Geochemical features of oxide minerals in carbonatites of Northern Transbaikalia

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The location Veseloe of carbonatite-bearing area of Northern Transbaikalia is located in a frame of Early Precambrian crystal base in limits of Vendian-Archean rift zone. It is represented by beforsite dykes. Carbonitites are massive fine-grained rocks, consisting by 70-80 % of ferruterous dolomite and 10-20% of apatite. Magnesioriebeckite, richterite, calcite, magnetite, rutile, zircon, fluorophlogopite are typical minor minerals. The contents of strontium, titanium, zirconium, nickel, chromium, fluorine and especially phosphorus are higher in carbonatite in comparison with average dolomite carbonatite.

Two groups of magnetites and rutiles in carbonatites are present. The first group (essentially carbonatite) composes dispersed dissemination and line segregation of magnetite and rutile, focused according to layering of rocks. Magnetite in this paragenesis is presented by several diversity generation. Earliest magnetites are represented by two types (M1 and M2). Both types are founded the inclusions in the grains of late nontitaniferous magnetite. M1 contains lenticular and myrmekitic inclusions of rutile. M1 is characterized by the contents TiO_2 up to 1,5 wt. % and V_2O_3 up to 0.5 wt. %. Rutile, presenting in magnetite M1, contains 1.2 wt. % V_2O_3. In second type M2 rutile segregation have lamellar form. The structure M2 differs by the highest concentration TiO_2 (8-9 wt. %) and V_2O_3 (1.6 wt. %). Rutile contains 1 wt. % V_2O_3 in magnetite M2.

The second group of magnetite and rutile was detected in the form of resorbed xenogeneic inclusions at carbonatites. They are represent aggregates of intergrowth Cr-bearing magnetite, chromite, rutile, ilmenite and titanite. Two types of magnetite are established here. The first type composes crystalline grains, surrounded by Cr-bearing rutile (0.95-2.30 wt.% Nb_2O_5). Magnetite characterized by high contents of Cr (13-18 wt. % Cr_2O_3). Relics of high-chromous (up to 50 wt.% Cr_2O_3) chromite at a inner core of grains are present. Cr content decreases till 5-13 wt. % in marginal parts of grains magnetite. The second type is myrmekitic aggregates intergrowth magnetite and rutile. Contents of Cr_2O_3 in magnetite is 0.5-2.5 wt.%, in rutile 0.3-2.9 wt.%.

The myrmekitic and tabular intergrowths of magnetite and rutile are present the structure of immiscibility of a solid solution not described in the scientific literature yet. The detection of Cr-bearing mineral phases let suggest that carbonatite melt is of mantle source, but not as a result of silicate - carbonate melt differentiation.

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Use and abuse of the term shoshonitic: Shoshonites versus vaugnerites, and minettes

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The term shoshonitic has been expanded from its original meaning, i.e. the richest-in-K among subduction magmas, to include other K-rich rocks such as appinite-vaugnerites, minettes and monzonitic granitoids, for which there is no requirement to be related to subduction processes. This is not appropriate, because the association between the term shoshonitic and subduction is so firmly established in geologist' mind that once a rock series has been qualified as shoshonitic it is practically inevitable that it is linked with subduction magmatism, something that frequently conflicts the evidence coming from other fields. A world-wide comparative study of the three main igneous rock associations that plot in the shoshonitic field of the K_2O-SiO_2 diagram: shoshonites, vaugnerites, and minettes, reveals that the similarities among them are just superficial. Vaugnerites and minettes are more magnesian and much richer in LIL and HFS elements, and have higher LaN/LuN than shoshonites. Whereas shoshonites have Th/U and Nb/Ta close to the mantle ratio, ≈ 3.2, some minettes and most vaugnerites have elevated Th/U (up to 14) characteristic of metapelitic granulites. Shoshonites have ε(Nd)t $\approx$ 2 to 6 and ε (Sr)t $\approx$ 20 to 24, vaugnerites and minettes have negative (down to 15) ε(Nd)t and positive ε(Sr)t (up to 123). These differences indicate that most vaugnerites and some minettes have a strong crustal imprint but *do not* represent crust-contaminated shoshonitic magmas. Their isotope composition requires derivation from metasomatically enriched mantle layers about 200 to 800 M.y. old, in the case of vaugnerites, and about 1000 to 1500 M.y. for minettes, which precludes a subduction environment. Neither the K_2O vs. SiO_2 diagram nor the N-MORB normalized multielement plot may be used for tectonic discrimination of magmas other that those obviously related to a subduction setting. We found it possible, however, to identify true shoshonitic rocks in old, dislocated orogens by means of discriminant functions.