Goldschmidt 2000
September 3rd–8th, 2000
Oxford, UK.

Journal of Conference Abstracts
Volume 5(2), 462
© 2000 Cambridge Publications

Osmium Isotopes in Ferromagnesian Mineral and Basalts from Iceland Measured by MC-IPC-MS Triple Ion Counting

Karl Grönvold (karl@norvol.hi.is), **Niels Oskarsson**, **Gylfi Sigurdsson** & **Gudrun Sverrisdottir**

Nordic Volcanol. Inst., Grensasvegur 50, IS-108 Reykjavik, Iceland

The rocks assumed to reflect upper mantle chemistry most closely in the Icelandic rift system are picrites and few spinel-bearing low potassium olivine-tholeiites. Ultramafic rocks and nodules are notably absent. Work on PGE elements and Re-Os-Pt isotope relations is thus restricted to these relatively few outcrops and always to rocks with very low abundances of the PGE. In the present contribution we report separation of the PGE and osmium isotope analysis by MC-ICP-MS (Nu Instruments) that we found most suitable for analysis at trace levels by means the three ion counting channels installed.

Sample preparation was designed to minimise background from chemicals. A 20 g sample of ground minerals or basalt was ignited for one hour at 1100 deg. C in a quartz tube in a flow of air which was bubbling trough a mixture of equal volumes of nitric acid, hydrochloric acid and water. The air stream was condensed in ice bath in a small teflon centrifuge tube containing 1 ml of 1% nitric acid. This solution was measured directly on the MC-ICP-MS (Nu Instruments). A present draw-back of the preparation method is that in addition to osmium it contains traces of Re, Pt, Pb, Tl, Au and W.

The mass spectrometry therefore needs measurements of ^{184}W, ^{185}Re and ^{184}Pt for correcting osmium masses 186,187 and 190 respectively. After adjustment at every other mass the three ion counting channels were used to cover masses 184 to 194 in five counting cycles. Inter-channel calibration, using the central channel as the reference, was made for each run based on the ratios of ion beams from masses 188, 189 and 190 which were counted on all channels. Mass bias estimates for each run were based on the ^{188}Os/^{189}Os for the J-M reference material. It was assumed that mass fractionation estimated for the 188/189 pair in the middle of the measured range was representative of all masses in the measurement routine. Data processing involved the selection of reading for each mass, using the reference channel where possible, and calculating mass bias for all masses from 184 upwards. Then the isobaric interferences on 187 (from Re) and 186 (from W) were removed before calculation of the 186/188 and 187/188 ratios. Error estimate for the ^{186}Os/^{188}Os and ^{187}Os/^{188}Os measurements indicate precision better than 2x10^{-6}.

Results for five mineral (olivine + spinel inclusions + minor cpx) and two basalts are reported below.

Sample	^{186}Os/^{188}Os	^{187}Os/^{188}Os
POSEIDON	.119833	.121137
SELARD	.119834	.119640
TH40	.119834	.127624
VADALDA	.119836	.134437
NAL606	.119843	.121210
SAL303	.119837	.120011
HEN49	.119834	.132851

Sample POSEIDON is from the Kolbeinsey-Ridge north of Iceland. Sample SELARD is from Tertiary picrite in NW-Iceland. Sample TH40 is picrite from Theistareykir in N-Iceland and samples VADALDA, NAL606 and SAL 303 represent basalts from central Iceland. Sample HEN49 is from the Hengill volcanic centre on the Reykjanes Peninsula SW Iceland. These data may indicate a significantly larger radiogenic origin of ^{187}Os in samples VADALDA and HEN49. Also, the high ^{186}Os in sample NAL may indicate core-related Pt/Os ratio for that sample (Brandon et al., 2000) The host for Osmium in these samples is most likely sulphide inclusions in chromite inclusions in minerals. The origin of these inclusions is complicated; their host minerals being a population of deep-crustal and possible mantle phases. The present osmium isotope data show little internal correlation nor correlation with He-isotopes. However, the sample highest in ^{186}Os/^{188}Os is derived from near the centre of the Iceland mantle plume.

Brandon, AD, et al., *Earth. Planet. Sci. Lett.*, **174**, 25-42, (1999).
Sigudsson, IA et al ,, *Earth. Planet. Sci. Lett. (Submitted)*
Hilton, DR et al., *Earth. Planet. Sci. Lett.*, **173**, 53-56, (1999).