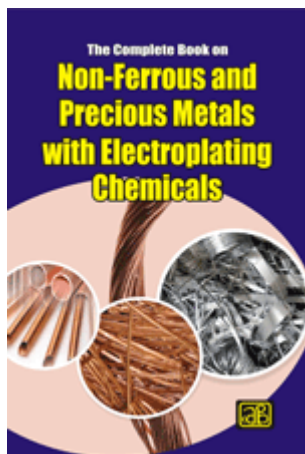


The Complete Book on Non-Ferrous and Precious Metals with Electroplating Chemicals



Author: Dr. H. Panda

Format: Paperback

ISBN: 9788178331737

Code: NI256

Pages: 558

Price: Rs. 1,975.00 **US\$** 200.00

Publisher: Asia Pacific Business Press Inc.

Usually ships within **5** days

Non-ferrous metals are those which don't have any iron content. These are specified for structural applications requiring reduced weight, higher strength, nonmagnetic properties, higher melting points, or resistance to chemical, atmospheric corrosion and also for electrical and electronic applications.

A precious metal is a rare, naturally occurring metallic chemical element of high economic value. Although they have industrial uses, they are better known for their uses in art, jewellery and coinage. Depending on the end use, metals can be simply cast into the finished part, or cast into an intermediate form, such as an ingot, then worked, or wrought, by rolling, forging, extruding, or other deformation process.

Electroplating is a procedure that uses electrolysis to apply a thin layer of a metal over the surface of another metal. Electroplating chemicals are used to change the surface properties of an object such as abrasion and wear resistance, corrosion protection, lubricity, etc. This chemical is widely demanded in automotive, electronics, telecommunications, aerospace and precision engineering industries. This handbook explains different extraction and production processes with flow diagrams of various non ferrous and precious metals.

Major contents of the book are Silver, Gold, Copper, Complex salts of copper, silver and gold, magnesium, chromium, platinum group of metals, nickel, zinc, lead, aluminium, mercury, cobalt, sodium, sodium chloride, soda ash, sodium sulfate, glauber salt, hydrochloric acid, sodium silicate, sodium sulfides, sodium thiosulfate, sodium bisulfate, anhydrous, sodium hyposulfite, liquid chlorine, hydrides of boron, silicon, sulfuric acid, nitric acid, ammonium nitrate, hydrazine, hydrogen cyanide, melamine, amines, aniline, isocyanates, phosphorus, tin, ferroalloys, manganese, bismuth, cerium, phosphoric acid, tungsten, niobium and tantalum etc.

It will be a standard reference book for professionals, entrepreneurs, engineers, those studying and researching in this important area and others interested in the field of non ferrous, precious metals and electroplating chemicals.

Contents

1. SILVER

Extraction by Chloridizing Roasting

Extraction by Cyanidation

Recovery from Base Metal Ores

Parke's Process

Silver Production in India

Silver Nitrate

Industrial Applications

Photography

2. GOLD

Extraction of Gold

Amalgamation Process

Chlorination Process

Cyanidation Process

Gold Extraction in India

Compounds of Gold

3. COPPER

Uses

Harmful Impurities in Copper

Pyrometallurgical Extraction of Copper

Sources of Copper

Extraction of Copper from Sulphide Ores

Concentration

Roasting

Smelting

Converting

Slagging Stage

Blister Formation Stage

Refining

Fire Refining

Electrolytic Refining

Newer Processes for Copper Extraction

Flash Smelting

Continuous Copper Production

WORCRA Process

Noranda Process

Mitsubishi Process

Smelting Furnace

Slag-cleaning Furnace

Converting Furnace

TORCO Segregation Process

Energy Concepts in Copper Smelting

Hydrometallurgy of Copper

Ferric Chloride Leaching

Leaching of Low-Grade Ores

Leaching of Roasted Sulphide Concentrates

Production of Copper in India

Indian Copper Complex

Khetri Copper Complex

Compounds of Copper

4. COMPLEX SALTS OF COPPER, SILVER AND GOLD

Complex Compounds of Silver

Complex Salts of Gold

5. MAGNESIUM

Uses

Nonstructural Uses

Alloying

Deoxidation and Desulphurization

Modifying Structure of Graphite in Cast Irons

Pyrotechnics and Photography

Cathodic Protection

Structural Uses

Magnesium Ores

Methods of Magnesium Extraction

Magnesium from Sea-Water

Pidgeon Process

Equipment and Operation

Reaction Mechanism

Energy Required for the Pidgeon Process

Magnotherm Process

Magnesium Production in India

NML Process

CECRI Process

Magnesium

Dow Process

Electrolysis of Magnesium Chloride

6. CHROMIUM

Uses

Occurrence

Metal Extraction

Electrolytic Chromium

Chrome Alum Process

Chromic Acid Process

7. PLATINUM GROUP OF METALS

Extraction of Platinum Group Metals

Compounds of Platinum

8. NICKEL

Uses

Extraction of Nickel by Pyrometallurgy

Extraction from Sulphide ores

Nickel Sulphide Ore Processing at Sudbury (Canada)

