	45.53	45.92	46.58	47.49	52.57	52.52	52.54	54.05	54.22	54.96	54.90	55.39	52.97	52.36	50.74	50.00	45.58	45.27	44.25	43.97	
TiO_2	0.07	0.05	0.30	0.33	0.24	0.31	0.29	0.14	0.06	0.11	0.00	0.05	0.06	0.00	0.03	0.09	0.11	0.17	0.17	0.30	0.28	0.24	0.24	
Al_2O_3	20.10	20.13	11.75	12.21	11.72	11.44	10.14	5.91	5.63	5.82	3.18	2.61	2.50	2.30	2.29	4.90	6.32	7.73	9.25	11.05	11.38	12.42	12.49	
FeO	23.15	22.91	17.55	17.17	17.08	17.06	16.94	13.76	13.75	13.58	12.40	12.08	12.86	12.83	13.12	13.58	13.68	15.83	15.67	18.21	17.85	18.64	19.35	
MnO	0.11	0.19	0.03	0.05	0.08	0.08	0.11	0.02	0.00	0.03	0.03	0.04	0.05	0.04	0.07	0.02	0.02	0.05	0.03	0.13	0.10	0.11	0.10	
MgO	2.55	2.51	9.86	9.76	10.29	10.44	10.93	14.53	14.79	14.57	16.06	16.05	16.48	16.47	16.51	14.92	14.33	13.19	11.74	9.74	9.45	8.89	8.62	
CaO	11.02	10.95	10.20	10.25	10.33	10.21	10.28	9.36	9.56	9.70	10.71	11.06	11.05	10.87	10.34	10.09	9.17	8.35	8.39	10.50	10.94	10.94	11.11	
Na_2O	1.57	1.60	2.00	2.03	2.07	1.96	1.57	1.26	1.24	1.22	0.66	0.63	0.56	0.51	0.64	1.04	1.53	1.67	2.15	1.60	1.65	1.68	1.55	
K_2O	0.61	0.65	0.34	0.36	0.30	0.27	0.23	0.19	0.19	0.15	0.09	0.09	0.07	0.06	0.09	0.15	0.19	0.25	0.27	0.28	0.30	0.31	0.41	
Cr_2O_3	0.00	0.00	0.04	0.02	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.04	0.00	
Total	96.79	96.75	97.54	97.70	98.01	98.36	97.96	97.73	97.74	97.72	97.19	96.81	98.62	97.98	98.47	97.76	97.70	97.98	97.66	97.40	97.22	97.50	97.83	
Cation O=23																								
Si	5.853	5.871	6.761	6.744	6.776	6.833	6.976	7.540	7.540	7.538	7.758	7.809	7.791	7.826	7.851	7.601	7.512	7.336	7.257	6.807	6.775	6.637	6.604	
Ti	0.008	0.006	0.033	0.036	0.027	0.034	0.032	0.015	0.006	0.012	0.000	0.006	0.007	0.000	0.004	0.010	0.011	0.018	0.018	0.034	0.031	0.027	0.027	
Al	3.685	3.687	2.058	2.131	2.038	1.979	1.755	0.999	0.953	0.985	0.538	0.443	0.418	0.387	0.383	0.829	1.069	1.318	1.582	1.945	2.007	2.196	2.210	
Fe	3.012	2.978	2.182	2.126	2.108	2.093	2.081	1.651	1.651	1.629	1.489	1.455	1.525	1.529	1.555	1.630	1.641	1.914	1.902	2.275	2.235	2.339	2.429	
Mn	0.014	0.025	0.004	0.006	0.009	0.010	0.013	0.002	0.000	0.004	0.004	0.005	0.006	0.005	0.009	0.002	0.002	0.006	0.003	0.017	0.013	0.014	0.013	
Mg	0.592	0.581	2.185	2.155	2.264	2.282	2.395	3.106	3.165	3.117	3.437	3.446	3.483	3.499	3.488	3.192	3.064	2.844	2.541	2.169	2.109	1.988	1.929	
Ca	1.836	1.824	1.626	1.627	1.633	1.605	1.618	1.439	1.471	1.491	1.647	1.706	1.678	1.660	1.571	1.551	1.410	1.294	1.305	1.680	1.754	1.758	1.787	
Na	0.474	0.483	0.578	0.582	0.592	0.558	0.446	0.349	0.344	0.339	0.185	0.176	0.154	0.140	0.175	0.288	0.425	0.467	0.605	0.464	0.478	0.487	0.450	
K	0.122	0.129	0.064	0.068	0.056	0.051	0.043	0.035	0.034	0.028	0.016	0.016	0.012	0.012	0.015	0.027	0.034	0.046	0.050	0.053	0.058	0.059	0.078	
Cr	0.000	0.000	0.005	0.003	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.003	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.004	0.000	
Total	15.595	15.585	15.495	15.478	15.503	15.447	15.359	15.137	15.166	15.141	15.073	15.060	15.075	15.057	15.049	15.131	15.171	15.243	15.261	15.445	15.459	15.509	15.528	

Total Fe as FeO

Table A3 **Chemical compositions of chlorites**

Rock type	**Pelitic schist**																							
Sample No.	**KG1251**																							
Analysis No.	1	2	3	1	2	3	4	1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	9	10
Weight %																								
SiO_2	28.30	28.01	26.92	26.50	26.94	27.15	27.89	28.30	28.01	26.92	26.50	26.94	27.15	27.89	27.61	27.53	27.79	28.04	27.96	27.90	27.93	27.67	27.87	27.56
TiO_2	0.05	0.06	0.02	0.02	0.04	0.01	0.03	0.05	0.06	0.02	0.02	0.04	0.01	0.03	0.06	0.03	0.01	0.01	0.07	0.05	0.01	0.05	0.04	0.01
Al_2O_3	21.90	21.71	21.75	21.95	21.58	21.72	21.45	21.90	21.71	21.75	21.95	21.58	21.72	21.45	21.31	21.27	21.13	21.27	21.27	21.36	21.33	21.17	21.45	20.86
FeO	10.53	10.91	10.50	10.95	10.92	10.48	11.05	10.53	10.91	10.50	10.95	10.92	10.48	11.05	11.10	11.04	11.25	11.37	11.04	11.57	11.43	11.10	10.98	11.00
MnO	0.07	0.13	0.00	0.01	0.05	0.00	0.00	0.07	0.13	0.00	0.01	0.05	0.00	0.00	0.00	0.01	0.03	0.07	0.09	0.03	0.02	0.03	0.00	0.01
MgO	25.85	25.84	24.83	24.92	24.76	25.01	25.77	25.85	25.84	24.83	24.92	24.76	25.01	25.77	25.24	25.45	25.59	26.02	25.67	25.47	25.50	25.49	25.39	25.17
CaO	0.01	0.00	0.00	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.03
Na_2O	0.02	0.07	0.00	0.02	0.04	0.01	0.03	0.02	0.07	0.00	0.02	0.04	0.01	0.03	0.04	0.02	0.01	0.03	0.01	0.04	0.00	0.00	0.03	0.04
K_2O	0.05	0.04	0.06	0.05	0.04	0.05	0.07	0.05	0.04	0.06	0.05	0.04	0.05	0.07	0.07	0.05	0.07	0.05	0.05	0.05	0.04	0.05	0.03	0.02
Cr_2O_3	0.00	0.05	0.01	0.01	0.01	0.00	0.01	0.00	0.05	0.01	0.01	0.01	0.00	0.01	0.00	0.02	0.04	0.02	0.00	0.00	0.00	0.00	0.03	0.01
Total	86.79	86.81	84.10	84.48	84.36	84.44	86.30	86.79	86.81	84.10	84.48	84.36	84.44	86.30	85.43	85.43	85.91	86.91	86.17	86.46	86.27	85.56	85.83	84.69
Cation O=14																								
Si	2.774	2.754	2.727	2.683	2.728	2.739	2.760	2.774	2.754	2.727	2.683	2.728	2.739	2.760	2.761	2.754	2.767	2.761	2.771	2.763	2.769	2.764	2.770	2.779
Ti	0.003	0.004	0.002	0.002	0.003	0.001	0.002	0.003	0.004	0.002	0.002	0.003	0.001	0.002	0.005	0.002	0.001	0.000	0.005	0.004	0.001	0.004	0.003	0.000
Al	2.530	2.516	2.598	2.619	2.576	2.582	2.501	2.530	2.516	2.598	2.619	2.576	2.582	2.501	2.512	2.508	2.479	2.469	2.485	2.493	2.493	2.492	2.513	2.479
Fe	0.863	0.897	0.890	0.928	0.925	0.884	0.914	0.863	0.897	0.890	0.928	0.925	0.884	0.914	0.929	0.924	0.936	0.937	0.915	0.958	0.948	0.927	0.913	0.928
Mn	0.006	0.010	0.000	0.001	0.004	0.000	0.000	0.006	0.010	0.000	0.001	0.004	0.000	0.000	0.000	0.001	0.002	0.006	0.007	0.002	0.002	0.003	0.000	0.001
Mg	3.776	3.788	3.751	3.761	3.739	3.760	3.802	3.776	3.788	3.751	3.761	3.739	3.760	3.802	3.764	3.794	3.798	3.819	3.793	3.760	3.769	3.794	3.762	3.785
Ca	0.001	0.000	0.000	0.005	0.000	0.000	0.000	0.001	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.003
Na	0.004	0.013	0.000	0.004	0.007	0.002	0.005	0.004	0.013	0.000	0.004	0.007	0.002	0.005	0.007	0.004	0.001	0.006	0.002	0.007	0.000	0.000	0.005	0.007
K	0.006	0.005	0.008	0.006	0.005	0.007	0.009	0.006	0.005	0.008	0.006	0.005	0.007	0.009	0.008	0.006	0.009	0.006	0.007	0.006	0.005	0.006	0.004	0.002
Cr	0.000	0.004	0.000	0.001	0.001	0.000	0.001	0.000	0.004	0.000	0.001	0.001	0.000	0.001	0.000	0.001	0.003	0.002	0.000	0.000	0.000	0.000	0.002	0.000
Total	9.963	9.991	9.976	10.010	9.986	9.974	9.994	9.963	9.991	9.976	10.010	9.986	9.974	9.994	9.986	9.995	9.996	10.009	9.986	9.993	9.986	9.989	9.974	9.985
Total Fe as FeO																								

Rock type	**Pelitic schist**																							
Sample No.	**KG1251**																							
Analysis No.	11	1	2	3	4	5	6	7	1	2	3	1	2	3	4	5	6	7	8	1	2	3	4	5
Weight %																								
SiO_2	27.56	27.91	28.14	28.26	28.09	28.03	28.15	28.27	27.74	27.27	27.59	27.77	27.68	27.74	27.47	27.43	28.04	27.40	27.70	27.27	27.77	27.30	27.36	26.84
TiO_2	0.01	0.01	0.01	0.05	0.05	0.06	0.03	0.00	0.07	0.03	0.03	0.03	0.05	0.03	0.03	0.04	0.05	0.07	0.03	0.06	0.04	0.06	0.03	0.03
Al_2O_3	20.86	21.41	21.14	21.10	21.01	21.11	21.04	20.92	22.05	21.85	22.32	21.26	21.25	21.51	21.30	21.37	21.30	21.63	21.19	21.47	20.85	20.33	20.66	21.41
FeO	11.00	11.08	11.38	11.03	11.30	10.94	11.14	10.86	11.25	11.14	11.13	10.97	11.05	11.44	11.29	11.09	11.29	11.74	11.21	11.29	11.36	11.36	11.12	11.33
MnO	0.01	0.04	0.04	0.00	0.01	0.01	0.05	0.08	0.05	0.02	0.01	0.05	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.06	0.01	0.00	0.00	0.00
MgO	25.17	25.74	25.99	25.82	25.64	25.72	25.84	25.63	25.50	25.13	25.46	25.44	25.34	25.68	25.34	24.83	25.57	25.19	25.37	25.52	25.61	25.04	25.01	24.76
CaO	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.02	0.02	0.02	0.03	0.02	0.05	0.00	0.00	0.00	0.00	0.01
Na_2O	0.04	0.02	0.02	0.01	0.01	0.00	0.01	0.01	0.03	0.00	0.00	0.05	0.00	0.04	0.05	0.04	0.06	0.04	0.02	0.02	0.03	0.02	0.01	0.04
K_2O	0.02	0.04	0.03	0.04	0.02	0.03	0.03	0.06	0.06	0.07	0.03	0.02	0.03	0.03	0.04	0.03	0.06	0.05	0.04	0.04	0.04	0.03	0.03	0.04
Cr_2O_3	0.01	0.00	0.01	0.00	0.02	0.01	0.02	0.00	0.03	0.00	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.01
Total	84.69	86.24	86.76	86.30	86.16	85.92	86.30	85.83	86.78	85.52	86.59	85.59	85.41	86.49	85.55	84.88	86.40	86.14	85.61	85.72	85.70	84.15	84.23	84.46
Cation O=14																								
Si	2.779	2.763	2.774	2.794	2.786	2.783	2.786	2.808	2.733	2.725	2.720	2.770	2.767	2.745	2.748	2.761	2.774	2.728	2.766	2.724	2.773	2.779	2.777	2.722
Ti	0.000	0.001	0.000	0.003	0.004	0.004	0.002	0.000	0.005	0.002	0.002	0.002	0.004	0.002	0.002	0.003	0.004	0.005	0.003	0.004	0.003	0.005	0.002	0.002
Al	2.479	2.498	2.457	2.458	2.457	2.470	2.454	2.450	2.559	2.574	2.593	2.498	2.504	2.508	2.511	2.535	2.484	2.539	2.494	2.528	2.454	2.439	2.472	2.559
Fe	0.928	0.917	0.938	0.912	0.938	0.909	0.922	0.902	0.927	0.931	0.918	0.915	0.924	0.947	0.945	0.934	0.934	0.978	0.936	0.943	0.949	0.967	0.944	0.961
Mn	0.001	0.004	0.004	0.000	0.001	0.001	0.004	0.006	0.004	0.002	0.001	0.004	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000
Mg	3.785	3.799	3.819	3.804	3.792	3.808	3.812	3.796	3.744	3.745	3.742	3.782	3.777	3.789	3.778	3.726	3.772	3.739	3.776	3.800	3.812	3.800	3.785	3.744
Ca	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.002	0.002	0.002	0.003	0.003	0.005	0.000	0.000	0.000	0.000	0.001
Na	0.007	0.003	0.005	0.002	0.002	0.000	0.002	0.002	0.006	0.000	0.000	0.010	0.000	0.008	0.009	0.008	0.012	0.007	0.003	0.004	0.006	0.004	0.002	0.009
K	0.002	0.005	0.004	0.005	0.003	0.004	0.004	0.007	0.008	0.009	0.004	0.002	0.003	0.003	0.005	0.004	0.007	0.006	0.005	0.005	0.005	0.004	0.004	0.005
Cr	0.000	0.000	0.001	0.000	0.001	0.001	0.001	0.000	0.003	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001
Total	9.985	9.990	10.001	9.977	9.983	9.980	9.988	9.971	9.989	9.989	9.982	9.985	9.979	10.005	10.001	9.974	9.990	10.004	9.989	10.013	10.002	10.000	9.987	10.003
Total Fe as FeO																								

Table A3 **Chemical compositions of chlorites**

Rock type	**Pelitic schist**																							
Sample No.	**KG1252B**																					**KG1244**		
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	1	2	3
																						Grt fra	Grt fra	Grt fra
Weight %																								
SiO_2	27.41	27.37	27.43	27.27	27.21	27.31	27.05	27.10	26.86	26.61	26.50	26.60	26.63	26.09	26.10	27.06	27.20	27.53	26.99	27.13	27.13	22.77	25.34	23.07
TiO_2	0.05	0.01	0.06	0.02	0.04	0.05	0.06	0.03	0.04	0.03	0.08	0.03	0.06	0.01	0.04	0.06	0.07	0.14	0.04	0.04	0.06	0.01	0.03	0.00
Al_2O_3	21.64	21.68	21.54	21.49	21.41	21.15	21.40	21.60	21.57	21.87	22.32	21.86	22.12	22.05	21.99	21.62	21.23	20.80	21.46	21.41	21.47	21.72	19.36	21.73
FeO	16.47	17.17	16.55	16.58	16.64	16.79	16.79	16.86	16.61	16.69	17.27	16.30	17.47	16.79	17.45	17.07	17.15	16.96	17.33	17.32	17.38	37.56	36.42	37.51
MnO	0.12	0.11	0.12	0.12	0.09	0.13	0.13	0.09	0.09	0.14	0.14	0.12	0.10	0.10	0.09	0.10	0.08	0.12	0.14	0.15	0.09	0.10	0.09	0.13
MgO	21.16	21.13	21.36	21.13	21.26	21.31	20.99	21.08	20.97	20.95	20.39	20.35	20.53	21.12	21.22	20.97	21.07	21.31	20.89	20.90	20.76	3.30	5.12	3.62
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.03	0.03	0.03	0.02	0.00	0.06	0.12	0.06
Na_2O	0.01	0.00	0.03	0.01	0.00	0.01	0.01	0.02	0.02	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.01	0.03	0.02	0.00	0.00	0.01	0.02	0.01
K_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.01	0.06	0.10	0.06
Cr_2O_3	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.03	0.01	0.00	0.00	0.02	0.01	0.02	0.00	0.00	0.08	0.00	0.00
Total	86.87	86.47	86.11	86.62	86.66	86.75	86.43	86.79	86.16	86.29	86.73	85.27	86.94	86.19	86.88	86.88	86.85	86.93	86.93	86.97	86.91	85.68	86.60	86.18
Cation O=14																								
Si	2.768	2.756	2.766	2.766	2.760	2.770	2.755	2.748	2.741	2.715	2.697	2.739	2.706	2.669	2.659	2.745	2.762	2.789	2.742	2.753	2.755	2.644	2.876	2.657
Ti	0.004	0.001	0.004	0.002	0.003	0.004	0.005	0.003	0.003	0.003	0.006	0.002	0.005	0.001	0.003	0.004	0.005	0.010	0.003	0.003	0.005	0.001	0.002	0.000
Al	2.577	2.573	2.559	2.569	2.560	2.529	2.569	2.582	2.595	2.629	2.676	2.653	2.649	2.660	2.640	2.584	2.540	2.485	2.569	2.560	2.569	2.972	2.591	2.950
Fe	1.391	1.446	1.396	1.406	1.412	1.424	1.430	1.430	1.418	1.424	1.470	1.404	1.485	1.437	1.487	1.448	1.456	1.437	1.472	1.470	1.476	3.647	3.458	3.613
Mn	0.010	0.010	0.010	0.010	0.008	0.011	0.011	0.007	0.008	0.012	0.012	0.011	0.008	0.009	0.008	0.009	0.007	0.010	0.012	0.013	0.008	0.010	0.009	0.012
Mg	3.187	3.171	3.211	3.195	3.214	3.222	3.186	3.187	3.192	3.186	3.094	3.123	3.109	3.221	3.222	3.171	3.188	3.218	3.163	3.162	3.143	0.572	0.867	0.622
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.003	0.003	0.003	0.002	0.000	0.008	0.014	0.007
Na	0.003	0.000	0.005	0.001	0.000	0.003	0.001	0.004	0.003	0.000	0.003	0.002	0.000	0.002	0.000	0.000	0.001	0.005	0.004	0.000	0.000	0.003	0.004	0.001
K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.001	0.009	0.015	0.009
Cr	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.000	0.000	0.007	0.000
Total	9.941	9.957	9.952	9.949	9.957	9.963	9.957	9.960	9.960	9.969	9.960	9.934	9.964	10.000	10.018	9.959	9.963	9.961	9.972	9.965	9.957	9.872	9.836	9.873
Total Fe as FeO																								

Rock type	**Garnet and chloritoid-bearing pelitic schist**																								
Sample No.	**KG1244**																								
Analysis No.	4	1	2	3	4	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	core	rim	rim	rim	rim	core	core	core	core	core	core	core	core	core	core	core	core	core	rim
Weight %																								
SiO_2	22.91	23.31	24.44	24.32	23.60	23.86	23.92	24.03	23.39	23.43	25.53	25.67	25.33	25.76	25.60	25.28	22.87	23.83	23.20	23.33	23.50	22.95	23.96	23.79
TiO_2	0.02	0.00	0.02	0.04	0.00	0.08	0.03	0.05	0.05	0.05	0.07	0.07	0.10	0.04	0.07	0.08	0.06	0.10	0.08	0.06	0.37	0.41	0.09	0.04
Al_2O_3	20.70	21.43	21.17	19.28	21.29	22.31	21.25	21.80	22.30	21.52	19.65	19.71	20.08	20.15	19.87	19.96	22.03	21.74	21.35	21.57	21.49	20.33	22.16	22.32
FeO	39.56	38.14	36.54	37.52	37.49	29.21	29.31	29.94	30.77	30.11	27.30	27.05	27.24	27.23	27.44	27.73	29.73	28.45	28.46	28.57	29.91	33.99	29.65	30.14
MnO	0.13	0.08	0.12	0.11	0.05	0.17	0.24	0.12	0.19	0.19	0.14	0.11	0.14	0.15	0.24	0.18	0.09	0.15	0.18	0.16	0.06	0.09	0.13	0.18
MgO	3.39	3.63	4.40	3.74	3.90	11.28	9.58	10.69	10.05	10.36	13.16	13.60	13.53	13.16	13.31	12.79	11.04	11.75	11.88	11.03	10.76	6.71	11.55	10.04
CaO	0.17	0.21	0.08	0.17	0.03	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.01
Na_2O	0.01	0.01	0.00	0.04	0.01	0.00	0.05	0.03	0.00	0.04	0.03	0.00	0.06	0.01	0.04	0.00	0.04	0.03	0.00	0.00	0.00	0.04	0.03	0.02
K_2O	0.04	0.08	0.13	0.14	0.08	0.03	0.38	0.13	0.05	0.03	0.09	0.07	0.08	0.09	0.07	0.06	0.05	0.06	0.07	0.04	0.04	0.14	0.06	0.21
Cr_2O_3	0.00	0.04	0.01	0.01	0.00	0.04	0.01	0.02	0.01	0.03	0.02	0.00	0.05	0.00	0.01	0.01	0.00	0.02	0.02	0.00	0.00	0.03	0.01	0.01
Total	86.92	86.93	86.90	85.36	86.46	86.98	84.92	86.82	86.82	85.75	85.99	86.27	86.60	86.63	86.65	86.09	85.92	86.11	85.24	84.74	86.14	84.75	87.64	86.75
Cation O=14																								
Si	2.653	2.670	2.765	2.834	2.705	2.594	2.681	2.631	2.574	2.607	2.780	2.779	2.738	2.778	2.767	2.755	2.536	2.611	2.578	2.605	2.597	2.651	2.592	2.610
Ti	0.001	0.000	0.001	0.003	0.000	0.006	0.003	0.004	0.004	0.004	0.006	0.006	0.008	0.003	0.006	0.007	0.005	0.008	0.007	0.005	0.031	0.035	0.007	0.004
Al	2.825	2.893	2.824	2.648	2.876	2.860	2.807	2.812	2.893	2.822	2.521	2.514	2.558	2.561	2.532	2.565	2.879	2.808	2.796	2.839	2.799	2.769	2.825	2.886
Fe	3.831	3.654	3.457	3.657	3.593	2.657	2.747	2.741	2.832	2.801	2.486	2.449	2.462	2.456	2.480	2.528	2.757	2.608	2.644	2.668	2.764	3.284	2.682	2.765
Mn	0.013	0.008	0.011	0.011	0.005	0.016	0.023	0.011	0.017	0.018	0.013	0.010	0.012	0.013	0.022	0.017	0.009	0.014	0.017	0.016	0.005	0.009	0.012	0.017
Mg	0.584	0.620	0.742	0.650	0.667	1.828	1.601	1.745	1.650	1.717	2.136	2.195	2.180	2.115	2.144	2.079	1.826	1.919	1.968	1.836	1.773	1.156	1.862	1.642
Ca	0.021	0.025	0.009	0.021	0.003	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.001
Na	0.003	0.003	0.000	0.009	0.002	0.000	0.010	0.005	0.000	0.008	0.006	0.000	0.012	0.002	0.008	0.000	0.009	0.006	0.000	0.000	0.000	0.008	0.007	0.005
K	0.006	0.012	0.018	0.021	0.012	0.004	0.055	0.018	0.007	0.005	0.012	0.010	0.011	0.013	0.009	0.008	0.007	0.008	0.010	0.005	0.006	0.021	0.008	0.029
Cr	0.000	0.004	0.001	0.001	0.000	0.004	0.001	0.002	0.001	0.003	0.001	0.000	0.004	0.000	0.001	0.000	0.000	0.001	0.002	0.000	0.000	0.002	0.001	0.001
Total	9.938	9.889	9.830	9.854	9.864	9.970	9.945	9.970	9.978	9.983	9.962	9.963	9.985	9.946	9.969	9.959	10.028	9.983	10.022	9.973	9.976	9.943	9.996	9.960
Total Fe as FeO																								

Table A3 **Chemical compositions of chlorites**

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	15	16	17	18	19	20	21	22	23	24	25	26	1	2	3	4	5	6	7	8	9	10	11	12
	rim	rim	rim	rim	rim	rim	rim	rim	core	core	core	core	rim	rim	rim	rim	rim	core	core	core	core	core	core	core
Weight %																								
SiO_2	24.09	23.66	23.86	23.44	23.65	23.97	23.34	22.84	26.71	25.83	25.72	25.54	22.46	23.18	23.26	23.30	23.23	23.45	23.29	23.48	23.67	23.11	23.34	23.77
TiO_2	0.08	0.07	0.05	0.05	0.07	0.06	0.09	0.03	0.08	0.06	0.09	0.04	0.08	0.09	0.06	0.08	0.10	0.09	0.02	0.04	0.06	0.09	0.07	0.05
Al_2O_3	21.57	21.95	21.84	21.71	21.54	21.69	21.63	22.37	21.60	19.90	19.59	19.97	21.53	21.69	21.74	21.46	21.58	21.64	21.80	22.02	21.96	21.77	21.63	21.96
FeO	30.70	30.25	30.77	30.01	29.47	29.78	29.25	30.63	26.51	27.29	27.42	27.26	31.27	29.39	30.07	30.34	30.50	28.92	29.36	28.75	28.83	28.74	29.23	29.37
MnO	0.08	0.12	0.08	0.16	0.19	0.17	0.08	0.11	0.11	0.07	0.06	0.13	0.19	0.07	0.22	0.12	0.12	0.13	0.14	0.16	0.02	0.12	0.13	0.15
MgO	10.30	11.28	10.76	11.09	10.97	11.69	11.53	9.98	12.14	13.23	13.65	13.56	10.14	11.31	11.00	10.64	10.94	11.46	11.67	11.76	11.69	11.63	11.31	11.54
CaO	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.03	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.01	0.00	0.02	0.00	0.02	0.05	0.03	0.00	0.03	0.03	0.01	0.01	0.06	0.02	0.02	0.02
K_2O	0.08	0.06	0.05	0.04	0.06	0.04	0.06	0.07	0.05	0.14	0.13	0.09	0.06	0.05	0.05	0.02	0.07	0.05	0.05	0.05	0.03	0.04	0.08	0.04
Cr_2O_3	0.00	0.00	0.03	0.01	0.03	0.00	0.04	0.01	0.04	0.00	0.00	0.02	0.00	0.02	0.02	0.01	0.00	0.01	0.00	0.00	0.01	0.03	0.01	0.00
Total	86.94	86.40	86.44	86.52	85.99	86.43	86.02	86.03	86.23	86.52	86.67	86.61	85.77	85.85	86.45	85.95	86.56	85.78	86.33	86.26	86.31	85.54	85.81	86.89
Cation O=14																								
Si	2.642	2.578	2.603	2.581	2.613	2.603	2.576	2.540	2.829	2.790	2.778	2.758	2.523	2.566	2.567	2.589	2.566	2.591	2.562	2.574	2.591	2.560	2.583	2.592
Ti	0.007	0.006	0.004	0.004	0.005	0.005	0.008	0.003	0.006	0.005	0.007	0.003	0.007	0.007	0.005	0.006	0.008	0.007	0.001	0.003	0.005	0.007	0.006	0.004
Al	2.789	2.819	2.808	2.817	2.804	2.777	2.813	2.931	2.696	2.533	2.493	2.541	2.851	2.831	2.827	2.810	2.809	2.817	2.827	2.846	2.833	2.842	2.820	2.823
Fe	2.817	2.757	2.807	2.763	2.722	2.705	2.699	2.848	2.349	2.465	2.476	2.462	2.938	2.721	2.775	2.819	2.818	2.671	2.702	2.636	2.639	2.662	2.705	2.679
Mn	0.007	0.011	0.008	0.015	0.017	0.016	0.008	0.010	0.010	0.006	0.005	0.012	0.018	0.007	0.020	0.011	0.011	0.012	0.013	0.015	0.002	0.011	0.012	0.014
Mg	1.684	1.832	1.751	1.820	1.807	1.893	1.896	1.654	1.917	2.130	2.198	2.183	1.698	1.867	1.809	1.762	1.802	1.887	1.914	1.921	1.907	1.920	1.866	1.876
Ca	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.006	0.002	0.000	0.000	0.003	0.004	0.000	0.000	0.003	0.000	0.003	0.000	0.004	0.010	0.007	0.000	0.006	0.006	0.001	0.002	0.012	0.005	0.005	0.003
K	0.011	0.008	0.008	0.006	0.009	0.006	0.008	0.010	0.007	0.019	0.017	0.012	0.009	0.007	0.007	0.003	0.010	0.007	0.007	0.007	0.005	0.006	0.011	0.006
Cr	0.000	0.000	0.002	0.001	0.003	0.000	0.003	0.001	0.003	0.000	0.000	0.002	0.000	0.002	0.002	0.001	0.000	0.001	0.000	0.000	0.000	0.002	0.001	0.000
Total	9.966	10.012	9.991	10.008	9.984	10.009	10.012	9.997	9.820	9.948	9.979	9.974	10.050	10.019	10.021	10.001	10.029	9.999	10.027	10.004	9.995	10.016	10.009	9.997

