

1. Record Nr.	UNINA9911019597303321
Autore	Fosso-Kankeu Elvis
Titolo	Recovery of Values from Low-Grade and Complex Minerals : Development of Sustainable Processes
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2024 ©2024
ISBN	9781119896890 1119896894 9781119896883 1119896886
Edizione	[1st ed.]
Descrizione fisica	1 online resource (273 pages)
Altri autori (Persone)	MambaBhekie B Mulaba-BafubiandiAntoine F
Disciplina	622.7
Soggetti	Ore-dressing Sustainability
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- Preface -- Chapter 1 Optimization of the Mechanical Comminution - The Crushing Stage -- 1.1 Introduction -- 1.2 The Role of Crushers -- 1.2.1 Types of Crushers and Their Effect -- 1.2.1.1 Jaw Crusher -- 1.2.1.2 Gyratory Crusher -- 1.2.1.3 Impact Crusher -- 1.2.1.4 Cone Crusher -- 1.2.1.5 HPGR Crusher -- 1.2.2 Gaps and Future Perspective -- 1.3 Conclusion -- References -- Chapter 2 Challenges Related to the Flotation Process of Complex Phosphate Ores -- Abbreviations -- 2.1 Introduction to the Geology of Complex Phosphate Ores -- 2.2 Phosphate Rock Beneficiation Processes -- 2.2.1 Principal and Sub-Ordinate Minerals (Ore Mineralogy) -- 2.3 Froth Flotation of Sedimentary Phosphate Ore -- 2.3.1 Collectors Used in Phosphate Rock Flotation -- 2.3.2 Depressants Used in Phosphate Rock Flotation -- 2.3.3 Frothers Used in Phosphate Rock Flotation -- 2.3.4 Effect of pH on Flotation of Phosphate Ores -- 2.3.5 Equipment Used in Phosphate Rock Flotation -- 2.4 Challenges Facing Flotation of Phosphate Rock -- 2.4.1 Water Quality -- 2.4.2 Mineralogy of the Phosphate Rock -- 2.4.3 Particle

