

The Complete Technology Book on Chemical Industries

Author:- NIIR Board

Format: paperback

Code: NI89

Pages: 443

Price: Rs.975US\$ 100

Publisher: NIIR PROJECT CONSULTANCY SERVICES

Usually ships within 5 days

In modern age chemical industries have permeated most extensively in comparison with other industries and are progressing at a very rapid pace. Chemical Industry in India is one of the fastest growing industries under the Indian economy. The chemical industry comprises the companies that produce industrial chemicals. Central to the modern world economy, it converts raw materials into more than 70,000 different products. Chemicals have contributed in various sectors like food industry, fertilizers, perfumery, fragrance and flavour etc. Chemicals are used to make a wide variety of consumer goods, as well as thousands inputs to agriculture, manufacturing, construction, and service industries. There are numerous chemicals produced in chemical industry for example chloroform, caffeine, fertilizers, dyes, drug intermediates, herbicide, inorganic salts, copper sulphate, acetaldehyde etc. The chemical industry itself consumes 26 percent of its own output. The Chemical Industry in India is based on the idea of diversification. For example inorganic chemicals is the sector where the growth rate is near about 9% and the chemicals produced in this sector are mainly used in alkalis, fertilizers, etc. Depending on the product categories the chemical industry is divided in many other sectors like drugs and pharmaceuticals, fertilizers, fine chemicals like dyes and paints etc. The chemical industry in India which generates almost 13% of total national export is growing annually at a growth rate anywhere between 10% and 12%.

This book majorly deals with the molecular formula, raw materials, properties, laboratory testing, manufacturing process explained with flow diagrams and uses of the chemicals. The major contents of the book are inorganic salts, inorganic chemicals, industrial gas, fertilizers, alum, caffeine, ceramic chemicals etc. This book covers the production of more than 100 chemicals for example acetanilide, methylamine, butylamine, linalol, phosphorous, salicylic acid etc. This book should be of great value to young chemical engineers and chemists who are just entering the field but those already practicing will find much of interest and use for broadening of their insight in to fields in which they are only marginally informed. It is hoped that this book will aid to young engineers, chemical, civil, mechanical and electrical as well as chemists, in understanding the value of chemical, the type of problems met in their production and method for solving these problems.

1. 2-Chloro-6(Trichloromethyl)-Pyridine

Introduction

Classification

Uses and Applications

Industrial Prospect

Formulations
Process of Manufacture
Laboratory Testing
Determination of Pyridine Content
Apparatus
Test Substances
Procedure
Chart Speed
Calculation

2. Alkylamines

Methylamine
Ethylamine
Propylamine
Isopropylamine
Butylamine
Isobutylamine
Amylamine
Monoethanolamine
Diethanolamines
Triethanolamine
Manufacturing Process
Reaction
Uses
Grades
Toxicity
Polypropylene
Manufacturing Process
Hercules Polypropylene Process
Uses
Grades
Polyethylene
Manufacturing Process
From Ethylene by Low-Pressure Polymerization
(Phillips Process)
Uses
Grades
Toxicity
Vinyl Acetate
Manufacturing Process

3. Alum

Introduction
Raw Material Requirements
Reactions
Process of Manufacture
Uses
Plant & Machinery
Market Potential
Plant Economics
Analytical Testing of Ammonium Alum
EDTA Method
Reagents

Procedure
Calculation
Gravimetric Method
Laboratory Testing of Aluminium Sulphate
Introduction
Procedure

4. Bleaching Powder

Introduction
Properties
Properties
Uses
Process of Manufacture
Laboratory Testing
Glacial Acetic Acid
Calculation

5. Caffeine ($C_8H_{10}N_4O_2 \cdot H_2O$)

From Tea Waste
Raw Material Requirements
Process
Properties
Purity
Reagents and Apparatus
Standardization
Procedure A : (Potentiometric)

6. Ceramic Chemicals

Boric Acid
Properties
Manufacturing Process
Reaction
Flow Diagram
Uses
Grades
Toxicity

7. Chemical and Additive for Food Industry

Citric Acid
Properties
Lactic Acid
Molecular Formula
Manufacturing Process
Sodium Bicarbonate
Manufacturing Process

