

Assessment of Zn pollution level in sediment and water of Nomi River, Tokyo, Japan

S. SHARMIN* AND N. SHIKAZONO

Laboratory of Geochemistry, School of Science for Open and Environmental Systems, Faculty of Science and Technology, Keio University, Hiyoshi 3-14-1, Yokohama 223-8522, Japan, Tel.: +81-045-566-1567, Fax: +81-045-566-1551 (*correspondence: shailasumi@gmail.com, Sikazono@applc.keio.ac.jp)

Study area Ota ward, Tokyo, Japan is well known as an industrial area. Sediment and water from the Whole Nomi river, Tokyo were collected to clarify the concentration, contamination, pollution level and geochemical behavior of Zn in the river water and sediment. The geochemical fractionation of Zn was examined with a widely used sequential extraction scheme and the concentration was measured in the liquid extracts by Inductively Coupled Plasma Mass Spectrometry (ICP-MS). A certified reference stream sediment sample (JSd-2) provided by the Geological Survey of Japan was also analyzed using the same procedure as a check. The association of Zn was comparatively higher with adsorbed/exchangeable/carbonate fraction and ranges from 50.3-440.01 $\mu\text{g g}^{-1}$. Analyzed most of the water sample by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES) also exceeded the standard environmental limit (0.03 $\mu\text{g g}^{-1}$ for Zn). The major element and mineralogy of the sediment were also determined by X-ray fluorescence (XRF) and X-ray diffraction (XRD) analysis, respectively. The sediment of Nomi river was considered to be polluted on the basis of Geochemical background values and also exceeded the US EPA's toxicity reference value [1] and for most of the site only AEC fraction surpassed the USEPA value though galena and sphalerite was absent considering mineralogy of the sediment. According to *Igeo* and pollution load index Nomi river sediment was contaminated by Zn, and the Zn enrichment factors (EFc), also reveals most of the sites have several times higher value than the standard. Finally the pollution of Nomi River could be linked to anthropogenic activities such as industrialization, urbanization, deposition of industrial waste and occasional flood.

[1] US EPA (1999) *EPA 530-D99-00*

Fairchildite in carbonatite of the Phalaborwa Igneous complex

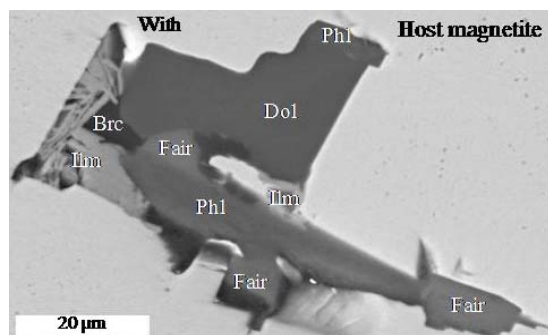
V.V. SHARYGIN^{1*}, L.M. ZHITOVA^{1*},
E.N. NIGMATULINA¹ AND E.YU. ZHITOV²

¹V. S. Sobolev Institute of Geology and Mineralogy SB RAS, Novosibirsk 630090, Russia

(*correspondence: sharygin@uiggm.nsc.ru, zhitova@uiggm.nsc.ru)

²Novosibirsk State University, Novosibirsk 630090, Russia

Fairchildite $\text{K}_2\text{Ca}(\text{CO}_3)_2$ has been found in a multiphase inclusion (size - 60 μm) in the core of large magnetite crystal from phoscoritic carbonatite at Loolekop mine, Phalaborwa. This inclusion also contains dolomite, geikielite-ilmenite, phlogopite, brucite, witherite and halite (Figure 1). Average composition of fairchildite is (n=5, wt.%): K_2O - 38.54; CaO - 23.15; FeO - 1.47; Na_2O - 0.63. Phase relationships within inclusion indicate that K-Ca-carbonate crystallized after



phlogopite and microilmenite and before dolomite.

Figure 1: BSE image of fairchildite-containing inclusion.

The study of apatite-hosted inclusions [1] and estimations for the magnetite-ilmenite and dolomite-calcite pairs demonstrate that crystallization of the Phalaborwa phoscoritic carbonatites started at temperatures higher than 630-750°C and primary $\text{K}_2\text{Ca}(\text{CO}_3)_2$ is a high-temperature polymorph (fairchildite). The solid phase fairchildite-buetschliite inversion is not excluded with temperature decreasing.

The existence of magmatic fairchildite in the Phalaborwa Na_2O -poor calcicarbonatites is supported by experiments of the system Na_2CO_3 - K_2CO_3 - CaCO_3 at 1 kb [2]. Unlike calcicarbonatite worldwide, the drastic predominance of K_2O over Na_2O was promoted the appearance of fairchildite instead of nyerereite $\text{Na}_2\text{Ca}(\text{CO}_3)_2$ during crystallization of the Phalaborwa calcicarbonatite melt.

This study was supported by RFBR Grant# 07-05-00685.

[1] Solovova *et al.* (1998) *Geokhimiya* **36**, 435-447. [2] Cooper *et al.* (1975) *Am. J. Sci.* **275**, 534-560.