Smelting of Nickel Concentrate

Carbonyl Process for Refining Nickel

Electrolytic Refining of Nickel

Extraction of Nickel from Oxide Ores

Pyrometallurgical Processing

DTA (Differential Thermal Analysis) of Lateritic Ores

Selective Nickel Reduction

Reduction Smelting

Ferronickel Production

Matte Smelting

Pyrometallurgical Processing followed by Hydrometallurgy

Ammoniacal Leaching

Other Leachants
Pyrometallurgical Processing followed by Carbonylation
Hydrometallurgy
Hydrometallurgy of Nickel Sulphide Concentrates
Other Metals from Sulphide Ores
Compounds of Nickel
9. ZINC
Uses
Extraction of Zinc
Sources of Zinc
Pyrometallurgical Extraction of Zinc
Horizontal Retort Reduction
Vertical Retort Reduction
Hydrometallurgical Extraction of Zinc
Imperial Smelting Process (ISP)
Production of Other Metals by ISP
Lead Recovery
Precious Metals Recovery
Copper Recovery
Arsenic, Antimony, and Bismuth Recovery
Tin Recovery
Cadmium Recovery
Zinc from Lead Slags by Slag Fuming
Production of Zinc in India
HZL Debari Plant
Treatment of Complex Sulphides of Lead, Copper and Zinc
Gravity Concentration
Differential Flotation
Retort Distillation
Electrolysis
Liquation
Rectification
Lead Blast Furnace Smelting
Selective Roasting
Reverberatory Smelting
Hydrometallurgical Treatment of Complex Sulphides
Solvent Extraction
Compounds of Zinc and Cadmium
10. LEAD
Uses
Extraction of Lead
Occurrence
Treatment of Ore and Production of Metal
Treatment of Base Bullion
Drossing
Parke's Process for Desilverization of Lead
Dezincing
Debismuthizing
Electrolytic Refining
Modern Developments in Lead Smelting
Outokumpu Flash Smelting
Direct Smelting in Converter
Flash Smelting with Oxygen

KIVCET Process
WORCRA Process
Q-S Process
TBRC (Top-Blown Rotary Converter) Smelting
Production of Lead in India
Tundoo Plant
Tundoo Blast Furnace
Lead Refining
Compounds of Lead
1. Lead monoxide or litharge PbO
2. Red lead, Pb_3O_4
3. Lead dioxide, PbO_2
4. Basic Lead Carbonate or White Lead, $Pb(OH)_2 \cdot 2PbCO_3$ —Dutch Process, Carter's Process, Electrolytic Process
11. ALUMINIUM
Uses
Aluminium Ores
Extraction of Aluminium
Bayer Process for Alumina Production
Factors Affecting Bayer Process
Hall-Heroult Process
Decomposition Potential of Al_2O_3 Dissolved in Cryolite
Influence of Hydrogen or Methane Injection at Anode
Actual Decomposition Potential
Electrolytic Reduction Cell
Cell Operation
Role of Cryolite in Electrolysis
Theory 1
Theory 2
Factors Influencing Electrolysis
Electrolytic Refining of Aluminium
Methods of Treating Low-Grade Ores
Lime Sinter Process
Deville-Pechiney Process
Serpeck Process
Production of Aluminium in India
The Alumina Plant at Hindalco
The Reduction Plant at HINDALCO
Environmental Considerations in Aluminium Production
Newer Processes for Aluminium Production
ALCOA Process
Toth Process
ALCAN Process
Properties of Aluminium: Physical
Compounds of Aluminium
Ceramics Industry
12. MERCURY
Extraction of Mercury
Compounds of Mercury—Experimental evidences to show that mercurous ion is Hg^{2+}
13. COBALT
Compounds of Cobalt
14. SODIUM
Production of Sodium