Size Distribution Challenges -- 2.5 Future Research Directions -- 2.6 Conclusion -- References -- Chapter 3 Increasing Ionic Strength and Oxyhydroxo Species in Process Water on the Floatability of Chalcopyrite and Pentlandite for a Selected Cu-Ni Bearing Ore Flotation -- 3.1 Introduction -- 3.2 Materials and Methods -- 3.2.1 Three-Phase Batch Flotation -- 3.2.2 Two-Phase Batch Flotation -- 3.2.3 Two-Phase Froth Column -- 3.3 Results and Discussion -- 3.3.1 Solids and Water Recoveries from a Three-Phase Batch Cell -- 3.2 Cu and Ni Recoveries and Grades from a Three-Phase Batch Cell -- 3.3 Water Recoveries from a Two-Phase Batch Float Cell -- 3.4 Froth Column Studies from a Two-Froth Column -- Conclusions -- Acknowledgments. References -- Chapter 4 Relating the Flotation Response of Pyrrhotite to the Adsorption of Sodium Carboxymethyl Cellulose and Sodium Isobutyl Xanthate on its Surface in Process Water of a Degrading Quality -- 4.1 Introduction -- 4.2 Experimental Methods -- 4.2.1 Synthetic Plant Water Preparation -- 4.2.2 Collector Preparation -- 4.2.3 Depressant Preparation -- 4.2.4 Ore Preparation and Milling -- 4.2.5 Batch Flotation -- 4.2.6 Sample Assays/Analyses -- 4.2.7 Pyrrhotite Sample Preparation -- 4.2.8 Bubble-Particle Attachment -- 4.2.9 Microflotation Tests -- 4.2.10 Zeta Potential Measurements -- 4.2.11 Adsorption of Sodium Isobutyl Xanthate -- 4.2.12 Adsorption of Sodium Carboxymethyl Cellulose -- 4.3 Results and Discussion -- 4.3.1 Batch Flotation of a Cu-Ni-PGM Ore: Effect of the Ionic Strength of SPW and CMC Dosage on the Behavior of Pyrrhotite -- 4.3.2 Microflotation of Pyrrhotite in Increasing Ionic Strength of SPW and CMC Dosage -- 4.3.3 Bubble-Particle Attachment of Pyrrhotite in Increasing Ionic Strength of SPW -- 4.3.4 Adsorption of Sodium Isobutyl Xanthate onto Pyrrhotite in Increasing Ionic Strength of SPW -- 4.3.5 Adsorption of Carboxy Methyl Cellulose onto Pyrrhotite in Increasing Ionic Strength of SPW -- 4.3.6 Zeta Potential of Pyrrhotite in Increasing Ionic Strength of SPW -- 4.3.7 Concluding Discussion -- 4.4 Conclusions -- Acknowledgments -- References -- Chapter 5 Simulated Short Cycle Water Recirculation on the Flotation Performance of a UG2 Cu-Ni-PGM Ore -- 5.1 Introduction -- 5.2 Materials and Methods -- 5.2.1 UG2 Ore Mineralogy -- 5.2.2 Plant Water Preparation -- 5.2.3 Reagents Preparation, Storage, and Disposal -- 5.2.3.1 Collector -- 5.2.3.2 Depressant -- 5.2.3.3 Frother -- 5.2.4 Comminution of the UG2 Ore -- 5.2.5 Batch Flotation Procedure -- 5.2.6 Determination of the Entrainment Factor and Gangue Recovery by Entrainment. 5.2.7 Simulating Short Water Recirculation -- 5.2.8 XRF Analysis of Solids Samples -- 5.2.9 Thermo Scientific Gallery Discrete Automated Photometric (Colorimetric) Analyser (GDAPA) -- 5.3 Results and Discussion -- 5.3.1 Solids and Water Recoveries -- 5.3.2 Copper and Nickel Recoveries and Grades -- 5.3.3 Relating the Water Quality Results from GDAPA to Flotation Performance -- 5.4 Conclusions -- Acknowledgements -- References -- Chapter 6 Complexity of Chalcopyrite Mineral Affecting Copper Recovery During Leaching -- 6.1 Introduction -- 6.2 CuFeS₂ Crystal Structure -- 6.3 Application of Dissolution/Leaching of Chalcopyrite -- 6.4 Challenges Associated with Copper Dissolution from the Chalcopyrite Mineral -- 6.4.1 Elemental Sulfur -- 6.4.2 Iron Precipitates -- 6.4.3 Fe-Deficient Polysulfide -- 6.4.4 Gangue-Related Mineral -- 6.5 H₂SO₄-Fe₂(SO₄)₃-FeSO₄-H₂O Speciation -- 6.6 Parameters Affecting Dissolution -- 6.6.1 Effect of pH -- 6.6.2 Effect of Size Particle -- 6.6.3 Effect of Concentration -- 6.6.4 Effect of Temperature -- 6.6.5 Effect of Potential -- 6.6.6 Effect of Geology of the Host Ore Body -- 6.6.7 Effect of Additives -- 6.6.7.1 Addition of Silver (Ag⁺) -- 6.6.7.2 Addition of Chloride (Cl⁻) -- 6.7 Thermodynamic Considerations -- 6.8 CuFeS₂ Phases

