

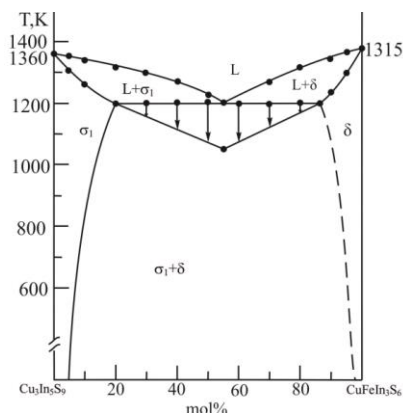
SYSTEM $\text{Cu}_3\text{In}_5\text{S}_9$ – $\text{CuFeIn}_3\text{S}_6$ *Bakhtiyarly I.B., Kurbanova R.J., Abdullayeva Sh.S.*

Institute of Catalysis and Inorganic Chemistry ANAS

Az-1143 Baku, H. Javid ave. 113

Phase equilibria in the Cu_2S - In_2S_3 - FeS quasy ternary system were studied along the $\text{Cu}_3\text{In}_5\text{S}_9$ - $\text{CuFeIn}_3\text{S}_6$ section by means of differential-thermal analysis, X-ray diffraction, microstructure and density determination technique and its phase diagram was constructed (see Figure). $\text{Cu}_3\text{In}_5\text{S}_9$ and $\text{CuFeIn}_3\text{S}_6$, which we take as the starting component are congruent melting compounds formed in quasibinary systems of Cu_2S - In_2S_3 and FeIn_2S_4 - CuInS_2 . It was found that the $\text{Cu}_3\text{In}_5\text{S}_9$ - $\text{CuFeIn}_3\text{S}_6$ section is quasibinary and its phase diagram refers to an eutectic type. Liquidus of this system consists of two branches intersecting eutectic point which characterize non-equilibrium $L \leftrightarrow \sigma_1(\text{Cu}_3\text{In}_5\text{S}_9) + \delta(\text{CuFeIn}_3\text{S}_6)$ and indicating primary crysallization of the solid solutions based on $\sigma_1(\text{Cu}_3\text{In}_5\text{S}_9)$, $\delta(\text{CuFeIn}_3\text{S}_6)$. The coordinate of the eutectic point is 55 mol% $\text{CuFeIn}_3\text{S}_6$ and crystallizes at 1200K. The composition of the eutectic point was confirmed by the construction of the Tamman triangle.

Based on the results of the microstructure analysis conducted on these samples the boundaries of the solid solution regions were clarified.



Phase diagram of the $\text{Cu}_3\text{In}_5\text{S}_9$ – $\text{CuFeIn}_3\text{S}_6$ system

Thus, the phase diagram of the $\text{Cu}_3\text{In}_5\text{S}_9$ – $\text{CuFeIn}_3\text{S}_6$ section was constructed based on the complex results obtained from the mentioned methods of physical and chemical analysis. The diagram is eutectic type and at room temperature (300 K) region of solid solutions based on $\text{Cu}_3\text{In}_5\text{S}_9$ reaches 5 mol%, on $\text{CuFeIn}_3\text{S}_6$ it reaches 2 mol%. The coordinate of the eutectic point 55 mol% $\text{CuFeIn}_3\text{S}_6$ at 1200 K.