

Review of the Mechanism for Orfom[®] D8 Depression of Chalcopyrite in Cu-Mo Separation during Cleaner Flotation

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For the past 5 years, Montana Tech has coordinated efforts with Chevron Phillips Chemical to determine how the organic depressant, disodium carboxymethyl trithiocarbonate (Orfom[®] D8 depressant), works to separate chalcopyrite from molybdenite during cleaner flotation of a bulk sulfide concentrate. Pure minerals were studied by cyclic voltammetry, X-ray photoelectron spectroscopy, Fourier transform infrared spectroscopy, zeta potential and adsorption density. Results illustrated that Orfom[®] D8 was specific for chalcopyrite by chemisorbing electrochemically through its thiol functionality (CSS⁻) thereby allowing the carboxylate group (COO⁻) to extend into solution and cause depression. Density Function Theory via molecular orbital modeling corroborated the results. Flotation results obtained with Orfom[®] D8 using laboratory simple kinetic tests (SKT), bench-scale experiments, and industrial plant trials revealed grade and recovery of both Cu and Mo were better than those obtained with the most common inorganic depressant, NaSH. Replacing NaSH with Orfom[®] D8 in Cu-Mo flotation is therefore recommended and would simultaneously address mining sustainability issues.

Keywords : Orfom[®] D8, depressant, chalcopyrite, molybdenite, flotation