

Practical Advances in Reagent Optimisation for PGM Flotation

Background

The increasing complexity of platinum group metal (PGM) ores and tightening economic constraints require practical, data-driven approaches to reagent optimisation. This webinar presents an integrated evaluation of reagent strategies aimed at improving flotation performance through depressant optimisation, co-collector optimisation, and advanced data analytics.

Laboratory flotation tests investigated the optimisation of a guar gum-based co-depressant and dispersant system to suppress pyroxene and associated gangue minerals. Increasing the co-depressant dosage from 0 to 50 g/t and dispersant from 1600 to 1900 g/t reduced chrome entrainment by 9.6% (Cr_2O_3 recovery from 11.6% to 10.5%) and improved 4E recovery from 66.6% to 69.8%. Concentrate grade increased by ~8.0% (35.5 g/t to 38.3 g/t) at stable mass pull (8.6–8.8%), with optimal conditions identified at 1700 g/t dispersant and 50 g/t co-depressant.

A second study applied Response Surface Methodology to evaluate co-collectors as partial substitutes for sodium isobutyl xanthate (SIBX) in Great Dyke PGM flotation. Significant synergistic interactions ($p < 0.05$) were observed, with a strong model fit ($R^2 > 0.7$). The optimised regime reduced SIBX dosage by 75% while increasing 4E recovery by 3%, with no significant change in concentrate grade.

In parallel, a MetSoP co-collector was evaluated during an industrial plant trial using the Optimaviz analytics platform. Statistical analysis showed a 3% increase in PGM recovery and a 2% increase in concentrate grade, with no increase in reagent consumption. Machine learning tools further enabled development of a predictive model linking co-collector dosage to recovery performance.

These results demonstrate that practical reagent optimisation can significantly improve flotation efficiency in complex PGM ore systems.

SPEAKERS



Martha Phasani
Research and Development
Manager
Metsop

Martha Phasani is a metallurgical engineer with a master's degree and over eight years of experience in mineral processing and metallurgical operations across the PGM, chromite, and copper industries. She specializes in process optimisation, metallurgical test work, and laboratory management. Martha consistently delivers actionable insights that enhance metallurgical recoveries and improve operational efficiency. She is a proven leader and mentor who drives performance improvement, fosters innovation, and promotes a culture of continuous learning within technical teams.



Liberty Chipise
Senior Technical Manager
Metsop

Dr. Liberty Chipise is a metallurgical engineer specialised in product development – advanced materials and specialty flotation reagents. His 17+ years' experience spans both academia and industry, and he is currently focusing on the development and optimisation of flotation reagent systems to improve metallurgical performance. Dr. Chipise has authored several peer-reviewed publications and conducted research on alloy development, hydrometallurgy and flotation reagent optimisation. Having begun his career in pyrometallurgical operations, he thus brings a holistic understanding of the metallurgical value chain. Throughout his career he has consistently applied data-driven approaches to solving complex metallurgical challenges.



Itayi Marufu
Regional Manager
Metsop

Itayi Marufu is a metallurgical engineer with over 17 years of experience in mineral processing, smelting, and hydrometallurgical refining of pgms, base metals and gold. He currently serves as Regional Manager at Metallurgical Solutions and Products (MetSop), where he leads client-facing flotation plant trials, reagent optimisation programmes, and technical reporting. His career has encompassed senior leadership roles in Zimbabwe and Mozambique. Itayi has extensive hands-on experience in reagents performance evaluation, and advanced data analytics platforms including Optimaviz. He is a member of the Southern African Institute of Mining and Metallurgy (SAIMM), the South African Council for Natural Scientific Professions (SACNASP).