Total Fe as FeO

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	13	14	15	16	17	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	1	2	3	4
	rim	rim	rim	rim	rim	rim	core	core	core	core	core	core	core	rim	core	core	core	core	rim	rim	rim	core	core	core
Weight %																								
SiO_2	23.78	23.70	23.66	23.38	23.47	22.17	22.44	22.47	22.91	23.10	22.67	22.73	22.56	22.74	23.09	23.14	22.64	22.35	22.43	22.32	23.15	23.28	23.23	23.20
TiO_2	0.03	0.05	0.09	0.03	0.06	0.05	0.06	0.08	0.07	0.09	0.06	0.05	0.07	0.07	0.04	0.07	0.06	0.04	0.07	0.03	0.09	0.06	0.05	0.10
Al_2O_3	21.48	21.90	22.05	21.95	21.95	21.87	21.85	21.75	21.70	21.37	21.85	22.09	21.71	22.02	22.04	21.73	21.69	21.80	21.73	21.87	21.46	21.94	21.86	21.76
FeO	30.01	29.55	29.67	28.83	29.72	31.09	30.00	28.48	29.13	28.83	29.92	29.32	28.57	30.85	29.51	28.62	28.81	29.79	30.83	30.65	29.82	29.44	29.08	29.03
MnO	0.17	0.12	0.05	0.05	0.14	0.08	0.24	0.13	0.06	0.17	0.11	0.19	0.13	0.14	0.22	0.13	0.07	0.17	0.10	0.17	0.11	0.13	0.09	0.09
MgO	11.38	10.92	11.29	11.40	11.29	10.19	10.70	11.15	11.48	11.72	10.90	11.24	10.92	10.09	11.01	11.62	10.98	10.82	9.88	10.02	10.57	10.94	11.31	11.45
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.03	0.04	0.03	0.04	0.00	0.04	0.02	0.02	0.04	0.03	0.01	0.02	0.01	0.04	0.03	0.00	0.02	0.04	0.05	0.05	0.02	0.02	0.03	0.01
K_2O	0.03	0.07	0.04	0.06	0.05	0.05	0.06	0.06	0.05	0.04	0.07	0.03	0.04	0.05	0.04	0.04	0.05	0.05	0.04	0.04	0.07	0.04	0.04	0.06
Cr_2O_3	0.00	0.00	0.06	0.01	0.00	0.00	0.00	0.03	0.02	0.02	0.02	0.05	0.03	0.01	0.03	0.03	0.01	0.05	0.03	0.00	0.01	0.02	0.05	0.01
Total	86.91	86.34	86.94	85.76	86.67	85.55	85.37	84.16	85.45	85.35	85.60	85.70	84.21	85.99	86.02	85.38	84.33	85.10	85.15	85.15	85.30	85.87	85.74	85.72
Cation O=14																								
Si	2.604	2.605	2.583	2.580	2.573	2.495	2.515	2.534	2.548	2.568	2.529	2.523	2.544	2.536	2.554	2.566	2.550	2.511	2.531	2.517	2.588	2.575	2.570	2.567
Ti	0.003	0.004	0.007	0.003	0.005	0.004	0.005	0.007	0.006	0.007	0.005	0.004	0.006	0.006	0.003	0.006	0.005	0.003	0.006	0.003	0.007	0.005	0.004	0.009
Al	2.773	2.837	2.837	2.855	2.837	2.901	2.887	2.890	2.843	2.801	2.873	2.890	2.885	2.895	2.873	2.841	2.879	2.887	2.889	2.906	2.827	2.861	2.851	2.838
Fe	2.749	2.716	2.708	2.661	2.726	2.926	2.813	2.686	2.708	2.681	2.792	2.722	2.694	2.877	2.730	2.655	2.714	2.799	2.910	2.891	2.788	2.724	2.690	2.687
Mn	0.015	0.011	0.005	0.005	0.013	0.007	0.023	0.012	0.005	0.016	0.011	0.018	0.012	0.013	0.021	0.012	0.007	0.016	0.009	0.017	0.010	0.013	0.008	0.009
Mg	1.857	1.790	1.838	1.876	1.846	1.710	1.788	1.875	1.904	1.942	1.813	1.861	1.835	1.678	1.816	1.922	1.843	1.813	1.662	1.685	1.761	1.805	1.865	1.890
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.006	0.008	0.006	0.009	0.000	0.010	0.003	0.005	0.009	0.006	0.002	0.003	0.002	0.008	0.006	0.000	0.003	0.008	0.010	0.011	0.003	0.005	0.007	0.002
K	0.004	0.009	0.006	0.009	0.007	0.008	0.009	0.008	0.006	0.006	0.010	0.004	0.006	0.006	0.006	0.005	0.007	0.008	0.006	0.005	0.010	0.006	0.005	0.008
Cr	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.002	0.002	0.001	0.001	0.004	0.003	0.000	0.002	0.003	0.001	0.004	0.002	0.000	0.001	0.002	0.004	0.001
Total	10.012	9.981	9.995	9.998	10.007	10.060	10.043	10.019	10.031	10.029	10.035	10.030	10.010	10.018	10.011	10.009	10.010	10.048	10.026	10.035	9.997	9.994	10.004	10.011

Total Fe as FeO

Table A3 **Chemical compositions of chlorites**

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
	core	rim	core	core	core	rim	core	core	rim	core	core	core	core	core	rim	rim	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra
Weight %																								
SiO_2	23.18	22.83	23.02	23.00	22.87	23.00	22.90	23.09	22.91	23.27	23.40	23.32	23.14	22.93	22.50	22.78	22.63	22.52	23.03	22.69	21.94	23.27	22.60	22.73
TiO_2	0.10	0.07	0.04	0.07	0.06	0.08	0.07	0.07	0.11	0.10	0.08	0.09	0.04	0.06	0.06	0.06	0.02	0.00	0.00	0.00	0.00	0.03	0.05	0.05
Al_2O_3	21.56	21.57	21.45	21.71	21.70	21.67	21.90	22.14	22.01	21.46	21.44	21.73	21.95	21.57	22.03	21.58	20.92	21.63	20.76	21.53	21.02	21.75	21.83	22.26
FeO	29.11	29.76	28.69	28.69	28.96	30.13	29.06	29.62	29.34	29.70	29.82	28.94	29.14	29.37	31.06	30.09	39.52	39.23	38.62	38.66	37.76	32.41	33.24	32.81
MnO	0.17	0.06	0.07	0.15	0.22	0.09	0.11	0.16	0.09	0.14	0.09	0.08	0.09	0.15	0.16	0.03	0.14	0.08	0.07	0.10	0.08	0.12	0.23	0.15
MgO	11.17	10.15	11.45	11.42	11.38	10.28	10.76	10.81	10.91	10.99	10.82	11.31	11.69	11.09	9.94	10.39	3.40	3.25	3.75	3.33	3.48	9.03	7.88	7.99
CaO	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.02
Na_2O	0.03	0.06	0.03	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.03	0.02	0.07	0.05	0.04	0.00	0.08	0.03	0.08	0.05	0.07	0.02	0.04	0.02
K_2O	0.05	0.05	0.05	0.05	0.05	0.06	0.03	0.04	0.04	0.07	0.05	0.06	0.06	0.04	0.06	0.04	0.07	0.04	0.08	0.11	0.05	0.05	0.06	0.05
Cr_2O_3	0.01	0.00	0.00	0.00	0.03	0.02	0.00	0.01	0.02	0.00	0.01	0.00	0.02	0.00	0.01	0.04	0.00	0.02	0.02	0.04	0.02	0.01	0.03	0.03
Total	85.38	84.55	84.79	85.10	85.28	85.34	84.82	85.94	85.43	85.72	85.73	85.54	86.19	85.26	85.85	85.07	86.80	86.80	86.41	86.50	84.40	86.68	85.96	86.13
Cation O=14																								
Si	2.579	2.576	2.574	2.562	2.548	2.574	2.564	2.556	2.549	2.586	2.600	2.583	2.548	2.560	2.519	2.559	2.626	2.604	2.668	2.625	2.603	2.591	2.558	2.557
Ti	0.008	0.006	0.003	0.006	0.005	0.007	0.006	0.006	0.009	0.008	0.007	0.007	0.003	0.005	0.005	0.005	0.002	0.000	0.000	0.000	0.000	0.003	0.005	0.004
Al	2.826	2.869	2.827	2.851	2.850	2.858	2.889	2.888	2.887	2.810	2.807	2.837	2.848	2.839	2.907	2.857	2.861	2.947	2.834	2.936	2.940	2.853	2.911	2.951
Fe	2.708	2.809	2.683	2.672	2.698	2.820	2.720	2.742	2.730	2.760	2.770	2.681	2.684	2.743	2.908	2.827	3.835	3.793	3.741	3.741	3.747	3.017	3.145	3.086
Mn	0.016	0.006	0.006	0.014	0.021	0.008	0.010	0.015	0.009	0.014	0.008	0.008	0.008	0.014	0.015	0.002	0.014	0.008	0.007	0.009	0.008	0.011	0.022	0.015
Mg	1.853	1.707	1.909	1.896	1.891	1.715	1.795	1.784	1.809	1.820	1.792	1.868	1.920	1.846	1.658	1.741	0.588	0.561	0.647	0.575	0.615	1.498	1.330	1.339
Ca	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.003	0.001	0.000	0.001	0.000	0.000	0.000	0.003
Na	0.006	0.013	0.007	0.000	0.003	0.002	0.000	0.001	0.000	0.000	0.006	0.005	0.015	0.011	0.008	0.001	0.017	0.006	0.018	0.011	0.015	0.004	0.009	0.005
K	0.007	0.008	0.007	0.006	0.007	0.008	0.004	0.006	0.005	0.009	0.007	0.009	0.008	0.006	0.008	0.006	0.010	0.006	0.012	0.017	0.007	0.007	0.009	0.008
Cr	0.001	0.000	0.000	0.000	0.002	0.002	0.000	0.001	0.002	0.000	0.000	0.000	0.001	0.000	0.001	0.004	0.000	0.002	0.001	0.004	0.001	0.001	0.002	0.003
Total	10.005	9.993	10.016	10.010	10.026	9.995	9.988	9.997	10.000	10.006	9.996	9.998	10.035	10.023	10.030	10.009	9.955	9.928	9.930	9.919	9.937	9.985	9.990	9.969
Total Fe as FeO																								

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4
	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra	Grt fra
Weight %																								
SiO_2	22.33	23.08	22.74	22.60	22.25	22.30	21.83	22.31	21.90	22.43	22.06	21.83	22.56	22.67	22.48	22.17	22.21	22.88	24.52	25.66	23.14	23.05	22.79	23.29
TiO_2	0.05	0.04	0.03	0.06	0.07	0.03	0.03	0.05	0.04	0.05	0.06	0.00	0.02	0.07	0.04	0.00	0.00	0.01	0.03	0.07	0.06	0.06	0.02	0.24
Al_2O_3	21.27	20.60	20.78	21.62	21.42	21.54	21.39	21.53	21.35	20.29	21.77	21.71	21.44	21.17	21.95	20.91	21.14	20.96	20.78	21.18	20.77	20.35	20.49	19.79
FeO	31.82	32.81	33.38	31.90	32.93	31.84	33.02	31.48	33.64	31.84	32.17	31.89	33.09	32.70	32.10	39.00	38.52	38.61	34.74	34.42	34.27	34.35	34.17	33.40
MnO	0.20	0.21	0.12	0.22	0.19	0.16	0.13	0.17	0.09	0.21	0.11	0.13	0.11	0.14	0.14	0.12	0.08	0.02	0.00	0.13	0.31	0.31	0.32	0.28
MgO	8.30	7.58	8.21	9.13	8.36	8.94	7.73	8.85	7.51	9.16	7.98	8.43	7.98	8.22	8.31	3.56	3.32	3.49	4.27	3.84	7.22	7.60	8.09	7.26
CaO	0.03	0.04	0.01	0.02	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.02	0.01	0.03	0.01	0.03	0.02	0.17	0.05	0.18	0.02	0.01	0.00	0.03
Na_2O	0.05	0.07	0.00	0.06	0.05	0.04	0.06	0.00	0.01	0.03	0.04	0.04	0.06	0.11	0.05	0.05	0.05	0.00	0.06	0.09	0.02	0.02	0.01	0.02
K_2O	0.06	0.10	0.06	0.04	0.05	0.05	0.05	0.07	0.07	0.04	0.08	0.04	0.07	0.11	0.11	0.09	0.10	0.06	0.65	0.62	0.10	0.06	0.06	0.40
Cr_2O_3	0.01	0.00	0.00	0.02	0.04	0.03	0.05	0.01	0.01	0.01	0.00	0.00	0.00	0.03	0.01	0.04	0.04	0.01	0.00	0.01	0.05	0.00	0.00	0.00
Total	84.12	84.54	85.33	85.66	85.36	84.93	84.30	84.48	84.61	84.07	84.26	84.09	85.34	85.24	85.18	85.97	85.47	86.20	85.09	86.18	85.96	85.80	85.95	84.70
Cation O=14																								
Si	2.571	2.654	2.598	2.549	2.538	2.540	2.527	2.550	2.533	2.588	2.539	2.516	2.572	2.585	2.553	2.597	2.609	2.657	2.819	2.893	2.636	2.633	2.598	2.689
Ti	0.004	0.003	0.003	0.005	0.006	0.003	0.002	0.004	0.004	0.004	0.005	0.000	0.002	0.006	0.003	0.000	0.000	0.001	0.003	0.006	0.005	0.005	0.002	0.021
Al	2.886	2.792	2.797	2.874	2.879	2.892	2.919	2.900	2.909	2.759	2.953	2.949	2.880	2.843	2.937	2.887	2.926	2.868	2.816	2.815	2.788	2.740	2.754	2.694
Fe	3.063	3.155	3.189	3.010	3.140	3.033	3.197	3.009	3.253	3.072	3.096	3.074	3.154	3.117	3.048	3.821	3.784	3.750	3.341	3.245	3.264	3.282	3.258	3.225
Mn	0.020	0.021	0.012	0.021	0.018	0.016	0.013	0.016	0.009	0.020	0.010	0.012	0.011	0.014	0.013	0.012	0.008	0.002	0.000	0.012	0.029	0.030	0.031	0.028
Mg	1.425	1.300	1.397	1.536	1.421	1.518	1.335	1.508	1.294	1.576	1.368	1.448	1.357	1.397	1.406	0.622	0.581	0.603	0.732	0.646	1.226	1.294	1.375	1.250
Ca	0.003	0.005	0.001	0.002	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.002	0.001	0.003	0.001	0.003	0.003	0.021	0.006	0.022	0.002	0.001	0.000	0.003
Na	0.012	0.015	0.000	0.013	0.011	0.008	0.012	0.000	0.002	0.006	0.008	0.008	0.013	0.024	0.011	0.011	0.011	0.000	0.013	0.019	0.005	0.005	0.001	0.004
K	0.009	0.014	0.008	0.005	0.007	0.007	0.008	0.010	0.010	0.006	0.011	0.006	0.010	0.016	0.016	0.014	0.015	0.009	0.095	0.088	0.014	0.008	0.009	0.058
Cr	0.000	0.000	0.000	0.001	0.004	0.002	0.004	0.001	0.001	0.001	0.000	0.000	0.000	0.003	0.001	0.004	0.003	0.001	0.000	0.001	0.004	0.000	0.000	0.000
Total	9.992	9.961	10.005	10.017	10.023	10.018	10.019	10.000	10.014	10.034	9.989	10.017	9.999	10.006	9.988	9.970	9.939	9.912	9.824	9.747	9.973	9.998	10.028	9.974
Total Fe as FeO																								

Table A3 **Chemical compositions of chlorites**

Rock type	**Garnet amphibolite**																								
Sample No.	**KG1252A**																								
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11	12	13	
	rim	rim	rim	rim	core	core	core	core	core	core	core	rim	rim	rim	rim	rim	core	core	core	core	core	core	core	core	
Weight %																									
SiO_2	25.05	24.96	25.09	24.98	24.32	24.71	24.56	24.34	24.39	24.43	24.75	23.19	23.36	23.85	23.29	23.13	23.34	23.98	23.29	24.56	24.59	24.68	24.64	24.58	
TiO_2	0.05	0.05	0.08	0.03	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.03	0.03	0.08	0.07	0.09	0.06	0.06	0.03	0.08	0.03	0.09	0.11	0.04	
Al_2O_3	20.57	20.42	20.03	20.32	20.89	20.61	20.81	20.59	20.73	20.56	20.69	20.30	20.30	20.48	20.63	20.66	20.20	20.58	20.89	20.55	20.50	20.45	20.31	20.14	
FeO	26.14	26.36	26.24	26.32	25.24	25.24	25.49	24.91	24.38	25.22	24.62	26.60	27.31	26.76	26.78	27.19	25.70	26.08	25.90	24.15	24.10	24.31	24.14	24.00	
MnO	0.07	0.15	0.04	0.25	0.06	0.08	0.02	0.08	0.04	0.14	0.08	0.09	0.11	0.07	0.09	0.15	0.06	0.07	0.08	0.03	0.12	0.08	0.00	0.12	
MgO	14.81	14.43	14.49	13.72	14.47	14.71	14.81	14.68	14.63	14.71	14.79	14.52	13.47	14.45	13.93	13.96	14.79	15.00	14.62	16.06	16.48	16.33	16.72	16.85	
CaO	0.01	0.05	0.01	0.23	0.11	0.11	0.21	0.16	0.02	0.00	0.07	0.03	0.02	0.04	0.01	0.00	0.01	0.02	0.07	0.00	0.00	0.00	0.00	0.00	
Na_2O	0.01	0.00	0.03	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.03	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.04	0.01	0.01	0.01	
K_2O	0.04	0.03	0.04	0.05	0.03	0.04	0.05	0.03	0.03	0.03	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.04	0.05	0.01	0.02	0.03	0.04	0.03	
Cr_2O_3	0.02	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.05	0.00	0.02	0.01	0.00	0.04	0.00	0.00	0.04	0.01	0.01	0.00	
Total	86.76	86.45	86.06	85.89	85.17	85.56	86.00	84.85	84.28	85.15	85.10	84.83	84.68	85.78	84.85	85.22	84.21	85.88	84.94	85.45	85.90	85.98	85.97	85.76	
Cation O=14																									
Si	2.685	2.691	2.715	2.714	2.649	2.678	2.652	2.659	2.672	2.663	2.687	2.569	2.600	2.607	2.578	2.557	2.591	2.607	2.563	2.650	2.641	2.650	2.643	2.645	
Ti	0.004	0.004	0.007	0.002	0.004	0.003	0.003	0.004	0.004	0.004	0.003	0.003	0.003	0.006	0.006	0.007	0.005	0.005	0.003	0.007	0.002	0.007	0.009	0.003	
Al	2.599	2.595	2.555	2.601	2.682	2.632	2.649	2.652	2.677	2.641	2.647	2.651	2.663	2.639	2.692	2.692	2.643	2.637	2.710	2.613	2.595	2.587	2.568	2.553	
Fe	2.343	2.377	2.375	2.391	2.300	2.288	2.302	2.276	2.234	2.299	2.236	2.465	2.542	2.446	2.480	2.514	2.386	2.371	2.384	2.180	2.164	2.182	2.166	2.159	
Mn	0.006	0.014	0.004	0.023	0.005	0.008	0.002	0.008	0.004	0.013	0.007	0.009	0.010	0.007	0.008	0.014	0.006	0.007	0.007	0.003	0.011	0.007	0.000	0.011	
Mg	2.367	2.319	2.338	2.222	2.349	2.377	2.385	2.391	2.390	2.390	2.394	2.398	2.236	2.355	2.299	2.301	2.447	2.432	2.400	2.583	2.638	2.613	2.673	2.702	
Ca	0.001	0.006	0.001	0.026	0.012	0.012	0.024	0.019	0.002	0.000	0.008	0.003	0.002	0.005	0.001	0.000	0.002	0.002	0.008	0.000	0.000	0.000	0.000	0.000	
Na	0.003	0.000	0.007	0.002	0.003	0.000	0.000	0.002	0.000	0.000	0.003	0.005	0.002	0.002	0.000	0.001	0.002	0.002	0.001	0.000	0.007	0.001	0.002	0.003	
K	0.006	0.004	0.006	0.006	0.003	0.005	0.006	0.003	0.004	0.005	0.007	0.006	0.005	0.005	0.005	0.004	0.004	0.006	0.007	0.002	0.003	0.004	0.006	0.004	
Cr	0.001	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.001	0.001	0.000	0.000	0.004	0.000	0.002	0.001	0.000	0.003	0.000	0.000	0.003	0.001	0.001	0.000	
Total	10.016	10.010	10.007	9.988	10.009	10.005	10.023	10.014	9.988	10.015	9.991	10.108	10.067	10.071	10.071	10.092	10.086	10.072	10.083	10.037	10.064	10.052	10.067	10.079	

Total Fe as FeO

Rock type	**Garnet amphibolite**																								
Sample No.	**KG1252A**																								
Analysis No.	14	15	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	1	2	3	4	5	
	core	core	rim	rim	core	core	core	core	core	core	core	core	core	rim	rim	rim	rim	rim	rim	rim	rim	rim	rim	rim	
Weight %																									
SiO_2	24.23	24.10	22.76	22.63	23.42	23.95	22.46	23.10	23.23	23.01	22.66	25.13	25.05	24.53	25.34	25.38	25.90	25.61	25.61	24.67	24.73	24.64	24.72	25.42	
TiO_2	0.06	0.07	0.10	0.06	0.08	0.05	0.07	0.11	0.06	0.03	0.04	0.06	0.09	0.04	0.03	0.03	0.10	0.10	0.03	0.09	0.08	0.05	0.06	0.07	
Al_2O_3	20.54	20.36	20.61	19.55	20.04	20.21	19.89	20.04	20.06	20.23	20.65	20.35	20.59	21.02	19.94	20.78	19.74	18.86	20.09	20.39	20.74	20.70	20.67	19.00	
FeO	24.63	24.38	25.43	25.88	25.96	25.66	25.48	26.69	25.58	26.23	25.20	24.67	25.47	26.83	28.73	27.24	26.93	27.88	27.31	26.65	26.83	26.88	27.77	28.43	
MnO	0.05	0.17	0.12	0.13	0.05	0.07	0.14	0.12	0.10	0.03	0.13	0.10	0.18	0.24	0.08	0.20	0.08	0.13	0.11	0.09	0.12	0.13	0.16	0.17	
MgO	16.48	16.50	15.33	15.31	15.55	15.31	14.78	15.66	14.80	15.48	15.81	16.00	15.12	14.07	11.78	11.91	11.12	10.90	12.27	14.02	13.95	13.70	12.97	12.08	
CaO	0.00	0.00	0.00	0.02	0.00	0.02	0.05	0.01	0.01	0.02	0.00	0.03	0.00	0.00	0.20	0.19	0.32	0.28	0.29	0.00	0.00	0.02	0.00	0.22	
Na_2O	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.04	0.04	0.08	0.08	0.08	0.00	0.00	0.02	0.03	0.03	
K_2O	0.03	0.02	0.04	0.03	0.04	0.05	0.05	0.03	0.05	0.06	0.02	0.03	0.06	0.02	0.12	0.12	0.45	0.72	0.18	0.01	0.02	0.01	0.01	0.04	
Cr_2O_3	0.00	0.01	0.01	0.04	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.01	0.04	0.02	0.00	0.01	
Total	86.01	85.62	84.40	83.65	85.15	85.35	82.94	85.78	83.93	85.10	84.52	86.38	86.58	86.77	86.25	85.91	84.71	84.58	85.98	85.93	86.50	86.17	86.38	85.47	
Cation O=14																									
Si	2.608	2.606	2.522	2.543	2.574	2.617	2.541	2.534	2.589	2.538	2.505	2.687	2.684	2.643	2.772	2.76	2.86	2.86	2.79	2.68	2.67	2.67	2.69	2.81	
Ti	0.005	0.006	0.009	0.005	0.007	0.004	0.006	0.009	0.005	0.002	0.003	0.005	0.007	0.004	0.002	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	
Al	2.606	2.595	2.690	2.589	2.596	2.602	2.652	2.591	2.635	2.630	2.690	2.564	2.600	2.669	2.572	2.67	2.57	2.48	2.58	2.61	2.64	2.65	2.65	2.47	
Fe	2.216	2.205	2.356	2.432	2.386	2.345	2.411	2.449	2.384	2.419	2.329	2.206	2.282	2.417	2.629	2.48	2.49	2.61	2.49	2.42	2.42	2.44	2.52	2.63	
Mn	0.004	0.015	0.011	0.013	0.004	0.007	0.014	0.011	0.009	0.003	0.012	0.009	0.016	0.022	0.008	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	
Mg	2.643	2.661	2.531	2.565	2.548	2.494	2.493	2.561	2.458	2.545	2.605	2.550	2.414	2.261	1.922	1.93	1.83	1.82	1.99	2.27	2.25	2.22	2.10	1.99	
Ca	0.000	0.000	0.000	0.003	0.000	0.003	0.006	0.001	0.002	0.003	0.000	0.004	0.000	0.000	0.024	0.02	0.04	0.03	0.03	0.00	0.00	0.00	0.00	0.03	
Na	0.001	0.001	0.003	0.000	0.000	0.003	0.002	0.005	0.005	0.003	0.002	0.002	0.004	0.003	0.008	0.01	0.02	0.02	0.02	0.00	0.00	0.00	0.01	0.01	
K	0.004	0.003	0.005	0.004	0.006	0.008	0.007	0.003	0.007	0.008	0.003	0.005	0.008	0.003	0.016	0.02	0.06	0.10	0.02	0.00	0.00	0.00	0.00	0.01	
Cr	0.000	0.001	0.000	0.004	0.002	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total	10.087	10.092	10.128	10.158	10.123	10.083	10.132	10.165	10.094	10.151	10.149	10.030	10.015	10.022	9.952	9.91	9.88	9.95	9.94	10.01	10.00	10.00	9.99	9.96	

Total Fe as FeO

Table A3 **Chemical compositions of chlorites**

Rock type	**Garnet amphibolite**												
Sample No.	**KG1252A**												
Analysis No.	6	7	8	1	2	3	4	5	6	7	8	9	10
	rim	core	core	rim	rim	rim	rim	rim	rim	rim	rim	core	core
Weight %													
SiO_2	24.78	25.37	25.13	24.93	25.10	24.60	24.77	25.43	25.52	25.06	25.25	25.81	26.08
TiO_2	0.06	0.09	0.08	0.07	0.07	0.07	0.05	0.06	0.05	0.04	0.07	0.08	0.05
Al_2O_3	20.18	20.01	20.08	19.80	19.83	19.69	19.99	20.27	19.90	20.19	20.31	20.26	19.86
FeO	29.20	26.25	25.87	27.21	26.97	26.51	26.26	27.63	27.39	26.95	27.11	26.74	25.72
MnO	0.17	0.11	0.12	0.09	0.08	0.12	0.06	0.12	0.17	0.17	0.14	0.06	0.09
MgO	12.47	14.53	14.54	13.91	14.52	14.38	14.69	13.87	14.14	14.06	13.85	14.82	15.42
CaO	0.06	0.00	0.00	0.02	0.00	0.00	0.00	0.17	0.09	0.14	0.05	0.07	0.02
Na_2O	0.00	0.04	0.00	0.00	0.01	0.03	0.03	0.02	0.00	0.01	0.00	0.03	0.01
K_2O	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.01	0.00	0.02
Cr_2O_3	0.01	0.02	0.03	0.00	0.01	0.02	0.01	0.02	0.02	0.04	0.02	0.00	0.00
Total	86.93	86.43	85.85	86.04	86.59	85.41	85.85	87.61	87.28	86.65	86.80	87.88	87.28
Cation O=14													
Si	2.699	2.732	2.720	2.714	2.710	2.693	2.690	2.719	2.737	2.705	2.719	2.734	2.767
Ti	0.005	0.007	0.007	0.006	0.006	0.006	0.004	0.005	0.004	0.003	0.005	0.007	0.004
Al	2.590	2.539	2.562	2.541	2.524	2.541	2.559	2.555	2.515	2.568	2.578	2.529	2.483
Fe	2.659	2.364	2.342	2.478	2.435	2.427	2.386	2.471	2.456	2.433	2.442	2.368	2.282
Mn	0.016	0.010	0.011	0.009	0.007	0.011	0.005	0.011	0.015	0.015	0.013	0.005	0.008
Mg	2.025	2.333	2.346	2.258	2.338	2.348	2.379	2.212	2.261	2.263	2.222	2.340	2.439
Ca	0.007	0.000	0.000	0.002	0.000	0.000	0.000	0.019	0.010	0.016	0.006	0.008	0.002
Na	0.001	0.008	0.000	0.001	0.002	0.007	0.005	0.004	0.001	0.002	0.000	0.007	0.002
K	0.001	0.001	0.001	0.000	0.000	0.000	0.001	0.002	0.002	0.001	0.001	0.000	0.003
Cr	0.001	0.001	0.002	0.000	0.001	0.001	0.000	0.002	0.002	0.003	0.001	0.000	0.000
Total	10.002	9.996	9.992	10.009	10.023	10.033	10.029	10.000	10.002	10.008	9.987	9.999	9.990

