**Beyond Reagent Trials – New Directions in Flotation Chemistry Research**

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Flotation chemistry research has had a long history of successful innovation, from the use of simple oily reagents to the developing understanding of interfacial science to the design and implementation of sophisticated chemistries. However, in the last 20 years, metallurgists have become increasingly disillusioned with the discipline. The industrial approach to flotation chemistry optimisation became a search for a “silver bullet” reagent, with a string of expensive and disappointing trials.

The high demand for “critical” metals, fuelled by the urgency to transition to renewable energy, has put increasingly more pressure on minerals processing operations. It is, therefore, imperative that flotation chemistry research moves beyond simple reagent trials towards a holistic approach that considers ore properties, surface chemistry, cell hydrodynamics and process water characteristics. This work outlines examples of such research and how they can build a more unified approach to flotation chemistry research with industrial applicability and impact.