AN ISO 9001 : 2015 CERTIFIED COMPANY

The Complete Technology Book on Minerals & Mineral Processing

FREE SAMPLE: contents and introduction of the 712-page book
Price: Rs 2,200 | US$ 58.95

Order the full book >

AN ISO 9001 : 2015 CERTIFIED COMPANY

Author: NPCS Board of Consultants & Engineers
Format: paperback
Code: NI204
Pages: 712
Price: Rs 2,200 | US$ 58.95
Publisher: NIIR PROJECT CONSULTANCY SERVICES
Shipping: 5 days

About the Book

Mineral is defined as a naturally occurring solid chemical substance formed through biogeochemical processes, having characteristic chemical composition, highly ordered atomic structure, and specific physical properties. By comparison, a rock is an aggregate of minerals and/or mineraloids and does not have a specific chemical composition. Mineral resources of India are sufficiently rich and varied to provide the country with strong industrial base. The country is particularly rich in metallic minerals of the ferrous group such as iron ores, manganese etc. It has the world largest reserves in mica and bauxite. In the field of extractive metallurgy, mineral processing, also known as mineral dressing or ore dressing, is the process of separating commercially valuable minerals from their ores. Mining is the extraction of valuable minerals or other geological materials from the earth, from an ore body; the term also includes the removal of soil. Materials recovered by mining include base metals, precious metals, iron, uranium, limestone, etc. There are three methods of mining; conventional or manual mining, semi mechanised mining and mechanised mining. Geopolymerisation is the processes which can transfer large scale alumina silicate wastes into value added geopolymeric products with sound mechanical strength and high acid, fire and bacterial resistance. One of many useful applications of geopolymerisation is the immobilization of heavy metals and radioactive elements. The production of non ferrous metals from natural mineral ores is, in general, highly energy intensive. Some of the non ferrous mineral sources are bauxite, granite, magnesite, limonite etc. Limestone is a sedimentary rock composed largely of the minerals calcite and aragonite, which are different crystal forms of calcium carbonate ($CaCO_3$). Limestone processing includes several steps; primary crushing (jaw crusher, gyratory crusher, impact breaker), secondary crushing (cone crusher), fine grinding and pulverization, conveying, screening, washing, heavy media separation, optical mineral sorters, drying and storage. The non metallic mineral mining and quarrying industry segment covers a wide range of mineral extraction. Most of these minerals are found in abundance close to the surface, so underground mining is uncommon in this industry segment. Mineral resources of India are sufficiently rich and varied to provide the country with strong industrial base. The country is particularly rich in metallic minerals of the ferrous group such as iron ores, manganese etc. It has the world largest reserves in mica and bauxite.
This book basically deals with methods of mining, mining machineries, geopolymerisation of mineral products and waste, industrial and scientific aspects of non ferrous metals production, processing of alumina rich Indian iron ore slimes, limestone processing, limestone exploration and extraction, the mineralogy of asbestos, the use of asbestos and asbestos free substitutes in buildings, flotation column ;a novel technique in mineral

processing, applications of thermal plasma in the synthesis of covalent carbides, nitrogenous fertilizers, manufacture of ammonium bicarbonate etc.
This book is designed to describe the details of mining and processing of different minerals like alumina rich iron ore slimes, conversion of waste to a high valued product, lime stone, asbestos, coal beneficiation, gravity concentration processes to recover values from coal and ore fines and many more. The book is meant for everyone who wants to study about the subject or wants to venture into the field of mineral processing.