Total Fe as FeO

Table A4 **Chemical compositions of epidotes**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	1	2	3	4	5	1	2	3	1	2	3	4	5	6	7	1	2	3	1	2	3	4	5	6
	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt
Weight %																								
SiO_2	37.78	37.12	38.18	38.14	37.91	37.96	37.62	37.78	38.48	37.59	37.74	37.99	38.24	38.13	38.05	38.14	38.05	38.10	37.74	37.79	38.55	38.20	38.71	37.31
TiO_2	0.04	0.00	0.07	0.06	0.00	0.06	0.06	0.07	0.03	0.03	0.00	0.04	0.03	0.01	0.06	0.01	0.04	0.02	0.04	0.00	0.05	0.03	0.03	0.03
Al_2O_3	24.93	24.27	26.19	27.76	23.98	24.96	23.78	24.44	28.99	24.73	25.12	25.13	26.66	24.84	24.77	25.47	25.78	25.64	26.16	23.81	29.36	30.38	29.40	25.39
FeO	10.79	11.51	9.77	8.67	12.16	10.86	11.77	10.81	6.60	10.68	10.60	10.65	8.90	10.55	11.38	10.46	9.82	10.23	9.24	12.04	6.39	5.60	6.64	10.39
MnO	0.11	0.16	0.00	0.11	0.09	0.21	0.02	0.09	0.38	0.17	0.17	0.15	0.07	0.05	0.12	0.12	0.17	0.12	0.16	0.10	0.06	0.05	0.10	0.15
MgO	0.02	0.00	0.02	0.67	0.03	0.02	0.02	0.04	0.07	0.00	0.04	0.02	0.01	0.13	0.02	0.02	0.00	0.00	0.03	0.02	0.05	0.06	0.03	0.00
CaO	22.04	21.62	21.81	20.61	21.58	21.75	21.49	21.62	21.32	21.43	21.89	21.74	22.07	21.75	21.84	21.69	22.11	21.96	21.57	21.84	22.36	22.59	21.78	22.00
Na_2O	0.00	0.03	0.00	0.00	0.02	0.00	0.05	0.00	0.00	0.01	0.03	0.00	0.02	0.00	0.05	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.22	0.00
K_2O	0.03	0.02	0.02	0.02	0.02	0.04	0.03	0.02	0.04	0.03	0.04	0.03	0.04	0.03	0.03	0.04	0.03	0.04	0.01	0.01	0.03	0.04	0.04	0.04
Cr_2O_3	0.01	0.00	0.02	0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.05	0.03	0.02	0.02	0.00	0.00	0.03	0.00	0.02	0.03	0.03	0.00
Total	95.75	94.74	96.07	96.05	95.80	95.87	94.86	94.85	95.91	94.69	95.64	95.74	96.07	95.51	96.33	95.96	96.00	96.13	94.96	95.61	96.87	96.99	96.98	95.32
Cation O=25																								
Si	6.194	6.182	6.184	6.116	6.250	6.212	6.255	6.247	6.125	6.222	6.188	6.215	6.172	6.247	6.212	6.211	6.185	6.194	6.173	6.245	6.079	5.998	6.097	6.138
Ti	0.005	0.001	0.009	0.007	0.000	0.007	0.007	0.008	0.004	0.004	0.000	0.004	0.003	0.001	0.008	0.001	0.005	0.003	0.004	0.000	0.006	0.004	0.004	0.004
Al	4.818	4.763	4.999	5.247	4.659	4.814	4.659	4.762	5.438	4.824	4.855	4.844	5.071	4.797	4.767	4.890	4.938	4.913	5.043	4.638	5.456	5.621	5.457	4.922
Fe	1.479	1.603	1.324	1.163	1.677	1.487	1.636	1.495	0.879	1.479	1.453	1.456	1.201	1.445	1.554	1.424	1.335	1.391	1.264	1.665	0.842	0.736	0.874	1.430
Mn	0.016	0.022	0.000	0.015	0.013	0.029	0.003	0.012	0.051	0.024	0.024	0.020	0.009	0.007	0.016	0.016	0.023	0.017	0.022	0.014	0.007	0.007	0.013	0.021
Mg	0.004	0.001	0.004	0.159	0.006	0.004	0.004	0.009	0.016	0.001	0.009	0.006	0.001	0.032	0.004	0.006	0.000	0.000	0.007	0.005	0.012	0.014	0.008	0.000
Ca	3.872	3.858	3.784	3.542	3.811	3.814	3.827	3.830	3.636	3.801	3.845	3.811	3.816	3.817	3.820	3.785	3.850	3.825	3.781	3.868	3.777	3.800	3.675	3.878
Na	0.000	0.010	0.000	0.000	0.007	0.000	0.015	0.000	0.000	0.004	0.010	0.000	0.005	0.000	0.015	0.000	0.003	0.004	0.000	0.000	0.000	0.000	0.067	0.001
K	0.005	0.004	0.004	0.005	0.005	0.009	0.007	0.004	0.008	0.007	0.009	0.006	0.008	0.005	0.005	0.008	0.005	0.007	0.003	0.002	0.005	0.008	0.008	0.009
Cr	0.001	0.000	0.002	0.000	0.000	0.002	0.005	0.000	0.000	0.000	0.000	0.000	0.006	0.003	0.003	0.003	0.000	0.000	0.003	0.000	0.003	0.004	0.003	0.000
Total	16.394	16.444	16.309	16.255	16.427	16.377	16.417	16.366	16.156	16.367	16.393	16.362	16.293	16.354	16.405	16.344	16.345	16.353	16.301	16.437	16.188	16.190	16.207	16.402

Total Fe as FeO

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	1	2	3	4	5	6	7	1	2	3	1	2	3	4	5	6	1	2	3	4	5	6	7	8
	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	core	rim	rim	rim	rim	rim	rim	rim	core	rim	rim	rim	rim	rim	rim	rim	core
Weight %																								
SiO_2	38.29	39.18	37.95	38.91	38.78	38.77	38.59	38.00	37.22	37.44	37.47	37.74	37.96	37.79	37.73	38.06	36.81	37.18	37.20	37.25	36.91	34.60	37.16	37.64
TiO_2	0.07	0.07	0.04	0.05	0.11	0.13	0.04	0.03	0.02	0.06	0.05	0.00	0.03	0.04	0.05	0.02	0.02	0.02	0.00	0.04	0.04	0.03	0.01	0.03
Al_2O_3	28.03	30.71	25.33	30.38	29.76	30.18	26.15	25.91	25.48	25.38	25.12	26.52	25.15	25.09	26.42	26.61	24.21	23.65	24.02	24.35	24.09	22.99	25.17	26.97
FeO	7.19	4.25	10.47	4.53	5.76	4.85	9.68	8.93	10.31	11.16	10.78	9.40	10.87	10.80	9.55	9.25	11.27	12.21	12.44	11.42	11.89	10.68	11.28	9.13
MnO	0.23	0.68	0.19	0.13	0.03	0.43	0.01	0.16	0.12	0.16	0.29	0.11	0.22	0.25	0.17	0.20	0.18	0.15	0.24	0.16	0.06	0.03	0.21	0.07
MgO	0.91	0.05	0.03	0.05	0.06	0.02	0.02	0.03	0.01	0.03	0.02	0.00	0.02	0.02	0.01	0.03	0.03	0.01	0.04	0.00	0.00	0.00	0.02	0.02
CaO	20.94	22.05	21.77	22.28	22.31	21.92	21.87	23.38	23.78	23.23	23.31	23.79	23.04	23.31	23.67	23.58	23.93	23.07	22.66	23.51	23.56	25.97	23.54	23.81
Na_2O	0.05	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00
K_2O	0.02	0.04	0.02	0.05	0.03	0.04	0.03	0.04	0.05	0.02	0.04	0.03	0.03	0.04	0.02	0.06	0.02	0.03	0.05	0.05	0.03	0.05	0.02	0.03
Cr_2O_3	0.01	0.01	0.02	0.00	0.00	0.10	0.04	0.00	0.00	0.02	0.00	0.00	0.02	0.03	0.03	0.00	0.00	0.00	0.04	0.03	0.00	0.00	0.01	0.02
Total	95.74	97.03	95.82	96.36	96.84	96.45	96.43	96.48	96.99	97.49	97.09	97.58	97.34	97.36	97.66	97.81	96.47	96.32	96.69	96.82	96.58	94.35	97.42	97.72
Cation O=25																								
Si	6.124	6.098	6.198	6.100	6.091	6.089	6.220	6.146	6.051	6.068	6.094	6.055	6.144	6.123	6.053	6.083	6.066	6.143	6.122	6.104	6.082	5.896	6.043	6.021
Ti	0.008	0.009	0.005	0.006	0.013	0.015	0.005	0.004	0.002	0.007	0.006	0.000	0.003	0.004	0.006	0.002	0.002	0.002	0.000	0.005	0.005	0.004	0.001	0.004
Al	5.283	5.633	4.876	5.613	5.508	5.587	4.968	4.939	4.883	4.848	4.815	5.014	4.798	4.792	4.997	5.011	4.701	4.605	4.659	4.703	4.678	4.617	4.825	5.085
Fe	0.962	0.554	1.430	0.594	0.757	0.637	1.305	1.208	1.402	1.513	1.466	1.262	1.471	1.463	1.282	1.236	1.553	1.688	1.713	1.565	1.638	1.521	1.534	1.221
Mn	0.032	0.090	0.026	0.017	0.003	0.058	0.001	0.021	0.017	0.021	0.040	0.015	0.030	0.034	0.023	0.027	0.025	0.020	0.033	0.022	0.008	0.004	0.029	0.009
Mg	0.217	0.011	0.007	0.011	0.013	0.004	0.005	0.006	0.001	0.008	0.004	0.000	0.004	0.005	0.003	0.008	0.007	0.003	0.010	0.000	0.000	0.001	0.005	0.005
Ca	3.589	3.678	3.810	3.742	3.754	3.689	3.777	4.052	4.143	4.033	4.062	4.089	3.996	4.047	4.069	4.037	4.224	4.084	3.997	4.128	4.160	4.743	4.101	4.080
Na	0.014	0.000	0.000	0.000	0.000	0.005	0.000	0.001	0.000	0.000	0.005	0.000	0.003	0.000	0.004	0.000	0.001	0.004	0.000	0.000	0.000	0.000	0.003	0.001
K	0.004	0.007	0.005	0.009	0.006	0.007	0.007	0.008	0.010	0.004	0.008	0.005	0.006	0.008	0.003	0.012	0.005	0.007	0.011	0.011	0.007	0.010	0.005	0.006
Cr	0.002	0.001	0.003	0.000	0.000	0.012	0.005	0.000	0.000	0.002	0.000	0.001	0.003	0.003	0.004	0.000	0.000	0.000	0.005	0.004	0.000	0.000	0.001	0.003
Total	16.235	16.080	16.360	16.092	16.145	16.103	16.292	16.385	16.510	16.502	16.499	16.440	16.457	16.479	16.444	16.416	16.584	16.557	16.551	16.543	16.578	16.796	16.547	16.435

Total Fe as FeO

Table A4 **Chemical compositions of epidotes**

Rock type	**Garnet amphibolite**																								
Sample No.	**KG1252A**																								
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	1	2	3	4	
	rim	rim	rim	rim	rim	rim	rim	core	rim	rim	rim	rim	rim	rim	rim	core	core	core	rim	rim	core	core	core	core	
Weight %																									
SiO_2	37.58	37.49	36.97	37.11	37.65	37.14	36.98	37.82	37.33	37.20	36.54	36.12	37.24	37.53	37.68	38.24	38.05	38.20	37.88	37.76	38.36	38.31	37.91	38.04	
TiO_2	0.11	0.08	0.10	0.05	0.10	0.09	0.04	0.08	0.05	0.04	0.02	0.01	0.08	0.10	0.11	0.19	0.04	0.12	0.09	0.10	0.06	0.01	0.00	0.08	
Al_2O_3	24.97	25.36	24.21	25.45	25.69	26.03	24.14	26.67	24.50	25.49	24.77	26.24	25.14	24.84	24.34	25.77	25.72	25.98	24.50	24.37	26.18	26.06	26.02	25.85	
FeO	10.68	10.06	11.06	9.84	10.23	11.25	11.17	8.62	11.37	10.79	11.23	9.69	10.66	9.96	10.34	8.44	8.54	8.41	10.34	10.74	8.01	8.15	8.49	8.57	
MnO	0.12	0.19	0.16	0.15	0.12	0.06	0.20	0.00	0.11	0.08	0.17	0.10	0.16	0.13	0.15	0.07	0.10	0.08	0.14	0.17	0.10	0.11	0.08	0.09	
MgO	0.17	0.04	0.03	0.01	0.03	0.35	0.02	0.02	0.06	0.04	0.02	0.04	0.02	0.02	0.01	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.01	0.01	
CaO	23.79	23.93	23.97	24.26	24.21	21.92	23.52	24.10	23.27	24.11	23.89	23.78	24.20	22.74	22.84	23.16	23.17	23.13	22.70	22.46	23.25	23.14	23.07	23.35	
Na_2O	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.01	0.03	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	
K_2O	0.03	0.06	0.04	0.02	0.05	0.02	0.05	0.04	0.05	0.03	0.04	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
Cr_2O_3	0.03	0.00	0.00	0.00	0.05	0.00	0.05	0.02	0.03	0.03	0.01	0.03	0.03	0.02	0.03	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
Total	97.47	97.21	96.54	96.88	98.12	96.85	96.18	97.37	96.79	97.80	96.70	96.06	97.55	95.35	95.49	95.92	95.65	95.92	95.66	95.61	95.99	95.79	95.58	96.00	
Cation O=25																									
Si	6.090	6.076	6.079	6.038	6.050	6.033	6.100	6.060	6.109	6.018	6.005	5.923	6.042	6.173	6.203	6.195	6.188	6.185	6.217	6.212	6.194	6.202	6.165	6.169	
Ti	0.013	0.010	0.012	0.006	0.012	0.011	0.005	0.010	0.007	0.005	0.002	0.001	0.010	0.012	0.013	0.023	0.005	0.015	0.011	0.012	0.007	0.001	0.000	0.010	
Al	4.768	4.844	4.692	4.879	4.865	4.984	4.694	5.037	4.725	4.860	4.798	5.072	4.806	4.815	4.723	4.920	4.930	4.958	4.741	4.726	4.983	4.973	4.987	4.939	
Fe	1.448	1.363	1.521	1.338	1.374	1.528	1.542	1.155	1.556	1.460	1.544	1.329	1.446	1.370	1.423	1.144	1.161	1.139	1.419	1.478	1.082	1.103	1.154	1.162	
Mn	0.016	0.026	0.022	0.021	0.016	0.008	0.029	0.000	0.016	0.010	0.024	0.014	0.021	0.018	0.020	0.010	0.013	0.012	0.020	0.023	0.014	0.015	0.011	0.013	
Mg	0.040	0.010	0.008	0.002	0.006	0.085	0.005	0.006	0.015	0.008	0.006	0.011	0.005	0.004	0.003	0.003	0.002	0.000	0.000	0.002	0.004	0.002	0.003	0.002	
Ca	4.130	4.155	4.223	4.229	4.168	3.814	4.158	4.137	4.080	4.179	4.207	4.179	4.207	4.008	4.029	4.020	4.037	4.013	3.993	3.959	4.023	4.013	4.019	4.057	
Na	0.000	0.003	0.004	0.000	0.000	0.000	0.002	0.000	0.007	0.000	0.000	0.000	0.001	0.006	0.003	0.009	0.000	0.000	0.000	0.002	0.002	0.001	0.000	0.000	
K	0.005	0.012	0.008	0.005	0.009	0.004	0.010	0.009	0.010	0.005	0.009	0.009	0.007	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	
Cr	0.003	0.000	0.000	0.000	0.006	0.000	0.006	0.002	0.003	0.003	0.002	0.004	0.004	0.003	0.003	0.001	0.003	0.000	0.001	0.000	0.000	0.000	0.000	0.000	
Total	16.514	16.499	16.568	16.518	16.507	16.466	16.550	16.415	16.528	16.549	16.597	16.542	16.548	16.409	16.422	16.326	16.340	16.321	16.402	16.414	16.309	16.311	16.341	16.352	

Total Fe as FeO

Rock type	**Garnet amphibolite**																								
Sample No.	**KG1252A**																								
Analysis No.	5	6	7	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	1	2	3	4	5	6	
	rim	rim	rim	core	core	core	core	core	core	core	rim	rim	rim	rim	Re Grt	Re Grt	Re Grt	Re Grt	Re Grt	Re Grt	Re Grt	Re Grt	Re Grt	Re Grt	
Weight %																									
SiO_2	38.00	37.02	37.27	38.45	38.35	39.15	38.67	38.30	38.24	38.49	37.44	37.77	37.49	37.78	38.33	38.32	39.16	40.03	39.61	39.37	37.99	38.14	38.39	38.55	
TiO_2	0.03	0.10	0.03	0.08	0.07	0.07	0.13	0.04	0.06	0.04	0.02	0.00	0.08	0.11	0.00	0.10	0.07	0.09	0.07	0.07	0.06	0.13	0.08	0.09	
Al_2O_3	23.83	25.44	24.83	28.37	28.09	29.54	29.23	26.32	26.17	26.74	23.65	25.40	25.47	25.70	30.65	31.44	29.65	31.69	31.65	31.16	28.30	28.46	28.60	29.59	
FeO	11.65	9.83	10.66	6.72	6.96	5.00	5.26	8.46	9.04	8.46	12.31	11.25	9.68	12.51	4.88	4.28	5.84	4.08	4.47	4.85	6.52	6.74	6.67	5.60	
MnO	0.07	0.10	0.12	0.09	0.11	0.22	0.15	0.06	0.09	0.04	0.21	0.26	0.17	1.26	0.23	0.41	0.70	0.52	0.38	0.54	0.44	0.27	0.36	0.30	
MgO	0.03	0.02	0.04	0.01	0.03	0.08	0.09	0.00	0.00	0.02	0.01	0.28	0.08	0.29	0.04	0.03	0.81	0.05	0.06	0.06	0.01	0.01	0.00	0.49	
CaO	23.01	23.09	22.96	23.34	23.58	23.55	23.84	23.48	23.36	22.85	23.25	23.03	23.62	20.88	24.49	24.32	22.44	24.14	24.14	23.78	23.30	23.43	23.76	22.92	
Na_2O	0.00	0.00	0.01	0.00	0.01	0.00	0.02	0.02	0.02	0.02	0.10	0.00	0.01	0.02	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.01	
K_2O	0.05	0.03	0.02	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.14	0.06	0.05	0.04	0.03	0.04	0.06	0.06	0.03	0.04	0.06	0.05	0.04	0.04	
Cr_2O_3	0.01	0.02	0.00	0.02	0.00	0.02	0.01	0.00	0.00	0.00	0.05	0.00	0.04	0.01	0.07	0.03	0.02	0.03	0.03	0.03	0.00	0.00	0.03	0.00	
Total	96.67	95.64	95.93	97.08	97.23	97.62	97.40	96.69	96.99	96.66	97.18	98.05	96.69	98.58	98.72	98.98	98.77	100.68	100.44	99.91	96.68	97.24	97.93	97.59	
Cation O=25																									
Si	6.221	6.078	6.123	6.088	6.079	6.103	6.063	6.158	6.147	6.170	6.143	6.085	6.091	6.072	5.933	5.896	6.056	6.026	5.989	5.998	6.052	6.042	6.042	6.031	
Ti	0.003	0.012	0.004	0.009	0.009	0.008	0.016	0.005	0.007	0.004	0.003	0.000	0.010	0.013	0.000	0.011	0.008	0.010	0.008	0.008	0.007	0.015	0.009	0.010	
Al	4.597	4.923	4.808	5.293	5.248	5.428	5.401	4.987	4.958	5.052	4.574	4.821	4.877	4.869	5.590	5.702	5.404	5.622	5.640	5.594	5.313	5.314	5.304	5.456	
Fe	1.595	1.350	1.464	0.890	0.923	0.651	0.690	1.138	1.215	1.134	1.689	1.515	1.316	1.682	0.632	0.551	0.756	0.513	0.565	0.618	0.869	0.893	0.877	0.733	
Mn	0.010	0.014	0.016	0.012	0.014	0.029	0.019	0.008	0.013	0.006	0.029	0.035	0.023	0.172	0.030	0.053	0.092	0.067	0.049	0.070	0.059	0.037	0.048	0.040	
Mg	0.008	0.004	0.009	0.003	0.007	0.018	0.022	0.000	0.000	0.005	0.001	0.067	0.020	0.070	0.009	0.006	0.187	0.012	0.014	0.015	0.001	0.003	0.000	0.115	
Ca	4.037	4.062	4.042	3.959	4.005	3.934	4.005	4.044	4.023	3.925	4.088	3.975	4.111	3.595	4.062	4.009	3.719	3.893	3.910	3.882	3.977	3.977	4.006	3.842	
Na	0.000	0.000	0.002	0.000	0.004	0.001	0.005	0.006	0.006	0.007	0.031	0.000	0.003	0.006	0.000	0.006	0.005	0.000	0.000	0.000	0.000	0.000	0.004	0.002	
K	0.010	0.007	0.005	0.000	0.003	0.000	0.000	0.002	0.002	0.001	0.030	0.012	0.009	0.007	0.006	0.007	0.012	0.011	0.006	0.008	0.012	0.011	0.007	0.009	
Cr	0.001	0.002	0.000	0.003	0.000	0.002	0.001	0.000	0.000	0.000	0.006	0.000	0.006	0.001	0.009	0.004	0.002	0.003	0.004	0.004	0.000	0.000	0.004	0.000	
Total	16.482	16.451	16.473	16.256	16.292	16.174	16.222	16.348	16.371	16.304	16.595	16.511	16.464	16.487	16.271	16.246	16.242	16.157	16.185	16.198	16.290	16.291	16.301	16.236	

Total Fe as FeO

Table A4 **Chemical compositions of epidotes**

Rock type	**Garnet amphibolite**																								
Sample No.	**KG1252A**																								
Analysis No.	1	2	3	4	1	2	3	4	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	
	Re Grt	Re Grt	Re Grt	Re Grt	Re Grt	Re Grt	Re Grt	Re Grt	core	core	core	core	rim	rim	rim	rim	rim	rim	rim	rim	rim	rim	rim	rim	
Weight %																									
SiO_2	39.06	38.59	38.46	38.36	38.33	38.07	38.11	38.60	38.53	38.00	37.85	38.54	37.77	37.90	37.49	37.75	37.44	37.74	37.64	37.40	36.53	37.55	37.50	37.71	
TiO_2	0.15	0.14	0.07	0.10	0.08	0.12	0.14	0.17	0.04	0.04	0.03	0.04	0.05	0.14	0.05	0.10	0.15	0.07	0.08	0.05	0.07	0.09	0.09	0.13	
Al_2O_3	29.08	28.89	30.67	30.59	30.87	27.86	30.10	29.88	28.31	27.80	27.69	28.54	25.38	26.36	25.51	25.31	25.52	24.88	26.29	24.54	23.91	25.63	24.81	25.70	
FeO	6.51	6.25	4.08	3.80	4.15	7.76	5.05	5.86	6.75	7.53	8.09	6.85	10.37	9.36	10.22	10.18	10.48	11.26	9.53	10.98	10.24	10.05	10.35	10.06	
MnO	0.35	0.21	0.43	0.48	0.51	0.25	0.68	0.33	0.17	0.11	0.13	0.09	0.13	0.03	0.15	0.18	0.29	0.33	0.15	0.20	0.25	0.06	0.10	0.12	
MgO	0.03	0.02	0.06	0.07	0.04	0.06	0.08	0.16	0.02	0.02	0.02	0.02	0.02	0.01	0.00	0.01	0.04	0.03	0.01	0.01	0.01	0.03	0.40	0.03	
CaO	23.79	23.86	23.76	23.75	23.86	23.27	23.03	23.68	24.15	24.21	24.06	24.47	23.64	23.23	23.32	23.48	23.02	22.91	23.27	22.65	23.15	22.80	22.18	22.62	
Na_2O	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.01	0.00	0.02	0.03	0.00	0.01	0.01	
K_2O	0.07	0.04	0.05	0.03	0.03	0.04	0.04	0.04	0.04	0.03	0.04	0.04	0.03	0.02	0.04	0.03	0.03	0.04	0.04	0.05	0.04	0.01	0.05	0.05	
Cr_2O_3	0.01	0.01	0.00	0.01	0.01	0.03	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.04	0.02	0.00	0.05	0.04	0.05	
Total	99.03	98.02	97.58	97.18	97.88	97.45	97.24	98.77	98.01	97.74	97.91	98.59	97.41	97.05	96.80	97.04	97.00	97.27	97.05	95.92	94.23	96.27	95.53	96.48	
Cation O=25																									
Si	6.063	6.048	5.987	5.990	5.955	6.049	5.982	5.988	6.062	6.028	6.011	6.034	6.105	6.098	6.091	6.118	6.078	6.131	6.071	6.153	6.126	6.114	6.160	6.124	
Ti	0.017	0.017	0.008	0.012	0.009	0.014	0.017	0.020	0.005	0.005	0.004	0.005	0.006	0.017	0.006	0.012	0.018	0.009	0.010	0.006	0.009	0.011	0.011	0.016	
Al	5.320	5.337	5.626	5.629	5.652	5.217	5.569	5.463	5.250	5.198	5.183	5.266	4.835	4.999	4.885	4.835	4.883	4.764	4.998	4.758	4.726	4.918	4.803	4.919	
Fe	0.845	0.819	0.531	0.496	0.539	1.030	0.663	0.760	0.888	0.999	1.075	0.897	1.402	1.259	1.389	1.380	1.423	1.530	1.286	1.511	1.436	1.368	1.422	1.366	
Mn	0.046	0.028	0.057	0.063	0.067	0.034	0.090	0.044	0.023	0.015	0.017	0.012	0.018	0.004	0.021	0.025	0.040	0.045	0.020	0.028	0.036	0.008	0.014	0.017	
Mg	0.007	0.005	0.013	0.015	0.009	0.013	0.018	0.038	0.005	0.005	0.005	0.005	0.005	0.002	0.000	0.002	0.010	0.007	0.002	0.002	0.002	0.007	0.098	0.007	
Ca	3.956	4.006	3.963	3.973	3.972	3.961	3.873	3.935	4.071	4.115	4.094	4.105	4.094	4.005	4.060	4.077	4.004	3.988	4.021	3.992	4.159	3.978	3.904	3.936	
Na	0.000	0.000	0.003	0.000	0.000	0.000	0.005	0.002	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.009	0.003	0.000	0.006	0.010	0.000	0.003	0.003	
K	0.013	0.007	0.009	0.007	0.006	0.008	0.007	0.008	0.008	0.006	0.008	0.008	0.006	0.004	0.008	0.005	0.006	0.008	0.008	0.010	0.009	0.002	0.010	0.010	
Cr	0.001	0.002	0.000	0.002	0.002	0.004	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.005	0.003	0.000	0.006	0.005	0.006	
Total	16.267	16.269	16.197	16.186	16.212	16.331	16.223	16.263	16.312	16.371	16.397	16.332	16.477	16.388	16.463	16.455	16.470	16.484	16.422	16.469	16.512	16.414	16.431	16.404	

Total Fe as FeO

Rock type	**Garnet amphibolite**																								
Sample No.	**KG1252A**																								
Analysis No.	8	9	10	11	12	13	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	10	
	rim	core	core	rim	rim	rim	core	core	core	rim	rim	rim	rim	rim	core	core	core	core	core	core	core	core	rim	rim	
Weight %																									
SiO_2	37.47	38.16	38.09	37.68	37.39	37.59	37.62	37.78	37.72	37.25	38.07	37.71	37.77	37.64	38.14	37.80	37.80	37.69	37.60	37.14	37.91	37.30	37.56	37.30	
TiO_2	0.08	0.15	0.05	0.07	0.05	0.04	0.10	0.10	0.05	0.08	0.02	0.00	0.01	0.07	0.02	0.04	0.04	0.03	0.08	0.14	0.14	0.10	0.08	0.13	
Al_2O_3	24.80	27.43	27.75	25.25	25.35	26.18	27.97	28.05	27.24	25.41	26.32	26.01	26.14	25.41	27.55	27.19	27.69	26.63	27.58	26.57	27.98	26.96	26.06	25.67	
FeO	10.61	8.37	7.13	9.77	10.23	9.49	6.40	6.46	7.81	9.67	8.80	9.13	9.11	10.04	7.70	8.23	7.53	8.20	7.15	7.90	7.12	7.06	8.94	8.97	
MnO	0.15	0.09	0.04	0.14	0.20	0.21	0.00	0.03	0.09	0.08	0.04	0.00	0.05	0.06	0.03	0.01	0.06	0.04	0.09	0.07	0.00	0.00	0.02	0.08	
MgO	0.00	0.06	0.03	0.00	0.02	0.00	0.04	0.05	0.01	0.01	0.01	0.00	0.02	0.01	0.00	0.00	0.02	0.02	0.05	0.75	0.03	0.08	0.03	0.02	
CaO	22.46	23.35	23.16	22.65	22.74	22.61	22.70	22.60	23.22	22.70	23.19	23.22	23.25	22.73	23.44	23.69	23.42	23.32	23.89	22.91	24.27	24.19	23.85	23.82	
Na_2O	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.04	0.02	0.01	0.00	0.00	0.02	0.00	0.00	0.02	
K_2O	0.06	0.03	0.01	0.04	0.04	0.04	0.03	0.05	0.03	0.04	0.03	0.03	0.02	0.04	0.04	0.02	0.05	0.03	0.05	0.07	0.03	0.01	0.01	0.04	
Cr_2O_3	0.01	0.03	0.02	0.02	0.00	0.04	0.05	0.00	0.00	0.01	0.00	0.02	0.00	0.03	0.04	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	
Total	95.65	97.69	96.28	95.62	96.02	96.20	94.92	95.12	96.17	95.25	96.48	96.13	96.37	96.03	96.98	97.03	96.63	95.99	96.50	95.56	97.50	95.69	96.55	96.05	
Cation O=25																									
Si	6.162	6.065	6.096	6.169	6.117	6.105	6.081	6.092	6.076	6.124	6.141	6.123	6.116	6.143	6.085	6.055	6.052	6.100	6.031	6.035	6.017	6.042	6.082	6.081	
Ti	0.010	0.018	0.006	0.009	0.006	0.005	0.012	0.012	0.006	0.010	0.002	0.000	0.001	0.009	0.002	0.005	0.005	0.004	0.010	0.017	0.017	0.012	0.009	0.016	
Al	4.806	5.138	5.235	4.872	4.888	5.011	5.329	5.330	5.172	4.923	5.004	4.977	4.989	4.888	5.181	5.133	5.225	5.080	5.215	5.089	5.233	5.146	4.972	4.933	
Fe	1.459	1.113	0.954	1.338	1.400	1.289	0.865	0.871	1.052	1.329	1.187	1.240	1.234	1.370	1.027	1.103	1.008	1.110	0.960	1.073	0.945	0.956	1.211	1.222	
Mn	0.021	0.012	0.005	0.019	0.028	0.029	0.000	0.004	0.012	0.011	0.005	0.000	0.007	0.008	0.004	0.001	0.008	0.005	0.012	0.010	0.000	0.000	0.003	0.011	
Mg	0.000	0.014	0.007	0.000	0.005	0.000	0.010	0.012	0.002	0.002	0.002	0.000	0.005	0.002	0.000	0.000	0.005	0.005	0.011	0.182	0.007	0.019	0.006	0.004	
Ca	3.957	3.976	3.972	3.973	3.986	3.934	3.931	3.904	4.008	3.998	4.008	4.040	4.034	3.975	4.007	4.066	4.018	4.044	4.106	3.989	4.126	4.197	4.138	4.161	
Na	0.003	0.006	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.006	0.012	0.006	0.003	0.000	0.000	0.005	0.000	0.000	0.005	
K	0.013	0.006	0.002	0.008	0.008	0.008	0.006	0.010	0.006	0.008	0.006	0.006	0.004	0.008	0.008	0.004	0.010	0.006	0.010	0.015	0.007	0.003	0.003	0.008	
Cr	0.001	0.004	0.003	0.003	0.000	0.005	0.006	0.000	0.000	0.001	0.000	0.003	0.000	0.004	0.005	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.002	
Total	16.432	16.352	16.280	16.390	16.437	16.386	16.244	16.236	16.335	16.408	16.357	16.392	16.390	16.407	16.326	16.381	16.338	16.360	16.356	16.411	16.356	16.375	16.424	16.442	

