

Analytical Techniques for Sr, Nd and Common Pb (including double-spiked analyses) from:

Housh, T. and McMahon, T.P., 2000, Sr, Nd and Pb Isotopic Characteristics of Late Miocene - Pleistocene Collision-Related Igneous Rocks in Western New Guinea (Irian Jaya, Indonesia), *Lithos*, 50:217-239

Prior to dissolution, the samples were leached with warm, weak HCl in order to remove secondary carbonates. Following sample dissolution, Sr was either separated by conventional cation exchange techniques or by using a 0.2 ml column of Sr-Spec, a Sr-selective extraction chromatographic resin produced by EIChroM Industries, Inc. (Darien, IL) (Horwitz et al., 1992). Using the Sr-Spec column, the sample was loaded onto the column in 0.2 ml of 3.5N HNO₃, and subsequently washed with 3.8 ml 3.5 N HNO₃. Sr was eluted using 3 ml of warm 0.05 N HNO₃, dried down, and loaded onto a Ta filament with H₃PO₄ for mass spectrometry. Analyses were made with an ⁸⁸Sr ion beam current of ca. 5×10^{-11} A in static multicollector mode on a Finnigan MAT 261 at the University of Texas at Austin. The data were corrected for mass fractionation using an exponential law and ⁸⁶Sr/⁸⁸Sr = 0.1194. Seventeen analyses of the NIST SRM 987 standard made during the course of analyses have a mean value of ⁸⁷Sr/⁸⁶Sr = 0.710249 ± 18 (2 σ).

Following sample dissolution, a bulk rare earth element separation was accomplished using either conventional cation exchange columns, or by using a 0.2 ml column of RE-Spec, an extraction chromatographic resin produced by EIChroM Industries, Inc. RE-Spec is similar to the TRU-Spec resin produced by EIChroM Industries, Inc. (Horwitz et al., 1993), except that it has a higher concentration of CMPO dissolved in a lower concentration of TBP, resulting in a superior separation of the light REE (EIChroM Industries, personal communication). Using the 0.2 ml RE-Spec column, the sample was loaded onto the column in 0.2 ml of 2 N HNO₃, and subsequently washed with 3.8 ml 2 N HNO₃. The REE were eluted with 6 ml warm 0.05 N HNO₃. Initially a small amount of ascorbic acid was added to the sample prior to loading onto the column in order to reduce the Fe³⁺ in solution; however, subsequent experiments have shown that this step was unnecessary for size of the whole rock samples being run and the practice was discontinued.

Once the REE were separated, Nd was separated using an 8 cm \times 7 mm column of HDEHP loaded onto an inert substrate following the procedure of Richard et al. (1976). Once separated, the Nd was loaded onto one Re side filament of a double filament assembly, and run on the Finnigan MAT 261 in dynamic multicollector mode with a ¹⁴⁴Nd beam current of ca. $2-3 \times 10^{-11}$ A. Correction for mass fractionation was made using an exponential law and ¹⁴⁶Nd/¹⁴⁴Nd = 0.7219. Fourteen analyses of the CIT nNd β standard made during the course of these analyses have a mean ¹⁴³Nd/¹⁴⁴Nd = 0.511905 ± 7 ($\epsilon = -14.30 \pm 0.13$), while three analyses of the LaJolla standard have a mean value of ¹⁴³Nd/¹⁴⁴Nd = 0.511855 ± 6 ($\epsilon = -15.27 \pm 0.12$).

Pb was separated using standard HBr anion exchange techniques. The samples from the Gunung Bijih mining district were analyzed using a double-spike technique modified from Hamelin et al. (1985). Using the double-spike technique, the sample was divided into two aliquots prior to column chemistry, and a ^{204}Pb - ^{208}Pb spike was added to one aliquot. Fifteen analyses of NBS 981 using this double-spike technique have yielded the following results: $^{206}\text{Pb}/^{204}\text{Pb} = 16.932 \pm 0.003$ (0.019%, 2σ), $^{207}\text{Pb}/^{204}\text{Pb} = 15.485 \pm 0.004$ (0.024%), $^{208}\text{Pb}/^{204}\text{Pb} = 36.681 \pm 0.013$ (0.034%). The remainder of the Pb samples were analyzed conventionally. The mean mass fractionation correction determined for NBS 981 during this period of time was 0.09 ± 0.04 %/amu, resulting in uncertainties in the $^{206}\text{Pb}/^{204}\text{Pb}$, $^{207}\text{Pb}/^{204}\text{Pb}$, and $^{208}\text{Pb}/^{204}\text{Pb}$ ratios for the samples run conventionally of 0.08, 0.12, and 0.16% respectively.

References cited:

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Horwitz, E.P., Chiarizia, R., Dietz, M.L., and Diamond, H., 1993. Separation and preconcentration of actinides from acidic media by extraction chromatography. *Anal. Chim. Acta*, 281: 361-372.

Richard, P., Shimizu, N., and Allegre, C.J., 1976. $^{143}\text{Nd}/^{144}\text{Nd}$, a natural tracer: an application to oceanic basalts. *Earth Planet. Sci. Lett.*, 31: 269-278