Downs's Process

15. SODIUM CHLORIDE

16. SODA ASH

Soda Ash, The Commercial Sodium Carbonate

Solvay Process

Soda Ash from Other Sources

Soda Ash Related Products

17. SODIUM SULFATE

Salt Cake

18. GLAUBER SALT

19. HYDROCHLORIC ACID

20. SODIUM SILICATE

Bormine and Bromides

21. SODIUM SULFIDES

22. SODIUM THIOSULFATE

23. SODIUM BISULFITE, ANHYDROUS

24. SODIUM HYPOSULFITE (HYDROSULFITE)

Caustic Soda and Chlorine

Electrolysis of Brine

The Electrolytic Cell

Purification of the Salt Solution

Diaphragm Cells

Concentration of the Caustic Liquor

The Mercury Cell

Hydrogen Disposal

Other Processes for the Production of Chlorine

25. LIQUID CHLORINE

Bleaches

26. HYDRIDES OF BORON

Historical

Methods of Preparation

Properties

Chemical

Oxyacids of Boron

Orthoboric Acid, H_3BO_3

Properties

Borax, $Na_2B_4O_7 \cdot 10H_2O$ Preparation

Properties

Perboric Acid and Perborates

Preparation

Properties

Structure

Industrial Applications

27. SILICON

Hydrides of Silicon

Silicon Tetrahydride, Silicane, or Monosilane, SiH_4

Preparation

Properties

Silicoethane, Disilicane, or Disilane, Si_2H_6

Properties

Silicopropane, Trisilicane or Trisilane, Si_3H_8

Preparation

Properties

Silicobutane, Tetrasilicane or Tetrasilane, Si_4H_{10}
Silicopentane, Si_5H_{12} and Silicohexane, Si_6H_{14}
Silico-acetylene, $(\text{Si}_2\text{H}_2)_n$
Structural Considerations
Short Note on Silicones
Structure of Silicates
Simplest Silicates
Mixed Silicates
Three Dimensional Networks—Felspar and Zeolites
Water Softening
Regeneration
Ultramarine
Halogen Compounds of Silicon
Silicon Tetrafluoride SiF_4
Hydrofluosilicic Acid, H_2SiF_6
Silicon Tetrachloride
Active silica
28. SULFURIC ACID
Uses of Sulfuric Acid
Kinds of Acid
The Manufacture of Sulfuric Acid
Development of the Sulfuric Acid Industry
The Chamber Process for Making Sulfuric Acid
The Contact Process
29. NITRIC ACID
Processes
Uses of Nitric Acid
30. AMMONIUM NITRATE
31. HEXAMETHYLENETETRAMINE
32. HYDRAZINE
Manufacture
Stabilization
33. UREA
Uses of Urea
34. HYDROGEN CYANIDE
35. ACRYLONITRILE
36. MELAMINE
37. AMINES
38. ANILINE
39. ISOCYANATES
Other Nitrogen Compounds
40. PHOSPHORUS
Manufacture of Phosphorus
Modern Electric Process
Manufacture in India
Purification
Smithel's Cold Flame
Luminescence
Manufacture of Red Phosphorus
Hydrides of Phosphorus
Phosphorus Trihydride, or Phosphine PH_3
Properties
Phosphonium Iodide, PH_4I

Hydrogen Hemiphosphide, P_2H_4
Hydrogen Diphosphide, P_2H_6
Other Hydrides of Phosphorus
Oxides of Phosphorus
Phosphorus Tetritoxide, P_4O
Properties
Phosphorus Hemtoxicide, P_2O
Phosphorus Trioxide, P_4O_6
Properties
Structure
Phosphorus Tetroxide, P_2O_4
Preparation
Properties
Phosphorus Pentoxide, P_2O_5
Modes of formation
Preparation
Manufacture
Properties
Chemical
Industrial Applications
Structure
Oxyacids of Phosphorus
Hypophosphorous Acid, H_3PO_2
Properties
Detection
Evaluation
Phosphorous Acid, H_3PO_3
Preparation
Properties
Constitution
Pyrophosphorus Acid, $H_4P_2O_5$
Preparation
Properties
Constitution
Metaphosphorous Acid, $(HPO_2)_n$
Preparation
Properties
Hypophosphoric Acid, $H_4P_2O_6$
Preparation
Structure
Orthophosphoric Acid, H_3PO_4
Manufacture
Thermal Process
Volatilization Process
Properties
Constitution
Orthosphates
Preparation
Detection
Evaluation
Pyrophosphoric Acid, $H_4P_2O_7$
Preparation
Properties