Conversion/Copper Sulfide (Cu-S) Intermediate Phases -- 6.8.1
 Alternative Ways of CuFeS₂ Dissolution -- 6.8.2 Development in the
 Field of Copper Sulfide Mineral Leaching -- 6.9 Conclusion --
 References -- Chapter 7 Fe³⁺-Fe²⁺ Redox Cycle Peculiarity in the Acid
 Dissolution of Copper-Cobalt Complex Ores -- 7.1 Introduction -- 7.2
 Conventional Leaching of Copper-Cobalt Minerals -- 7.2.1 Minerals
 Found in Copper-Cobalt Ores -- 7.2.1.1 Location of the African
 Copperbelt -- 7.2.1.2 Geology of the Katanguian -- 7.2.2
 Thermodynamics of the Cu and Co Bearing Mineral Dissolution.
 7.2.2.1 Potential-pH Diagram of the Cu-H₂O System at 25°C -- 7.2.2.2
 Potential-pH Diagram of the Co-H₂O System at 25°C -- 7.2.2.3
 Leaching Reactions -- 7.2.3 Leaching of Oxidized Copper Minerals --
 7.2.4 Leaching of Cobalt Oxidized Minerals -- 7.2.4.1 Reaction
 Chemistry -- 7.2.4.2 Discussions on the Reducing Agents of Co(III) --
 7.2.4.3 Environmental Aspects Related to the Use of Reagents that
 Generate SO₂ -- 7.2.4.4 Experimental Data on Co(III) Reduction --
 7.2.4.5 Microwave Assisted Acid Leaching of Cobalt (III) -- 7.2.5
 Leaching of Sulfide Minerals -- 7.3 Fe³⁺-Fe²⁺ Redox Cycle in the
 Dissolution of Mixed Oxidized and Sulfide Minerals -- 7.3.1 Oxidation
 by Dissolved Oxygen -- 7.3.2 Oxidation by Fe³⁺ -- 7.3.3 Towards a
 New "Mineral-Mineral" Process -- 7.4 Application of Mineral-Mineral
 Leaching Process to the Dissolution of Complex Ores -- 7.4.1 Reaction
 Mechanism -- 7.4.2 Redox Test Results of the CuFeS₂-Fe₃O₄-Co₂O₃
 System -- 7.4.3 Results of Leaching Tests of the CuFeS₂-Fe₃O₄-
 Co₂O₃ System with Temperature Variation -- 7.4.4 Discussions -- 7.5
 Conclusion -- References -- Chapter 8 Rare Earth Elements (REEs) in
 Complex Ores and Spent Materials: Processing Technologies and
 Relevance in the Global Energy Transition -- 8.1 Introduction -- 8.2
 The Chemistry of REEs -- 8.3 REE Minerals and Deposit Types -- 8.4
 REE Ore Mining and Processing Technologies -- 8.4.1 Mineral
 Beneficiation for Recovery of REEs -- 8.4.1.1 Recovery of REEs Using
 Gravity, Magnetic, and Electrostatic Separation -- 8.4.1.2 Recovery of
 REEs from Monazite Using Flotation -- 8.4.2 Hydrometallurgical
 Approach for Processing REEs -- 8.4.2.1 Recovery of REEs from
 Phosphogypsum -- 8.4.2.2 Recovery of REEs from Apatite Mineral --
 8.4.2.3 Recovery of REEs from Red Mud -- 8.4.2.4 Recovery of REEs
 from Calcium Sulfate Sludge -- 8.4.2.5 Recovery of REEs from NdFeB
 Magnet.
 8.4.3 Pyrometallurgical Approach for Processing of REEs -- 8.4.4
 Integrated Pyrometallurgical and Hydrometallurgical Approach for
 Processing of REEs -- 8.4.4.1 Recovery of REEs from Monazite,
 Xenotime and Bastnaesite -- 8.4.4.2 Recovery of REEs Using Alkaline
 Treatment -- 8.4.5 Alternative Technology for Processing of REEs --
 8.4.5.1 Phytomining for Production of REEs -- 8.4.5.2 Solvometallurgy
 -- 8.5 Relevance of REEs in Energy Transition -- 8.6 Conclusion --
 References -- Index -- Also of Interest -- EULA.

Sommario/riassunto

This book focuses on the development of sustainable processes for the recovery of values from low-grade and complex minerals. Edited by experts in the field, it covers key topics such as mechanical comminution, flotation processes, and the leaching of challenging ores. The book discusses various technical challenges, innovative solutions, and future research directions in mineral processing. It is intended for professionals and researchers in metallurgy and mineral engineering, providing insights into the latest advancements in sustainable mineral recovery techniques.