

# The Role of sorption processes of collectors in the enrichment of polymetallic ores

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The sorption and flotation properties of minerals depend on the genesis of the deposit, which is manifested in the heterogeneity of the surface properties and thus technological features shared minerals. In turn, the consideration of the selection of an effective reagent for the enrichment and processing of ore is not possible without a detailed qualitative and quantitative analysis of complex multicomponent objects as polymetallic ores. The X-ray diffraction, elemental, IR-spectroscopic analysis of ores' samples of Central Kazakhstan deposits. From the elemental analysis it is shown that the useful part of the oxidized ore represented by Fe, Pb, Cu, Zn and refractory minerals of Mn, Ti. It gives an indication of the presence in the samples of iron sulfides, iron oxides, lead, copper, zinc sulfides. And second type of ore consists of sulfides of zinc, lead, iron, copper (sphalerite, galena, pyrite, chalcopryrite, chalcocite). The physical-chemical parameters of interaction "adsorbate-adsorbate", "adsorbent-adsorbate" for oxygen- and sulfur-containing collectors were calculated. Therefore, the reactivity collectors' mixture and the chemical affinity to transition and non-transition metals ions included to the mineral crystal lattice, play a decisive role in the interaction with the ores' surface, and it is reflected in the sorption value.

Further the determination of the sorption characteristics of the collectors in the composition of mixtures, and the comparative analysis of sorption parameters for individual collectors was carried out. The equilibria features occurring in the systems "ore/solution of collectors' mixture" in the case of Cu-Pb ore, which determine the influence of relation "hardness" and "softness" of collectors.

It is shown that binding on the sulfide center is characteristically for the mixtures sodium dibutylthiophosphate (sodium isooctylisobutylthiophosphate, sodium diisooctylthiophosphate) – ammonium oleate; the binding on the sulfide and oxide centers - in the case of mixtures of sodium butyl xanthate (sodium diisooctylthiophosphate) – sodium oleate, ammonium isooctylisobutylthiophosphate – potassium butyl xanthate – sodium oleate; the binding mainly on the oxide center is characteristically in the case of mixture "potassium butyl xanthate – sodium diisooctylthiophosphate - sodium oleate". For Py-Cu-Pb-Zn ore adsorption mechanism has a electrochemical nature. The optimal compositions of the mixtures and the active centers on the ore's surface which providing the maximize sorption values in these conditions were established. It is determined that FeS<sub>2</sub> and PbS are as reaction center for the mixture of potassium butyl xanthate – sodium oleate, (i-C<sub>8</sub>H<sub>17</sub>O)(i-C<sub>4</sub>H<sub>9</sub>O)PS<sub>2</sub>NH<sub>4</sub> – C<sub>17</sub>H<sub>33</sub>COONa, (i-C<sub>8</sub>H<sub>17</sub>O)<sub>2</sub>PS<sub>2</sub>Na – C<sub>17</sub>H<sub>33</sub>COONa; FeS<sub>2</sub> - Cu<sub>2</sub>S (binding on pyrite) is the reaction center for the mixture of sodium diisooctylthiophosphate – sodium oleate.

It was established that FeS<sub>2</sub> – CuFeS<sub>2</sub> (is reaction center for the mixture "C<sub>4</sub>H<sub>9</sub>OCS<sub>2</sub>K – (i-C<sub>8</sub>H<sub>17</sub>O)<sub>2</sub>PS<sub>2</sub>Na – C<sub>17</sub>H<sub>33</sub>COONa" (xanthate oxidation to dixantogenide, low complexing ability of sodium diisooctylthiophosphate toward to Fe (II, III) and Cu (II) ions); and FeS<sub>2</sub>- ZnS is reaction center for (i-C<sub>8</sub>H<sub>17</sub>O)(i-C<sub>4</sub>H<sub>9</sub>O)PS<sub>2</sub>NH<sub>4</sub> - C<sub>4</sub>H<sub>9</sub>OCS<sub>2</sub>K - C<sub>17</sub>H<sub>33</sub>COONa (removal of xanthate through dixantogenide, binding of Fe (III) ion by oleate-ion, binding of oleate-ion on the Zn(II) ion).

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