ABOUT APPLICABILITY OF EXPERIMENTAL DATA FOR DRY SYSTEMS TO THE ANALYSIS OF FORMATION CONDITIONS OF NATURAL HYDROTHERMAL ASSOCIATIONS

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The data received for synthesis of Ni-Co-Fe arsenidies [1, 2, 3] and sulphoarsenides [4] in dry systems are used for an estimation of temperatures education of natural hydrothermal associations containing these minerals [5,6].

Synthesis cubic Ni-Co sulphoarsenides [4] shows, that arising in system CoAsS-NiAsS-FeAsS to 500^0C the solid solutions are formed by two isolated fields of compositions: with prevalence Co and with prevalence Ni. With increase of temperature up to 650^0C, when solid solutions between Co, Ni and Fe becomes better, the compositions between them are synthesized, i.e. there is a series of continuous solid solutions with education of a uniform field of the significant area (fig. 1). In natural high-temperature deposits with Ni-Co (Illimaussaq alkalin intrusion in South Greenland, in Cr-Ni-ores from Malaga Province, Spain and Northern Morocco) are known (Fe, Co) –rich gersdorffite and Ni-rich cobaltite [7, 8].

Cubic sulphoarsenides are developed in hydrothermal angidrite- carbonate veins of Norilsk ore field. They are gersdorffite, Co–rich gersdorffite and Ni-rich cobaltite (fig. 1). Sulphoarsenides form detached of allocation or enter into structure of complex - zone antimonide - arsenidic mineralization association. The induction sides of joint growth of antimonide - arsenidic mineralization association with veins carbonate. Parameters of formation arsenidic - carbonate veins are determined by study of air- liquid inclusions in calcite are T = 216 - 127^0 C, P = 0.9 - 0.1 кб. Formation temperature of calcite associatining with arsenidic mineralization is 120-165^0C[9]; formation temperature of dolomite - 90-145 ^{0}C [10].

I.e. formation temperature of arsenidic - carbonate veins in Norilsk ore field does not exceed 220^0C. Sulphoarsenides of similar compositions, on the data of synthesis in dry systems, are formed at temperature above 500^0C.

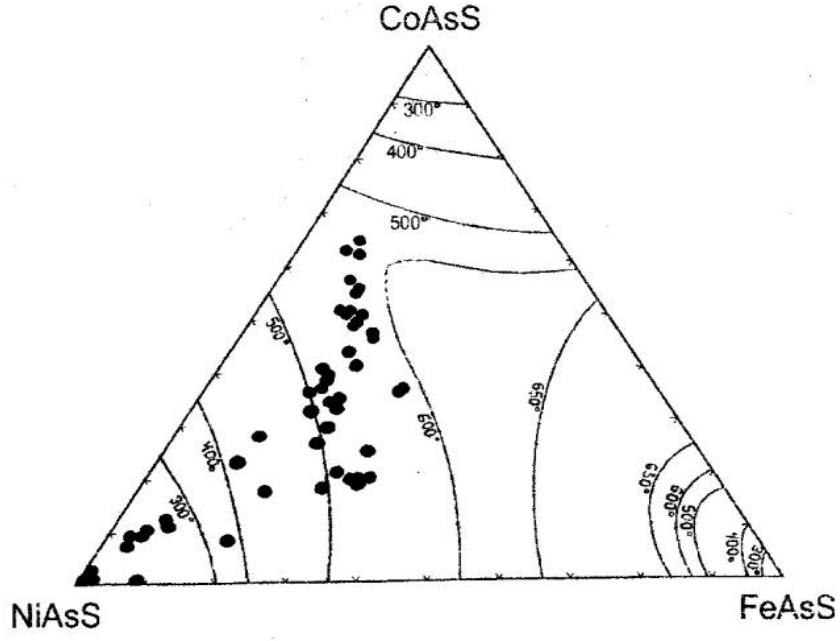

Fig. 1. Chemical compositions of the analyzed sulphoarsenides of hydrothermal angidrite - carbonate veins of Norilsk ore field in the system CoAsS-NiAsS-FeAsS. We have also represented the experimentally determined extent of the immiscibility region at 300, 400, 500, 600 and 650^0C.

Rhombic diarsenides are allocated minerals - solid solutions series: loellingite $FeAs_2$- safflorite $CoAs_2$; rammelsbergite $NiAs_2$ – safflorite $CoAs_2$ and rammelsbergite $NiAs_2$ – loellingite $FeAs_2$. Usually diarsenides contain all three elements of a triad, with prevalence one or two of them. Synthesis of diarsenides in dry systems at temperature 800 ^{0}C [1] has revealed extensive area of solid solutions, though complete solid solutions in this case were not observed (Fig. 2). The significant break of solid solutions between $NiAs_2$ and $FeAs_2$ is observed at synthesis of diarsenides at 625 ^{0}C [2]. 2 isolated fields of compositions: rammelsbergite – loellingite and rammelsbergite – Co- rich rammelsbergite are formed at ~ 300 ^{0}C [3].

Formation temperature of hydrothermal arsenidic - carbonate veins in Norilsk ore field are determined by study of air- liquid inclusions in calcite is 216 - 127^{0}C. These veins contain solid solution series rammelsbergite – loellingite, Co - rich rammelsbergite and Fe - rich safflorite (fig. 2). Diarsenides of similar compositions, on the data of synthesis in dry systems, are formed at temperature above 800^{0}C [1].

Thus, the temperature estimations of hydrothermal education of associations with Ni-Co-Fe arsenides and sulphoarsenides which has been carried by the data for experimental synthesis of dry systems are not correct.

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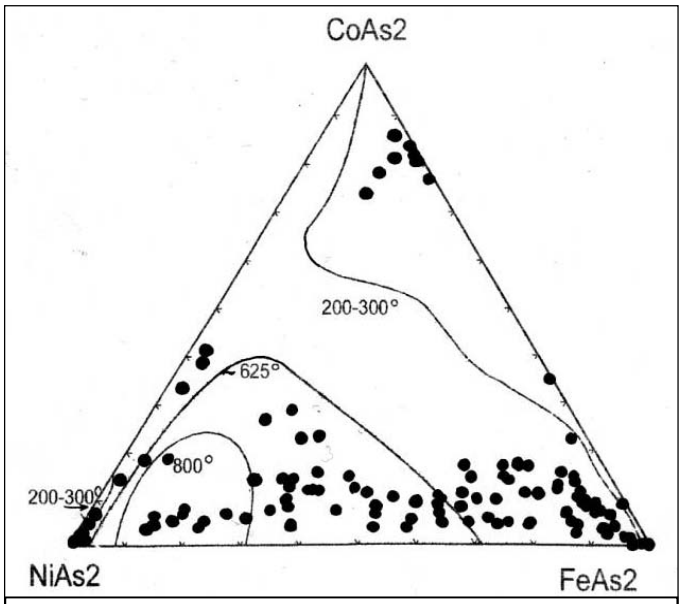

Fig. 2. Chemical compositions of the analyzed diarsenides of hydrothermal angidrite- carbonate veins of Norilsk ore field in the system $CoAs_2$-$NiAs_2$-$FeAs_2$. We have also represented the experimentally determined extent of the immiscibility region at 200-300, 625 and 800^{0}C.

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