

High temperature chromium isotope variations in the mantle

MATTHEW JERRAM^{1A}, PIERRE BONNAND^{2A,B} ALEX N. HALLIDAY^{3A}

a) Department of Earth Sciences, University of Oxford, South Parks Road, Oxford, OX1 3AN, United Kingdom,

b) Laboratoire Magmas et Volcans, Université Blaise Pascal-CNRS, Campus Universitaire des Cézeaux, 63178 Aubière, France.

¹matthew.jerram@seh.ox.ac.uk

²pierre.bonnand@univ-bpclermont.fr

³alex.halliday@earth.ox.ac.uk

Chromium is both lithophile and siderophile with multiple oxidation states on Earth, rendering it ideal for use as a stable isotope tracer in a range of problems. Previous stable Cr isotope work found no resolvable difference between chondrites and the bulk silicate Earth (BSE). To better constrain the extent of fractionation during core formation the Cr isotopic composition of the BSE needs to be more tightly defined. Thermal ionisation mass spectrometry with double spiking was used to obtain more precise Cr isotope data on a broader range of well characterised mantle peridotite samples. Further study was carried out on seven of these peridotites by measuring mineral separates. Our results suggest that the Cr isotopic composition of peridotites is controlled by melting and metasomatism. A new value for the BSE is suggested of $-0.12 \pm 0.06\text{‰}$ relative to NIST SRM 979 which is similar to previous values but with a smaller uncertainty¹. There are small variations between some chondrites^{2,3} and further work is needed to define the degree of fractionation during core formation, which will depend on the chondrite group that represents the best analogue for the total Earth.

[1] Schoenberg *et al.* (2008) *Chemical Geology*, **249**, 294-306.

[2] Bonnand *et al.* (2016) *EPSL*, **435**, 14-21. [3] Schoenberg *et al.* (2016) *GCA*, **183**, 14-30.