

## YTTRIUM IN ROMANIAN PEGMATITES

MURARIU, T.

Chair of Mineralogy and Geochemistry, Department of Geology, "Al. I. Cuza" University, Carol I, No. 11, Iași, Romania  
E-mail: titusmurariu@yahoo.com

Pegmatites have always aroused the researchers' interest by their interesting features, regarding structure, petrography, mineralogy, geochemistry, metallogenetic potential and genesis.

In the Romanian Carpathian area a large pegmatite Province (PPC) is known, consisting of several subprovinces, as follows: Preluca, Rodna, Gilău–Muntele Mare and Getică (MÂRZA, 1980). The PPC pegmatites have a granite type composition and a simple mineralogy and low rare-elements contents, which are characteristic features of the metamorphic pegmatites (HANN, 1987; MURARIU, 2001 *etc.*). The pegmatites are hosted within Precambrian metamorphic rocks, typical of amphibolite facies: paragneisses, micaschist, amphibolites, crystalline marbles, usually associated with migmatites, which belong to the mesometamorphic groups of Baia de Arieș, Rebra, Someș, Sebeș–Lotru (BALINTONI, 1986).

On the basis of mineralogical and geochemical features, pegmatites from the Carpathian Province belong to the following classes (ČERNY, 1982): (1) feldspar pegmatites; (2) mica-bearing pegmatites and (3) rare-element pegmatites, which include two types: (3a) beryl type ( $\pm$  columbite, tantalite, montebasite) and (3b) albite-spodumene type (+ tantalite, columbite, beryl, cassiterite, purpurite).

Yttrium is included in the heavy rare earths subgroup (HREE) by reason of his geochemical affinity with lanthanides. The rare metal yttrium is a typical lithophile element of granites, syenites, pegmatites and carbonatites.

In the Carpathian Pegmatites Province yttrium does not form its own minerals, but occurs in the structure of rock-forming minerals and accessory minerals. The yttrium contents in the Carpathian Province are evidently increasing from the rare-elements pegmatites (albite-spodumene type),

from the feldspar pegmatites, mica bearing pegmatites to garnets pegmatites and apatite pegmatites. The geochemical distribution of yttrium in the minerals of the Carpathian Province Pegmatites revealed lower contents in spodumene, quartz, feldspars, micas, tourmaline as distinct from higher values in apatite and garnets.

In Romanian pegmatites apatite and garnets (almandine–spessartine species) are the main minerals that concentrate yttrium. The presence of yttrium (1564–1950 ppm) in the apatite structure is the result of the following isomorphous substitutions:  $Y^{3+} + Na^+ = 2Ca^{2+}$ ;  $Y^{3+} + Si^{4+} = Ca^{2+} + P^{5+}$ . The isomorphous penetration of yttrium in the crystal structure of garnet depends on their content in Mn:  $Y^{3+} + Al^{3+} = Mn^{2+} + Si^{4+}$ . The substitution of Mn with Y in the analyzed garnets is confirmed by the character of the negative correlation: Y (ppm)/Sp + Cld (%). Based on the concentration coefficient (k) the order in which yttrium was accumulated in the minerals of the pegmatites from Carpathian Province is: apatite > garnet > biotite > tourmaline > muscovite > microcline > albite > quartz > spodumene.

### References

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