



## Effects of process water recycling during flotation of copper and cobalt oxidised ores from Luiswishi deposit in the Democratic Republic of Congo

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### ABSTRACT

Laboratory flotation tests with copper–cobalt oxidized ore from the Luiswishi deposit in the Katanga province were done using process water being recycled to different degrees. Grade and recovery of copper and cobalt were followed by 10, 20 and 80% process to fresh water addition with the results from these conditions being compared to those without water recycling. When process water was recycled at 10%, 83.7% copper and 84.1% cobalt were recovered at the rougher stage bringing the cleaner stage to a concentrate with recovery of 53 and 60% for copper and cobalt, respectively. However, recycling process water, up to 20 and 80%, has reduced the recovery of copper in the final concentrate to 23 and 6%, respectively, and of cobalt to 46 and 27%, respectively. Monitoring of dissolved oxygen content, pulp pH and Es potential during flotation, coupled with thermodynamic estimation of the predominant chemical compounds in the system, has enabled to evaluate the effects on flotation from the undesirable compounds' formation during process water recycling. DRIFT spectroscopy was used to identify the nature of the chemical compounds formed on malachite and heterogenite surface during their sulphidisation in the presence of thiosulphate ions. Thiosulphate ions depending on their concentration could promote or hinder malachite and heterogenite flotation by inducing changes in pulp physicochemical parameters or by altering mineral surface properties.

*Keywords:* Oxide ores flotation; Process water recycling; Sulphidisation efficiency; Mineral surface alterations

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