The selective adsorption of collectors' mixtures on Py-Cu-Pb-Zn ore

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The expediency development of reagent modes taking into account features of the interaction with the ore surface on the base of physical, chemical and electrochemical properties of minerals or mineral groups plays one of the main roles at the present stage of development of the mining and processing industry it allows one to improve the efficiency of the flotation of polymetallic and other ores.

The aim of the study is to establish the influence of physical and chemical properties of Py-Cu-Pb-Zn ore's minerals on the sorption capacity of flotation reagents.

The constants of sorption equilibrium in solutions of mixtures of sulfhydryl collectors and sodium oleate on the samples of Py-Cu-Pb-Zn ore were determined by the potentiometric method in this paper.

It was shown that the saturation of the ore's surface by molecules of collectors occurs into micropores. It is found that the strong interaction between the adsorbate molecules is characteristically of the potassium butyl xanthate, sodium dibuthyldithiophosphate, ammonium diisooctyldithiophosphate, ammonium isooctylbuthyldithiophosphate. On the other hand the presence the sulfides of four metals with different electronic structure of the outer valence orbital in the ore allow to assume the appearance of galvanic couples of these metals' sulfides [1].

Therefore the mechanism of interaction collectors' mixtures with ore's surface includes multiple steps: the oxidation of sulfur-containing collector for pyrite, removal (full or partial) of oxidation products from the surface, the interaction of the second component of the mixture with minerals ($CuFeS_2$, PbS, ZnS), the formation of an adsorption complex with metal ions, desorption systems. In this plan, the redox potentials of sulfur-containing collectors is particularly relevant, which are arranged to increase the resistance to oxidation: $C_4H_9OCS_2K>(C_4H_9O)_2PS_2Na>(C_4H_9O)_2PS_2NH_4>(i\text{-}C_8H_{17}O)(i\text{-}C_4H_9O)_2PS_2NH_4>(i\text{-}C_8H_{17}O)_2PS_2Na>(i\text{-}C_8H_{17}O)_2PS_2NH_4>>C_{17}H_{33}COONa$.

From the results it is concluded that the fixing reaction of collector molecule occurring on the center FeS_2 - Cu_2S will take place with the highest intensity in the presence of a mixture of sodium diisooctyldithiophosphate - sodium oleate.

In the case of other collectors the intensity will decrease in the row of ammonium isooctylisobutyldithiophosphate – sodium oleate, ammonium dibuthyldithiophosphate – sodium oleate, potassium butyl xanthate - sodium oleate on the active centers FeS_2 – ZnS, FeS_2 – PbS and FeS_2 - $CuFeS_2$ accordingly as result of low complexing capacity of sodium oleate, and change of the interaction type of "adsorbate-adsorbate" due to hydrophobic effects.

Thus, the redox potential of galvanic couples of metal sulphide has dominant effect on the sorption capacity of collectors in mixtures.

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[1] Kh. K. Ospanov, *Physical and Chemical foundations for selective dissolution of minerals*, 2004, 175, Flint River, London, UK.