ORE MINERALS FROM THE LAMPROITE GROUND MASS.

Bogatikov[1], O.A.; Garanin[2], V.K.; Kononova[1], K.A.; Kudrjavtseva[2], G.P.; Makhotkin[1], I.L. and Mikhailichenko[2], O.A.

(1) Institute of Geology, Geochemistry and Mineralogy Ore Deposits, Academy Sciences of USSR, 109017, Staromonetni per., 35, Moscow, USSR; (2) Geological Department of Moscow State University, 119899, Lenin's Hills, Moscow, USSR.

The study of mineralogy of oxides from the lamproite ground mass of different regions (Australia, Spain, USSR) and magnetic properties of these rocks has allowed to define their typomorphism at the level of provinces, types of lamproite rocks (ultrabasic, basic) and their facies belonging (tuffs, tuffbreccia, intrusive lamproites, dyke facies). It is shown that the typomorphism of the composition of minerals from the ground mass of lamproites and their spreading correlates to the lamproite diamond bearing.The spreading of microcrystal oxides ("density" of ore mineralization),the set of different mineral phases and their correlation,the size of the extracts and their chemical and phase composition refer to the typomorphic features of oxides from the ground mass of lamproites.

In a nutshell, the essence of the discovered typomorphism is the following. As far as its details at the province level are concerned - this is a wide occurence of rutile, perovskite and K-Ba containing titanates in the ground mass of lamproites of Australia; apatite and ilmenite for dyke rocks of Spain and titanomagnetite (magnetite) specification of Aldan Shield lamproites. It should be also noted that there is the decrease of chrome and magnesian content of the microcrystallic mineralization during the transition from ultrabasic to basic and medium (from olivine to phlogopite, leucite, diopside and etc. lamproites) and the increase in the same direction of its titanium and, especially, iron content. Speaking about the facies belonging of lamproites it should be noted that there is a wide spreading (to one order and more) of microcrystallic oxides in the rocks of dyke facies as compared with the diatreme one and, parallelly to it, its structure is more coarse grained. The similar difference is observed between intrusive and tuff (or breccia) facies, but at somewhat lower level.

Taking into account the importance of microcrystallic extractions in the ground mass of spinels as more sensitive indicators of the surroundings of origin and evolution of the lamproite magma,we'll consider in more details the analysis of the typomorphic peculiarities of spinels. The most characteristic one is the following : the prevailing (or wide) development, among microcrystallic oxides, of high magnesian type of chromite in the ground mass of rich and diamond bearing rocks and their mainly homogeneous form of extractions.With the decrease of the rock diamond bearing, the homogeneous grains of chrome spinellides are changed into zonal extractions with chrome magnetite borders.

The range of spinellide of non-diamond bearing rocks is characterised by the clearly marked domination of the zonal chromite-chrome magnetite extractions over homogeneous chromite one and domination of homogeneous chrome magnetite and titanomagnetite differences. This tendency unanimously illustrates the direct link between the depth and oxide potential of the

developing lamproite system, on the one hand, and its diamond bearing, on the other hand.

On the basis of the magnetic data some peculiarities of ferrimagnetics reflecting the conditions of their formation can be discovered. In particular, for lamproites,containing zonal grains of chrome spinels, the curves $I_s(T)$ in the heating cooling cycle are irreversible.Depending on the composition of the zones both the increase magnetization of I_s saturation and Curie T_c temperature (olivine - chrome spinellide) and the decrease of these parameters (chrome spinellide - magnetite) can take place.Chrome spinellides with the high content of chrome on the $I_s(T)$ curve in the $T<T_c$ field have a sharp decrease of Is while T is increased. The I_s increasing in result of the thermo treating indicates the formation of ferrimagnetic phase with the high content of magnetite minal (transformations pyrrhotine - magnetite, titanomagnetite - magnetite and ilmenite lamellae and others). In its turn, zonality and the titanomaghemitization process show the conditions for less probable preservation of diamond. The availability of high chrome content, vice versa, proves the depth conditions of the lamproite formation. High content of titanomagnetite and magnetite proving the oxidation processes shows the unfavourable conditions for the diamond formation. It is reflected in high values of magnetic susceptibility χ_o, magnetizations I_n, I_s, I_{RS} and the values of temperatures Curie $T_c \approx 580^{\circ}C$.

Thus, the study of oxides from the ground mass is the effective way to carry out the passportization of the lamproite bodies and their diamond bearing evaluation.