

Oxygen and sulfur isotope characteristics of the Salmagora Complex, Kola Peninsula

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Introduction

Oxygen and sulfur isotope study on the rock of dunite-werhlite-melilitolite (type 0) from the early stage of magma differentiation and on the rock of pyroxeneite-ijolite (type 1 and type 2) from the later stage, which are classified based on the mineralogical and geochemical characteristics, is performed for the contribution to the petrogenetic model of the Salmagora ultramafic-alkaline-carbonatite complex in the Kola Peninsula.

Experimental Method

25 bulk rock samples were analyzed for oxygen isotope using silicate oxygen preparation line and Finnigan MAT 252 mass spectrometer in Indiana University and splits of the samples used for oxygen isotope were also analyzed for sulfur isotope composition by CF-mass spectrometer.

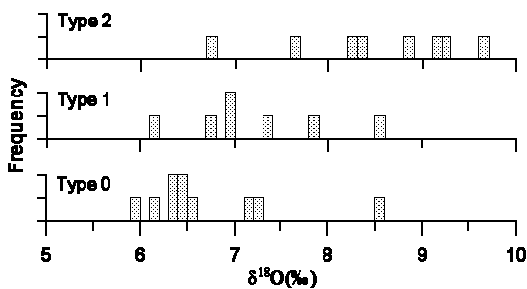


Fig. 1. Variations of oxygen isotope compositions of the Salmagora Complex.

Results and Discussions

In Figure 1, we can observe that oxygen isotope composition systematically increases from type 0, type 1 and to type 2. Especially each rock type of pyroxenite, melteigite, ijolite and urtite in type 2 has higher value than that in type 1 by +0.6 to +2.4‰. Sulfur content was below analytical limit in type 0. The isotope composition varies from -9.3 to -4.8‰ for only melteigite in type 1 and from -4.2 to +1.0‰ in type 2. The increases in oxygen isotope composition from type 0 to type 1 can be explained by common magmatic differentiation process [1] with the influence of crustal contamination, while type 2 seems to indicate another highly evolved magma. Similarly, the low sulfur isotope values in type 1 may also be the effect of crustal contamination and the higher values of type 2 indicates the effect of more evolved magma.

Reference

[1] Epstein, S. and Taylor, Jr. H.P. (1967). *Researches in Geochemistry*. John Wiley, 633p.

Inorganic arsenic speciation in contaminated soils, in Korea

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Materials and method

The selected site for this study is an area of arsenic contaminated region (abandoned mine) and near land.

Total arsenic concentration in soil samples and reference materials were as follows. 0.1g of sample was accurately weighed into acid washed digestion vessels containing 9ml of HCl and 3ml of HNO₃, and the resultant solution was heated at 140°C for 1hr in a digestion block. The solutions were allowed to cool and then diluted to 100ml with deionized water. The extraction of the arsenic species for speciation analysis were as follows. 0.1g of soil sample and 15ml of extractant (1M of phosphoric acid + 0.1 M of ascorbic acid) were reacted in a microwave system (Milestone 1200 Mega, power 60W, 15min). This solution is then cooled at room temperature and centrifuged at 2500 rpm for 30min. Total arsenic and arsenic speciation of the supernatant solution was analyzed by ICP-AES and SPE-HG-ICP-AES respectively.

Result and discussion

Total arsenic concentration in samples were measured between 109.97 and 11758.31ppm. In all samples, the majority of arsenic was present as AsV, while AsIII only account for < 3% of the total arsenic. The extraction efficiency, relative to the total arsenic concentration, varied from 25 – 108%. Most of the samples - except to one samples - showed recovery efficiency of above 86%. Only one samples exist both AsIII and AsV and recovery efficiency is not good (respectively 3.18% (AsIII) and 22.18% (AsV)). This sample is tailing which is mostly composed of calcite mineral. Concentration of the Ca is about 24%. AsIII of the tailing sample is presumed to be adsorbed on the calcite surfaces.

Reference

S. Garcia-Manyes *et al.*, (2002), *Talanta*, **58**, 97-109.
C. Hutton *et al.*, (2005), *Mineralogical Magazine*, **69**(5), 577-589
Myron Georgiadis *et al.*, (2006), *Environmental pollution*, **141**, 22-29