

REFINEMENT OF GARNET STRUCTURE FROM KIMBERLITE OF YAKUTIA

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The attempt to execute the analysis of the garnet structure from kimberlite by profile refinement method analysis in collation with result X-ray microprobe analysis and optical spectroscopic studies is undertaken. Garnet sized beside 5 mm from kimberlite tube Komsomolskaya and Internacionalinaya (West Yakutiya) is studied for this purpose. All garnets are located in the area of lherzolitic paragenesis according to contents of CaO и Cr₂O₃. In accordance with data of optical spectroscopy garnets are situated in area distheneic eclogites and grosspidites, magnesium eclogites. On the grounds of received chemical composition refinement of the crystalline structure by method of Rietveld is executed for them. Refinement of the garnet structure within single-phase system does not give the satisfactory result. For instance, sample of garnet from tube Komsomolskaya (the borehole 105, depths 106 m) according to data of X-ray microprobe analysis has crystallochemical formula $(\text{Mg}_{2.223}, \text{Fe}^{2+}_{0.451}, \text{Mn}_{0.023}, \text{Ca}_{0.328})_{3.025} (\text{Al}_{1.76}, \text{Fe}^{3+}_{0.037}, \text{Cr}_{0.153})_{1.95} (\text{Si}_{3.011}, \text{Ti}_{0.014})_{3.025} \text{O}_{12}$. As a result of refinement the garnet is a mixture of pyrope $(\text{Mg}_{2.85}, \text{Fe}^{2+}_{0.21})_{3.06} (\text{Al}_{1.97}, \text{Fe}^{3+}_{0.009})_{1.979} (\text{Si}_{2.64}, \text{Ti}_{0.015})_{2.655} \text{O}_{11.4}$ ($R_{\text{Br}}=7.20$) and majorite $(\text{Mg}_{2.70}, \text{Mn}_{0.003}, \text{Ca}_{0.30})_{3.003} (\text{Fe}^{3+}_{1.65}, \text{Cr}_{0.35})_{2.00} (\text{Si}_{2.55}, \text{Ti}_{0.018})_{2.558} \text{O}_{x<12}$ ($R_{\text{Br}}=3.43$). Studied grain has a significant spottiness of the chemical composition, according to small size of the areas of the coherent dissipation (193 - 266) nm, measured toward, perpendicular to plane h42. Formation of two phases of garnet can be bound or with his zonality of growing, or with disintegration of the hard solution. It is necessary to take into account the received results at building of the different diagrams for garnet from kimberlite, founded on result of the chemical analysis or optical spectroscopic studies.