Total Fe as FeO

Table A4 **Chemical compositions of epidotes**

Rock type	**Garnet amphibolite**																								
Sample No.	**KG1252A**																								
Analysis No.	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	
	rim	core	core	core	core	core	core	rim	core	core	core	core	core	core	core	rim	rim	rim	rim	rim	rim	rim	core	rim	
Weight %																									
SiO_2	36.72	37.80	37.76	37.88	37.77	37.86	37.81	37.55	37.66	37.51	37.78	37.69	37.71	37.54	37.46	37.45	37.35	36.99	37.01	37.65	37.55	35.32	37.33	36.81	
TiO_2	0.02	0.06	0.00	0.03	0.02	0.01	0.00	0.07	0.05	0.06	0.03	0.03	0.06	0.04	0.03	0.10	0.10	0.04	0.02	0.11	0.10	6.07	0.11	0.09	
Al_2O_3	22.98	27.63	27.72	27.13	26.85	27.27	27.68	25.51	27.50	27.43	28.14	28.38	28.00	27.08	26.88	25.33	25.08	23.89	24.36	25.53	25.52	21.82	26.67	24.62	
FeO	11.50	7.54	7.83	8.31	8.61	8.00	7.37	10.14	7.71	7.85	7.04	6.79	7.48	8.27	8.77	10.18	10.43	11.96	11.95	10.13	10.50	8.31	8.17	10.82	
MnO	0.07	0.21	0.03	0.07	0.04	0.12	0.07	0.09	0.09	0.12	0.12	0.18	0.11	0.11	0.10	0.14	0.12	0.09	0.09	0.12	0.07	0.07	0.03	0.08	
MgO	0.01	0.00	0.00	0.01	0.00	0.02	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.01	0.02	0.02	0.04	0.02	0.00	0.01	0.01	
CaO	23.80	23.52	23.73	23.75	24.11	23.53	23.95	23.38	23.78	23.75	23.86	23.73	24.09	23.40	23.88	23.29	23.41	23.88	23.80	23.76	23.59	24.53	23.73	23.67	
Na_2O	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.02	
K_2O	0.05	0.04	0.04	0.05	0.04	0.02	0.04	0.02	0.03	0.03	0.03	0.06	0.03	0.04	0.03	0.02	0.02	0.05	0.06	0.02	0.04	0.03	0.04	0.02	
Cr_2O_3	0.03	0.00	0.01	0.04	0.02	0.06	0.02	0.07	0.04	0.00	0.01	0.00	0.00	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.05	0.00	0.02	0.00	
Total	95.16	96.82	97.11	97.26	97.46	96.89	96.97	96.85	96.85	96.76	97.02	96.86	97.49	96.53	97.16	96.56	96.52	96.91	97.30	97.37	97.45	96.19	96.11	96.13	
Cation O=25																									
Si	6.147	6.047	6.030	6.059	6.046	6.065	6.038	6.095	6.032	6.021	6.018	6.007	5.998	6.048	6.021	6.100	6.098	6.084	6.057	6.084	6.072	5.822	6.047	6.062	
Ti	0.003	0.007	0.000	0.003	0.003	0.001	0.000	0.008	0.006	0.007	0.003	0.004	0.007	0.005	0.003	0.012	0.013	0.005	0.003	0.014	0.012	0.752	0.013	0.011	
Al	4.534	5.210	5.217	5.113	5.067	5.149	5.210	4.880	5.191	5.189	5.283	5.329	5.248	5.141	5.093	4.862	4.826	4.631	4.699	4.862	4.864	4.239	5.093	4.778	
Fe	1.610	1.009	1.046	1.111	1.152	1.072	0.984	1.377	1.033	1.053	0.938	0.905	0.994	1.115	1.179	1.386	1.424	1.645	1.635	1.369	1.420	1.146	1.107	1.490	
Mn	0.010	0.028	0.004	0.009	0.005	0.017	0.009	0.012	0.012	0.017	0.016	0.024	0.015	0.015	0.014	0.019	0.017	0.012	0.012	0.016	0.009	0.010	0.004	0.011	
Mg	0.001	0.001	0.000	0.002	0.000	0.004	0.007	0.003	0.001	0.000	0.001	0.000	0.000	0.006	0.005	0.004	0.002	0.005	0.006	0.009	0.004	0.000	0.002	0.003	
Ca	4.269	4.032	4.060	4.070	4.136	4.039	4.098	4.066	4.081	4.085	4.071	4.051	4.104	4.039	4.112	4.065	4.095	4.208	4.173	4.113	4.086	4.331	4.119	4.177	
Na	0.000	0.005	0.001	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.002	0.000	0.005	0.000	0.000	0.004	0.000	0.000	0.000	0.001	0.010	0.010	0.000	0.006	
K	0.010	0.009	0.008	0.010	0.008	0.004	0.008	0.004	0.005	0.006	0.006	0.012	0.006	0.009	0.006	0.003	0.004	0.010	0.012	0.004	0.008	0.007	0.008	0.005	
Cr	0.004	0.000	0.001	0.005	0.003	0.008	0.002	0.009	0.005	0.001	0.002	0.000	0.000	0.003	0.000	0.003	0.000	0.000	0.000	0.000	0.006	0.000	0.002	0.000	
Total	16.587	16.348	16.365	16.383	16.420	16.358	16.363	16.454	16.367	16.380	16.340	16.331	16.376	16.380	16.433	16.459	16.478	16.601	16.597	16.473	16.490	16.315	16.397	16.542	

Total Fe as FeO

Rock type	**Garnet amphibolite**															
Sample No.	**KG1252A**															
Analysis No.	8	9	1	2	3	4	5	6	7	8	1	2	3	4	5	6
	rim	rim	rim	rim	rim	core	core	rim	rim	rim	rim	core	core	core	core	rim
Weight %																
SiO_2	36.53	36.87	37.64	37.07	36.35	37.38	37.09	36.53	36.95	36.60	37.05	37.63	37.94	37.52	37.4	37.58
TiO_2	0.07	0.05	0.11	0.00	0.10	0.11	0.10	0.00	0.11	0.01	0.106	0.186	0.101	0.102	0.236	0.075
Al_2O_3	24.11	24.86	25.55	25.37	24.82	27.82	27.10	23.61	25.22	24.33	25.41	28.6	27.72	27.3	28.27	24.92
FeO	10.81	10.45	10.20	9.77	9.71	7.22	7.62	11.77	10.32	10.90	9.914	6.372	7.267	7.875	6.46	10.31
MnO	0.22	0.09	0.09	0.07	0.04	0.12	0.04	0.05	0.15	0.15	0.183	0	0	0	0.016	0.109
MgO	0.00	0.02	0.00	0.00	1.18	0.01	0.03	0.01	0.02	0.00	0.014	0.078	0.074	0.025	0.055	0.022
CaO	22.59	23.74	23.69	24.36	22.08	24.50	24.07	23.62	23.63	23.19	23.69	24.19	24.09	24.17	23.8	23.26
Na_2O	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.008	0	0.042	0.011	0.039
K_2O	0.04	0.02	0.03	0.03	0.06	0.02	0.03	0.04	0.04	0.05	0.023	0.036	0.018	0.032	0.038	0.018
Cr_2O_3	0.02	0.00	0.00	0.02	0.00	0.00	0.07	0.03	0.03	0.01	0.027	0.034	0	0.019	0.047	0
Total	94.38	96.10	97.31	96.71	94.34	97.17	96.14	95.65	96.47	95.24	96.43	97.14	97.21	97.09	96.33	96.33
Cation O=25																
Si	6.118	6.062	6.086	6.042	6.044	5.970	5.999	6.086	6.045	6.086	6.05	5.972	6.04	6.011	5.985	6.138
Ti	0.008	0.006	0.013	0.000	0.012	0.013	0.012	0.000	0.014	0.001	0.013	0.022	0.012	0.012	0.028	0.009
Al	4.759	4.817	4.869	4.873	4.865	5.238	5.166	4.635	4.863	4.768	4.891	5.349	5.2	5.154	5.332	4.798
Fe	1.514	1.436	1.379	1.332	1.350	0.964	1.031	1.639	1.412	1.515	1.354	0.846	0.967	1.055	0.865	1.409
Mn	0.031	0.013	0.013	0.010	0.005	0.016	0.006	0.007	0.020	0.021	0.025	0	0	0	0.002	0.015
Mg	0.000	0.005	0.000	0.000	0.294	0.001	0.008	0.003	0.005	0.000	0.003	0.018	0.018	0.006	0.013	0.005
Ca	4.055	4.182	4.103	4.254	3.935	4.193	4.170	4.217	4.141	4.130	4.145	4.113	4.109	4.148	4.081	4.071
Na	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.002	0	0.013	0.003	0.012
K	0.008	0.005	0.006	0.006	0.013	0.004	0.006	0.008	0.008	0.010	0.005	0.007	0.004	0.007	0.008	0.004
Cr	0.002	0.000	0.000	0.002	0.000	0.000	0.008	0.003	0.004	0.001	0.003	0.004	0	0.002	0.006	0
Total	16.497	16.526	16.47	16.53	16.52	16.40	16.41	16.60	16.51	16.53	16.49	16.33	16.35	16.41	16.32	16.46

Total Fe as FeO

Table A5 **Chemical compositions of white micas**

Rock type	**Pelitic schist**																							
Sample No.	**KG1251**																							
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph
Weight %																								
SiO_2	48.33	48.39	48.60	49.17	49.99	49.35	49.05	49.78	49.79	48.56	47.66	49.39	49.77	50.32	49.44	49.88	48.75	46.45	48.31	48.65	49.43	48.97	48.03	46.83
TiO_2	0.40	0.64	0.49	0.18	0.19	0.18	0.42	0.49	0.45	0.61	0.59	0.41	0.24	0.20	0.44	0.55	0.63	0.68	0.26	0.26	0.27	0.33	0.53	0.64
Al_2O_3	29.97	30.79	30.21	28.95	29.12	29.33	29.72	29.75	29.79	30.76	30.85	29.72	28.98	28.84	29.79	28.66	30.75	31.03	28.46	28.58	28.45	29.00	29.90	31.95
FeO	1.35	1.28	1.19	0.96	1.03	1.16	1.22	1.23	1.30	1.07	1.17	1.12	1.27	1.10	1.23	1.22	1.08	1.24	1.29	1.28	1.14	1.21	1.31	1.17
MnO	0.00	0.04	0.00	0.00	0.01	0.02	0.00	0.00	0.01	0.07	0.00	0.00	0.07	0.00	0.01	0.00	0.00	0.03	0.04	0.02	0.00	0.00	0.00	0.07
MgO	3.06	2.81	3.18	3.68	3.66	3.66	3.41	3.29	3.22	2.78	2.66	3.25	3.61	3.70	3.51	3.47	2.48	2.28	3.35	3.56	3.45	3.33	3.01	2.11
CaO	0.01	0.01	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.03	0.02	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.01
Na_2O	0.28	0.54	0.62	0.44	0.42	0.40	0.43	0.54	0.48	0.40	0.59	0.51	0.44	0.39	0.50	0.50	0.69	0.69	0.48	0.41	0.46	0.51	0.64	0.76
K_2O	12.29	11.84	11.70	11.93	11.86	11.95	11.86	11.87	11.84	12.10	11.80	11.86	11.79	11.94	11.76	11.86	11.74	11.68	11.70	11.82	11.93	11.64	11.64	11.42
Cr_2O_3	0.01	0.02	0.00	0.00	0.04	0.00	0.05	0.03	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.04	0.01	0.03	0.00	0.01	0.02	0.03	0.01	0.03
Total	95.70	96.34	96.01	95.31	96.33	96.08	96.15	96.98	96.89	96.38	95.33	96.26	96.17	96.50	96.68	96.18	96.13	94.11	93.90	94.58	95.16	95.01	95.08	94.99
Cation O=22																								
Si	6.480	6.430	6.474	6.592	6.621	6.568	6.524	6.559	6.565	6.449	6.401	6.554	6.613	6.655	6.534	6.629	6.477	6.331	6.587	6.584	6.641	6.584	6.468	6.307
Ti	0.041	0.064	0.049	0.018	0.019	0.018	0.042	0.049	0.045	0.061	0.060	0.041	0.024	0.020	0.043	0.055	0.063	0.070	0.026	0.026	0.028	0.033	0.054	0.065
Al	4.736	4.822	4.743	4.573	4.546	4.600	4.659	4.620	4.630	4.815	4.884	4.648	4.538	4.494	4.640	4.489	4.815	4.985	4.573	4.559	4.505	4.595	4.745	5.071
Fe	0.151	0.142	0.133	0.108	0.114	0.129	0.135	0.136	0.143	0.119	0.131	0.124	0.141	0.122	0.136	0.135	0.119	0.141	0.147	0.144	0.128	0.136	0.148	0.132
Mn	0.000	0.004	0.000	0.000	0.001	0.003	0.000	0.000	0.001	0.008	0.000	0.000	0.008	0.000	0.001	0.000	0.000	0.003	0.004	0.002	0.000	0.000	0.000	0.008
Mg	0.612	0.556	0.632	0.736	0.722	0.726	0.676	0.646	0.633	0.550	0.533	0.643	0.715	0.729	0.691	0.688	0.491	0.463	0.680	0.718	0.691	0.667	0.604	0.424
Ca	0.001	0.001	0.000	0.000	0.003	0.003	0.000	0.000	0.000	0.004	0.002	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.003	0.000	0.002	0.000	0.001	0.001
Na	0.073	0.138	0.159	0.115	0.107	0.104	0.112	0.139	0.123	0.104	0.154	0.132	0.112	0.099	0.129	0.130	0.178	0.182	0.126	0.107	0.119	0.132	0.168	0.198
K	2.101	2.007	1.988	2.040	2.003	2.028	2.013	1.996	1.992	2.050	2.021	2.007	1.997	2.014	1.983	2.010	1.989	2.031	2.036	2.041	2.044	1.997	2.000	1.962
Cr	0.001	0.002	0.000	0.000	0.004	0.000	0.005	0.003	0.001	0.001	0.000	0.001	0.000	0.001	0.001	0.004	0.001	0.004	0.000	0.001	0.002	0.003	0.001	0.003
Total	14.197	14.166	14.179	14.181	14.140	14.180	14.165	14.148	14.132	14.159	14.186	14.150	14.149	14.134	14.159	14.140	14.135	14.210	14.182	14.183	14.159	14.148	14.189	14.171

Total Fe as FeO

Rock type	**Pelitic schist**																							
Sample No.	**KG1251**																							
Analysis No.	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph
Weight %																								
SiO_2	48.74	48.63	49.11	49.09	48.00	49.07	49.09	48.32	48.73	47.09	50.40	50.27	50.66	50.81	50.02	49.61	49.96	50.10	50.05	50.35	50.40	49.15	49.58	50.07
TiO_2	0.60	0.62	0.51	0.40	0.55	0.55	0.58	0.58	0.63	0.49	0.17	0.16	0.14	0.21	0.26	0.31	0.33	0.26	0.16	0.17	0.19	0.61	0.51	0.28
Al_2O_3	31.03	31.10	29.72	29.67	31.37	29.91	29.58	31.66	31.04	30.20	28.27	28.38	28.66	28.52	28.85	29.54	29.50	28.85	28.92	28.89	28.51	30.13	29.06	29.33
FeO	1.20	1.16	1.19	1.26	1.10	1.50	1.30	1.10	1.16	1.48	1.24	1.22	1.20	1.27	1.25	1.40	1.21	1.40	1.20	1.18	1.41	1.15	1.36	1.17
MnO	0.01	0.01	0.00	0.07	0.01	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.01	0.05	0.07	0.02	0.00	0.00	0.01	0.00	0.00
MgO	2.77	2.59	3.29	3.17	2.53	3.23	3.03	2.43	2.80	4.04	3.85	3.65	3.66	3.81	3.66	3.44	3.49	3.54	3.52	3.65	3.76	2.81	3.29	3.48
CaO	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.04	0.05	0.04	0.09	0.06	0.09	0.02	0.01	0.00
Na_2O	0.57	0.57	0.56	0.52	0.64	0.52	0.59	0.65	0.50	0.21	0.36	0.36	0.35	0.38	0.48	0.47	0.48	0.44	0.45	0.42	0.42	0.54	0.47	0.44
K_2O	11.67	11.74	11.71	11.83	11.44	11.82	11.81	11.76	12.04	11.97	12.04	11.79	11.99	11.91	11.70	11.30	11.71	11.48	11.50	11.49	11.58	11.59	11.74	11.81
Cr_2O_3	0.01	0.00	0.05	0.01	0.00	0.01	0.01	0.03	0.01	0.00	0.04	0.00	0.01	0.00	0.00	0.00	0.03	0.03	0.00	0.02	0.00	0.01	0.01	0.02
Total	96.60	96.41	96.13	96.01	95.66	96.63	96.00	96.53	96.91	95.48	96.41	95.82	96.66	96.93	96.23	96.11	96.81	96.22	95.91	96.22	96.36	96.01	96.03	96.59
Cation O=22																								
Si	6.445	6.444	6.529	6.540	6.403	6.504	6.542	6.396	6.435	6.341	6.683	6.691	6.688	6.691	6.634	6.578	6.588	6.642	6.649	6.662	6.673	6.531	6.599	6.614
Ti	0.059	0.061	0.050	0.040	0.056	0.055	0.058	0.058	0.062	0.049	0.017	0.016	0.014	0.021	0.026	0.031	0.033	0.026	0.016	0.017	0.019	0.060	0.051	0.028
Al	4.836	4.857	4.657	4.659	4.932	4.672	4.647	4.939	4.830	4.791	4.418	4.453	4.459	4.425	4.509	4.617	4.584	4.509	4.527	4.505	4.449	4.718	4.558	4.566
Fe	0.133	0.128	0.132	0.140	0.123	0.166	0.145	0.122	0.128	0.167	0.138	0.135	0.132	0.140	0.138	0.155	0.133	0.155	0.133	0.130	0.156	0.128	0.151	0.129
Mn	0.001	0.001	0.000	0.007	0.001	0.003	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.001	0.005	0.008	0.003	0.000	0.000	0.001	0.000	0.000
Mg	0.545	0.511	0.652	0.630	0.503	0.638	0.602	0.480	0.551	0.810	0.762	0.725	0.720	0.748	0.724	0.680	0.687	0.700	0.698	0.720	0.742	0.556	0.653	0.685
Ca	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.001	0.001	0.000	0.002	0.000	0.000	0.002	0.000	0.006	0.007	0.006	0.012	0.009	0.012	0.003	0.001	0.000
Na	0.147	0.146	0.145	0.133	0.165	0.135	0.152	0.166	0.127	0.056	0.093	0.092	0.089	0.098	0.124	0.121	0.123	0.114	0.117	0.106	0.108	0.140	0.120	0.114
K	1.968	1.984	1.985	2.011	1.946	1.999	2.008	1.985	2.027	2.056	2.036	2.002	2.020	2.000	1.980	1.912	1.969	1.941	1.949	1.939	1.956	1.964	1.994	1.990
Cr	0.001	0.000	0.005	0.001	0.000	0.001	0.001	0.003	0.001	0.000	0.004	0.000	0.001	0.000	0.000	0.000	0.003	0.003	0.000	0.002	0.000	0.001	0.001	0.002
Total	14.135	14.132	14.155	14.162	14.131	14.172	14.156	14.151	14.164	14.270	14.154	14.114	14.122	14.125	14.137	14.099	14.132	14.104	14.104	14.091	14.116	14.102	14.128	14.126

Total Fe as FeO

Table A5 **Chemical compositions of white micas**

Rock type	**Pelitic schist**																							
Sample No.	**KG1252B**																							
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10
	Ms	Ms	Ms	Ms	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph
Weight %																								
SiO_2	47.79	46.92	47.35	47.30	48.08	48.32	48.74	48.93	49.70	48.90	48.66	48.48	48.51	48.99	54.49	54.82	54.27	54.88	54.25	54.68	54.64	54.49	53.54	52.24
TiO_2	0.34	0.37	0.37	0.46	0.47	0.48	0.46	0.43	0.33	0.20	0.26	0.24	0.24	0.24	0.21	0.13	0.12	0.15	0.19	0.14	0.17	0.18	0.20	0.27
Al_2O_3	34.95	34.84	34.87	34.31	33.83	33.06	31.64	30.68	31.06	31.81	31.44	31.45	30.91	31.19	26.90	26.38	27.09	26.79	27.36	26.63	26.10	26.60	27.83	28.33
FeO	1.27	1.25	1.18	1.34	1.35	1.53	1.53	1.66	1.74	2.07	1.91	2.02	1.71	1.67	2.33	2.51	2.71	2.74	2.50	2.72	2.53	2.49	1.77	2.02
MnO	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.01	0.00	0.00	0.03	0.01	0.03	0.00	0.00	0.02	0.04	0.00
MgO	1.21	1.41	1.19	1.31	1.45	1.65	2.09	2.22	2.34	2.42	2.38	2.42	2.28	2.19	3.62	3.69	3.52	3.69	3.49	3.64	3.69	3.64	3.40	3.20
CaO	0.01	0.03	0.00	0.01	0.00	0.04	0.01	0.00	0.00	0.01	0.01	0.00	0.03	0.04	0.00	0.02	0.01	0.00	0.01	0.01	0.00	0.03	0.04	0.06
Na_2O	0.55	0.59	0.63	0.57	0.79	0.66	0.56	0.64	0.78	0.81	0.66	0.92	0.66	0.48	0.15	0.14	0.13	0.19	0.21	0.14	0.14	0.16	0.30	0.37
K_2O	10.63	10.50	10.78	10.54	10.32	10.42	10.61	10.02	10.33	10.06	10.49	10.13	9.77	10.58	10.60	10.65	10.62	10.66	10.48	10.73	10.71	10.34	10.65	10.43
Cr_2O_3	0.05	0.01	0.06	0.01	0.03	0.00	0.04	0.00	0.03	0.00	0.00	0.00	0.03	0.01	0.02	0.02	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.02
Total	96.80	95.95	96.42	95.87	96.31	96.17	95.66	94.58	96.32	96.30	95.81	95.65	94.16	95.41	98.33	98.36	98.50	99.13	98.52	98.70	97.99	97.94	97.76	96.94
Cation O=22																								
Si	6.253	6.201	6.229	6.256	6.321	6.370	6.465	6.545	6.542	6.446	6.457	6.442	6.515	6.515	7.005	7.051	6.979	7.013	6.964	7.020	7.060	7.028	6.918	6.820
Ti	0.034	0.036	0.037	0.046	0.046	0.048	0.045	0.044	0.033	0.019	0.026	0.024	0.024	0.024	0.020	0.012	0.012	0.014	0.018	0.013	0.017	0.018	0.019	0.027
Al	5.390	5.427	5.407	5.349	5.242	5.136	4.947	4.837	4.819	4.941	4.917	4.926	4.892	4.889	4.076	3.999	4.107	4.035	4.140	4.030	3.974	4.043	4.237	4.359
Fe	0.139	0.138	0.130	0.148	0.148	0.169	0.169	0.186	0.192	0.228	0.212	0.224	0.192	0.186	0.251	0.270	0.291	0.293	0.269	0.292	0.273	0.268	0.191	0.220
Mn	0.000	0.003	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.003	0.001	0.000	0.000	0.003	0.001	0.004	0.000	0.000	0.002	0.004	0.000
Mg	0.235	0.279	0.233	0.258	0.283	0.324	0.413	0.443	0.460	0.476	0.471	0.478	0.456	0.434	0.694	0.708	0.675	0.703	0.668	0.697	0.711	0.699	0.655	0.623
Ca	0.002	0.005	0.001	0.001	0.000	0.006	0.001	0.001	0.000	0.002	0.001	0.000	0.005	0.006	0.000	0.003	0.002	0.001	0.001	0.002	0.000	0.003	0.005	0.008
Na	0.141	0.150	0.161	0.145	0.202	0.170	0.144	0.165	0.198	0.208	0.170	0.236	0.172	0.125	0.036	0.034	0.032	0.047	0.052	0.035	0.035	0.039	0.075	0.093
K	1.774	1.770	1.809	1.778	1.731	1.753	1.795	1.710	1.735	1.691	1.775	1.717	1.674	1.794	1.739	1.748	1.743	1.739	1.716	1.757	1.764	1.702	1.756	1.737
Cr	0.005	0.001	0.006	0.001	0.003	0.000	0.004	0.000	0.003	0.000	0.000	0.000	0.004	0.001	0.002	0.002	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.002
Total	13.973	14.009	14.012	13.985	13.976	13.975	13.983	13.930	13.981	14.014	14.031	14.048	13.936	13.975	13.823	13.827	13.843	13.847	13.832	13.847	13.836	13.803	13.860	13.889
Total Fe as FeO																								

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Ms	Ms	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ms	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph
Weight %																								
SiO_2	47.75	47.59	49.57	50.57	51.32	51.30	50.07	50.22	51.62	47.32	48.75	50.57	50.60	50.64	50.98	51.50	51.68	51.47	51.76	51.79	51.90	51.89	50.79	48.87
TiO_2	0.30	0.23	0.28	0.22	0.26	0.20	0.29	0.26	0.20	0.31	0.31	0.21	0.23	0.19	0.25	0.21	0.26	0.21	0.24	0.22	0.25	0.27	0.29	0.35
Al_2O_3	33.21	32.98	27.88	26.61	26.95	26.91	28.91	28.63	27.31	33.53	29.98	26.52	26.46	26.47	26.57	26.29	26.41	26.34	26.61	26.55	26.78	26.94	27.46	32.77
FeO	2.80	2.75	3.06	3.22	3.68	3.77	3.30	3.27	3.52	2.30	2.99	3.19	3.21	3.47	3.46	3.43	3.52	3.64	3.57	3.54	3.61	3.48	3.35	2.91
MnO	0.00	0.03	0.02	0.00	0.02	0.08	0.03	0.07	0.05	0.05	0.02	0.01	0.10	0.00	0.03	0.06	0.00	0.00	0.12	0.02	0.01	0.03	0.03	0.02
MgO	1.32	1.30	2.81	3.04	3.32	3.33	2.60	2.69	3.28	1.01	2.15	3.28	3.31	3.31	3.29	3.32	3.36	3.40	3.47	3.44	3.40	3.38	3.19	1.51
CaO	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Na_2O	0.52	0.47	0.22	0.17	0.14	0.08	0.22	0.22	0.11	0.47	0.37	0.19	0.16	0.11	0.10	0.07	0.07	0.11	0.12	0.12	0.12	0.14	0.20	0.43
K_2O	10.85	11.01	10.82	10.74	11.07	11.17	11.01	11.03	11.05	10.59	10.71	10.65	10.95	10.83	11.02	11.14	11.08	10.99	11.11	11.15	11.06	11.01	11.00	10.98
Cr_2O_3	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.02	0.06	0.04	0.01	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.05	0.02
Total	96.77	96.40	94.68	94.57	96.76	96.85	96.42	96.39	97.15	95.60	95.35	94.64	95.07	95.06	95.72	96.03	96.37	96.15	96.99	96.86	97.13	97.14	96.37	97.88
Cation O=22																								
Si	6.312	6.322	6.701	6.835	6.805	6.804	6.653	6.676	6.806	6.306	6.542	6.829	6.820	6.825	6.827	6.873	6.869	6.861	6.845	6.855	6.846	6.838	6.755	6.386
Ti	0.030	0.023	0.029	0.022	0.026	0.020	0.029	0.025	0.020	0.031	0.032	0.021	0.024	0.019	0.026	0.021	0.026	0.021	0.024	0.022	0.025	0.027	0.029	0.035
Al	5.174	5.163	4.441	4.239	4.212	4.206	4.527	4.486	4.243	5.266	4.740	4.220	4.203	4.204	4.194	4.136	4.138	4.139	4.146	4.142	4.163	4.184	4.304	5.047
Fe	0.309	0.305	0.345	0.364	0.408	0.418	0.367	0.363	0.388	0.257	0.336	0.360	0.362	0.391	0.388	0.383	0.391	0.406	0.395	0.392	0.398	0.383	0.372	0.318
Mn	0.000	0.004	0.002	0.000	0.003	0.009	0.004	0.008	0.005	0.006	0.002	0.002	0.011	0.000	0.004	0.007	0.000	0.000	0.013	0.002	0.001	0.004	0.004	0.002
Mg	0.261	0.256	0.566	0.613	0.655	0.659	0.514	0.533	0.644	0.201	0.430	0.660	0.665	0.664	0.656	0.661	0.665	0.675	0.683	0.678	0.669	0.663	0.633	0.295
Ca	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000
Na	0.133	0.122	0.058	0.045	0.035	0.021	0.056	0.055	0.028	0.120	0.095	0.050	0.042	0.029	0.027	0.019	0.017	0.027	0.029	0.030	0.031	0.037	0.050	0.108
K	1.830	1.866	1.866	1.852	1.873	1.891	1.866	1.871	1.859	1.800	1.833	1.835	1.882	1.862	1.882	1.896	1.878	1.868	1.875	1.883	1.861	1.851	1.866	1.831
Cr	0.002	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.006	0.002	0.006	0.004	0.001	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.005	0.002
Total	14.051	14.065	14.012	13.971	14.017	14.029	14.016	14.019	13.995	13.989	14.018	13.980	14.015	13.998	14.005	13.996	13.984	13.997	14.011	14.007	13.993	13.987	14.020	14.024
Total Fe as FeO																								