Contents

1. MINING
General Consideration
Mining Machineries
Methods of Mining
1. Conventional or Manual Method
2. Semi-mechanised Method
3. Mechanised Method
Mining of Other Decorative Stones
Conservation and Safety
Problems of Granite Mining
Geological Problems
Operational Problems
Environmental Problems
Status of Granite Mining in India

2. PROCESSING
General Consideration
Manual Methods
Mechanical Methods
1. Sawing
2. Polishing
3. Cutting and Polishing of Edges
4. Status of Granite Processing Industries in India

3. GEOPOLYMERISATION OF MINERAL PRODUCTS AND WASTE
Principles of Geopolymerisation
Reaction Mechanisms and Material Properties
Immobilisation of Heavy Metals and Radioactive Elements
Encapsulation of Organic Residue
Stabilisation of Mine Tailings
Concluding Remarks

4. INDUSTRIAL AND SCIENTIFIC ASPECTS OF NON- FERROUS METALS PRODUCTION
Introduction
Resources in India
The Developed Metals Industry
Environmental Aspects: Life Cycle Assessment (LCA)
Metals for Secondary Sources : The Energy Aspect
Extraction as a Separation Process
Application of Thermodynamics and Kinetics - Some Examples
R & D for the Future

Nonferrous Metallurgy at Regional Research Laboratory, Bhubaneswar
Processing of Ocean Nodules
Processing of Chromite Overburden
Concluding Remarks

5. THE IMPORTANCE OF USING A MULTIDISCIPLINARY APPROACH IN THE EVALUATION OF AMMONIA LEACHING BEHAVIOUR OF MULTIMINERAL SULPHIDES
Introduction
Research Practice/Methodology
1. Overall Aim of Leaching Studies
2. Raw Materials
3. Analysis of Feed Material, Leach Solution and Residues
4. Leaching as a process involving Parallel Reactions
5. Experimental Options and Limitations during Laboratory Studies
6. Analysis of Kinetic Data in Terms of Models
7. Selection of Experimental Conditions for Oxidative Ammonia Leaching of Multimetal Sulphides
Use of Multi-disciplinary Approach
1. Microscopic Studies
2. X-ray Diffraction (XRD) Studies
3. Thermal Analysis (TA)
4. Chemical Phase Analysis
5. Surface Area Measurements
6. Galvanic Interactions
Concluding Remarks

6. PROCESSING OF ALUMINA-RICH INDIAN IRON ORE SLIMES
Introduction
Motivation for the Beneficiation of Indian Iron Ores
Beneficiation Strategies for Indian Iron Ore Slimes
Selective Dispersion-flocculation Studies on Iron Ore Slimes
Concluding Remarks

7. CONVERSION OF A WASTE TO A HIGH VALUED PRODUCT
Introduction
Experimental
Results and Discussions
Concluding Remarks

8. DEFINITIONS AND PROPERTIES OF LIMES
Nomenclature
Physical Properties of Quicklimes
Physical Properties of Hydrated Limes
Chemical Properties of Quick and Hydrated Lime

9. ANALYTICAL TESTING OF LIMESTONE AND LIME
Physical Testing of Limestone
Limestone: Use Specifications
Limestone: Chemical Analyses
Physical Tests of Lime
Lime Materials Specifications
Lime: Chemical Analysis

10. LIMESTONE PROCESSING
Primary Crushing
Secondary Crushing
Fine Grinding and Pulverization
Conveying
Screening
Washing
Heavy-Media Separation
Optical Mineral Sorters
Drying
Storage
Portable Plants
Environmental Controls
Model of Ultramodern, High-Capacity Limestone Producer
Costs
Safety Record

11. LIME MANUFACTURE
Development of Kilns
Vertical Kilns
Rotary Kilns
Coolers
Internals
Miscellaneous Kilns
Chemical Analysis
Refractory Linings
Flexibility
Fuels and Combustion
Rotary Kilns
Vertical Kilns
Heat Balance
Instrumentation
Temperature
Air
Fuel
Equipment
Classification of Quicklime
Control of Kiln Particulate Emissions
Dead-Burned Dolomite Production
Oystershell Lime
Precipitated Calcium Carbonate
Hydraulic Lime
Selective Calcination
Manufacturing Costs
Lime Plant Safety