8. Chloroform (Trichloromethane) $CHCl_3$

Chloroform
Molecular Formula
Properties
From Methane by Chlorination
Material Requirements (Theoretical)
Process

From Acetone and Bleaching Powder

Reaction

Material Requirements

Process

Grades

Purity

Determination of Relative Density

Apparatus

Procedure

Calculation

Determination of Distillation Yield

Apparatus

Assembly of the Apparatus

Procedure

9. Chloram Phenicol (p)(-)-Threo-1-(Para-nitrophenyl)-
2-dichloroacetamide-1, 3-propanediol

Reaction

Raw Material Requirements

Manufacturing Process

Properties

Grades

Purity

10. Coumarin (C₉H₆O₂)

From Salicylaldehyde

Reaction

Properties

Grades

Use & Application

Process of Manufacture

Laboratory Testing

Apparatus

Coumarin

Procedure

Reaction with Iodine Solution

11. Construction Material

Lime (Calcium Oxide)

Properties

Manufacturing Process

Hydrated Lime

Chemical Lime

Reaction

Flow Diagram

Uses

Grades

Toxicity

12. Corrosion Inhibitor

Sodium Dichromate

Manufacturing Process

From Chromite Ore

Reaction
Flow Diagram
Uses
Grades
Toxicity

13. Drug Intermediates & Pharmaceuticals

Acetanilide
Molecular Formula
Properties
Manufacturing Process
Reaction
Uses
Specification of Commercial Graders
Toxicity

14. Dry Cleaning Solvent

Perchloroethylene
Molecular Formula
Properties
Manufacturing Process
Reaction
Flow Diagram
Uses
Grades
Toxicity

15. Dyes and Intermediates

Aceto-Acetanilide
Properties
Manufacturing Process
Reaction
Flow Diagram
Uses
Grades
Toxicity
Anthraquinone
Properties
Manufacturing Process
From Phthalic Anhydride and Benzene
Raw Material requirements
b-Naphthol
Properties
Manufacturing Process
From Naphthalene
Raw material requirements
Bon Acid (3-Hydroxy-2 Naphthoic Acid)
Properties
Manufacturing Process
Raw material requirements
Reaction
Flow Diagram
Uses

Grade
G-Acid (2-Naphthol-6, 8 Disulphonic Acid)
Properties (Sodium Salt)
Manufacturing Process
Reaction
Uses
H-Acid
Properties
Manufacturing Process
Reaction
Flow Diagram
Uses
Naphthalene
Manufacturing Process
Process
Naphthol Asg
Manufacturing Process
Raw material requirements
Reaction
Flow Diagram
Uses
Grades
Rhodamine B (Basic Dye)
Properties
Manufacturing Process
From Phthalic Anhydride
Raw material requirements
Reaction
Flow Diagram
Uses
Grades
Toxicity

16. Ester Gum
Field of Applications
Classification
Manufacture
Laboratory Testing
Reagents
Driers
Procedure
Determination of Gel Time
General
Reagents
Procedure

17. Fatty Acids
Properties
Manufacturing Process
Raw Material Requirement
Reaction
Flow Diagram
Uses

Grades
Toxicity

18. Fertilizers

Introduction

Nutrition requirements of crops

Overview of the fertilizer industry

Nitrogen Fertilizers

Miscellaneous low-volume nitrogen fertilizers

Nitrogen fertilizers from synthetic ammonia

Phosphate Fertilizers

Natural Organic Phosphate Fertilizers

Fertilizers from Mineral Phosphates

Potassium Salts

Potassium Minerals

Potassium-Magnesium Minerals

Potassium Sulfate

Potassium Nitrate

Potassium Phosphates

Mixed Fertilizers

Nongranular Mixtures

Compound Granulars

Bulk Blends

Fluid Mixtures

19. Gaur Gum (Galactomannan Gum)

From Guar Seeds (Dry Process)

Raw Material Requirements

Process

Other Processes

Properties

Grades

Containers

Purity

Procedure

Calculation

Determination of Ash

Procedure

Calculation

Determination of Protein

Apparatus

Reagents

Calculation

Determination of Residue Insoluble in Acid

Reagents

Procedure

Calculation

Determination of Gum Content

Procedure

Economic Aspects

20. Herbicide

2, 4-Dichloro Phenoxy Acetic Acid (2, 4-D Acid)