Table A5 **Chemical compositions of white micas**

Rock type	**Garnet and chloritoid-bearing pelitic schist**																								
Sample No.	**KG1244**																								
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1	2	3	4	5	6	7	
	Ms	Ms	Ms	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ms	Ms	Ms	Ms	Ms	Ms	Ms	Ms	Ms	Ms	Ph	Ph	Ms	Ms	
Weight %																									
SiO_2	46.33	46.52	47.17	48.80	49.34	51.15	51.80	51.23	51.23	50.68	45.82	46.26	45.66	46.01	46.12	45.75	45.37	46.01	47.24	45.73	49.09	49.53	46.17	45.85	
TiO_2	0.28	0.31	0.33	0.30	0.32	0.26	0.19	0.23	0.22	0.25	0.26	0.30	0.27	0.21	0.29	0.27	0.18	0.30	0.27	0.20	0.28	0.12	0.16	0.17	
Al_2O_3	35.03	35.12	34.58	31.16	29.77	26.92	26.75	27.09	27.27	27.83	34.45	34.76	35.01	35.87	35.78	35.20	35.04	34.39	33.11	33.15	33.98	30.38	33.75	33.77	
FeO	2.45	2.20	2.48	2.86	3.26	3.59	3.51	3.86	3.69	3.18	1.96	2.18	2.23	1.84	2.00	2.18	2.28	2.26	2.89	3.21	2.45	3.19	2.47	2.19	
MnO	0.00	0.01	0.10	0.00	0.01	0.00	0.04	0.05	0.03	0.02	0.03	0.03	0.19	0.00	0.00	0.03	0.01	0.03	0.03	0.02	0.00	0.05	0.04	0.00	
MgO	0.78	0.83	1.17	2.06	2.55	3.37	3.31	3.29	3.26	3.08	0.70	0.81	0.68	0.52	0.70	0.67	0.71	0.64	1.08	0.86	1.31	1.03	0.88	0.81	
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	
Na_2O	0.52	0.66	0.52	0.32	0.21	0.16	0.12	0.13	0.17	0.26	0.55	0.49	0.62	0.67	0.66	0.59	0.54	0.51	0.49	0.61	0.56	0.44	0.49	0.52	
K_2O	10.64	10.71	10.86	10.99	11.22	10.96	10.98	10.92	10.92	10.75	10.77	10.89	10.63	10.64	10.80	10.86	10.72	10.78	10.78	10.88	10.87	10.48	11.03	10.98	
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.05	0.02	0.02	0.03	0.03	0.11	0.05	0.06	0.00	0.04	0.07	0.03	0.00	0.00	0.00	0.01	0.01	
Total	96.04	96.36	97.21	96.48	96.68	96.43	96.70	96.85	96.80	96.06	94.57	95.76	95.41	95.82	96.42	95.56	94.89	95.00	95.93	94.65	98.54	95.21	94.99	94.31	
Cation O=22																									
Si	6.158	6.160	6.203	6.470	6.552	6.800	6.856	6.788	6.784	6.744	6.181	6.170	6.119	6.114	6.103	6.119	6.111	6.187	6.304	6.215	6.347	6.632	6.225	6.218	
Ti	0.028	0.031	0.032	0.030	0.032	0.026	0.019	0.023	0.022	0.025	0.026	0.030	0.027	0.021	0.029	0.027	0.019	0.031	0.027	0.021	0.027	0.012	0.016	0.018	
Al	5.487	5.481	5.359	4.870	4.658	4.219	4.174	4.231	4.256	4.365	5.478	5.464	5.529	5.618	5.580	5.549	5.562	5.451	5.208	5.311	5.179	4.794	5.363	5.397	
Fe	0.273	0.243	0.273	0.317	0.362	0.400	0.389	0.428	0.408	0.353	0.221	0.244	0.250	0.205	0.222	0.244	0.257	0.254	0.323	0.364	0.265	0.357	0.278	0.249	
Mn	0.000	0.001	0.011	0.000	0.001	0.000	0.005	0.005	0.003	0.003	0.004	0.004	0.021	0.000	0.000	0.004	0.001	0.003	0.004	0.002	0.000	0.005	0.004	0.000	
Mg	0.154	0.164	0.230	0.406	0.504	0.669	0.653	0.650	0.644	0.612	0.141	0.161	0.136	0.102	0.138	0.133	0.143	0.129	0.215	0.173	0.252	0.205	0.177	0.164	
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000	
Na	0.133	0.169	0.133	0.082	0.055	0.040	0.030	0.034	0.044	0.066	0.145	0.127	0.160	0.173	0.170	0.153	0.140	0.133	0.126	0.161	0.141	0.114	0.129	0.138	
K	1.805	1.808	1.822	1.859	1.900	1.859	1.854	1.846	1.845	1.824	1.854	1.853	1.816	1.804	1.824	1.853	1.843	1.849	1.835	1.886	1.794	1.790	1.897	1.900	
Cr	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.005	0.002	0.002	0.003	0.003	0.012	0.005	0.006	0.000	0.004	0.007	0.003	0.000	0.000	0.000	0.001	0.001	
Total	14.039	14.058	14.063	14.034	14.064	14.013	13.980	14.010	14.009	13.993	14.052	14.057	14.072	14.042	14.072	14.082	14.079	14.045	14.045	14.133	14.004	13.911	14.091	14.085	

Total Fe as FeO

Rock type	**Garnet and chloritoid-bearing pelitic schist**																								
Sample No.	**KG1244**																								
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
	Ms	Ms	Ms	Ms	Ph	Ph	Ph	Ms	Ms	Ms	Ms	Ms	Ms	Ms	Ms	Ph	Ph	Ph	Ph	Ms	Ms	Ms	Ms	Ms	
Weight %																									
SiO_2	47.52	47.31	47.04	47.38	49.93	50.37	47.79	46.89	47.01	46.96	47.18	47.22	46.07	46.36	46.79	49.44	49.34	49.67	48.98	47.19	46.92	46.88	47.02	47.00	
TiO_2	0.16	0.17	0.13	0.13	0.15	0.16	0.14	0.11	0.14	0.17	0.16	0.16	0.15	0.16	0.15	0.15	0.10	0.10	0.19	0.07	0.12	0.11	0.10	0.13	
Al_2O_3	34.74	34.03	34.52	34.52	28.34	28.48	32.31	33.41	33.56	33.36	33.35	34.17	34.60	34.73	34.53	28.62	29.06	29.04	28.42	34.50	34.67	34.45	34.58	34.33	
FeO	1.90	1.93	1.85	1.84	3.00	2.95	2.44	2.07	2.21	2.42	2.28	2.52	1.96	1.78	1.80	3.06	2.88	2.86	2.80	1.96	1.80	1.93	1.84	1.98	
MnO	0.00	0.03	0.00	0.00	0.00	0.05	0.07	0.00	0.00	0.04	0.02	0.00	0.08	0.06	0.01	0.02	0.01	0.00	0.00	0.03	0.01	0.02	0.01	0.03	
MgO	0.84	0.99	0.90	0.95	2.57	2.55	1.39	0.99	1.04	1.21	1.13	1.00	0.80	0.87	0.84	2.53	2.44	2.43	2.30	0.97	0.87	0.91	0.87	0.91	
CaO	0.01	0.02	0.02	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.03	0.01	0.00	0.03	0.01	0.00	0.03	0.00	0.02	0.00	0.01	0.00	0.01	
Na_2O	0.57	0.69	0.96	0.98	0.50	0.49	0.80	0.81	0.82	0.82	0.75	0.71	0.93	0.92	1.06	0.51	0.51	0.50	0.55	1.16	1.31	1.22	1.21	1.10	
K_2O	11.34	11.04	10.68	10.64	10.79	10.85	10.78	10.99	10.89	10.80	10.78	10.96	10.51	10.60	10.59	10.81	10.88	10.86	10.54	10.64	10.53	10.38	10.56	10.54	
Cr_2O_3	0.00	0.00	0.02	0.03	0.03	0.02	0.06	0.00	0.01	0.00	0.00	0.00	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.04	0.04	0.00	0.03	0.04	
Total	97.08	96.21	96.10	96.49	95.31	95.91	95.80	95.28	95.67	95.79	95.66	96.77	95.13	95.50	95.80	95.15	95.23	95.50	93.78	96.59	96.27	95.90	96.22	96.07	
Cation O=22																									
Si	6.247	6.275	6.236	6.252	6.701	6.714	6.379	6.289	6.279	6.273	6.299	6.244	6.177	6.186	6.222	6.655	6.630	6.651	6.672	6.232	6.212	6.227	6.227	6.237	
Ti	0.015	0.016	0.013	0.013	0.015	0.016	0.014	0.011	0.014	0.017	0.016	0.016	0.015	0.016	0.015	0.015	0.010	0.010	0.020	0.007	0.012	0.011	0.010	0.013	
Al	5.383	5.319	5.393	5.368	4.483	4.474	5.083	5.282	5.283	5.251	5.247	5.324	5.469	5.461	5.412	4.539	4.603	4.583	4.563	5.370	5.411	5.393	5.397	5.370	
Fe	0.209	0.214	0.205	0.203	0.337	0.329	0.273	0.232	0.247	0.271	0.254	0.279	0.220	0.199	0.200	0.344	0.324	0.320	0.318	0.216	0.199	0.215	0.203	0.220	
Mn	0.000	0.003	0.000	0.000	0.000	0.006	0.008	0.000	0.000	0.004	0.002	0.000	0.009	0.007	0.002	0.003	0.001	0.000	0.000	0.003	0.002	0.002	0.002	0.003	
Mg	0.165	0.196	0.177	0.187	0.513	0.507	0.277	0.198	0.207	0.240	0.226	0.197	0.159	0.172	0.167	0.508	0.489	0.485	0.466	0.191	0.172	0.180	0.172	0.180	
Ca	0.001	0.002	0.002	0.003	0.000	0.000	0.001	0.002	0.000	0.001	0.001	0.005	0.002	0.000	0.004	0.002	0.000	0.005	0.001	0.003	0.000	0.002	0.000	0.001	
Na	0.145	0.177	0.247	0.250	0.130	0.126	0.208	0.210	0.212	0.213	0.194	0.182	0.242	0.238	0.273	0.133	0.134	0.130	0.146	0.298	0.336	0.314	0.310	0.282	
K	1.901	1.868	1.806	1.791	1.848	1.845	1.835	1.881	1.855	1.841	1.836	1.848	1.799	1.804	1.797	1.856	1.865	1.856	1.830	1.792	1.778	1.759	1.784	1.785	
Cr	0.000	0.000	0.002	0.003	0.003	0.002	0.007	0.000	0.001	0.000	0.000	0.000	0.001	0.003	0.001	0.000	0.000	0.000	0.000	0.004	0.005	0.000	0.003	0.004	
Total	14.068	14.072	14.080	14.070	14.031	14.018	14.084	14.104	14.098	14.111	14.076	14.094	14.093	14.087	14.092	14.055	14.057	14.040	14.015	14.118	14.126	14.102	14.109	14.096	

Total Fe as FeO

Table A5 **Chemical compositions of white micas**

Rock type	**Garnet and chloritoid-bearing pelitic schist**																								
Sample No.	**KG1244**																								
Analysis No.	Ms	Ms	Ms	Ms	Ms	Ms	Ph	Ph	Ph	Ph	Ph	Ph	Ms	Ms	Ms	Ms	Ms	Ph	Ph	Ph	Ph	Ph	Ms	Ms	
	1	2	3	4	5	6	7	8	9	10	11	12	13	1	1	1	1	1	1	1	1	1	1	1	
Weight %																									
SiO_2	47.27	46.88	47.18	46.83	47.48	47.22	48.37	48.04	47.35	47.59	47.64	47.56	46.16	45.99	46.69	46.70	46.98	47.61	48.43	49.74	48.95	46.98	46.74	46.60	
TiO_2	0.14	0.11	0.16	0.15	0.13	0.16	0.17	0.13	0.15	0.12	0.10	0.12	0.12	0.09	0.13	0.14	0.13	0.13	0.17	0.15	0.13	0.16	0.15	0.11	
Al_2O_3	34.02	34.34	33.48	33.77	34.60	34.54	31.31	30.39	31.47	30.34	30.08	30.34	34.78	35.29	34.87	34.24	34.18	31.23	30.24	27.70	27.53	32.13	34.54	34.67	
FeO	1.91	1.83	1.88	2.12	2.01	2.35	2.88	3.31	3.47	3.42	3.42	3.53	2.31	2.12	1.87	2.02	1.98	2.90	3.27	3.01	2.69	2.33	1.97	1.80	
MnO	0.02	0.01	0.03	0.00	0.01	0.04	0.08	0.00	0.01	0.00	0.00	0.00	0.03	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.05	0.02	0.00	0.02	
MgO	0.92	0.85	0.95	0.85	0.87	1.10	1.59	1.68	1.90	2.15	2.29	2.14	1.07	0.94	0.83	0.95	0.96	1.60	1.84	2.52	2.46	1.18	0.91	0.84	
CaO	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	
Na_2O	0.88	0.98	0.69	0.76	0.92	1.06	0.78	0.70	0.78	0.66	0.62	0.66	0.96	1.17	1.04	1.04	1.04	0.75	0.66	0.50	0.45	0.60	0.93	1.09	
K_2O	10.91	10.84	11.11	10.97	11.11	10.67	10.88	10.78	10.87	10.79	10.74	10.78	10.97	10.51	10.99	10.67	10.58	10.92	10.81	10.82	10.69	11.12	10.88	10.71	
Cr_2O_3	0.00	0.00	0.00	0.01	0.03	0.01	0.04	0.00	0.01	0.03	0.00	0.03	0.04	0.00	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.06	0.00	0.01	
Total	96.08	95.84	95.49	95.47	97.16	97.15	96.09	95.04	96.01	95.09	94.90	95.15	96.43	96.15	96.44	95.81	95.85	95.15	95.43	94.44	92.97	94.59	96.12	95.85	
Cation O=22																									
Si	6.276	6.240	6.307	6.268	6.242	6.212	6.452	6.490	6.351	6.439	6.455	6.434	6.136	6.112	6.186	6.222	6.247	6.420	6.513	6.742	6.731	6.361	6.209	6.201	
Ti	0.014	0.011	0.016	0.015	0.013	0.015	0.017	0.013	0.015	0.012	0.011	0.012	0.012	0.008	0.012	0.014	0.013	0.013	0.017	0.015	0.014	0.017	0.015	0.011	
Al	5.323	5.386	5.275	5.326	5.362	5.356	4.922	4.838	4.976	4.838	4.804	4.838	5.449	5.527	5.444	5.377	5.358	4.963	4.793	4.424	4.462	5.127	5.407	5.437	
Fe	0.212	0.204	0.211	0.237	0.221	0.259	0.321	0.373	0.389	0.386	0.388	0.400	0.257	0.236	0.208	0.225	0.220	0.327	0.368	0.341	0.310	0.264	0.219	0.200	
Mn	0.003	0.001	0.003	0.000	0.001	0.005	0.009	0.000	0.002	0.000	0.000	0.000	0.003	0.001	0.000	0.004	0.000	0.000	0.000	0.000	0.006	0.003	0.000	0.003	
Mg	0.182	0.168	0.189	0.169	0.171	0.215	0.316	0.339	0.380	0.433	0.463	0.431	0.212	0.186	0.163	0.189	0.189	0.322	0.368	0.509	0.505	0.238	0.180	0.166	
Ca	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.003	0.000	0.000	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	
Na	0.227	0.254	0.179	0.197	0.235	0.271	0.202	0.184	0.203	0.174	0.164	0.174	0.248	0.302	0.268	0.268	0.269	0.196	0.172	0.130	0.120	0.157	0.240	0.282	
K	1.849	1.841	1.895	1.873	1.863	1.791	1.851	1.858	1.860	1.862	1.857	1.860	1.860	1.782	1.858	1.813	1.795	1.879	1.855	1.870	1.875	1.920	1.845	1.818	
Cr	0.000	0.000	0.000	0.001	0.003	0.001	0.004	0.000	0.001	0.003	0.000	0.003	0.004	0.000	0.002	0.002	0.000	0.000	0.001	0.000	0.000	0.007	0.000	0.001	
Total	14.086	14.104	14.075	14.087	14.112	14.125	14.094	14.099	14.177	14.147	14.142	14.151	14.180	14.158	14.142	14.115	14.093	14.122	14.087	14.032	14.022	14.094	14.114	14.119	
Total Fe as FeO																									

Rock type	**Garnet and chloritoid-bearing pelitic schist**																								
Sample No.	**KG1244**																								
Analysis No.	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	
	Ms	Ms	Ms	Ph	Ph	Ph	Ms	Ms	Ms	Ph	Ph	Ph	Ph	Ph	Ph	Ms	Ms	Ms	Ph	Ph	Ph	Ph	Ph	Ms	
Weight %																									
SiO_2	47.33	47.07	46.83	47.51	49.79	48.28	46.83	46.84	47.42	49.04	47.97	49.70	50.03	50.33	49.98	46.33	47.70	46.92	48.37	49.41	50.30	50.91	50.40	46.90	
TiO_2	0.21	0.34	0.25	0.28	0.23	0.30	0.19	0.24	0.26	0.24	0.32	0.27	0.22	0.26	0.23	0.28	0.30	0.26	0.36	0.26	0.32	0.25	0.27	0.23	
Al_2O_3	36.18	36.28	35.04	33.54	27.68	30.86	35.94	35.04	33.98	29.25	31.39	28.61	28.65	28.38	28.46	34.72	34.60	35.33	31.81	27.55	27.91	27.91	27.92	35.13	
FeO	1.99	2.05	1.67	2.28	3.82	3.27	1.52	1.73	2.06	3.71	3.25	3.53	3.31	3.21	3.30	1.71	1.61	1.59	2.84	3.45	3.26	3.14	2.63	1.65	
MnO	0.05	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.01	0.03	0.00	0.01	0.00	
MgO	0.55	0.46	0.92	1.29	2.81	2.03	0.68	0.86	1.19	2.41	1.05	2.75	2.80	2.69	2.74	0.83	0.95	0.83	1.71	2.57	2.79	2.80	2.66	0.88	
CaO	0.02	0.03	0.00	0.01	0.00	0.00	0.02	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.06	0.01	0.01	0.01	0.00	0.09	0.07	0.03	
Na_2O	1.40	1.55	1.20	0.99	0.35	0.61	1.38	1.29	1.18	0.58	0.73	0.47	0.03	0.28	0.33	1.06	1.04	1.26	0.79	0.51	0.42	0.40	0.35	1.19	
K_2O	9.67	9.33	9.87	10.26	10.61	10.74	9.95	9.77	10.19	10.36	10.42	10.56	10.87	10.96	10.81	10.32	10.07	10.11	10.40	10.34	10.76	10.30	10.54	9.94	
Cr_2O_3	0.04	0.04	0.03	0.02	0.03	0.06	0.03	0.01	0.03	0.00	0.04	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.06	0.03	0.01	0.06	0.00	0.04	
Total	97.42	97.19	95.81	96.18	95.32	96.16	96.54	95.77	96.31	95.58	95.22	95.91	95.94	96.10	95.83	95.28	96.37	96.31	96.36	94.15	95.81	95.85	94.84	95.98	
Cation O=22																									
Si	6.160	6.137	6.197	6.292	6.704	6.443	6.151	6.201	6.266	6.578	6.449	6.640	6.672	6.704	6.678	6.186	6.272	6.184	6.414	6.719	6.721	6.769	6.766	6.196	
Ti	0.020	0.033	0.024	0.028	0.023	0.030	0.019	0.024	0.026	0.024	0.032	0.027	0.022	0.026	0.023	0.028	0.030	0.026	0.035	0.027	0.032	0.025	0.027	0.023	
Al	5.550	5.574	5.465	5.236	4.392	4.854	5.564	5.466	5.292	4.624	4.974	4.506	4.503	4.455	4.481	5.464	5.362	5.487	4.971	4.415	4.396	4.374	4.417	5.471	
Fe	0.217	0.223	0.185	0.253	0.430	0.365	0.167	0.191	0.228	0.416	0.365	0.394	0.369	0.357	0.368	0.190	0.177	0.175	0.315	0.393	0.365	0.349	0.295	0.182	
Mn	0.005	0.005	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.000	0.000	0.000	0.000	0.003	0.000	0.001	0.001	0.003	0.000	0.001	0.000	
Mg	0.107	0.089	0.181	0.254	0.563	0.405	0.132	0.170	0.234	0.481	0.210	0.548	0.557	0.534	0.545	0.165	0.186	0.162	0.337	0.522	0.556	0.556	0.533	0.174	
Ca	0.002	0.005	0.000	0.002	0.000	0.000	0.002	0.000	0.002	0.000	0.003	0.000	0.003	0.000	0.000	0.000	0.008	0.002	0.001	0.001	0.001	0.013	0.010	0.004	
Na	0.352	0.393	0.308	0.254	0.092	0.159	0.352	0.332	0.301	0.151	0.191	0.122	0.008	0.073	0.085	0.275	0.266	0.322	0.202	0.134	0.110	0.102	0.090	0.304	
K	1.606	1.552	1.667	1.733	1.823	1.828	1.667	1.649	1.718	1.773	1.788	1.800	1.850	1.862	1.843	1.758	1.690	1.700	1.760	1.794	1.834	1.748	1.806	1.675	
Cr	0.004	0.004	0.004	0.002	0.004	0.007	0.003	0.001	0.003	0.000	0.004	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.007	0.003	0.001	0.006	0.000	0.004	
Total	14.023	14.014	14.032	14.054	14.032	14.090	14.057	14.033	14.070	14.048	14.019	14.040	13.983	14.010	14.023	14.069	13.995	14.058	14.043	14.009	14.019	13.941	13.946	14.033	
Total Fe as FeO																									

Table A5 **Chemical compositions of white micas**

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
	Ms	Ms	Ms	Ms	Ph	Ph	Ph	Ph	Ph	Ms	Ms	Ms	Ms	Ms	Ms	Ms	Ms	Ph	Ph	Ms	Ms	Ms	Ms	Ms
Weight %																								
SiO_2	46.58	46.79	47.68	47.16	48.80	50.20	49.98	48.39	50.77	47.65	47.15	47.11	46.19	46.71	46.73	45.74	46.71	49.03	48.08	47.24	47.13	46.75	46.42	46.70
TiO_2	0.18	0.25	0.26	0.31	0.27	0.28	0.26	0.28	0.29	0.26	0.30	0.27	0.30	0.22	0.27	0.25	0.30	0.26	0.33	0.32	0.27	0.25	0.17	0.18
Al_2O_3	34.78	35.24	34.73	34.46	31.26	28.88	27.78	30.40	28.38	33.95	34.35	34.61	34.51	34.43	34.99	34.44	34.00	29.85	32.03	33.20	33.56	35.56	34.95	35.03
FeO	1.82	1.55	1.75	1.76	2.79	2.89	3.28	2.74	3.15	2.00	1.78	1.70	1.38	1.58	1.77	1.62	2.18	3.53	2.95	2.75	2.06	1.38	2.33	2.30
MnO	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.02	0.01	0.02	0.04	0.00	0.00	0.03	0.00	0.02	0.01
MgO	0.79	0.89	0.98	0.96	1.84	2.47	2.71	2.04	2.69	1.17	1.06	0.89	0.69	0.85	0.94	0.84	1.15	2.19	1.78	1.08	1.26	0.74	0.69	0.75
CaO	0.06	0.01	0.00	0.01	0.18	0.03	0.03	0.00	0.00	0.02	0.01	0.01	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.04	0.03	0.09	0.03
Na_2O	0.80	1.19	1.14	1.16	0.78	0.42	0.43	0.52	0.48	1.03	1.02	1.25	0.90	1.08	1.20	0.95	1.08	0.67	0.79	0.72	0.98	1.05	0.79	0.58
K_2O	9.89	9.93	10.10	10.02	9.95	10.53	10.84	10.66	10.65	10.16	10.35	9.97	10.59	9.64	9.82	9.63	10.22	10.60	10.50	10.52	9.61	10.00	10.02	11.10
Cr_2O_3	0.02	0.04	0.00	0.01	0.00	0.04	0.00	0.03	0.03	0.02	0.00	0.00	0.03	0.00	0.00	0.00	0.02	0.05	0.09	0.00	0.00	0.01	0.03	0.03
Total	94.94	95.90	96.64	95.85	95.87	95.72	95.31	95.05	96.44	96.25	96.02	95.83	94.59	94.52	95.75	93.50	95.68	96.21	96.54	95.83	94.94	95.77	95.51	96.72
Cation O=22																								
Si	6.218	6.185	6.258	6.245	6.481	6.687	6.721	6.507	6.725	6.291	6.243	6.238	6.208	6.250	6.191	6.194	6.224	6.540	6.373	6.300	6.293	6.180	6.183	6.175
Ti	0.018	0.025	0.026	0.030	0.027	0.028	0.026	0.028	0.028	0.026	0.030	0.027	0.030	0.022	0.027	0.026	0.030	0.026	0.033	0.032	0.027	0.025	0.017	0.018
Al	5.472	5.490	5.372	5.378	4.893	4.534	4.403	4.818	4.431	5.282	5.361	5.401	5.467	5.430	5.463	5.497	5.340	4.693	5.005	5.218	5.282	5.540	5.487	5.459
Fe	0.203	0.171	0.192	0.195	0.310	0.322	0.369	0.308	0.349	0.221	0.197	0.188	0.155	0.177	0.196	0.183	0.243	0.393	0.327	0.307	0.230	0.152	0.260	0.255
Mn	0.004	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.000	0.002	0.001	0.002	0.005	0.000	0.000	0.004	0.000	0.002	0.001
Mg	0.158	0.176	0.192	0.189	0.365	0.490	0.543	0.409	0.531	0.230	0.209	0.176	0.138	0.169	0.186	0.170	0.228	0.435	0.351	0.215	0.251	0.146	0.136	0.149
Ca	0.008	0.001	0.000	0.001	0.025	0.004	0.004	0.000	0.000	0.003	0.002	0.002	0.000	0.001	0.003	0.002	0.000	0.000	0.000	0.000	0.006	0.004	0.013	0.005
Na	0.206	0.304	0.291	0.298	0.202	0.108	0.113	0.135	0.124	0.262	0.261	0.321	0.234	0.280	0.307	0.251	0.280	0.172	0.202	0.185	0.253	0.269	0.204	0.150
K	1.684	1.675	1.692	1.693	1.685	1.789	1.859	1.828	1.800	1.711	1.748	1.684	1.815	1.646	1.660	1.665	1.737	1.804	1.776	1.790	1.637	1.686	1.703	1.873
Cr	0.002	0.004	0.000	0.001	0.000	0.004	0.000	0.003	0.003	0.002	0.000	0.000	0.003	0.000	0.000	0.000	0.002	0.005	0.009	0.000	0.000	0.001	0.003	0.003
Total	13.972	14.032	14.022	14.031	13.989	13.965	14.038	14.036	13.991	14.028	14.051	14.038	14.052	13.975	14.035	13.989	14.084	14.073	14.076	14.047	13.984	14.003	14.008	14.087

Total Fe as FeO

Rock type	**Garnet amphibolite**																	
Sample No.	**KG1252A**																	
Analysis No.	1	2	1	2	3	1	2	3	1	2	1	1	2	3	1	1	2	3
	Ms	Ph	Pg	Pg	Pg	Pg	Pg	Pg	Ph	Ms	Pg	Pg	Pg	Pg	Pg	Ms	Ms	Ms
Weight %																		
SiO_2	44.77	46.91	47.82	48.09	48.01	45.43	45.54	46.01	50.15	48.49	46.81	44.05	41.72	45.05	45.52	45.66	47.24	46.57
TiO_2	0.23	0.61	0.08	0.08	0.03	0.28	0.10	0.40	0.23	0.44	0.03	0.05	0.07	0.05	0.02	0.05	0.07	0.04
Al_2O_3	33.92	31.92	42.27	42.52	42.36	35.06	33.37	32.89	34.83	34.70	40.21	41.10	35.89	41.32	41.57	39.13	41.56	41.00
FeO	3.45	3.25	0.99	1.10	1.14	2.28	2.82	2.88	2.45	3.18	0.43	0.83	1.27	0.61	0.88	2.57	1.32	1.63
MnO	0.00	0.00	0.01	0.00	0.03	0.00	0.03	0.01	0.04	0.02	0.00	0.07	0.19	0.04	0.04	0.01	0.05	0.02
MgO	0.71	1.01	0.09	0.08	0.07	0.39	0.92	1.03	0.55	0.83	0.09	0.09	0.04	0.04	0.06	0.27	0.11	0.13
CaO	0.16	0.39	0.37	0.37	0.35	0.10	0.20	0.13	0.10	0.10	0.31	1.76	4.94	1.02	0.73	0.89	0.51	0.64
Na_2O	0.58	0.27	7.48	7.82	7.59	1.36	0.44	1.07	0.44	0.55	7.38	6.57	5.86	7.23	6.93	6.08	7.22	7.18
K_2O	9.46	8.64	0.26	0.19	0.25	10.14	11.36	10.35	9.58	9.52	0.18	0.08	0.20	0.05	0.21	2.30	0.87	0.87
Cr_2O_3	0.01	0.00	0.02	0.05	0.04	0.00	0.00	0.03	0.01	0.01	0.00	0.03	0.00	0.03	0.00	0.00	0.01	0.01
Total	93.30	93.00	99.37	100.29	99.87	95.03	95.78	95.79	98.36	97.85	95.46	94.62	90.19	95.42	95.96	96.96	98.97	98.07
Cation O=22																		
Si	6.133	6.387	5.868	5.857	5.869	6.108	6.190	6.228	6.424	6.289	5.957	5.699	5.759	5.763	5.787	5.859	5.855	5.839
Ti	0.023	0.063	0.007	0.015	0.005	0.028	0.010	0.041	0.022	0.043	0.003	0.005	0.007	0.005	0.002	0.009	0.014	0.008
Al	5.477	5.122	6.113	13.051	13.083	5.555	5.346	5.247	5.257	5.304	6.032	6.267	5.839	6.230	6.229	12.664	12.981	12.914
Fe	0.396	0.370	0.101	0.239	0.249	0.257	0.321	0.325	0.262	0.345	0.046	0.090	0.147	0.065	0.093	0.590	0.293	0.364
Mn	0.000	0.000	0.001	0.000	0.007	0.000	0.003	0.001	0.004	0.003	0.000	0.007	0.022	0.004	0.004	0.003	0.011	0.004
Mg	0.146	0.205	0.016	0.031	0.026	0.079	0.187	0.208	0.104	0.160	0.018	0.017	0.008	0.007	0.011	0.110	0.045	0.051
Ca	0.024	0.057	0.049	0.102	0.099	0.014	0.029	0.019	0.013	0.014	0.042	0.244	0.730	0.139	0.099	0.262	0.146	0.182
Na	0.154	0.072	1.779	3.949	3.857	0.354	0.115	0.281	0.108	0.139	1.821	1.647	1.569	1.793	1.708	3.234	3.711	3.720
K	1.653	1.501	0.040	0.063	0.083	1.739	1.969	1.788	1.565	1.576	0.030	0.013	0.036	0.007	0.034	0.806	0.294	0.295
Cr	0.001	0.000	0.001	0.009	0.009	0.000	0.000	0.003	0.001	0.001	0.000	0.003	0.000	0.003	0.000	0.000	0.002	0.003
Total	14.008	13.776	13.977	23.317	23.288	14.133	14.169	14.141	13.761	13.873	13.949	13.992	14.117	14.016	13.968	23.537	23.352	23.380