12. LIMESTONE EXPLORATION AND EXTRACTION
Exploration Criteria
Land Use
Zoning

Coring
Extraction of Limestone
Stripping
Disposal of Overburden
Quarry Layout
Mining Layout
Drilling
Blasting
Loading
Haulage
Pumping
Extraction without Blasting
Environmental Controls

13. THE MINERALOGY OF ASBESTOS
Introduction
Definitions
Chemical Composition
Crystal Structures
Serpentine Minerals
Amphibole Minerals
Occurrences
Synthesis
Optical Properties
X-ray Diffraction Data
Electron Optical Characteristics
Non-asbestiform Amphibole and Serpentine Minerals

14. CHEMISTRY AND PHYSICS OF ASBESTOS
Asbestos : The Raw Material
Occurrence and Formation
World Production
Applications
Structure
Composition
Chemical Reactions
Synthesis of the Asbestos Minerals
Physical Properties of Asbestos Fibres
Tensile Strength
Surface Area
Other Physical Properties
Optical Properties
Thermal Decomposition of Asbestos
Amphibole Asbestos
Chrysotile Asbestos
Surface Properties of Asbestos
Infrared Spectroscopic Data for Asbestos

15. THE IDENTIFICATION OF ASBESTOS IN SOLID MATERIALS
Synopsis
Introduction

Sampling and Pre-treatment of Samples
Analysis of Samples for Asbestos
(1) Observation by Stereo-bionocular Microscope
(2) The Action of Heat on Fibres
(3) Optical Microscope Methods
(4) Infrared Spectrophotometry
(5) X-ray Diffraction Analysis
(6) Electron-optical Methods
(7) Miscellaneous Methods of Analysis

16. THE USE OF ASBESTOS AND ASBESTOS-FREE SUBSTITUTES IN BUILDINGS
Synopsis
Introduction
Asbestos in Buildings
(1) Higher Density Hard-surfaced Materials
(2) Lower Density Soft-surfaced Materials
(3) Sprayed Asbestos
(4) Other Asbestos-based Building Materials and Components
The Risks to Health in the Use of Asbestos in Buildings
Sampling of Installed Building Materials
General Considerations of Health and Safety
Labelling Schemes for Asbestos-based Building Materials
Other Safety Precautions for Building Operatives and Users
Remedial Construction and Maintenance Work
The Substitution of Asbestos in Buildings
(1) Higher Density Hard-surfaced Materials
(2) Lower Density Soft-surfaced Materials
(3) Sprayed or Floated Materials
(4) Other Building Materials and Components
The Asbestos Hazard in Perspective
The Future for Asbestos in Building

17. PROCESS MODELLING AND SIMULATION OF COAL BENEFICIATION FLOWSHEET
Introduction
Software Components
1. Coaldata.com
2. Flowdata.com
3. Coalben.com
Case Study
Discussion
1. Effect of Media Density
Concluding Remarks
Appendix : Specifications and Parameters of Different Units of Sudamdih Washery

18. ENHANCED GRAVITY CONCENTRATION PROCESSES TO RECOVER VALUES FROM COAL AND ORE FINES
Introduction
Why Fines are a Problem?
Enhanced Gravity Separation Process
Treating Chromite Ore Fines Rejects
1. Multi-Gravity Separator

Results and Discussion
Concluding Remarks

19. MAGNETIC SEPARATION OF HEAVY MINERALS FROM BEACH SAND PLACER DEPOSITS
Introduction
Magnetic Separation Principle
Types of Magnetic Separators
1. Dry Type Magnetic Separators
2. Wet Type Magnetic Separators
Separation of Heavy Minerals
1. Factors of Layout Study
Test Work on Various Options
1. WHIMS in the Up-Front of Feed
2. RED in the Up-Front
3. HTS and RED Combination
4. Use of HTS and IRMS Combination
Concluding Remarks

