CHROME TITANATE INCLUSIONS OF UNUSUAL COMPOSITION IN PYROPES FROM LAMPROPHYRES AND KIMBERLITES.

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Some accessory minerals of lamprophyric rocks, which make up the pipe and dyke bodies of the Chompoloo field, located within the Aldan alkali province can be referred to kimberlite associations. Pyrope, Mg-Al chromite, chrome-diopside, pycroilmenite produce typical spectrum of mineral phenocrysts, common for these rocks. The study of crystalline inclusions in phenocrysts turned out to be informative. High-Cr ultrabasic associations with inclusions of chromite (Cr_2O_3 - up to 58,6%), pycroilmenite (MgO - up to 14,7% , Cr_2O_3 - up to 2,4%), chromous rutile (Cr_2O_3 - up to 8,4%) and chrome titanates of unique composition is mostly remarkable amongst the associations, observed in garnets.

The high-Cr associations of mineral inclusions is found in red-violet pyropes of lherzolite paragenesis. The main peculiarity of their composition is the presence of knorringite minal. The chrome titanates are small crystalline ingrowths of 0.001 -0.3 mm, which are marked by a high degree of idiomorphism. Two groups of chrome titanates are distinguished. The first group is characterized by the following composition: TiO_2 - 56.9 ÷59.7%, Al_2O_3 - 1.8 ÷2.1%, Cr_2O_3 -21.3÷ 22.7%, FeO - 8.4 ÷9.3%, MgO - 3.3 ÷3.7%, CaO - 0.2 ÷0.9%, Na_2O - 0 ÷0.2%, K_2O - 0÷0.4%, ZrO_2 - 3.2 ÷3.7%. The second group has close but markedly different composition: TiO_2 - 60.9-68.3%, Al_2O_3 - 0.8 ÷1.9%, Cr_2O_3 --11.4 ÷19.4%, FeO - 8.8÷ 11.7%, MgO - 3.2 ÷4.6%, CaO - 1.4 ÷1.9 %, Na_2O - 0.2 ÷0.4%, K_2O - 0.2 ÷0.6% , ZrO_2 -0.9 ÷4.0%.

Identification of chrome titanates is a complicated problem. The X-ray analysis did not provide any realible results because of small inclusions. The comparison with the data from literature sources (Haggerty,1983) indicated, that the chrome titanates are close in composition to the minerals of crichtonite group (loverengite) and pseudo-brookite group (armalcolite). But there are some pecularities in the composition of the studied minerals which do not surely permit their classification.

The high-Cr titanates of the first group, which are close to the minerals of the crichtonite group are different from the latter in the deficit of large-ionic cations (Ca, Na, C, et al). Their total (Ca, Na, K) should be 1, but virtually it varies within the interval 0.07-0.37 (when reculculated for atom amount). The chrome titanates of the second group are close on TiO_2 content to armalcolite and on Cr_2O_3 content as well as large-ionic cations, to loverengite.

It is quite possible, that the studied chrome titanates refer to the same continuous series of chrome titanate minerals. The correlation analysis showed the close relationship between oxides, which reflect wide developed isomorphic replacement in these minerals. Two groups of oxides are distinguished:

1) TiO_2, FeO, MgO, CaO, Na_2O, K_2O and
2) Al_2O_3, Cr_2O_3, ZrO_2

The negative evident relationship is observed between these two groups. Oxides positevely correlate within each group. The highest negative correlation is found for TiO_2 and Cr_2O_3, the figurative points on the plot lie on the straight line.

The chrome titanates of the second group are found in pyropes with knorringite minal from typical kimberlites. It indicates that the high-Cr titanates refer to the high-P association.