Total Fe as FeO

Table A6 **Chemical compositions of plagioclase**

Rock type	**Pelitic schist**																							
Sample No.	**KG1251**																**KG1252B**							
Analysis No.	1	2	3	4	1	2	3	1	2	3	4	5	1	2	3	4	1	2	3	4	5	6	1	2
	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab
Weight %																								
SiO_2	68.14	68.36	68.22	68.80	68.14	67.61	67.43	68.28	68.59	67.81	68.38	66.95	67.98	67.72	68.46	68.31	68.37	67.91	68.57	68.16	68.13	67.82	64.40	64.12
TiO_2	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.04	0.03	0.00	0.00
Al_2O_3	20.79	20.52	21.30	20.99	20.79	21.03	20.67	21.13	21.04	20.70	21.47	21.61	20.99	20.73	20.76	20.83	20.50	20.78	20.34	20.07	20.54	20.30	19.83	19.72
FeO	0.07	0.03	0.05	0.07	0.01	0.03	0.05	0.14	0.04	0.05	0.03	0.10	0.02	0.02	0.03	0.07	0.05	0.03	0.01	0.04	0.04	0.00	0.09	0.03
MnO	0.03	0.00	0.01	0.02	0.01	0.00	0.00	0.01	0.00	0.02	0.00	0.02	0.05	0.02	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.04	0.01
MgO	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02
CaO	0.45	0.26	0.39	0.34	0.36	0.25	0.41	0.26	0.33	0.38	0.39	1.10	0.53	0.46	0.45	0.36	1.19	1.31	0.90	0.81	1.38	1.47	1.61	1.32
Na_2O	11.25	11.57	11.46	11.56	11.39	11.53	11.13	11.16	11.35	11.23	11.26	10.99	11.36	11.34	11.27	11.45	10.39	10.68	11.09	10.92	11.01	10.76	10.67	10.78
K_2O	0.09	0.06	0.10	0.09	0.10	0.11	0.08	0.09	0.10	0.10	0.10	0.06	0.10	0.12	0.10	0.09	0.07	0.06	0.06	0.07	0.07	0.06	0.08	0.06
Cr_2O_3	0.00	0.01	0.00	0.00	0.02	0.01	0.02	0.01	0.01	0.00	0.05	0.01	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Total	100.80	100.81	101.57	101.87	100.82	100.57	99.81	101.08	101.48	100.29	101.67	100.84	101.07	100.43	101.08	101.11	100.57	100.76	100.99	100.10	101.22	100.46	96.72	96.06
Cation O=8																								
Si	2.954	2.963	2.937	2.953	2.953	2.940	2.952	2.949	2.952	2.954	2.938	2.910	2.942	2.949	2.958	2.953	2.966	2.947	2.967	2.973	2.948	2.954	2.926	2.930
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000
Al	1.062	1.048	1.081	1.062	1.062	1.078	1.066	1.076	1.067	1.063	1.087	1.107	1.071	1.064	1.057	1.061	1.048	1.063	1.038	1.032	1.048	1.042	1.062	1.062
Fe	0.002	0.001	0.002	0.003	0.000	0.001	0.002	0.005	0.002	0.002	0.001	0.004	0.001	0.001	0.001	0.003	0.002	0.001	0.000	0.002	0.002	0.000	0.003	0.001
Mn	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.001
Mg	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Ca	0.021	0.012	0.018	0.015	0.017	0.012	0.019	0.012	0.015	0.018	0.018	0.051	0.025	0.022	0.021	0.016	0.055	0.061	0.042	0.038	0.064	0.068	0.078	0.065
Na	0.945	0.972	0.957	0.962	0.957	0.973	0.945	0.934	0.947	0.948	0.938	0.926	0.953	0.958	0.944	0.960	0.874	0.898	0.931	0.924	0.924	0.909	0.940	0.955
K	0.005	0.003	0.005	0.005	0.005	0.006	0.005	0.005	0.005	0.005	0.005	0.003	0.006	0.006	0.006	0.005	0.004	0.003	0.003	0.004	0.004	0.003	0.004	0.004
Cr	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.002	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	4.990	5.001	5.003	5.000	4.997	5.010	4.990	4.982	4.990	4.991	4.989	5.002	5.001	5.001	4.988	4.998	4.949	4.973	4.981	4.974	4.991	4.979	5.016	5.018
Total Fe as FeO																								

Rock type	**Pelitic schist**																							
Sample No.	**KG1252B**																							
Analysis No.	3	4	5	6	7	8	1	2	3	4	5	6	7	10	11	12	13	14	15	1	2	3	4	5
	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab
Weight %																								
SiO_2	64.48	66.02	66.36	67.39	68.15	67.74	68.80	69.24	67.60	68.26	67.10	67.49	67.55	66.43	67.71	67.89	67.17	67.04	66.40	67.91	68.57	68.16	68.13	67.82
TiO_2	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.03
Al_2O_3	19.57	19.80	19.74	19.34	19.40	19.44	19.84	19.78	20.02	20.13	20.76	20.63	20.66	17.77	19.81	19.99	20.34	20.55	20.87	20.78	20.34	20.07	20.54	20.30
FeO	0.03	0.00	0.00	0.04	0.05	0.03	0.00	0.06	0.07	0.03	0.00	0.07	0.09	0.14	0.09	0.16	0.12	0.22	0.23	0.03	0.01	0.04	0.04	0.00
MnO	0.00	0.04	0.01	0.04	0.00	0.01	0.00	0.00	0.02	0.00	0.02	0.01	0.01	0.02	0.03	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01
MgO	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01
CaO	1.25	1.31	1.31	1.24	1.13	1.16	0.84	0.81	1.20	1.17	1.77	1.76	1.79	0.11	0.79	0.97	1.38	1.57	1.80	1.31	0.90	0.81	1.38	1.47
Na_2O	10.85	10.80	10.65	10.57	10.45	10.24	10.26	11.03	10.44	10.56	10.05	9.99	10.16	0.11	10.71	10.71	10.67	10.68	10.44	10.68	11.09	10.92	11.01	10.76
K_2O	0.06	0.08	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.08	17.59	0.07	0.08	0.08	0.07	0.08	0.06	0.06	0.07	0.07	0.06
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Total	96.24	98.05	98.15	98.69	99.26	98.72	99.84	101.00	99.42	100.23	99.78	100.03	100.36	102.18	99.23	99.82	99.79	100.14	99.83	100.76	100.99	100.10	101.22	100.46
Cation O=8																								
Si	2.940	2.951	2.959	2.984	2.995	2.992	2.998	2.992	2.969	2.973	2.939	2.948	2.944	3.022	2.979	2.972	2.948	2.936	2.919	2.947	2.967	2.973	2.948	2.954
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Al	1.052	1.043	1.037	1.009	1.005	1.012	1.019	1.007	1.037	1.034	1.072	1.062	1.061	0.953	1.027	1.031	1.052	1.061	1.081	1.063	1.038	1.032	1.048	1.042
Fe	0.001	0.000	0.000	0.001	0.002	0.001	0.000	0.002	0.002	0.001	0.000	0.002	0.003	0.005	0.003	0.006	0.004	0.008	0.008	0.001	0.000	0.002	0.002	0.000
Mn	0.000	0.001	0.000	0.002	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Mg	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ca	0.061	0.063	0.062	0.059	0.053	0.055	0.039	0.037	0.056	0.055	0.083	0.082	0.083	0.005	0.037	0.045	0.065	0.074	0.085	0.061	0.042	0.038	0.064	0.068
Na	0.959	0.935	0.921	0.907	0.890	0.877	0.867	0.924	0.889	0.891	0.853	0.846	0.859	0.010	0.913	0.909	0.908	0.906	0.890	0.898	0.931	0.924	0.924	0.909
K	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.005	0.004	0.004	0.004	0.004	0.005	1.021	0.004	0.005	0.004	0.004	0.005	0.003	0.003	0.004	0.004	0.003
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	5.016	4.998	4.985	4.967	4.950	4.943	4.928	4.968	4.959	4.958	4.953	4.946	4.957	5.017	4.966	4.969	4.983	4.989	4.988	4.973	4.981	4.974	4.991	4.979
Total Fe as FeO																								

Table A6 **Chemical compositions of plagioclase**

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	1	2	3
	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab
Weight %																								
SiO_2	66.82	66.91	66.65	66.66	66.48	67.51	67.58	68.01	67.40	67.60	67.94	68.13	65.74	67.84	67.37	67.89	66.95	67.29	66.52	66.17	67.36	68.43	68.55	69.07
TiO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00
Al_2O_3	20.09	19.92	20.25	19.93	19.91	20.05	20.19	19.91	20.07	20.23	20.13	19.97	20.07	20.35	20.14	20.24	19.96	19.97	20.19	20.01	19.85	20.26	19.97	19.73
FeO	0.06	0.00	0.03	0.02	0.00	0.03	0.03	0.02	0.09	0.00	0.02	0.03	0.05	0.03	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.02	0.01	0.05
MnO	0.04	0.00	0.00	0.00	0.06	0.00	0.00	0.04	0.00	0.01	0.00	0.02	0.00	0.08	0.01	0.00	0.00	0.07	0.00	0.02	0.06	0.00	0.00	0.00
MgO	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01
CaO	0.43	0.43	0.33	0.34	0.24	0.24	0.36	0.29	0.33	0.31	0.30	0.26	0.47	0.54	0.46	0.43	0.38	0.26	0.31	0.31	0.32	0.37	0.32	0.41
Na_2O	11.76	11.73	11.69	11.61	11.51	11.65	11.70	11.98	11.97	11.90	11.92	11.66	11.17	11.76	11.87	11.81	11.71	11.70	11.71	11.46	11.43	11.33	10.84	10.93
K_2O	0.09	0.09	0.11	0.07	0.12	0.10	0.14	0.08	0.13	0.13	0.10	0.11	0.12	0.10	0.11	0.12	0.11	0.09	0.26	0.13	0.08	0.12	0.11	0.11
Cr_2O_3	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.02
Total	99.29	99.08	99.05	98.65	98.32	99.59	100.01	100.33	99.99	100.19	100.44	100.18	97.63	100.71	100.02	100.51	99.16	99.38	99.01	98.13	99.10	100.56	99.81	100.34
Cation O=8																								
Si	2.951	2.958	2.948	2.959	2.959	2.965	2.959	2.969	2.956	2.956	2.963	2.974	2.948	2.953	2.954	2.958	2.958	2.964	2.947	2.952	2.972	2.972	2.991	3.000
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Al	1.046	1.038	1.056	1.042	1.045	1.038	1.042	1.024	1.038	1.043	1.035	1.028	1.061	1.044	1.041	1.039	1.039	1.036	1.054	1.052	1.032	1.037	1.027	1.010
Fe	0.002	0.000	0.001	0.001	0.000	0.001	0.001	0.001	0.003	0.000	0.001	0.001	0.002	0.001	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.000	0.002
Mn	0.001	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.003	0.000	0.001	0.002	0.000	0.000	0.000
Mg	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001
Ca	0.020	0.020	0.016	0.016	0.012	0.011	0.017	0.014	0.016	0.014	0.014	0.012	0.023	0.025	0.022	0.020	0.018	0.012	0.015	0.015	0.015	0.017	0.015	0.019
Na	1.007	1.005	1.002	0.999	0.993	0.992	0.994	1.014	1.018	1.009	1.008	0.987	0.971	0.992	1.009	0.997	1.004	0.999	1.006	0.991	0.977	0.954	0.917	0.920
K	0.005	0.005	0.006	0.004	0.007	0.006	0.008	0.005	0.007	0.007	0.006	0.006	0.007	0.005	0.006	0.007	0.006	0.005	0.015	0.008	0.004	0.007	0.006	0.006
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001
Total	5.032	5.028	5.029	5.022	5.018	5.015	5.020	5.028	5.037	5.030	5.027	5.009	5.011	5.024	5.034	5.023	5.027	5.020	5.036	5.021	5.003	4.989	4.956	4.958

Total Fe as FeO

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	7	8	9	10	1	2	3	1	2
	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab
Weight %																								
SiO_2	68.82	68.48	68.22	68.14	68.36	68.22	68.80	68.14	67.61	67.43	68.28	68.59	67.81	68.38	66.95	67.98	67.72	68.46	68.31	69.00	68.79	68.85	69.02	69.57
TiO_2	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.02	0.03	0.03	0.00	0.00
Al_2O_3	19.55	19.65	19.52	20.79	20.52	21.30	20.99	20.79	21.03	20.67	21.13	21.04	20.70	21.47	21.61	20.99	20.73	20.76	20.83	20.00	20.17	20.17	20.25	20.27
FeO	0.00	0.07	0.03	0.07	0.03	0.05	0.07	0.01	0.03	0.05	0.14	0.04	0.05	0.03	0.10	0.02	0.02	0.03	0.07	0.05	0.06	0.09	0.02	0.00
MnO	0.07	0.04	0.01	0.03	0.00	0.01	0.02	0.01	0.00	0.00	0.01	0.00	0.02	0.00	0.02	0.05	0.02	0.01	0.00	0.01	0.01	0.00	0.00	0.00
MgO	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
CaO	0.37	0.42	0.40	0.45	0.26	0.39	0.34	0.36	0.25	0.41	0.26	0.33	0.38	0.39	1.10	0.53	0.46	0.45	0.36	0.18	0.36	0.29	0.38	0.23
Na_2O	10.73	10.90	10.77	11.25	11.57	11.46	11.56	11.39	11.53	11.13	11.16	11.35	11.23	11.26	10.99	11.36	11.34	11.27	11.45	11.19	11.34	11.31	11.62	11.70
K_2O	0.09	0.09	0.09	0.09	0.06	0.10	0.09	0.10	0.11	0.08	0.09	0.10	0.10	0.10	0.06	0.10	0.12	0.10	0.09	0.10	0.12	0.09	0.08	0.10
Cr_2O_3	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.01	0.02	0.01	0.01	0.00	0.05	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.01
Total	99.64	99.65	99.06	100.80	100.81	101.57	101.87	100.82	100.57	99.81	101.08	101.48	100.29	101.67	100.84	101.07	100.43	101.08	101.11	100.56	100.86	100.85	101.37	101.89
Cation O=8																								
Si	3.006	2.996	3.000	2.954	2.963	2.937	2.953	2.953	2.940	2.952	2.949	2.952	2.954	2.938	2.910	2.942	2.949	2.958	2.953	2.991	2.978	2.980	2.975	2.982
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000
Al	1.006	1.013	1.012	1.062	1.048	1.081	1.062	1.062	1.078	1.066	1.076	1.067	1.063	1.087	1.107	1.071	1.064	1.057	1.061	1.022	1.029	1.029	1.029	1.024
Fe	0.000	0.002	0.001	0.002	0.001	0.002	0.003	0.000	0.001	0.002	0.005	0.002	0.002	0.001	0.004	0.001	0.001	0.001	0.003	0.002	0.002	0.003	0.001	0.000
Mn	0.003	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Ca	0.017	0.019	0.019	0.021	0.012	0.018	0.015	0.017	0.012	0.019	0.012	0.015	0.018	0.018	0.051	0.025	0.022	0.021	0.016	0.008	0.017	0.013	0.018	0.011
Na	0.909	0.925	0.918	0.945	0.972	0.957	0.962	0.957	0.973	0.945	0.934	0.947	0.948	0.938	0.926	0.953	0.958	0.944	0.960	0.940	0.952	0.949	0.971	0.972
K	0.005	0.005	0.005	0.005	0.003	0.005	0.005	0.005	0.006	0.005	0.005	0.005	0.005	0.005	0.003	0.006	0.006	0.006	0.005	0.005	0.007	0.005	0.004	0.005
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.002	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Total	4.947	4.962	4.956	4.990	5.001	5.003	5.000	4.997	5.010	4.990	4.982	4.990	4.991	4.989	5.002	5.001	5.001	4.988	4.998	4.970	4.986	4.981	4.998	4.994

Total Fe as FeO

Table A6 **Chemical compositions of plagioclase**

Rock type	**Garnet amphibolite**																								
Sample No.	**KG1244**		**KG1252A**																						
Analysis No.	3	4	1	2	1	2	3	4	5	6	1	2	3	4	5	1	2	3	4	5	6	7	1	2	
	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Olg	Olg	Olg	Olg	Olg	Olg	Olg	Olg	Ab	Ab	Ab	Ab	
Weight %																									
SiO_2	69.31	69.25	66.72	66.10	68.02	67.57	67.92	68.23	68.58	67.41	68.56	68.55	63.21	63.13	59.99	65.29	64.81	64.07	64.72	64.86	70.63	70.63	69.49	69.77	
TiO_2	0.00	0.00	0.01	0.02	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.01	
Al_2O_3	20.05	20.04	20.22	20.55	19.37	19.35	19.25	19.23	20.15	20.03	19.81	19.75	22.95	23.06	22.15	22.52	22.60	22.45	22.67	22.21	19.85	19.85	19.34	19.96	
FeO	0.00	0.03	0.08	0.49	0.07	0.08	0.07	0.09	0.09	0.01	0.15	0.08	0.10	0.17	2.67	0.22	0.16	0.12	0.11	0.15	0.20	0.20	0.33	0.32	
MnO	0.01	0.01	0.00	0.00	0.05	0.00	0.04	0.00	0.00	0.01	0.00	0.01	0.01	0.03	0.05	0.00	0.00	0.00	0.05	0.03	0.01	0.01	0.03	0.00	
MgO	0.00	0.03	0.01	0.25	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.11	0.02	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.00	
CaO	0.15	0.40	1.06	1.50	0.34	0.27	0.30	0.24	0.13	0.38	0.07	0.05	3.91	4.11	4.42	3.40	3.64	3.79	3.77	3.38	0.04	0.04	0.16	0.16	
Na_2O	11.51	11.78	11.22	10.64	11.54	11.48	11.50	11.64	11.37	11.28	11.58	11.59	9.52	9.42	8.75	9.53	9.61	9.46	9.72	9.78	11.83	11.83	11.71	11.66	
K_2O	0.09	0.09	0.11	0.39	0.09	0.08	0.08	0.07	0.10	0.06	0.07	0.11	0.10	0.11	0.14	0.09	0.08	0.12	0.12	0.10	0.05	0.05	0.09	0.12	
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.02	0.00	0.04	0.01	0.00	0.01	0.01	0.00	0.00	
Total	101.12	101.63	99.43	99.95	99.50	99.85	99.21	99.50	100.45	99.18	100.26	100.15	99.83	100.02	98.29	101.08	100.89	100.05	101.17	100.52	102.61	102.61	101.16	101.99	
Cation O=8																									
Si	2.990	2.980	2.943	2.913	2.989	2.988	2.993	2.997	2.980	2.969	2.987	2.989	2.800	2.793	2.744	2.846	2.834	2.827	2.826	2.846	3.004	3.004	3.004	2.990	
Ti	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	
Al	1.019	1.016	1.051	1.067	1.003	1.008	1.000	0.995	1.032	1.040	1.017	1.015	1.198	1.203	1.194	1.157	1.165	1.168	1.166	1.149	0.995	0.995	0.985	1.008	
Fe	0.000	0.001	0.003	0.018	0.002	0.003	0.002	0.003	0.003	0.000	0.006	0.003	0.004	0.006	0.102	0.008	0.006	0.004	0.004	0.006	0.007	0.007	0.012	0.011	
Mn	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.001	0.000	
Mg	0.000	0.002	0.001	0.016	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.008	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	
Ca	0.007	0.018	0.050	0.071	0.016	0.013	0.014	0.011	0.006	0.018	0.003	0.002	0.185	0.195	0.216	0.159	0.170	0.179	0.176	0.159	0.002	0.002	0.008	0.007	
Na	0.962	0.983	0.960	0.909	0.983	0.985	0.983	0.991	0.958	0.963	0.978	0.980	0.818	0.808	0.776	0.805	0.815	0.809	0.823	0.832	0.976	0.976	0.981	0.969	
K	0.005	0.005	0.006	0.022	0.005	0.005	0.005	0.004	0.006	0.003	0.004	0.006	0.006	0.006	0.008	0.005	0.004	0.007	0.007	0.005	0.003	0.003	0.005	0.006	
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	
Total	4.984	5.006	5.014	5.018	5.002	5.002	5.000	5.003	4.986	4.994	4.995	4.996	5.012	5.012	5.050	4.981	4.994	4.996	5.005	4.998	4.987	4.987	4.996	4.993	
Total Fe as FeO																									

Rock type	**Garnet amphibolite**																								
Sample No.	**KG1252A**																								
Analysis No.	1	2	3	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	10	11	12	13	
	Ab	Ab	Olg	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Olg	Olg	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	
Weight %																									
SiO_2	70.14	69.20	65.77	67.78	67.69	65.26	65.51	68.35	67.75	67.56	68.43	63.58	64.26	67.16	67.76	69.45	66.14	66.76	66.66	67.16	67.13	67.50	67.40	67.38	
TiO_2	0.00	0.00	0.00	0.01	0.07	0.05	0.05	0.05	0.06	0.01	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	
Al_2O_3	19.71	20.07	21.81	19.95	20.27	18.13	18.61	20.47	20.25	20.79	20.00	22.14	21.86	20.30	20.22	21.45	20.36	20.74	20.55	20.44	19.99	20.48	20.41	20.43	
FeO	0.42	0.25	0.17	0.22	0.32	0.30	0.17	0.18	0.13	0.14	0.08	0.23	0.20	0.06	0.03	0.00	0.09	0.07	0.07	0.04	0.08	0.06	0.08	0.13	
MnO	0.00	0.02	0.00	0.00	0.04	0.01	0.04	0.00	0.06	0.03	0.01	0.06	0.00	0.00	0.01	0.00	0.02	0.06	0.00	0.03	0.03	0.00	0.00	0.01	
MgO	0.01	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	
CaO	0.10	0.71	2.61	0.45	0.79	0.04	0.02	0.27	0.37	0.83	0.25	2.64	2.22	0.44	0.44	0.57	0.88	0.82	0.81	0.56	0.35	0.40	0.42	0.45	
Na_2O	11.64	11.40	9.65	11.89	11.66	0.11	0.14	11.63	11.69	11.40	11.70	10.07	10.12	11.41	11.38	9.90	10.78	11.25	11.11	11.43	11.56	11.35	11.64	11.44	
K_2O	0.10	0.08	0.46	0.10	0.10	17.20	17.04	0.08	0.07	0.08	0.08	0.08	0.10	0.08	0.07	0.10	0.10	0.08	0.10	0.07	0.08	0.09	0.08	0.10	
Cr_2O_3	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.02	0.02	0.01	0.00	0.00	
Total	101.14	101.74	100.49	100.39	100.93	101.10	101.59	101.03	100.39	100.83	100.56	99.79	99.78	99.44	99.92	101.51	99.39	99.80	99.30	99.73	99.24	99.89	100.02	99.96	
Cation O=8																									
Si	3.001	2.977	2.880	2.961	2.946	3.000	2.991	2.960	2.956	2.937	2.976	2.839	2.862	2.955	2.965	2.969	2.942	2.932	2.940	2.948	2.961	2.955	2.951	2.951	
Ti	0.000	0.000	0.000	0.000	0.002	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Al	0.994	1.017	1.125	1.027	1.040	0.982	1.001	1.045	1.042	1.065	1.025	1.165	1.147	1.052	1.043	1.081	1.067	1.074	1.068	1.058	1.039	1.056	1.053	1.055	
Fe	0.015	0.009	0.006	0.008	0.012	0.012	0.007	0.007	0.005	0.005	0.003	0.008	0.007	0.002	0.001	0.000	0.003	0.002	0.002	0.001	0.003	0.002	0.003	0.005	
Mn	0.000	0.001	0.000	0.000	0.002	0.000	0.002	0.000	0.002	0.001	0.000	0.002	0.000	0.000	0.001	0.000	0.001	0.002	0.000	0.001	0.001	0.000	0.000	0.000	
Mg	0.001	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	
Ca	0.005	0.033	0.122	0.021	0.037	0.002	0.001	0.013	0.017	0.038	0.012	0.126	0.106	0.021	0.021	0.026	0.042	0.038	0.038	0.026	0.017	0.019	0.020	0.021	
Na	0.965	0.951	0.819	1.007	0.984	0.010	0.013	0.976	0.989	0.961	0.987	0.872	0.874	0.973	0.965	0.821	0.930	0.958	0.950	0.972	0.989	0.963	0.988	0.972	
K	0.005	0.004	0.025	0.005	0.005	1.009	0.993	0.005	0.004	0.004	0.004	0.004	0.005	0.004	0.004	0.006	0.006	0.005	0.005	0.004	0.005	0.005	0.005	0.006	
Cr	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	
Total	4.987	4.992	4.980	5.031	5.027	5.016	5.009	5.006	5.017	5.013	5.007	5.017	5.003	5.008	4.999	4.903	4.992	5.013	5.004	5.011	5.015	5.001	5.019	5.010	
Total Fe as FeO																									

Table A6 **Chemical compositions of plagioclase**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	1	2	3	4	5	6
	Olg	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Olg	Olg	Olg	Ab	Olg	Olg	Ab	Ab
Weight %																								
SiO_2	66.49	66.28	65.10	65.87	67.45	67.43	66.97	66.25	66.19	66.74	66.23	64.04	64.41	68.64	66.92	67.72	64.37	64.78	65.78	67.13	66.27	65.96	66.29	68.09
TiO_2	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.02	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Al_2O_3	22.11	21.31	21.76	21.15	20.74	20.84	21.37	21.08	20.61	20.32	20.72	17.46	17.54	18.88	19.77	19.09	21.43	21.13	21.94	20.86	21.31	21.03	20.60	19.94
FeO	0.05	0.14	0.11	0.06	0.11	0.07	0.11	0.12	0.12	0.08	0.05	0.24	0.10	0.22	0.10	0.16	0.19	0.18	0.37	0.29	0.11	0.08	0.08	0.07
MnO	0.02	0.00	0.00	0.02	0.06	0.01	0.03	0.03	0.00	0.03	0.07	0.00	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	0.01	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00
CaO	1.97	1.76	1.97	1.58	1.10	1.30	1.39	1.60	1.19	1.04	1.23	0.00	0.01	0.04	1.28	0.69	3.51	3.12	2.91	1.74	2.35	2.21	1.86	0.83
Na_2O	8.36	10.57	10.49	10.68	11.11	10.82	10.04	10.63	10.87	11.08	10.75	0.17	0.09	11.59	10.75	11.29	9.66	9.74	10.52	11.27	10.61	10.62	10.74	11.49
K_2O	0.06	0.10	0.07	0.07	0.08	0.09	0.07	0.09	0.10	0.09	0.08	17.84	17.74	0.07	0.07	0.07	0.07	0.06	0.08	0.10	0.07	0.11	0.07	0.07
Cr_2O_3	0.00	0.03	0.03	0.00	0.00	0.02	0.00	0.04	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Total	99.07	100.18	99.53	99.44	100.69	100.60	99.96	99.87	99.08	99.42	99.17	99.77	99.90	99.45	98.90	99.04	99.24	99.01	101.61	101.39	100.72	100.01	99.65	100.48
Cation O=8																								
Si	2.916	2.904	2.875	2.907	2.936	2.936	2.926	2.911	2.929	2.942	2.927	3.001	3.007	3.014	2.962	2.992	2.861	2.881	2.859	2.915	2.894	2.901	2.921	2.968
Ti	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Al	1.143	1.100	1.132	1.100	1.064	1.069	1.100	1.092	1.075	1.056	1.079	0.964	0.965	0.977	1.032	0.994	1.123	1.107	1.124	1.067	1.097	1.090	1.070	1.024
Fe	0.002	0.005	0.004	0.002	0.004	0.003	0.004	0.005	0.005	0.003	0.002	0.009	0.004	0.008	0.004	0.006	0.007	0.007	0.013	0.010	0.004	0.003	0.003	0.002
Mn	0.001	0.000	0.000	0.001	0.002	0.000	0.001	0.001	0.000	0.001	0.003	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000
Ca	0.093	0.083	0.093	0.075	0.051	0.061	0.065	0.076	0.057	0.049	0.058	0.000	0.000	0.002	0.061	0.033	0.167	0.148	0.135	0.081	0.110	0.104	0.088	0.039
Na	0.711	0.898	0.899	0.913	0.937	0.914	0.850	0.906	0.932	0.947	0.921	0.016	0.008	0.987	0.923	0.967	0.833	0.840	0.886	0.949	0.899	0.906	0.918	0.971
K	0.003	0.005	0.004	0.004	0.004	0.005	0.004	0.005	0.005	0.005	0.004	1.066	1.057	0.004	0.004	0.004	0.004	0.003	0.004	0.005	0.004	0.006	0.004	0.004
Cr	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	4.869	4.996	5.009	5.002	5.002	4.989	4.951	4.997	5.002	5.005	4.996	5.057	5.042	4.992	4.985	4.996	4.996	4.987	5.023	5.028	5.008	5.010	5.005	5.008

Total Fe as FeO

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	7	8	9	10	11	12	13	1	2	3	4	5	6	7	1	2	3	4	5	6	7			
	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab			
Weight %																								
SiO_2	68.28	68.18	68.71	68.89	68.23	67.60	67.48	66.90	68.00	68.07	68.80	68.36	68.51	68.27	66.97	67.11	67.42	67.23	66.64	65.64	65.76			
TiO_2	0.04	0.00	0.02	0.00	0.01	0.00	0.00	0.04	0.00	0.02	0.02	0.00	0.02	0.03	0.01	0.01	0.00	0.02	0.01	0.00	0.00			
Al_2O_3	19.29	19.47	19.49	18.90	19.23	19.29	19.09	22.63	19.24	19.99	20.82	20.68	20.88	20.30	19.39	19.47	19.09	19.39	19.31	20.11	20.26			
FeO	0.15	0.14	0.10	0.00	0.06	0.00	0.13	0.49	0.10	0.07	0.17	0.13	0.09	0.12	0.14	0.19	0.38	0.01	0.09	0.08	0.12			
MnO	0.00	0.03	0.03	0.00	0.00	0.02	0.01	0.00	0.03	0.00	0.01	0.01	0.02	0.00	0.05	0.00	0.02	0.00	0.01	0.00	0.06			
MgO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01			
CaO	0.53	0.45	0.41	0.37	0.29	0.28	0.31	1.89	0.22	0.32	0.14	0.28	0.16	0.16	1.95	1.94	1.49	0.52	0.62	1.46	1.52			
Na_2O	11.56	11.51	11.45	11.74	11.73	11.51	11.53	10.45	11.37	11.64	11.48	11.34	11.54	11.36	11.03	11.18	11.45	11.43	11.28	10.72	10.70			
K_2O	0.09	0.07	0.12	0.08	0.08	0.07	0.09	0.05	0.09	0.08	0.08	0.09	0.09	0.09	0.08	0.08	0.09	0.09	0.07	0.08	0.08			
Cr_2O_3	0.00	0.00	0.04	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.03	0.00	0.01	0.00	0.02			
Total	99.93	99.86	100.36	100.00	99.62	99.78	99.63	102.45	99.05	100.19	101.53	100.91	101.32	100.34	99.62	99.98	99.96	98.69	98.04	98.10	98.52			
Cation O=8																								
Si	2.990	2.987	2.993	3.011	2.995	2.991	2.993	2.870	2.998	2.972	2.960	2.960	2.955	2.971	2.956	2.953	2.968	2.980	2.975	2.935	2.930			
Ti	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000			
Al	0.996	1.005	1.000	0.974	0.995	1.006	0.998	1.144	1.000	1.029	1.056	1.055	1.061	1.041	1.009	1.010	0.991	1.013	1.016	1.060	1.064			
Fe	0.005	0.005	0.004	0.000	0.002	0.000	0.005	0.018	0.004	0.002	0.006	0.005	0.003	0.004	0.005	0.007	0.014	0.000	0.003	0.003	0.004			
Mn	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.002			
Mg	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001			
Ca	0.025	0.021	0.019	0.017	0.013	0.013	0.014	0.087	0.010	0.015	0.006	0.013	0.007	0.007	0.092	0.091	0.070	0.025	0.030	0.070	0.073			
Na	0.981	0.978	0.967	0.995	0.998	0.988	0.991	0.869	0.972	0.985	0.958	0.952	0.965	0.959	0.944	0.954	0.977	0.983	0.976	0.929	0.925			
K	0.005	0.004	0.007	0.005	0.005	0.004	0.005	0.003	0.005	0.004	0.004	0.005	0.005	0.005	0.004	0.004	0.005	0.005	0.004	0.005	0.005			
Cr	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001			
Total	5.004	5.001	4.992	5.002	5.009	5.002	5.006	4.992	4.991	5.008	4.992	4.991	4.999	4.989	5.013	5.020	5.027	5.006	5.006	5.002	5.003			