Manufacturing Process
Raw Material requirements
Reaction
Flow Diagram
Uses
Grades
Toxicity

21. Industrial Gases

Overview
Nitrogen
Oxygen
Argon
Hydrogen
Helium
Carbon Dioxide - CO₂
Liquefied Natural Gas
Acetylene
Nitrous Oxide

22. Industrial Halogens

Bromine
Manufacturing Process
Bromine from Sea Water
Reaction
Raw material requirements
Reaction
Uses
Grades
Toxicity
Chlorine
Properties
Manufacturing Process
From Salt by Electrolysis
Raw material requirements (Diaphragm cell)
Reaction
Uses
Grades
Toxicity
Iodine
Manufacturing Process
From Oil-well Brines (Silver iodide process)
Raw material requirements
Reaction
Uses
Grades
Toxicity

23. Inorganic Chemicals - With Multipurpose end use

Activated Alumina
Manufacturing Process
From Alum and Caustic Soda

Raw material requirement
Reaction
Uses
Grades
Toxicity
Activated Carbon
Properties
Manufacturing Process
From Charcoal
Raw Material Requirements
Uses
Grades
Toxicity
Phosphorus Oxychloride
Properties
Manufacturing Process
From Phosphorus Trichloride and Phosphorus
Pentoxide
Raw material requirements
Reaction
Uses
Grades
Toxicity
Sodium Acetate
Properties
Manufacturing Process
From Acetic Acid and Soda Ash
Raw material requirements
Reaction
Uses
Grades
Toxicity
Sodium Chloride
Properties
Manufacturing Process
By Solar Evaporation
Raw material requirements
Major Engineering Problems
Uses
Grades
Toxicity

24. Inorganic Salts
Aluminium Chloride
Properties
Manufacturing Process
From Aluminium Metal and Chlorine
Raw material requirements
Reaction
Uses
Grades
Toxicity
Ammonium Chloride

Properties
Manufacturing Process
From ammonium sulphate and sodium chloride
Raw material requirements
Reaction
Uses
Grades
Toxicity

Ammonium Nitrate

Properties
Manufacturing Process
From Ammonia and Nitric Acid
Raw Material Requirements
Barium Carbonate
Properties
Manufacturing Process
From Barium Sulphide and Carbon Dioxide
Raw material requirements
Reaction
From Barium Sulphide and soda Ash
Raw material requirements
Reaction
Uses
Grades
Toxicity

Copper Sulphate

Properties
Manufacturing Process
From Cupric Oxide and Sulphuric Acid
Raw material requirements
Reaction
Uses
Grades
Toxicity
Uses
Grades
Toxicity

Ferrous Sulphate Heptahydrate

Properties
Manufacturing Process
From Steel Pickling Liquor
Raw material requirements
Reaction
Uses
Grades
Toxicity

Potassium Silicate

Properties
Manufacturing Process
From Sodium Silicate
Raw material requirements
Uses
Grades

25. Linalol

Introduction

Raw Materials Required

Process

Miscellaneous

Properties

Containers

Grades

Uses

Plant & Machinery

Plant Economics

Market Potential

26. Litharge (Lead Monoxide, Yellow Lead Oxide) pbo

By Air Oxidation of Lead Metal (4 Alternate Processes)