20. FLOTATION COLUMN â€“ A NOVEL TECHNIQUE IN MINERAL PROCESSING
Introduction
Column Parameters and their Effect on Metallurgical Performance
1. Effect of Various Column Operating Parameters
2. Effect of Various Column Design Parameters on Metallurgical Performance
Mixing Effect in the Flotation Column
1. Reduction of Mixing Effect in Column
Flotation Studies at Regional Research Laboratory, Bhubaneswar
Concluding Remarks

21. PREPARATION OF OXIDES AND HYDROXIDES OF ALUMINIUM THROUGH AQUEOUS ROUTES
Introduction
Preparation of Alumina and Alumina Precursors through Aqueous Route
The Aqueous Species of Al3+
The Sol-Gel Synthesis Route
Homogenous Precipitation Route
Hydrothermal Precipitation Route
Boehmite Synthesis
Concluding Remarks

22. DISSOLUTION BEHAVIOUR OF CARBONACEOUS MATERIALS INTO IRON MELTS DURING DIRECT IRON SMELTING
Introduction
Characterisation of Various Carbonaceous Materials
Experimental
Experimental Results
Discussion
Concluding Remarks

23. APPLICATIONS OF THERMAL PLASMA IN THE SYNTHESIS OF COVALENT CARBIDES
Introduction
Experimental
Results and Discussion

Concluding Remarks

24. LIQUID FERTILIZERS
Liquid Nitrogenous Fertilizers
Compound Liquid Fertilizers

25. MANUFACTURE OF ORDINARY SUPERPHOSPHATE
Production Technology of Simple Superphosphate
Sulphuric Acid as a Raw Material in the Manufacture of Superphosphate
Reactions Occurring in Superphosphate Manufacture
Stoicheiometric Amount of Sulphuric Acid and Peculiarities of the Decomposition Reaction
Main Technical-analytical Indices of Superphosphate Manufacture
Manufacturing Indices of Ordinary Superphosphate from Vietnam Phosphorite
Fast Curing of Superphosphate
Apparatus Used in Superphosphate Manufacture
Storage and Conditioning of Superphosphate

26. NITROGENOUS FERTILIZERS
Nitrogenous Fertilizers and the Cyclic Process of Plant Nutrition
Significance of Inorganic Nitrogenous Fertilizers
World Production of Nitrogenous Inorganic Fertilizers

27. CHEMISTRY OF NITROGEN AND ITS INORGANIC COMPOUNDS

28. AMMONIUM SALTS
Physicochemical and Agrochemical Properties
Manufacturing Processes
Ammonium Chloride
Physicochemical and Agrochemical Properties
Manufacturing Processes
Ammonium Bicarbonate
Physicochemical and Agrochemical Properties
Manufacture of Ammonium Bicarbonate

Get the full book
This sample shows only the contents and introduction. The full book has every chapter.
Price: Rs 2,200 | US$ 58.95
Delivery: Shipped within 5 working days of payment
Order online: niir.org/books/minerals-mineral-processing-handbook/ **WhatsApp:** +91 9097-075-054

Planning a unit? NPCS project reports:

- Chromite Beneficiation project report

NIIR PROJECT CONSULTANCY SERVICES (NPCS) is a reliable name in the industrial world for offering integrated technical consultancy services. NPCS is manned by engineers, planners, specialists, financial experts, economic analysts and design specialists with extensive experience in the related industries.

Our various services are: Detailed Project Report, Business Plan for Manufacturing Plant, Start-up Ideas, Business Ideas for Entrepreneurs, Market Research, Manufacturing Process, Machinery, Raw Materials, Project Feasibility, Investment Opportunities, Technical Consultancy and Startup Help.

NPCS also publishes process technology books, technical books, startup books, directory, business database, detailed project reports and market research reports.

AN ISO 9001 : 2015 CERTIFIED COMPANY

Our Detailed Project Report aims at providing all the critical data required by entrepreneurs for starting new business ventures.

NIIR PROJECT CONSULTANCY SERVICES
106-E, Kamla Nagar, New Delhi-110007, India

Email: npcs.india@gmail.com **Website:** https://www.niir.org/

Scan to order the full book on niir.org