Total Fe as FeO

Table A7 **Chemical compositions of chloritoid**

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	1	2	1	2	3	4	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
	In Grt	In Grt	In Grt	In Grt	In Grt	In Grt	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix
Weight %																								
SiO_2	26.79	25.79	23.93	23.60	23.99	23.88	24.16	24.08	24.13	23.71	23.79	24.32	24.22	24.26	24.07	24.31	24.08	23.85	24.22	23.86	24.01	24.13	24.11	24.12
TiO_2	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Al_2O_3	29.03	30.24	39.33	38.96	36.99	39.06	39.59	39.26	39.30	38.42	38.77	39.29	39.70	39.77	39.50	39.76	39.28	39.33	39.52	39.08	39.57	39.33	39.30	39.29
FeO	35.12	32.78	25.39	26.06	25.87	25.79	24.39	24.97	25.17	24.63	24.56	25.21	25.23	24.88	25.30	25.04	24.29	24.30	24.83	24.62	24.99	24.40	25.66	24.45
MnO	0.03	0.22	0.57	0.52	0.44	0.45	0.17	0.28	0.35	0.38	0.31	0.36	0.27	0.37	0.28	0.14	0.24	0.13	0.27	0.37	0.15	0.20	0.39	0.12
MgO	3.94	3.48	2.07	1.94	2.14	1.92	2.53	2.42	2.48	2.29	2.22	2.47	2.38	2.38	2.48	2.59	2.51	2.63	2.43	2.50	2.51	2.63	2.25	2.99
CaO	0.01	0.11	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.02	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.00
K_2O	0.36	0.33	0.03	0.04	0.15	0.05	0.05	0.04	0.04	0.04	0.00	0.04	0.03	0.04	0.04	0.04	0.04	0.07	0.04	0.03	0.01	0.03	0.07	0.07
Cr_2O_3	0.06	0.05	0.07	0.01	0.01	0.04	0.01	0.01	0.00	0.00	0.05	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.07	0.06	0.02	0.00
Total	95.35	93.01	91.39	91.16	89.63	91.18	90.89	91.06	91.46	89.47	89.72	91.71	91.84	91.70	91.69	91.88	90.43	90.30	91.33	90.47	91.35	90.82	91.80	91.04
Cation O=6																								
Si	1.144	1.119	1.009	1.002	1.038	1.011	1.016	1.015	1.014	1.018	1.017	1.019	1.012	1.014	1.009	1.014	1.018	1.010	1.016	1.012	1.008	1.017	1.012	1.014
Ti	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Al	1.461	1.547	1.955	1.950	1.886	1.949	1.962	1.951	1.946	1.945	1.954	1.940	1.956	1.959	1.952	1.955	1.958	1.964	1.955	1.953	1.959	1.953	1.945	1.946
Fe	1.254	1.190	0.895	0.926	0.936	0.913	0.858	0.880	0.884	0.885	0.878	0.883	0.882	0.870	0.887	0.873	0.859	0.861	0.871	0.873	0.878	0.860	0.901	0.860
Mn	0.001	0.008	0.020	0.019	0.016	0.016	0.006	0.010	0.012	0.014	0.011	0.013	0.010	0.013	0.010	0.005	0.008	0.005	0.010	0.013	0.005	0.007	0.014	0.004
Mg	0.251	0.225	0.130	0.123	0.138	0.121	0.158	0.152	0.155	0.146	0.142	0.154	0.148	0.148	0.155	0.161	0.158	0.166	0.152	0.158	0.157	0.165	0.141	0.187
Ca	0.001	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.001	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.000	0.000
K	0.020	0.018	0.002	0.002	0.008	0.003	0.003	0.002	0.002	0.002	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.004	0.002	0.002	0.001	0.002	0.004	0.004
Cr	0.002	0.002	0.002	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.002	0.001	0.000
Total	4.135	4.115	4.014	4.023	4.025	4.015	4.004	4.010	4.014	4.010	4.005	4.012	4.010	4.007	4.017	4.010	4.004	4.009	4.007	4.012	4.012	4.008	4.017	4.015
Total Fe as FeO																								

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	1	2	3	4	1	2	3	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5
	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix
Weight %																								
SiO_2	24.25	24.42	24.41	24.30	23.69	24.02	23.89	24.27	24.25	24.22	24.12	24.46	24.48	24.46	24.43	24.44	24.42	24.36	24.47	24.39	24.28	24.14	23.94	23.98
TiO_2	0.00	0.02	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Al_2O_3	39.58	39.61	39.71	39.51	38.82	38.73	38.84	39.35	39.25	39.30	39.15	39.58	39.62	39.81	40.06	40.26	40.04	40.21	40.29	39.58	39.83	39.78	39.25	39.08
FeO	24.48	24.60	25.16	24.19	24.10	24.11	24.38	25.20	24.19	24.47	24.62	24.56	24.84	25.04	24.83	24.92	25.12	24.59	25.18	24.68	25.02	24.74	24.29	24.85
MnO	0.18	0.22	0.28	0.26	0.22	0.23	0.22	0.23	0.12	0.19	0.15	0.21	0.15	0.17	0.09	0.18	0.19	0.17	0.25	0.23	0.21	0.06	0.28	0.21
MgO	2.68	2.65	2.61	2.70	2.65	2.35	2.53	2.59	2.59	2.68	2.87	2.60	2.66	2.70	2.76	2.75	2.80	2.92	2.73	2.62	2.66	2.66	2.73	2.63
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.04	0.00	0.02	0.01	0.02	0.02	0.03	0.00	0.00	0.04	0.00	0.00	0.02
K_2O	0.03	0.03	0.03	0.05	0.07	0.04	0.05	0.03	0.02	0.04	0.05	0.05	0.06	0.05	0.04	0.01	0.06	0.05	0.04	0.02	0.04	0.02	0.04	0.05
Cr_2O_3	0.03	0.03	0.00	0.02	0.02	0.00	0.00	0.03	0.02	0.04	0.07	0.01	0.04	0.05	0.01	0.01	0.02	0.02	0.04	0.02	0.03	0.03	0.03	0.02
Total	91.24	91.57	92.24	91.04	89.63	89.48	89.91	91.69	90.45	90.95	91.02	91.53	91.85	92.29	92.22	92.60	92.67	92.35	92.98	91.55	92.10	91.43	90.56	90.83
Cation O=6																								
Si	1.016	1.020	1.015	1.020	1.012	1.026	1.018	1.016	1.024	1.019	1.015	1.022	1.020	1.015	1.013	1.010	1.010	1.008	1.009	1.019	1.011	1.010	1.012	1.013
Ti	0.000	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Al	1.955	1.950	1.946	1.954	1.955	1.951	1.951	1.942	1.953	1.949	1.942	1.949	1.946	1.948	1.958	1.961	1.952	1.962	1.957	1.950	1.954	1.963	1.955	1.946
Fe	0.858	0.859	0.875	0.849	0.861	0.862	0.869	0.883	0.854	0.861	0.867	0.858	0.866	0.870	0.861	0.861	0.869	0.851	0.868	0.863	0.871	0.866	0.859	0.878
Mn	0.006	0.008	0.010	0.009	0.008	0.008	0.008	0.008	0.004	0.007	0.005	0.008	0.005	0.006	0.003	0.006	0.006	0.009	0.008	0.008	0.008	0.002	0.010	0.007
Mg	0.168	0.165	0.162	0.169	0.169	0.150	0.161	0.162	0.163	0.168	0.180	0.162	0.165	0.167	0.170	0.169	0.172	0.180	0.168	0.163	0.165	0.166	0.172	0.165
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.003	0.000	0.002	0.000	0.001	0.002	0.002	0.000	0.000	0.003	0.000	0.000	0.001
K	0.001	0.001	0.002	0.003	0.004	0.002	0.002	0.002	0.001	0.002	0.003	0.003	0.003	0.002	0.002	0.001	0.003	0.003	0.002	0.001	0.002	0.001	0.002	0.002
Cr	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.002	0.000	0.001	0.002	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total	4.006	4.005	4.011	4.005	4.012	3.999	4.008	4.013	4.001	4.007	4.014	4.005	4.008	4.012	4.009	4.010	4.016	4.013	4.013	4.006	4.014	4.009	4.011	4.015
Total Fe as FeO																								

Table A7 **Chemical compositions of chloritoid**

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	1	2	3	4	5	6	7	8	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10	11
	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix
Weight %																								
SiO_2	23.73	24.08	23.78	24.07	23.87	23.70	23.79	24.07	24.29	24.21	24.13	24.04	24.32	24.16	24.08	24.13	23.71	23.79	24.32	24.22	24.26	24.07	24.31	24.08
TiO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Al_2O_3	39.27	38.99	39.37	39.36	39.01	39.10	38.98	39.68	39.44	39.85	39.78	39.90	39.92	39.59	39.26	39.30	38.42	38.77	39.29	39.70	39.77	39.50	39.76	39.28
FeO	24.33	24.58	24.71	24.58	24.20	24.89	24.72	24.74	24.79	25.15	25.23	25.62	25.50	24.39	24.97	25.17	24.63	24.56	25.21	25.23	24.88	25.30	25.04	24.29
MnO	0.19	0.22	0.23	0.24	0.21	0.36	0.35	0.15	0.25	0.34	0.30	0.21	0.25	0.17	0.28	0.35	0.38	0.31	0.36	0.27	0.37	0.28	0.14	0.24
MgO	2.76	2.49	2.40	2.75	2.55	2.23	2.31	2.64	2.13	2.10	2.21	2.40	2.37	2.53	2.42	2.48	2.29	2.22	2.47	2.38	2.38	2.48	2.59	2.51
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.04	0.07	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.03	0.00	0.00
K_2O	0.07	0.02	0.04	0.02	0.04	0.06	0.06	0.04	0.03	0.02	0.03	0.04	0.04	0.05	0.04	0.04	0.04	0.00	0.04	0.03	0.04	0.04	0.04	0.04
Cr_2O_3	0.07	0.02	0.09	0.00	0.05	0.05	0.04	0.06	0.01	0.03	0.03	0.00	0.02	0.01	0.01	0.00	0.00	0.05	0.00	0.02	0.01	0.00	0.00	0.00
Total	90.42	90.39	90.61	91.02	89.91	90.39	90.25	91.40	91.00	91.71	91.74	92.30	92.47	90.89	91.06	91.46	89.47	89.72	91.71	91.84	91.70	91.69	91.88	90.43
Cation O=6																								
Si	1.005	1.021	1.007	1.013	1.016	1.008	1.012	1.009	1.023	1.013	1.010	1.002	1.011	1.016	1.015	1.014	1.018	1.017	1.019	1.012	1.014	1.009	1.014	1.018
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Al	1.961	1.948	1.964	1.952	1.957	1.960	1.955	1.960	1.957	1.965	1.963	1.960	1.955	1.962	1.951	1.946	1.945	1.954	1.940	1.956	1.959	1.952	1.955	1.958
Fe	0.862	0.871	0.875	0.865	0.861	0.885	0.880	0.867	0.873	0.880	0.883	0.893	0.886	0.858	0.880	0.884	0.885	0.878	0.883	0.882	0.870	0.887	0.873	0.859
Mn	0.007	0.008	0.008	0.008	0.007	0.013	0.013	0.005	0.009	0.012	0.011	0.007	0.009	0.006	0.010	0.012	0.014	0.011	0.013	0.010	0.013	0.010	0.005	0.008
Mg	0.174	0.157	0.151	0.173	0.162	0.141	0.146	0.165	0.134	0.131	0.138	0.149	0.147	0.158	0.152	0.155	0.146	0.142	0.154	0.148	0.148	0.155	0.161	0.158
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.002	0.000	0.000
K	0.004	0.001	0.002	0.001	0.002	0.003	0.003	0.002	0.002	0.001	0.001	0.002	0.002	0.003	0.002	0.002	0.002	0.000	0.002	0.002	0.002	0.002	0.002	0.002
Cr	0.002	0.001	0.003	0.000	0.002	0.002	0.001	0.002	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.000
Total	4.016	4.006	4.011	4.012	4.006	4.013	4.011	4.011	4.000	4.004	4.010	4.018	4.013	4.004	4.010	4.014	4.010	4.005	4.012	4.010	4.007	4.017	4.010	4.004

Total Fe as FeO

Rock type	**Garnet and chloritoid-bearing pelitic schist**																							
Sample No.	**KG1244**																							
Analysis No.	1	2	3	4	5	6	1	2	3	4	5	6	7	8	1	2	3	4	5	1	2	3	4	5
	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix
Weight %																								
SiO_2	24.22	23.86	24.01	24.13	24.11	24.12	23.73	24.08	23.78	24.07	23.87	23.70	23.79	24.07	24.39	24.28	24.14	23.94	23.98	24.44	24.42	24.36	24.47	24.43
TiO_2	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Al_2O_3	39.52	39.08	39.57	39.33	39.30	39.29	39.27	38.99	39.37	39.36	39.01	39.10	38.98	39.68	39.58	39.83	39.78	39.25	39.08	40.26	40.04	40.21	40.29	40.06
FeO	24.83	24.62	24.99	24.40	25.66	24.45	24.33	24.58	24.71	24.58	24.20	24.89	24.72	24.74	24.68	25.02	24.74	24.29	24.85	24.92	25.12	24.59	25.18	24.83
MnO	0.27	0.37	0.15	0.20	0.39	0.12	0.19	0.22	0.23	0.24	0.21	0.36	0.35	0.15	0.23	0.21	0.06	0.28	0.21	0.18	0.19	0.17	0.25	0.09
MgO	2.43	2.50	2.51	2.63	2.25	2.99	2.76	2.49	2.40	2.75	2.55	2.23	2.31	2.64	2.62	2.66	2.66	2.73	2.63	2.75	2.80	2.92	2.73	2.76
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.00	0.00	0.02	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.02	0.02	0.02	0.03	0.00	0.01
K_2O	0.04	0.03	0.01	0.03	0.07	0.07	0.07	0.02	0.04	0.02	0.04	0.06	0.06	0.04	0.02	0.04	0.02	0.04	0.05	0.01	0.06	0.05	0.04	0.04
Cr_2O_3	0.02	0.02	0.07	0.06	0.02	0.00	0.07	0.02	0.09	0.00	0.05	0.05	0.04	0.06	0.02	0.03	0.03	0.03	0.02	0.01	0.02	0.02	0.04	0.01
Total	91.33	90.47	91.35	90.82	91.80	91.04	90.42	90.39	90.61	91.02	89.91	90.39	90.25	91.40	91.55	92.10	91.43	90.56	90.83	92.60	92.67	92.35	92.98	92.22
Cation O=6																								
Si	1.016	1.012	1.008	1.017	1.012	1.014	1.005	1.021	1.007	1.013	1.016	1.008	1.012	1.009	1.019	1.011	1.010	1.012	1.013	1.010	1.010	1.008	1.009	1.013
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Al	1.955	1.953	1.959	1.953	1.945	1.946	1.961	1.948	1.964	1.952	1.957	1.960	1.955	1.960	1.950	1.954	1.963	1.955	1.946	1.961	1.952	1.962	1.957	1.958
Fe	0.871	0.873	0.878	0.860	0.901	0.860	0.862	0.871	0.875	0.865	0.861	0.885	0.880	0.867	0.863	0.871	0.866	0.859	0.878	0.861	0.869	0.851	0.868	0.861
Mn	0.010	0.013	0.005	0.007	0.014	0.004	0.007	0.008	0.008	0.008	0.007	0.013	0.013	0.005	0.008	0.008	0.002	0.010	0.007	0.006	0.006	0.006	0.009	0.003
Mg	0.152	0.158	0.157	0.165	0.141	0.187	0.174	0.157	0.151	0.173	0.162	0.141	0.146	0.165	0.163	0.165	0.166	0.172	0.165	0.169	0.172	0.180	0.168	0.170
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.000	0.000	0.002	0.003	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.001	0.001	0.002	0.002	0.000	0.000
K	0.002	0.002	0.001	0.002	0.004	0.004	0.004	0.001	0.002	0.001	0.002	0.003	0.003	0.002	0.001	0.002	0.001	0.002	0.002	0.001	0.003	0.003	0.002	0.002
Cr	0.001	0.001	0.002	0.002	0.001	0.000	0.002	0.001	0.003	0.000	0.002	0.002	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000
Total	4.007	4.012	4.012	4.008	4.017	4.015	4.016	4.006	4.011	4.012	4.006	4.013	4.011	4.011	4.006	4.014	4.009	4.011	4.015	4.010	4.016	4.013	4.013	4.009

Total Fe as FeO

Table A7 **Chemical compositions of chloritoid**

Rock type	**Garnet and chloritoid-bearing pelitic schist**																								
Sample No.	**KG1244**																								
Analysis No.	1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	1	
	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	matrix	
Weight %																									
SiO_2	24.35	24.19	24.31	24.14	24.14	24.09	23.98	24.17	24.27	24.15	24.26	24.32	24.19	24.48	24.33	24.27	24.15	24.08	23.87	24.28	23.45	23.93	23.78	23.58	
TiO_2	0.00	0.02	0.01	0.00	0.00	0.01	0.01	0.00	0.04	0.01	0.03	0.00	0.01	0.01	0.04	0.03	0.04	0.04	0.01	0.02	0.00	0.00	0.02	0.00	
Al_2O_3	40.42	40.42	40.70	40.50	40.62	40.33	40.43	40.45	40.63	40.81	40.39	40.46	40.49	40.32	40.34	40.47	40.47	40.45	40.64	40.97	39.90	40.85	40.64	40.32	
FeO	24.22	24.32	24.72	24.53	24.16	24.07	23.70	24.43	24.72	24.09	23.82	24.24	23.78	23.68	23.51	24.22	24.79	23.81	23.93	24.21	24.70	24.27	23.38	23.72	
MnO	0.17	0.16	0.32	0.37	0.34	0.36	0.48	0.36	0.44	0.28	0.39	0.30	0.29	0.25	0.32	0.44	0.53	0.30	0.28	0.19	0.29	0.21	0.19	0.23	
MgO	2.42	2.30	2.26	2.28	2.13	2.19	2.28	2.12	2.15	2.22	2.27	2.36	2.55	2.37	2.22	2.23	2.23	2.15	2.35	2.35	2.31	2.34	2.53	2.55	
CaO	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	
Na_2O	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.04	0.00	0.00	0.00	0.01	0.03	0.00	0.02	0.04	0.03	0.04	0.00	0.00	0.02	0.06	0.00	
K_2O	0.05	0.04	0.04	0.06	0.03	0.02	0.05	0.06	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.06	0.04	0.04	0.03	0.03	0.01	0.04	0.04	0.03	
Cr_2O_3	0.00	0.04	0.00	0.00	0.03	0.02	0.02	0.01	0.03	0.00	0.05	0.00	0.05	0.02	0.00	0.05	0.00	0.01	0.03	0.02	0.03	0.03	0.03	0.01	
Total	91.68	91.49	92.36	91.91	91.46	91.09	90.95	91.62	92.35	91.57	91.23	91.72	91.41	91.18	90.78	91.79	92.28	90.91	91.18	92.07	90.69	91.69	90.68	90.45	
Cation O=6																									
Si	1.013	1.009	1.007	1.005	1.007	1.009	1.005	1.008	1.006	1.005	1.013	1.012	1.008	1.021	1.019	1.010	1.003	1.009	0.998	1.005	0.992	0.996	0.998	0.994	
Ti	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.001	0.000	
Al	1.981	1.987	1.986	1.986	1.997	1.991	1.997	1.989	1.985	2.002	1.988	1.984	1.988	1.982	1.991	1.985	1.981	1.998	2.003	1.999	1.990	2.004	2.009	2.004	
Fe	0.843	0.848	0.856	0.854	0.843	0.843	0.831	0.852	0.857	0.838	0.832	0.843	0.829	0.826	0.823	0.843	0.861	0.834	0.837	0.838	0.874	0.845	0.820	0.836	
Mn	0.006	0.006	0.011	0.013	0.012	0.013	0.017	0.013	0.015	0.010	0.014	0.011	0.010	0.009	0.011	0.016	0.019	0.011	0.010	0.007	0.010	0.007	0.007	0.008	
Mg	0.150	0.143	0.139	0.141	0.132	0.137	0.142	0.132	0.133	0.138	0.141	0.146	0.159	0.147	0.139	0.138	0.138	0.134	0.147	0.145	0.146	0.145	0.158	0.160	
Ca	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	
Na	0.003	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.003	0.000	0.000	0.000	0.001	0.002	0.000	0.001	0.003	0.002	0.003	0.000	0.000	0.001	0.005	0.000	
K	0.002	0.002	0.002	0.003	0.002	0.001	0.003	0.003	0.002	0.001	0.001	0.002	0.001	0.001	0.001	0.003	0.002	0.002	0.001	0.002	0.001	0.002	0.002	0.002	
Cr	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.000	0.001	0.000	0.002	0.001	0.000	0.002	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.000	
Total	3.999	3.997	4.001	4.004	3.994	3.995	3.997	3.999	4.003	3.994	3.992	3.997	3.998	3.989	3.985	3.998	4.008	3.993	4.001	3.996	4.013	4.003	4.001	4.005	
Total Fe as FeO																									

Rock type	**Garnet and chloritoid-bearing pelitic schist**					
Sample No.	**KG1244**					
Analysis No.	2	3	4	5	6	7
	matrix	matrix	matrix	matrix	matrix	matrix
Weight %						
SiO_2	23.20	23.64	23.61	23.89	23.88	23.57
TiO_2	0.00	0.03	0.03	0.03	0.02	0.02
Al_2O_3	39.12	40.03	40.28	40.06	40.29	40.27
FeO	24.30	24.56	24.36	23.99	24.61	24.34
MnO	0.29	0.39	0.40	0.34	0.44	0.31
MgO	2.43	2.33	2.40	2.38	2.37	2.59
CaO	0.02	0.00	0.00	0.00	0.01	0.00
Na_2O	0.01	0.00	0.00	0.00	0.00	0.00
K_2O	0.04	0.03	0.04	0.05	0.04	0.04
Cr_2O_3	0.03	0.02	0.03	0.04	0.08	0.05
Total	89.43	91.02	91.15	90.79	91.73	91.18
Cation O=6						
Si	0.995	0.996	0.992	1.005	0.998	0.989
Ti	0.000	0.001	0.001	0.001	0.001	0.001
Al	1.979	1.987	1.994	1.986	1.984	1.993
Fe	0.872	0.865	0.856	0.844	0.860	0.855
Mn	0.011	0.014	0.014	0.012	0.016	0.011
Mg	0.155	0.146	0.150	0.149	0.148	0.162
Ca	0.001	0.000	0.000	0.000	0.001	0.000
Na	0.001	0.000	0.000	0.000	0.000	0.000
K	0.002	0.002	0.002	0.003	0.002	0.002
Cr	0.001	0.001	0.001	0.001	0.003	0.002
Total	4.016	4.011	4.011	4.002	4.010	4.014
Total Fe as FeO						

Table A8 **Chemical compositions of biotite**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	6	1	2	1	2	3	1	2	1
Weight %																								
SiO_2	34.62	33.55	32.57	34.42	34.42	28.43	27.76	38.14	34.41	34.32	34.41	34.32	35.95	35.73	35.11	35.35	31.11	30.06	33.86	35.22	33.48	33.44	33.31	35.04
TiO_2	0.79	1.57	1.36	1.63	1.63	0.83	1.00	0.16	0.23	0.20	0.23	0.20	1.69	1.37	3.61	1.10	1.08	0.37	1.44	1.69	1.71	1.43	1.23	1.16
Al_2O_3	16.51	18.44	17.05	17.32	17.32	18.10	18.67	22.39	16.20	15.98	16.20	15.98	16.65	16.60	15.75	16.91	17.66	17.98	16.41	15.74	14.64	16.85	16.99	16.57
FeO	21.55	23.67	25.90	25.45	25.45	32.44	29.61	18.21	24.91	25.64	24.91	25.64	19.44	19.17	18.15	19.01	24.47	27.31	21.79	24.75	22.70	21.00	21.01	21.87
MnO	0.05	0.31	0.14	0.17	0.17	0.30	0.15	0.16	0.08	0.06	0.08	0.06	0.06	0.10	0.06	0.08	0.09	0.11	0.16	0.11	0.06	0.09	0.08	0.08
MgO	9.92	6.70	5.16	5.61	5.61	4.70	7.33	5.71	8.13	7.68	8.13	7.68	9.44	9.30	8.90	9.90	8.73	9.44	9.21	8.65	8.55	9.31	9.57	9.34
CaO	0.27	0.13	0.83	0.11	0.11	2.56	0.27	0.09	0.13	0.12	0.13	0.12	0.25	0.28	2.12	0.60	0.24	0.33	0.38	0.34	0.47	0.18	0.19	0.12
Na_2O	0.08	0.12	0.12	0.11	0.11	0.03	0.01	0.03	0.08	0.13	0.08	0.13	0.09	0.09	0.10	0.14	0.07	0.05	0.04	0.07	0.09	0.11	0.11	0.09
K_2O	8.31	8.62	7.83	8.01	8.01	1.55	2.90	5.52	8.22	8.41	8.22	8.41	8.88	8.55	7.75	7.12	5.32	3.00	6.85	7.97	6.64	8.27	8.00	9.01
Cr_2O_3	0.01	0.04	0.00	0.03	0.03	0.03	0.00	0.02	0.01	0.00	0.01	0.00	0.03	0.00	0.02	0.00	0.01	0.01	0.05	0.01	0.00	0.00	0.06	0.04
Total	92.11	93.14	90.96	92.86	92.86	88.95	88.68	90.42	92.38	92.53	92.38	92.53	92.48	91.20	91.57	90.2	88.76	88.65	90.18	94.56	88.34	90.68	90.56	92.32
Cation O=22																								
Si	5.513	5.353	5.396	5.524	5.524	4.875	4.772	5.841	5.555	5.562	5.555	5.562	5.636	5.667	5.545	5.624	5.171	5.018	5.483	5.534	5.580	5.413	5.392	5.529
Ti	0.095	0.189	0.170	0.197	0.197	0.106	0.129	0.018	0.028	0.025	0.028	0.025	0.200	0.164	0.428	0.131	0.135	0.047	0.175	0.200	0.214	0.174	0.149	0.137
Al	3.098	3.467	3.330	3.276	3.276	3.659	3.782	4.042	3.082	3.052	3.082	3.052	3.077	3.104	2.930	3.170	3.46	3.537	3.132	2.915	2.875	3.214	3.242	3.082
Fe	2.871	3.157	3.588	3.415	3.415	4.653	4.257	2.333	3.363	3.475	3.363	3.475	2.549	2.543	2.397	2.529	3.401	3.812	2.951	3.252	3.163	2.842	2.844	2.887
Mn	0.006	0.042	0.019	0.024	0.024	0.043	0.021	0.020	0.010	0.008	0.010	0.008	0.008	0.014	0.009	0.011	0.013	0.015	0.022	0.015	0.009	0.012	0.012	0.011
Mg	2.354	1.593	1.274	1.342	1.342	1.202	1.877	1.305	1.958	1.857	1.958	1.857	2.206	2.200	2.095	2.349	2.165	2.348	2.223	2.025	2.125	2.246	2.309	2.197
Ca	0.047	0.022	0.147	0.019	0.019	0.471	0.050	0.014	0.023	0.021	0.023	0.021	0.042	0.047	0.358	0.103	0.042	0.059	0.065	0.057	0.083	0.032	0.034	0.021
Na	0.026	0.036	0.038	0.034	0.034	0.009	0.003	0.009	0.024	0.040	0.024	0.040	0.028	0.026	0.030	0.042	0.021	0.017	0.013	0.022	0.027	0.036	0.033	0.028
K	1.688	1.753	1.655	1.640	1.640	0.339	0.635	1.078	1.692	1.738	1.692	1.738	1.777	1.731	1.561	1.445	1.127	0.639	1.416	1.598	1.412	1.708	1.653	1.814
Cr	0.002	0.005	0.000	0.004	0.004	0.004	0.000	0.002	0.001	0.000	0.001	0.000	0.003	0.000	0.002	0.000	0.002	0.002	0.006	0.001	0.000	0.000	0.008	0.005
Total	15.699	15.617	15.616	15.476	15.476	15.361	15.527	14.663	15.734	15.777	15.734	15.777	15.526	15.496	15.356	15.403	15.54	15.49	15.487	15.618	15.489	15.678	15.676	15.711