Reaction

Material Requirements

Process

Properties

Grades

Containers

Purity

Determination of Litharge Content

General

Volumetric Method

Reagents

Procedure

EDTA Method

Reagents

Procedure

Economic Aspects

27. Metallic Stearates

Aluminium Stearate

Calcium Stearate

Magnesium Stearate

Lead Stearate

Zinc Stearate

Metallic Stearates

Manufacturing Process

Raw material requirements

Aluminium Stearate

Test

Reaction

Uses

Aluminium Stearate

Calcium Stearate

Lead Stearate

Magnesium Stearate

Zinc Stearate

Grades
Toxicity

28. Metal Treatment and Degreasing chemicals

Chromic Acid

Properties

Manufacturing Process

From Sodium Dichromate

Raw material requirements

Reaction

Uses

Grades

Trichloroethylene

Properties

Manufacturing Process

From Acetylene and Chlorine

Raw material requirements

Reaction

Uses

Grades

Toxicity

29. Natural Gas

Characteristics

Occurrence of Natural Gas

Preparing Natural Gas for Transmission and Sale

Processing for Liquids Recovery

30. Acetaldehyde

Properties

Aceto Acetic Ester

Properties

Manufacturing Process

Raw Material Requirement

Reaction

Uses

Grades

Toxicity

Fire Fighting

Aniline

Properties

Manufacturing Process

From Nitrobenzene by reduction

Raw Material requirements

Benzaldehyde

Properties

Manufacturing Process

Oxidation of Toluene

Raw material requirements

Reaction

Uses

Grades

Specifications for Benzaldehyde

Toxicity
Carboxy methyl cellulose (sodium Salt)
Properties
Manufacturing Process
From Waste Cotton (or cellulose)
Raw material requirements
Reaction
Uses
Grades
Ethylene Dichloride
Properties
Manufacturing Process
From Ethylene and Chlorine
Raw material requirements
Glycerine
Properties
Manufacturing Process
Raw material requirements
8-Hydroxy Quinoline
Properties
Manufacturing Process
Raw material requirements
Uses
Grades
Toxicity

31. Perfumery, FragNance and Flavour

Chemicals
Benzyl Acetate
Properties
Manufacturing Process
Raw material requirements
Reaction
Coumarin
Properties
Manufacturing Process
Raw material requirements
Reaction
Uses
Grades
Toxicity
Phenylacetic Acid
Properties
Manufacturing Process
From Benzyl Chloride
Raw material requirement
Reaction
Uses
Grades
Toxicity
Vanillin
Properties
Manufacturing Process

From Waste Sulphite Pulp Liquor
Raw material requirements
Reaction
Uses
Grades
Toxicity

32. Phosphorus and Phosphates

Introduction
Phosphate Rock
Resources
Phosphate Ores
Mining
Beneficiation
Elemental Phosphorus and Phosphoric Acid
Furnace Phosphoric Acid
Industrial Phosphates
Wet Process Phosphoric Acid
Dihydrate Process
Major Dihydrate Processes
Hemihydrate Processes for Phosphoric Acid
Unit Operations
Superphosphoric Acid
Wet Process Acid by-Products
Phosphogypsum
Fluorine Recovery
Uranium Recovery
Purified Phosphoric Acid
Environmental Aspects

33. Plasticiser

Chlorinated Paraffin Wax
Molecular Formula
Properties
Dialkyl Phthalates
Dimethyl Phthalates
Properties
Diethyl Phthalate
Properties
Dibutyl Phthalates
Properties
Dioctyl Phthalates
Properties
Diamyl Phthalates
Properties
Manufacturing Process
From Phthalic Anhydride and Alcohol by
Esterification
Raw material requirements
Dibutyl phthalate
Reaction
Uses
Grades

Toxicity
Tricresyl Phosphate
Properties
Manufacturing Process
From Cresol and Phosphorus Oxychloride
Reaction
Uses
Grades
Toxicity

34. Potassium Permanganate (KMnO_4)

Properties
From Manganese Ore
Reaction
Material Requirements
Process
From Potassium Manganate by Electrochemical
Oxidation
Reaction
Material Requirements
Process
Grades
Containers
Purity
Determination of Potassium Permanganate Content
Reagents
Procedure
Calculation
Economic Aspects

35. Red Iron Oxide

Introduction
Raw Material Requirements
Process
Plant and Machinery
Uses
Market Potential
Plant Economics
Properties
Grades
Containers
Determination of Ferric Oxide (Red)
Reagents
Procedure
Calculation

36. Red Lead (Pb_3O_4)

Introduction
Raw Material Requirements
Process of Manufacture
Plant and Machinery
Plant Economics
Economic Aspects/Market Potential

Miscellaneous
Properties
Grades
Containers
Hazard
Uses
Analytical Testing
Determination of Lead
Procedure
Calculation

37. Resorcinol (3-Hydroxy Phenol)

From Benzene
Reaction
Raw Material Requirements
Process
Properties
Grades
Containers
Purity
Economic Aspects

