THE DEVELOPMENT OF REAGENT REGIME OF COLLECTIVELY SELECTIVE FLOTATION OF Fe-Cu-Zn ORE USING A MIXTURE OF SODIUM DIISOPROPYLDITHIOPHOSPHATE AND SODIUM DIISOBUTYLDITHIOPHOSPHATE

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The demand of world leaders in the production of non-ferrous metals in high-quality raw materials is growing. And it determines the need for complex processing of sophisticated difficult-to-process polymetallic ores. The aim of the research is to develop a reagent regime of collective-selective flotation of pyrite-copper-zinc ore. The collective-selective flotation of pyrite-copper-zinc ore has been carried out using a mixture of sodium diisopropyldithiophosphate and sodium diisobutyl dithiophosphate (in ratio 1:1). The kinetic characteristics of flotation (rate constants, energy of activation) have been calculated for the evaluation of activity of collectors' mixture in the flotation. It is shown that the barrier energy of flotation adhesion increases in the result of increasing the soda consumption. It suggests about less activity of dialkyldithiophosphates in the flotation in strongly alkaline medium (the soda consumption is 2100 $g \cdot t^{-1}$) due to the formation of sparingly soluble iron and copper hydroxides, which enhance the hydrophobicity of the particles. So the collective flotation and the separation of the copper-zinc concentrate have been carried out at the following conditions: the air flow rate (W) is 20 $l \cdot h^{-1}$, the impeller rotation frequency is 25 Hz, the collector consumption is 50 $g \cdot t^{-1}$, the soda consumption is 700 $g \cdot t^{-1}$. The extraction of copper into the concentrate is 88%. The high values of extraction of zinc ε=85% are reached at w=50 $l \cdot h^{-1}$, ν=25 Hz, W_{col}=75 $g \cdot t^{-1}$, W (Na_2CO_3)=1750 $g \cdot t^{-1}$.

The FT-IR-spectra of the collective concentrate have been analysed. The absorption band at 547 cm^{-1} is observed, which refers to -S-S bond in alkyl disulfides analogous to that of dixanthogenides [1]. Thus, the reagent regime of collective-selective copper flotation requires low flow rates of the medium regulator (700 $g \cdot t^{-1}$) and the collectors' mixture (50 $g \cdot t^{-1}$). The soda consumption of 1750 $g \cdot t^{-1}$ and the collectors' mixture consumption of 75 $g \cdot t^{-1}$ is needed the re-cleaning of the zinc concentrate.

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References:

1. MERMILLOD-BLONDIN, R., et.al. 2005. Pyrite Flotation With Xanthate Under Alkaline Conditions — Application to Environmental Desulfurisation. *Centenary of Flotation Symposium,* Brisbane, QLD, pp.683 – 692.