Total Fe as FeO

Rock type			
Sample No.	**KG1252A**		
Analysis No.	2	1	2
Weight %			
SiO_2	34.69	34.17	34.69
TiO_2	1.27	0.50	0.54
Al_2O_3	17.49	18.48	17.84
FeO	21.95	20.51	20.95
MnO	0.10	0.06	0.14
MgO	8.33	8.98	8.93
CaO	0.14	0.19	0.97
Na_2O	0.10	0.08	0.10
K_2O	9.17	8.49	7.19
Cr_2O_3	0.00	0.00	0.03
Total	92.24	91.45	91.38
Cation O=22		22.00	22.00
Si	5.484	5.446	5.513
Ti	0.150	0.059	0.064
Al	3.259	3.471	3.341
Fe	2.902	2.734	2.784
Mn	0.013	0.008	0.019
Mg	1.963	2.134	2.115
Ca	0.024	0.032	0.164
Na	0.031	0.023	0.031
K	1.850	1.725	1.458
Cr	0.000	0.000	0.004
Total	15.677	15.633	15.495

Total Fe as FeO

Table A9	**Chemical compositions of K-feldspar**							
Rock type	**Garnet amphibolite**							
Sample No.	**KG1252A**							
Analysis No.	1	2	3	4	5	6	1	2
Weight %								
SiO_2	65.86	65.37	64.86	65.81	65.58	65.71	65.26	65.51
TiO_2	0.03	0.00	0.03	0.00	0.00	0.01	0.05	0.05
Al_2O_3	18.59	18.57	18.29	18.25	18.43	18.08	18.13	18.61
FeO	0.07	0.18	0.13	0.19	0.20	0.33	0.30	0.17
MnO	0.05	0.01	0.07	0.03	0.12	0.00	0.01	0.04
MgO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	0.00	0.01	0.01	0.01	0.01	0.00	0.04	0.02
Na_2O	0.12	0.10	0.18	0.12	0.09	0.16	0.11	0.14
K_2O	17.26	17.02	16.93	17.41	17.25	17.27	17.20	17.04
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Total	101.99	101.25	100.50	101.81	101.68	101.57	101.10	101.59
Cation O=8								
Si	2.996	2.994	2.995	3.003	2.996	3.006	3.000	2.991
Ti	0.001	0.000	0.001	0.000	0.000	0.000	0.002	0.002
Al	0.997	1.002	0.995	0.982	0.992	0.975	0.982	1.001
Fe	0.003	0.007	0.005	0.007	0.008	0.013	0.012	0.007
Mn	0.002	0.000	0.003	0.001	0.005	0.000	0.000	0.002
Mg	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001
Na	0.010	0.008	0.016	0.010	0.008	0.014	0.010	0.013
K	1.002	0.995	0.997	1.014	1.005	1.008	1.009	0.993
Cr	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Total	5.011	5.007	5.013	5.018	5.015	5.017	5.016	5.009

Total Fe as FeO

Table A10 **Chemical compositions of rutile**

Rock type	**Pelitic schist**													**Garnet and chloritoid-bearing pelitic schist**										
Sample No.	**KG1251**							**KG1252B**						**KG1244**										
Analysis No.	1	2	1	2	1	2	3	1	2	7	1	2	5	1	2	12	15	1	2	4	5	6	10	20
Weight %																								
SiO_2	0.07	0.08	0.06	0.03	0.04	0.39	0.14	0.28	0.05	0.00	0.08	0.13	0.14	0.56	0.02	0.56	0.02	0.08	0.28	0.16	0.24	0.20	0.04	0.04
TiO_2	100.30	99.95	98.68	100.82	100.39	99.62	99.73	99.20	96.59	97.10	98.32	98.10	97.73	98.18	100.86	98.18	100.86	100.31	100.05	99.27	98.91	97.78	99.74	100.45
Al_2O_3	0.12	0.13	0.13	0.10	0.14	0.12	0.12	0.22	0.20	0.12	0.15	0.15	0.13	0.65	0.12	0.65	0.12	0.18	0.51	0.51	0.39	0.31	0.23	0.11
FeO	0.28	0.22	0.25	0.27	0.20	0.18	0.17	0.97	2.43	1.72	1.84	1.17	1.24	0.67	0.37	0.67	0.37	0.28	0.44	0.43	0.69	1.48	0.21	0.43
MnO	0.00	0.00	0.04	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.07	0.00	0.00	0.00	0.00	0.01	0.00	0.05	0.03	0.00	0.00	0.04
MgO	0.01	0.03	0.02	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.02	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00
CaO	0.01	0.00	0.01	0.02	0.00	0.03	0.00	0.06	0.05	0.07	0.08	0.10	0.22	0.15	0.02	0.15	0.02	0.03	0.02	0.02	0.12	0.04	0.02	0.04
Na_2O	0.07	0.00	0.00	0.07	0.04	0.03	0.01	0.06	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.00	0.03	0.02
K_2O	0.10	0.16	0.27	0.13	0.15	0.12	0.10	0.08	0.07	0.08	0.08	0.05	0.05	0.05	0.04	0.05	0.04	0.05	0.03	0.06	0.05	0.06	0.05	0.06
Cr_2O_3	0.04	0.00	0.01	0.03	0.02	0.03	0.02	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.01	0.08
Total	100.99	100.57	99.45	101.53	100.96	100.53	100.29	100.95	99.38	99.09	100.59	99.77	99.61	100.25	101.44	100.25	101.44	100.95	101.36	100.56	100.48	99.86	100.34	101.27
Cation O=2																								
Si	0.001	0.001	0.001	0.000	0.000	0.005	0.002	0.004	0.001	0.000	0.001	0.002	0.002	0.007	0.000	0.007	0.000	0.001	0.004	0.002	0.003	0.003	0.001	0.001
Ti	0.995	0.995	0.995	0.995	0.996	0.991	0.995	0.987	0.983	0.988	0.986	0.989	0.987	0.980	0.996	0.980	0.996	0.995	0.988	0.988	0.987	0.985	0.995	0.994
Al	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.002	0.002	0.002	0.002	0.010	0.002	0.010	0.002	0.003	0.008	0.008	0.006	0.005	0.004	0.002
Fe	0.003	0.002	0.003	0.003	0.002	0.002	0.002	0.011	0.028	0.019	0.020	0.013	0.014	0.007	0.004	0.007	0.004	0.003	0.005	0.005	0.008	0.017	0.002	0.005
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Mg	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.003	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.001
Na	0.002	0.000	0.000	0.002	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.000
K	0.002	0.003	0.005	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Total	1.005	1.004	1.006	1.006	1.004	1.004	1.003	1.009	1.016	1.012	1.013	1.009	1.010	1.008	1.003	1.008	1.003	1.003	1.005	1.006	1.008	1.011	1.004	1.005

Total Fe as FeO

Rock type	**Garnet and chloritoid-bearing pelitic schist**						
Sample No.	**KG1244**						
Analysis No.	1	5	8	9	13	15	16
Weight %							
SiO_2	0.03	0.28	0.05	0.00	0.08	0.13	0.14
TiO_2	98.37	99.20	96.59	97.10	98.32	98.10	97.73
Al_2O_3	0.11	0.22	0.20	0.12	0.15	0.15	0.13
FeO	1.25	0.97	2.43	1.72	1.84	1.17	1.24
MnO	0.05	0.03	0.00	0.00	0.00	0.03	0.07
MgO	0.00	0.03	0.00	0.00	0.02	0.02	0.04
CaO	0.12	0.06	0.05	0.07	0.08	0.10	0.22
Na_2O	0.00	0.06	0.00	0.00	0.00	0.03	0.00
K_2O	0.02	0.08	0.07	0.08	0.08	0.05	0.05
Cr_2O_3	0.00	0.03	0.00	0.00	0.01	0.00	0.00
Total	99.94	100.95	99.38	99.09	100.59	99.77	99.61
Cation O=2							
Si	0.000	0.004	0.001	0.000	0.001	0.002	0.002
Ti	0.990	0.987	0.983	0.988	0.986	0.989	0.987
Al	0.002	0.003	0.003	0.002	0.002	0.002	0.002
Fe	0.014	0.011	0.028	0.019	0.020	0.013	0.014
Mn	0.001	0.000	0.000	0.000	0.000	0.000	0.001
Mg	0.000	0.001	0.000	0.000	0.000	0.000	0.001
Ca	0.002	0.001	0.001	0.001	0.001	0.001	0.003
Na	0.000	0.001	0.000	0.000	0.000	0.001	0.000
K	0.000	0.001	0.001	0.001	0.001	0.001	0.001
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	1.009	1.009	1.016	1.012	1.013	1.009	1.010

Total Fe as FeO

Table A11	**Chemical compositions of ilmenite**							
Rock type	**Garnet amphibolite**							
Sample No.	**KG1252A**							
Analysis No.	1	3	6	7	10	58	23	12
Weight %								
SiO_2	0.03	0.04	0.01	0.02	0.03	0.02	0.04	0.13
TiO_2	52.42	52.36	52.85	53.16	52.77	50.75	48.13	48.19
Al_2O_3	0.04	0.06	0.07	0.01	0.03	0.04	0.07	0.03
FeO	46.28	43.96	44.05	44.24	44.81	43.01	45.26	40.09
MnO	0.78	1.11	0.79	0.91	0.85	1.43	1.48	0.95
MgO	0.00	0.02	0.00	0.00	0.00	0.04	0.11	0.06
CaO	0.03	0.01	0.03	0.04	0.00	0.02	0.23	0.53
Na_2O	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.00
K_2O	0.08	0.08	0.08	0.07	0.10	0.03	0.05	0.04
Cr_2O_3	0.00	0.00	0.00	0.01	0.05	0.00	0.00	0.00
Total	99.65	97.63	97.87	98.45	98.63	95.36	95.42	90.03
Cation O=22								
Si	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.004
Ti	0.604	0.621	0.625	0.625	0.618	0.617	0.968	1.008
Al	0.001	0.001	0.001	0.000	0.000	0.001	0.002	0.001
Fe	1.186	1.159	1.158	1.157	1.167	1.162	1.012	0.933
Mn	0.010	0.015	0.010	0.012	0.011	0.020	0.033	0.022
Mg	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.003
Ca	0.000	0.000	0.000	0.001	0.000	0.000	0.007	0.016
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000
K	0.001	0.002	0.002	0.001	0.002	0.001	0.002	0.002
Cr	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Total	1.803	1.799	1.796	1.797	1.799	1.802	2.032	1.988

Total Fe as FeO

Table A12 **Chemical compositions of titanite**

Rock type	**Garnet amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	5	6	7	34	38	40	41	1	2	15	19	21	72	73	212	213	214	226	227	228	242	244	1	3
Weight %																								
SiO_2	29.82	32.82	30.74	31.21	29.97	29.21	32.14	30.73	30.13	28.81	29.49	30.02	30.06	30.44	30.03	29.99	29.61	29.94	29.27	29.63	30.02	29.66	29.94	30.13
TiO_2	35.61	22.39	26.45	35.90	36.16	35.58	35.96	29.86	35.13	38.39	36.64	37.02	36.29	33.44	36.41	37.95	36.60	36.82	37.65	38.92	36.93	37.94	39.18	37.68
Al_2O_3	2.31	9.49	5.23	1.85	2.25	1.53	1.24	4.38	1.71	1.22	2.65	1.29	1.22	1.71	2.19	1.86	1.99	2.38	1.58	1.28	2.02	1.38	1.37	1.88
FeO	2.11	9.46	5.67	1.67	1.50	1.44	0.81	4.56	0.76	0.81	0.36	0.53	0.33	0.50	0.59	0.27	1.87	0.84	0.46	0.68	0.68	0.60	0.22	0.59
MnO	0.63	2.56	1.72	0.11	0.15	0.20	0.12	1.51	0.16	0.02	0.02	0.00	0.03	0.00	0.02	0.00	0.01	0.06	0.03	0.07	0.02	0.00	0.03	0.00
MgO	0.05	0.37	0.86	0.61	0.33	0.35	0.09	0.24	0.05	0.00	0.02	0.01	0.01	0.05	0.01	0.00	0.10	0.06	0.03	0.00	0.02	0.00	0.00	0.01
CaO	27.17	21.96	22.77	27.42	27.26	27.05	27.61	25.27	28.49	27.80	28.52	28.36	27.43	26.52	28.67	28.58	27.55	28.41	28.92	28.14	28.81	27.99	28.28	27.95
Na_2O	0.00	0.00	0.05	0.04	0.00	0.02	0.03	0.00	0.00	0.01	0.06	0.01	0.00	0.06	0.02	0.00	0.02	0.02	0.00	0.03	0.02	0.00	0.00	0.03
K_2O	0.03	0.05	0.07	0.07	0.06	0.02	0.02	0.05	0.03	0.05	0.05	0.04	0.04	0.02	0.03	0.04	0.03	0.02	0.03	0.03	0.03	0.03	0.04	0.05
Cr_2O_3	0.06	0.03	0.06	0.00	0.05	0.02	0.01	0.03	0.02	0.00	0.02	0.00	0.01	0.00	0.12	0.04	0.03	0.01	0.05	0.00	0.03	0.05	0.00	0.06
Total	97.81	99.12	93.61	98.87	97.74	95.43	98.03	96.64	96.47	97.10	97.82	97.28	95.41	92.74	98.08	98.74	97.81	98.56	98.02	98.77	98.58	97.64	99.05	98.38
Cation O=5																								
Si	1.001	1.092	1.078	1.030	1.002	1.003	1.064	1.047	1.021	0.973	0.984	1.008	1.025	1.063	1.000	0.991	0.993	0.993	0.979	0.982	0.996	0.993	0.987	0.999
Ti	0.899	0.560	0.698	0.891	0.909	0.919	0.895	0.765	0.895	0.975	0.920	0.935	0.931	0.878	0.912	0.943	0.923	0.918	0.947	0.970	0.921	0.955	0.971	0.939
Al	0.092	0.372	0.216	0.072	0.089	0.062	0.048	0.176	0.068	0.049	0.104	0.051	0.049	0.070	0.086	0.072	0.079	0.093	0.062	0.050	0.079	0.054	0.053	0.074
Fe	0.059	0.263	0.166	0.046	0.042	0.041	0.022	0.130	0.021	0.023	0.010	0.015	0.010	0.000	0.016	0.007	0.053	0.023	0.013	0.019	0.019	0.017	0.006	0.016
Mn	0.018	0.072	0.051	0.003	0.004	0.006	0.003	0.044	0.005	0.000	0.001	0.000	0.001	0.015	0.001	0.000	0.000	0.002	0.001	0.002	0.001	0.000	0.001	0.000
Mg	0.003	0.018	0.045	0.030	0.017	0.018	0.004	0.012	0.002	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.005	0.003	0.001	0.000	0.010	0.000	0.000	0.001
Ca	0.978	0.783	0.856	0.969	0.977	0.995	0.979	0.923	1.034	1.006	1.020	1.020	1.002	0.003	1.023	1.012	0.990	0.009	1.036	0.999	1.024	1.004	0.998	0.993
Na	0.000	0.000	0.003	0.003	0.000	0.001	0.002	0.000	0.000	0.000	0.004	0.001	0.000	0.992	0.001	0.000	0.001	0.002	0.000	0.002	0.001	0.000	0.000	0.002
K	0.001	0.002	0.003	0.003	0.003	0.001	0.001	0.002	0.001	0.002	0.002	0.002	0.002	0.004	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002
Cr	0.002	0.001	0.002	0.000	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.001	0.001	0.000	0.001	0.000	0.001	0.001	0.000	0.002
Total	3.053	3.163	3.118	3.046	3.044	3.047	3.019	3.100	3.049	3.029	3.046	3.033	3.020	3.026	3.044	3.029	3.046	3.044	3.043	3.025	3.044	3.025	3.017	3.026

Total Fe as FeO

Rock type	**Grante amphibolite**																							
Sample No.	**KG1252A**																							
Analysis No.	3	4	6	7	10	11	23	24	30	31	32	1	2	3	20 In Grt	21 In Grt	22 In Grt	23 In Grt	1	2	3	7	8	
Weight %																								
SiO_2	29.81	30.55	30.27	30.49	30.00	30.16	30.87	30.71	30.06	30.59	30.33	30.19	30.14	30.03	30.39	30.56	30.83	30.53	30.79	30.70	30.97	30.88	30.77	
TiO_2	37.07	40.24	38.97	38.62	37.13	38.41	37.08	37.33	38.19	39.33	38.89	37.29	40.32	39.09	36.78	35.42	37.23	35.02	33.63	31.72	32.60	32.16	33.81	
Al_2O_3	1.99	1.16	1.19	1.52	1.76	1.69	1.92	2.21	1.82	1.47	1.55	1.84	0.98	1.30	0.86	1.80	1.17	1.51	1.66	2.22	2.13	2.21	1.74	
FeO	0.57	0.64	0.46	0.62	0.46	0.39	0.97	1.10	0.45	0.33	0.90	1.03	0.46	0.27	0.94	0.07	0.87	0.98	0.43	0.91	0.40	0.53	0.39	
MnO	0.00	0.04	0.04	0.01	0.00	0.00	0.07	0.02	0.02	0.00	0.00	0.00	0.02	0.00	0.06	0.00	0.32	0.20	0.00	0.02	0.01	0.00	0.00	
MgO	0.00	0.00	0.00	0.04	0.01	0.00	0.26	0.15	0.02	0.00	0.00	0.03	0.01	0.00	0.00	0.07	0.00	0.16	0.01	0.04	0.01	0.00	0.02	
CaO	28.02	28.74	28.78	28.82	28.78	28.65	27.69	28.17	28.71	28.74	28.30	28.34	28.76	28.49	27.43	27.77	27.88	27.60	28.07	27.55	28.34	27.95	27.32	
Na_2O	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.03	0.01	0.03	0.00	0.00	0.01	0.00	0.00	0.05	
K_2O	0.04	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.06	0.03	0.04	0.03	0.02	0.03	0.05	0.04	0.05	0.05	0.02	0.03	0.03	0.05	0.04	
Cr_2O_3	0.04	0.00	0.00	0.00	0.02	0.04	0.02	0.00	0.00	0.06	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
Total	97.54	101.40	99.77	100.18	98.20	99.37	98.95	99.75	99.32	100.56	100.06	98.82	100.72	99.33	96.53	95.72	98.38	96.04	94.61	93.21	94.51	93.77	94.14	
Cation O=5																								
Si	0.997	0.985	0.992	0.995	0.999	0.991	1.016	1.005	0.989	0.993	0.991	0.999	0.979	0.987	1.027	1.036	1.023	1.037	1.058	1.070	1.064	1.069	1.060	
Ti	0.933	0.976	0.961	0.948	0.929	0.949	0.918	0.918	0.945	0.960	0.955	0.928	0.985	0.969	0.935	0.903	0.929	0.894	0.869	0.832	0.843	0.837	0.876	
Al	0.079	0.044	0.046	0.059	0.069	0.065	0.074	0.085	0.070	0.056	0.060	0.072	0.037	0.050	0.034	0.072	0.046	0.060	0.067	0.091	0.086	0.090	0.070	
Fe	0.016	0.017	0.013	0.017	0.013	0.011	0.027	0.030	0.012	0.009	0.025	0.029	0.013	0.007	0.026	0.002	0.024	0.028	0.012	0.027	0.012	0.015	0.011	
Mn	0.000	0.001	0.001	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.009	0.006	0.000	0.001	0.000	0.000	0.000	
Mg	0.000	0.000	0.000	0.002	0.000	0.000	0.012	0.007	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.003	0.000	0.008	0.001	0.002	0.001	0.000	0.001	
Ca	1.004	0.993	1.011	1.007	1.026	1.009	0.977	0.987	1.012	0.999	0.991	1.005	1.001	1.003	0.993	1.009	0.991	1.004	1.033	1.029	1.044	1.037	1.008	
Na	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.002	0.001	0.002	0.000	0.000	0.001	0.000	0.000	0.003	
K	0.002	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.002	0.002	
Cr	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.002	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Total	3.031	3.018	3.026	3.030	3.039	3.028	3.030	3.036	3.032	3.020	3.024	3.037	3.018	3.020	3.022	3.027	3.027	3.040	3.040	3.054	3.051	3.050	3.032	

Total Fe as FeO

Table A13 **Chemical compositions of calcite**

Rock type	**Pelitic schist**													**Garnet and chloritoid-bearing pelitic schist**										
Sample No.	**KG1251**							**KG1252B**						**KG1244**										
Analysis No.	1	13	14	15	20	21	25	10	12	20	22	44	45	23	11	16	17	1	5	12	13	14	15	16
Weight %																								
SiO_2	0.01	0.09	0.01	0.14	0.00	0.00	0.00	0.19	0.06	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TiO_2	0.02	0.06	0.00	0.11	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.04	0.02	0.00	0.00	0.67	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.04
Al_2O_3	0.01	0.02	0.02	0.01	0.01	0.01	0.00	0.05	0.03	0.03	0.14	0.08	0.02	0.01	0.01	0.00	0.00	0.01	0.01	0.03	0.02	0.02	0.00	0.00
FeO	0.14	0.21	0.10	0.17	0.11	0.12	0.06	0.17	1.37	1.47	1.21	0.83	0.57	0.22	0.22	0.20	0.09	0.20	0.31	0.15	0.68	0.57	0.53	0.68
MnO	0.02	0.01	0.03	0.00	0.06	0.00	0.01	0.02	0.76	0.70	0.11	0.04	0.02	0.00	0.00	0.04	0.09	0.07	0.00	0.05	0.07	0.10	0.05	0.09
MgO	0.01	0.01	0.01	0.05	0.02	0.00	0.00	0.00	0.86	0.75	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.04	0.00	0.02	0.01	0.00
CaO	51.48	50.99	50.89	50.89	51.08	50.86	51.14	49.97	52.80	50.18	52.29	51.20	51.87	48.80	48.80	49.92	51.37	49.55	49.78	52.11	52.72	52.61	52.45	52.57
Na_2O	0.01	0.00	0.00	0.00	0.05	0.00	0.00	0.01	0.02	0.01	0.06	0.01	0.01	0.02	0.02	0.00	0.00	0.03	0.02	0.01	0.03	0.01	0.00	0.03
K_2O	0.07	0.14	0.11	0.09	0.04	0.05	0.04	0.01	0.03	0.02	0.04	0.03	0.05	0.03	0.03	0.06	0.04	0.05	0.05	0.11	0.06	0.05	0.02	0.04
Cr_2O_3	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.02	0.03	0.00	0.00	0.00	0.00
Total	51.79	51.53	51.17	51.47	51.36	51.04	51.26	50.42	55.96	53.38	53.86	52.22	52.57	49.09	49.09	50.91	51.63	49.95	50.20	52.52	53.58	53.38	53.09	53.45
Cation O=3																								
Si	0.001	0.005	0.000	0.008	0.000	0.000	0.000	0.010	0.003	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ti	0.001	0.003	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002
Al	0.000	0.001	0.002	0.001	0.001	0.001	0.000	0.003	0.002	0.002	0.008	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.001	0.001	0.000	0.000
Fe	0.012	0.019	0.009	0.015	0.010	0.011	0.006	0.016	0.111	0.124	0.102	0.072	0.050	0.021	0.021	0.018	0.008	0.009	0.015	0.007	0.059	0.049	0.046	0.058
Mn	0.001	0.000	0.001	0.000	0.003	0.000	0.000	0.001	0.031	0.030	0.005	0.002	0.001	0.000	0.000	0.002	0.004	0.003	0.000	0.002	0.003	0.005	0.002	0.004
Mg	0.001	0.001	0.001	0.004	0.001	0.000	0.000	0.000	0.061	0.056	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.003	0.000	0.002	0.000	0.000
Ca	2.972	2.949	2.977	2.944	2.976	2.982	2.989	2.949	2.729	2.703	2.825	2.878	2.917	2.964	2.964	2.913	2.979	2.980	2.979	2.979	2.904	2.917	2.924	2.902
Na	0.001	0.000	0.000	0.000	0.005	0.000	0.000	0.001	0.002	0.001	0.006	0.001	0.001	0.002	0.002	0.000	0.000	0.003	0.003	0.001	0.003	0.001	0.000	0.003
K	0.005	0.009	0.008	0.006	0.003	0.004	0.003	0.001	0.002	0.001	0.003	0.002	0.003	0.002	0.002	0.004	0.002	0.004	0.003	0.007	0.004	0.003	0.001	0.003
Cr	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.001	0.001	0.000	0.000	0.000	0.000
Total	2.995	2.987	2.998	2.983	2.999	2.996	2.998	2.981	2.942	2.927	2.949	2.961	2.976	2.992	2.992	2.965	2.996	3.003	3.002	3.002	2.974	2.977	2.976	2.972
Total Fe as FeO																								

Rock type	**Garnet and chloritoid-bearing pelitic schist**															**Garnet amphibolite**								
Sample No.	**KG1244**															**KG1252A**								
Analysis No.	63	85	94	95	98	1	4	5	8	7	9	12	13	16	18	6	8	9	12	14	54	55	1	4
Weight %																								
SiO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
TiO_2	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.04	0.41	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
Al_2O_3	0.00	0.01	0.00	0.00	0.04	0.01	0.01	0.03	0.02	0.02	0.00	0.00	0.26	0.03	0.10	0.03	0.18	0.06	0.07	0.03	0.01	0.00	0.02	0.03
FeO	0.24	0.22	0.10	0.30	0.75	0.20	0.31	0.15	0.68	0.57	0.53	0.68	1.22	0.79	0.76	0.64	0.79	0.77	0.59	0.77	0.68	0.42	0.40	0.38
MnO	0.07	0.00	0.00	0.01	0.06	0.07	0.00	0.05	0.07	0.10	0.05	0.09	0.13	0.05	0.11	0.27	0.24	0.25	0.27	0.52	0.00	0.02	0.07	0.00
MgO	0.02	0.01	0.00	0.04	0.04	0.01	0.00	0.04	0.00	0.02	0.01	0.00	0.01	0.03	0.02	0.04	0.04	0.04	0.02	0.04	0.39	0.09	0.00	0.08
CaO	51.19	50.80	50.93	51.03	51.35	49.55	49.78	52.11	52.72	52.61	52.45	52.57	51.70	52.39	52.55	50.57	49.94	49.65	57.97	56.88	54.79	54.53	51.49	50.84
Na_2O	0.00	0.00	0.01	0.00	0.00	0.03	0.02	0.01	0.03	0.01	0.00	0.03	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
K_2O	0.05	0.04	0.03	0.03	0.03	0.05	0.05	0.11	0.06	0.05	0.02	0.04	0.04	0.03	0.03	0.04	0.02	0.02	0.11	0.15	0.04	0.03	0.03	0.00
Cr_2O_3	0.01	0.00	0.00	0.02	0.00	0.04	0.02	0.03	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.01
Total	51.58	51.08	51.10	51.45	52.26	49.95	50.20	52.52	53.58	53.38	53.09	53.45	53.77	53.40	53.61	51.60	51.24	50.79	59.03	58.40	55.92	55.08	52.02	51.57
Cation O=3																								
Si	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010
Ti	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.016	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Al	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.002	0.001	0.001	0.000	0.000	0.015	0.002	0.006	0.002	0.011	0.004	0.004	0.002	0.001	0.000	0.001	0.002
Fe	0.022	0.020	0.009	0.027	0.066	0.009	0.015	0.007	0.059	0.049	0.046	0.058	0.102	0.068	0.065	0.057	0.071	0.070	0.047	0.061	0.056	0.036	0.036	0.034
Mn	0.003	0.000	0.000	0.001	0.002	0.003	0.000	0.002	0.003	0.005	0.002	0.004	0.005	0.002	0.005	0.012	0.011	0.011	0.011	0.021	0.000	0.001	0.003	0.000
Mg	0.002	0.001	0.000	0.003	0.003	0.001	0.000	0.003	0.000	0.002	0.000	0.000	0.001	0.002	0.001	0.003	0.003	0.003	0.001	0.003	0.029	0.006	0.000	0.006
Ca	2.960	2.967	2.982	2.952	2.891	2.980	2.979	2.979	2.904	2.917	2.924	2.902	2.785	2.885	2.884	2.894	2.860	2.875	2.909	2.877	2.884	2.939	2.939	2.917
Na	0.000	0.000	0.001	0.000	0.000	0.003	0.003	0.001	0.003	0.001	0.000	0.003	0.000	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
K	0.003	0.003	0.002	0.002	0.002	0.004	0.003	0.007	0.004	0.003	0.001	0.003	0.002	0.002	0.002	0.003	0.001	0.002	0.006	0.009	0.003	0.002	0.002	0.000
Cr	0.001	0.000	0.000	0.001	0.000	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Total	2.990	2.991	2.996	2.986	2.967	3.003	3.002	3.002	2.974	2.977	2.976	2.972	2.927	2.965	2.966	2.972	2.959	2.964	2.978	2.973	2.973	2.983	2.982	2.973
Total Fe as FeO																								

Table A13	**Chemical compositions of calcite**									
Rock type	**Garnet amphibolite**									
Sample No.	**KG1252A**									
Analysis No.	1	2	3	6	9	22	26	36	42	45
Weight %										
SiO_2	0.02	0.24	0.08	0.00	0.83	0.00	0.00	0.00	0.00	0.65
TiO_2	0.01	0.00	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.04
Al_2O_3	0.00	0.01	0.01	0.02	0.58	0.05	0.03	0.05	0.00	0.41
FeO	0.24	1.00	0.08	0.87	0.81	0.95	0.60	0.62	0.66	0.95
MnO	0.04	0.13	0.02	0.00	0.00	0.08	0.15	0.19	0.20	0.30
MgO	0.02	0.43	0.01	0.02	0.77	0.01	0.03	0.01	0.00	0.08
CaO	50.38	49.79	51.73	50.83	50.09	50.89	50.72	50.44	50.70	49.42
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K_2O	0.03	0.04	0.05	0.30	0.05	0.05	0.04	0.01	0.04	0.02
Cr_2O_3	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.04	0.01	0.00
Total	50.75	51.63	52.02	51.10	53.14	52.03	51.56	51.36	51.62	51.87
Cation O=3										
Si	0.001	0.012	0.004	0.000	0.043	0.000	0.000	0.000	0.000	0.034
Ti	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.002
Al	0.000	0.000	0.001	0.001	0.035	0.003	0.002	0.003	0.000	0.025
Fe	0.022	0.088	0.007	0.040	0.035	0.084	0.053	0.056	0.059	0.083
Mn	0.002	0.006	0.001	0.000	0.000	0.003	0.007	0.009	0.009	0.013
Mg	0.002	0.034	0.001	0.002	0.059	0.001	0.002	0.001	0.000	0.006
Ca	2.959	2.802	2.973	2.954	2.766	2.864	2.907	2.899	2.900	2.748
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
K	0.002	0.002	0.003	0.002	0.003	0.003	0.003	0.001	0.003	0.001
Cr	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000
Total	2.988	2.945	2.992	3.000	2.941	2.958	2.974	2.970	2.972	2.911

Total Fe as FeO