Constitution

Metaphosphoric Acid, (HPO₃)

Preparation

Permonophosphoric Acid, H₃PO₅

Perdiphosphoric Acid, H₄P₂O₈

Halogen Compounds of Phosphorus

Phosphorus Trichloride

Phosphorus Pentachloride, PCl₅

Phosphoryl Chloride, POCl₃

41. TIN

Uses

Concentration of Tin Ores

Smelting of Tin Concentrate

Reverberatory Furnace Smelting

Rotary Furnace Smelting

Refining of Tin

Pyrometallurgical Refining of Tin

Electrolytic Refining of Tin

Compounds of Tin

42. FERROALLOYS

General Methods of Producing Ferroalloys

Beneficiation

Carbon Reduction

Aluminothermic Reduction

Analysis of Aluminothermic Reduction of Manganese Ores

Aluminothermic Process Versus Carbothermic Process

Refining of Ferroalloys

Production of Individual Ferroalloys

Ferromanganese

Ferrosilicon

Ferrochromium (Ferrochrome)

Charge Chrome

Ferrotitanium

Ferrotungsten

Ferromolybdenum

Ferrovandium

Compounds of Iron

43. MANGANESE

Uses

Electrolytic Manganese

Compounds of Manganese

44. ANTIMONY

Extraction of Antimony

45. BISMUTH

Extraction of Bismuth

46. CADMIUM

Production of Byproduct Cadmium

47. CERIUM

Compounds of Cerium

48. PHOSPHORIC ACID

Production of Elemental Phosphorus and Phosphoric Acid

Industrial Phosphates

Wet-Process Phosphoric Acid

49. INDIUM

Properties

Methods of Manufacture

Commercial Grades

Indium Compounds

Oxides

Chlorides

Bromides

Iodides

Fluorides

Sulfides

Sulfates

Nitride

Other Salts

Indium Alkyls

Other Organic Indium Compounds

Methods of Analysis

Procedure

50. TUNGSTEN

Uses

Occurrence and Extraction

51. VANADIUM

Uses

52. NIOBIUM AND TANTALUM

Sources of Niobium and Tantalum

Extraction of Niobium and Tantalum

Niobium and Tantalum in India

53. MOLYBDENUM

Molybdenite Roasting

54. TITANIUM

Sources of Titanium

Treatment of Ilmenite for Upgradation

Electric Smelting of Ilmenite

Acid Leaching of Ilmenite

Halogenation of Ilmenite

Upgradation Processes

Smelting of Ilmenite: Sorel Process

Direct Acid Leaching of Ilmenite

Hydrochloric Acid Digestion of Ilmenite

Sulphuric Acid Digestion of Ilmenite

Solid-State Reduction of Ilmenite Followed by Iron Removal

Preferential Chlorination of Ilmenite

Chlorination of TiO_2

Production of Metallic Titanium by Reduction of Titanium Tetrachloride

Kroll's Process

Production of Ductile Titanium

Theory of Titanium Chloride Reduction by Sodium (Hunter's Process) and Magnesium (Kroll's Process)

Sodium Reaction

Magnesium Reduction

About NIIR

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, Start up Business Opportunities, entrepreneurship projects, Successful Business Plan, Industry Trends, Market Research, Manufacturing Process, Machinery, Raw Materials, project report, Cost and Revenue, Pre-feasibility study for Profitable Manufacturing Business, Project Identification, Project Feasibility and Market Study, Identification of Profitable Industrial Project Opportunities, Business Opportunities, Investment Opportunities for Most Profitable Business in India, Manufacturing Business Ideas, Preparation of Project Profile, Pre-Investment and Pre-Feasibility Study, Market Research Study, Preparation of Techno-Economic Feasibility Report, Identification and Section of Plant, Process, Equipment, General Guidance, Startup Help, Technical and Commercial Counseling for setting up new industrial project and Most Profitable Small Scale Business.

NPCS also publishes various process technology, technical, reference, self employment and startup books, directory, business and industry database, bankable detailed project report, market research report on various industries, small scale industry and profit making business. Besides being used by manufacturers, industrialists and entrepreneurs, our publications are also used by professionals including project engineers, information services bureau, consultants and project consultancy firms as one of the input in their research.

NIIR PROJECT CONSULTANCY SERVICES , 106-E, Kamla Nagar, New Delhi-110007, India. **Email:** npcs.india@gmail.com **Website:** NIIR.org

Tue, 12 Dec 2017 16:14:08 +0530