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Abstracts

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TYPOMORPHISM AND TOPOMINERALOGY OF SPHALERITE OF PAICHOI-
NOVOZEMELSKAJA MINERALOGICAL PROVINCE

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The sphalerite with its wide range of variations of the constitution and properties, stipulated by genetical reasons, is one of the most informative objects of topomineralogical investigations. The methodical peculiarities and results of a middlescale mineralogical mapping are discussed on the example of Paichoi-Novozemelskaja mineralogical province.

As an element of mineralogical mapping, the distribution of the sphalerite, its content in mineralogical system, typomorphic associations, chemical composition and more important typomorphic properties have been used. The contraction of information for generalized comparisons was carried out by statistical methods and by the calculation of entropy and anentropy in the composition and factor weights.

The diversity of sphalerites of the province is determined by three independent tendencies in their composition change, realized in three isomorphic series:

series of sphalerite-Fe with ranges $100\% \text{ZnS} \rightleftharpoons 90\% \text{ZnS} + 10\% \text{FeS}$;
 series of sphalerite-Mn with ranges $100\% \text{ZnS} \rightleftharpoons 85\% \text{ZnS} + 15\% \text{MnS}$;
 series of sphalerite-Cd with ranges $100\% \text{ZnS} \rightleftharpoons 93\% \text{ZnS} + 7\% \text{CdS}$.

The last two series in the pure state are established in nature for the first time and in any other mineralogical provinces of the world are not known.

The correlation between the composition and properties of the sphalerite is described by the system of equations of multiple regression:

$$\begin{aligned} a_0 &= 5,4083 + 0,000456 \text{FeS} + 0,00210 \text{MnS} + 0,00424 \text{CdS} (\text{\AA}); \\ d &= 4,0812 - 0,00498 \text{FeS} - 0,00817 \text{MnS} + 0,00741 \text{CdS} (\text{gr/cm}^3); \\ \mu &= -0,30 + 0,619 \text{FeS} + 0,945 \text{MnS} (10^{-6} \text{cm}^3/\text{gr}) \text{ and so forth.} \end{aligned}$$

With the help of the analysis of the sphalerite typomorphism, the mineralogical zoning of the province is found out and a number of regions with specific peculiarities in the mineral formation are distinguished.

The factor analysis permits to establish the main reasons of the sphalerite typomorphism. Observed variations of typomorphic peculiarities are almost completely determined by three factors: $F_1(20\%) = +(a_0, \text{Mn, Cd, Sb, H, Cu, V, Sn, Ga}) - (\text{Zn, Fe, Co, S, Ge})$ interpreted as the chemical composition of the mineralogenetic environment; $F_2(14\%) = +(\text{Fe, S, Co, colour, Pb, Ti, Mn}) - (\text{Zn, Cd, Ht, } \sum \text{Ti, Ga})$, identified as the medium temperature; $F_3(6,2\%) = +(\text{Cd, } \sum \text{Ti, Fe, Co, Ti, Pb}) - (\text{S, Sb, Mn, Zn, Ht})$ showing the medium pH.

The conditions and regime of the formation of sphalerite-bearing associations were established and general evolution of the mineral formation in the province was stated.