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Nd isotope data for GSJ reference samples JB-1a, JB-3 and JG-1a and the La Jolla standard

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High precision Nd isotope ratios ($^{143}Nd/^{144}Nd$) have been determined for GSJ reference samples, JB-1a, JB-3 and JG-1a and the La Jolla standard, using a Finigan MAT262 mass spectrometer equipped with five collectors in the Department of Geology, Shimane University. Nd isotope data of these standard samples are similar to previously reported values.

Introduction

Sr and Nd isotope geochemistry is an important tool in geochronological and petrological studies of rocks and minerals. During isotope determination of rocks and minerals, measuring standard samples is indispensable for inter-laboratory correlation and evaluation of data. The GSJ (Geological Survey of Japan) rock reference samples, igneous rock series, are widely available, and Sr and Nd isotope ratios for some standard samples have been measured by many authors (SHIBATA and ADACHI, 1972; NOHDA and WASSERBURG, 1981; KAGAMI *et al.*, 1982, 1987, 1989; KURASAWA, 1984; TANAKA *et al.*, 1987; OKANO *et al.*, 1989; ARAKAWA, 1992, amongst others). Data reported prior to 1988 have been complied by Ando and Shibata (1988). We have reportd Sr isotope data for some of the GSJ reference samples (IIZUMI *et al.*, 1994), using a MAT262 mass spectrometer installed in the Department of Geology at Shimane University in 1994. Although Sr isotope data for GSJ reference samples are common, there are relatively few Nd isotope data.

In this short note, we report Nd isotope data for three GSJ rock reference samples (JB-1a, JB-3 and JG-1a) and the La Jolla standard, and comment on the results.

Analytical methods

Complete analytical procedures for Sr and Nd isotope ratios will be described elsewhere (IIZUMI *et al.*, in prep).

Extraction of Nd was made in the Department of Geology, Shimane University, essentially following the method of KAGAMI *et al.* (1987). Each powdered samples (ca.

100 mg) was completely decomposed in a sealed Teflon vessel using a HF, HCl and HNO_3 mixture. After extracting Sr, rare earth elements were collected with 6N HCl in a 10 ml pyrex beaker, using a column filled with cation exchange resin (Dowex AG 50W-X8, 200-400 mesh). Nd was separated from other REE with two types of hydroxy-isobutyric acids, using another small column filled with the same cation exchange resin. The extracted Nd was loaded on a Re filament with HNO_3. Nd isotope ratios were measured using a Finigan MAT 262 thermal ionization mass spectrometer equipped with five collectors. Measured Nd isotope ratios were normalized to a $^{146}Nd/^{144}Nd$ ratio of 0.7219. The data were computed from 100 to 200 measurements, comprising 10 to 20 blocks.

Results and Comments

Nd isotope ratios of analyzed samples are listed in Table 1, along with previously reported values. We determined the Nd isotope ratio of La Jolla standard three times during the course of measurement, producing similar ratios of $0.511847 \pm 5(2\sigma)$, $0.511849 \pm 5(2\sigma)$ and $0.511847 \pm 5(2\sigma)$ (Table 1). These data are similar to previously reported values for the La Jolla standard (WASSERBURG *et al.*, 1981; ARAKAWA, 1992 and others).

The aliquots of JB-1a, which were separately decomposed, give similar Nd isotope

Table 1. Analytical results for JB-1a, JB-3, JG-1a and the La Jolla standard, and previously reported data.

Samples	$^{143}Nd/^{144}Nd \pm 2\sigma$	
	This study	Previously reported data
JB-1a	0.512772±9	0.512780±6 (a)
	0.512764±9	0.512784±11 (b)
		0.512773±5 (c)
		0.512771±12 (d)
JB-3	0.513035±9	0.513054±8 (a)
		0.513046±9 (d)
		0.51299 ±2 (e)
JG-1a	0.512345±9	0.512377±19 (b)
		0.512378±18 (d)
La Jolla	0.511847±5	
	0.511849±5	
	0.511847±5	

a: OKANO *et al.* (1989); b: KAGAMI *et al.* (1989);
c: TAKAHASHI and MASUDA (1990), d: ARAKAWA (1992);
e: TANAKA *et al.* (1987)

ratos of $0.512772 \pm 9(2\sigma)$ and $0.512764 \pm 9(2\sigma)$. These ratios are consistent with previously reported values within a range of error (Table 1) (OKANO *et al.*, 1989; KAGAMI *et al.*, 1989; TAKAHASHI and MATSUDA, 1990; ARAKAWA, 1992). JB-1a is a replacement sample for JB-1 (ANDO *et al.*, 1988), and is expected to have a similar isotope ratio to JB-1. Three Nd isotope data have been reported for JB-1 (0.512786 ± 15: KAGAMI *et al.*, 1987; 0.512763 ± 9: OKANO *et al.*, 1989; 0.512780 ± 9: ARAKAWA, 1992), and these data are very close to values for JB-1a.

Our Nd isotope value for JB-3 is slightly higher than the value reported by TANAKA *et al.* (1987), but it is similar to data of OKANO *et al.* (1989) and ARAKAWA (1992) (Table 1). Our value for JG-1a is slightly lower than previously reported data (KAGAMI *et al.*, 1989; ARAKAWA, 1992), but within a range of error. Based on analytical data of seven aliquots of JG-1a determined by neutron activation, KAMIOKA and TANAKA (1989) reported that variations in Sm and Nd concentrations among aliquots reach 10-20 percent (1σ), implying that 100 mg powdered samples of JG-1a are heterogeneous in terms of the relative abundances of accessory minerals, such as apatite, zircon, and allanite. As discussed by ARAKAWA (1992), this variation in Sm and Nd concentrations and Sm/Nd ratios among powdered samples may result in inducing slightly different Nd isotope ratios for JG-1a.

In summary, highly precise data reported here for GSJ rock reference samples show similar Nd isotope ratios to previously reported data.

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