

Summary of PhD Thesis

THE EFFECT OF SELECTED COLLECTOR MIXTURES ON EFFICIENCY OF COPPER ORE BENEFICIATION PROCESS

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Contemporary base metals economy is facing the problem of exploring more and more poor resources, which results in greater difficulties in achieving high recovery of valuable metals. The phenomena of decreasing ore processing efficiency of excavated run-of-mine ore also affects the biggest European producer of primary copper, KGHM Polska Miedz S.A. KGHM's concentrator plants are supplied with ore, which beneficiation properties have gradually worsened. This is followed by increasing commercial metals losses in tailings during ore processing, which is directly accompanied by higher metal production costs. Ore processing is based on froth flotation, where one of the most important factor is proper selection of flotation reagents.

The purpose of this research was to describe the influence of chosen collector mixtures in copper sulphide flotation process and therefore specify a proper reagent mixture dedicated to Lubin concentrators plant, taking mineralogical variability of ore being processed into account.

The concept of research scope assumed that examination of xanthates, dithiophosphates and dithiocarbamates collectors are believed to be the most efficient in KGHM conditions as proven by previous research results. Therefore, the set of laboratory flotation experiments were executed using different mixtures of collectors mentioned above. The assessment of lab results was based on mass balance of copper, silver, lead and total organic carbon as well as detailed characterisation of specific sulphide minerals and main mineral species of copper-bearing rocks, including mass balances.

On the basis of laboratory experiments results, the mixtures of collectors have been selected, which may potentially improve ore beneficiation efficiency in technology circuits at Lubin concentrators. The industrial trial was conducted for chosen mixtures of collectors. Results of laboratory scale experiments have been confirmed on industrial scale, referring to copper mass balance.

It was concluded that implementation of collector mixture containing sodium O-diethyldithiophosphate positively influences improvement of copper selectivity beneficiation index. Therefore it may restrain copper loss in tailing and, on the other hand, limit total organic carbon amount in ore concentrates.

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