38. Rubber & Rubber Chemicals

Butadiene
Properties
Manufacturing Process
From Butane by Dehydrogenation (Hydro
Catadiene process)
Raw material requirements
Reaction
Uses
Grades
Toxicity
Chlorinated Rubber
Properties
Manufacturing Process
Raw material requirements
From Rubber Solution
Test
Uses
Grades
Diphenylamine
Properties
Manufacturing Process
From Aniline
Raw material requirement
Reaction
Uses
Grades
Toxicity

39. Saccharin

Alkali Oxidation Process

Raw Material Requirements
Process
Sodium Dichromate Process
Chromic Acid Process
Sodium Saccharin
Liquid Saccharin
Properties
Grades
Purity
Economic Aspects

40. Salicylic Acid
From Phenol
Reaction
Material Requirements
Process
Properties
Grades
Containers
Purity
Reagents
Procedure
Economic Aspects

41. Silica Gel $\text{SiO}_2 \cdot n\text{H}_2\text{O}$
From Sodium Silicate and Sulphuric Acid
Raw Material Requirements
Process
Properties
Grades
Containers
Purity
Procedure
Water Soluble Chlorides
Reagents
Procedure
Calculation
Cobalt Assessment
Reagents
Procedure
Calculation
Ammonium Compounds
Apparatus
Reagents
Procedure
Water Soluble Sulphates
Reagents
Procedure
Economic Aspects

42. Salt, Chlor-Alkali, and Related Heavy
Chemicals
Sodium Chloride

Soda Ash
Sodium Bicarbonate
Sodium Sulfate
Sodium Sulfides
Sodium Thiosulfate
Sodium Sulfite
Sodium Bisulfite
Sodium Hyposulfite
Sodium Phosphates
Sodium Silicate
Chlor-Alkali (Chlorine and Caustic Soda)
Hydrochloric Acid
Bromine and Brine Chemicals
Bleaches
Sodium Chlorate

43. Silicone Resin
Manufacturing Process
Laboratory Testing
Silicone Resin
Rapid Method for Determination of Silicone
Laboratory Testing
Silica Resin
Determination of Silica by the Gravimetric Method
Reagents
Procedure
Properties
Calculation

44. Solvents
Acetone
Properties
Carbon Tetrachloride
Properties
Manufacturing Process
From Carbon Disulphide and Chlorine
Raw material requirements
Chlorobenzene And Dichlorobenzene
Chlorobenzene
p-Dichlorobenzene
Properties
Ethyl Acetate
Properties
Manufacturing Process
From Ethyl Alcohol and Acetic Acid by
Esterification
Raw material requirements
Isopropyl Alcohol
Properties
Manufacturing Process
From Propylene
Raw material requirements
Methyl Alcohol (Methanol)

Properties
Manufacturing Process
From Carbon Monoxide and Hydrogen
Raw material requirements
Methyl Ethyl Ketone
Properties
Manufacturing Process
From Secondary Butyl Alcohol by Dehydrogenation
Raw material requirements
Reaction
Uses
Grades
Toxicity
Nitrobenzene
Properties
Manufacturing Process
From Benzene and Nitric Acid
Raw material requirements
Nitroparaffins
Nitromethane
Properties

45. Sulfur and Sulfuric Acid

Sulfur
Development of the Sulfur Industry
Sulfur Production Processes
Recovered Sulfur
Sulfuric Acid
Uses of Sulfuric Acid
Manufacture of Sulfuric Acid by the Contact
Process
Sulfur Dioxide production
Conversion of SO_2 to H_2SO_4
Absorption of SO_3
Other Sources of Sulfuric Acid

46. Ultramarine Blue

47. Raw Material Requirements

Process
Properties
Grades
Containers
Purity
General
Apparatus
Reagents
Procedure
Calculation
Test for Fastness of Light
General
Apparatus
Procedure
Test for soluble organic colouring matter

General
Reagents
Procedure
Market Aspects

47. Zinc Sulphate

Introduction
Properties
Uses
Scope
Manufacturing Process
Purification
Laboratory Testing of Zinc Sulphate
Determination of Zinc
Reagents
Procedure
Calculation

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.

Our Detailed Project report aims at providing all the critical data required by any entrepreneur vying to venture into Project. While expanding a current business or while venturing into new business, entrepreneurs are often faced with the dilemma of zeroing in on a suitable product/line.

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

Thu, 01 May 2025 22:45:04 +0000