Scandium deposits and potential in Finland

M. Ahven[1]

[1] *University of Helsinki, Department of Geosciences and Geography, Division of Geology and Geochemistry (DiGG), P.O. Box 64, FI-00014 Helsinki, Finland*

Scandium (atomic no. 21) is a light transition metal with good electrical conductivity and heat stabilization properties. Globally, its usage has been minor due to unstable markets as a byproduct. Current applications include Sc-Al alloys, natural light bulbs and solid oxide fuel cells, the latest being forecasted to place growing demand for a stable primary product supply. Sc is compatible in ferromagnesian minerals and is thus evenly distributed in the Earth's crust. Usually, Sc enrichment requires hydrothermal and erosional environment: typical economic deposits are in laterites or in placer sands together with REE-minerals. Other showings of Sc are related to pegmatitic vein systems, greisen, skarn and carbonatite complexes.

Sc showings in Finland are rare. In Haapaluoma pegmatites, columbite contains 0.90 wt% of Sc_2O_3 (Haapala et al. 1967). Also a few grains of Sc-Y-silicate thortveitite has been described from a pegmatite in Pello (Alviola 2003).

On the contrary to the vein-type findings, a ferrodiorite intrusion in Kiviniemi, Eastern Finland, shows abnormally high and rather homogeneously distributed Sc concentrations in apatite, clinopyroxene and amphibole (940-1133 ppm, 610-1740 ppm and 103-2088 ppm of Sc_2O_3, respectively). Preliminary enrichment tests have been made at the GTK Mintec and the University of Eastern Finland (UEF) facilities to evaluate the utilisation potential of the deposit. The conventional separation and flotation techniques failed to separate Sc from the silicates. Also the new extraction method with a bisphosphanate collector (at UEF) faced problems, since the high iron content of the diorite prevents the full adsorption of Sc into the collector. However, the yield can be raised up to 96 % by combining a magnetic separation with the dissolution-based bisphosphanate extraction. The collector extraction can therefore turn out to provide a new enrichment method for REE and silicate mineral type ores.

References:

Haapala, I., Siivola, J. and Löfgren, A. 1967. On the Haapaluoma Sc-bearing columbite and its inclusions. C. R.Soc. géol. Finlande, No 39, p.95.

Alviola, R. 2003. Pegmatiittien malmipotentiaalista Suomessa. Geological Survey of Finland, archive report M 10/2003/1/85, 5 p. (in finnish)