The Indian detergent industry is about three decades old. An interesting and unique feature of detergent industry in India is the existence of non power operated units which do not use any electrical power for the production of detergent powder. But the production technology of detergents have been changed involving high technique in process control, more skilled personnel and requiring large input. There are various forms of detergents; liquid detergents, paste detergents, solid detergents etc. Whether in liquid or in powdered forms, present detergent products are complex mixtures of several ingredients including performance additives such as bleaches, bleach activators etc. The scope and spectrum of methods and techniques applied in detergent analysis have changed significantly during the last decade.

The book outlines features and experimental parameters for many essential procedures, and emphasizes the latest techniques and methods. This book emphasizes practical aspects of detergent production with latest development and other special products based on synthetic surfactants. This book basically deals with the builders, additives and components of detergents, recent developments in surfactant, manufacture of active Ingredients for detergents, manufacture of finished detergents, application and formulation of detergents, packaging of detergents, analysis of detergents, machinery photographs with their suppliers, directory of raw material suppliers etc. This is an attempt to fill the need of those desirous of starting detergent industry in small scale sector and necessarily contains analytical methods for testing and evaluation of raw as well as final products.

Contents

1. Introduction
   Definition
   Biodegradability
   Synthetic Detergents
   Introduction
   Surfactant Hydrophilic-Hydrophobic Balance
   Anionic Surfactants
   Alkylaryl Sulfonates
   Sulfonation
   Sulfation
   Neutralization
   Nonionic Surfactants
Ethoxylation
Amphoteric Surfactants
Alkylolamides
Cationic Surfactants

2. Builders, Additives and components of detergents
Phosphates
Silicates
Soluble glass
Water glass
Soluble powders
Contribution by the alkaline radical
(Na2O or K2O)
Contribution by the SiO2 radical
Zeolites
Carbonates
Sodium Carbonate or Soda Ash-Na2CO3
Sodium Bicarbonate-NaHCO3
Sodium Sesquicarbonate, or Modified Soda
Potassium Carbonate
Oxygen-releasing Compounds
Sundry Inorganic Builders
Borax
Sodium Chloride
Magnesium Sulphate
Insoluble Inorganic Fillers
Caustic Alkalis
Ammonia
Colloidal Silica
Sodium Hypochlorite

3. Recent Developments in Surfactant Synthesis
Sulphation of glycerine
Nonionic surfactants
Amphoteric surfactants
Anionic surfactants
Nonionic surfactants
Cationic surfactants
Amphoteric surfactants
Miscellaneous surfactants
Surfactant synthesis
Toxicological studies
Effluent decolorisation
Synthesis of Surfactants and their Toxicity-IV
Diastereoisomers
Fructose C6H12O6
Saccharose or sucrose or table sugar
C12H22O11
D-Mannose
D-Galactose
b-Glucosamine
Anionic surfactants
Cationic surfactants
Nonionic surfactants
Sugar-based surfactants
Toxicity of surfactants

4. Manufacture of Active Ingredients for Detergents
Sulphonation Process
Manufacture of Alkyl benzene sulphonic acid (Acid Slurry)
Alkyl benzene
Process to obtain straight chain normal paraffins of desired chain length
Major technologies using molecular sieves for separation of n-paraffins
Process for alkylation of benzene by narrow cut (C10-C14) n-paraffin
Review of technologies for production of LAB from n-paraffins
UOP technology to manufacture lab from kerosene
Prefractionation unit
Feed preparation (hydrotreater) unit-hydrobon n-Paraffin Extraction Unit (MOLEX)
Catalytic partial dehydrogenation unit-PACOL
HF alkylation unit
Advance in technology in production of LAB
Improvements in dehydrogenation catalysts and process
Introduction of additional step to achieve reduction of by-product diolefins-Define process
Introduction of a solid catalyst in place of liquid HF catalyst-UPO-Detal Process
Other raw materials for sulphonation
Sulphuric acid and oleum (fuming sulphuric acid)
Liquid SO3
Sulphur
Sulphonation with sulphuric acid and oleum
Batch sulphonation
Manufacturing process
Sulphonation with 98% sulphuric acid
Sulphonation with oleum
Continuous sulphonation with oleum
Chemithon Process
Bellestra sulfan process
Proctor & Gamble Process
Rifenberick process
Sulphonation with SO3
Production of sulphur trioxide
Sulphur burning SO3 plant
Oleum stripping
Stabilised liquid sulphur trioxide
vapourisation
Batch sulphonation
Continuous sulphonation with sulphur
trioxide
Cascade sulphonation
SO3 withdrawal
Sulphonation plant
Exhaust gas scrubbing
Ballestra Sulphurex Process
Air drying
SO2/SO3 production
Film sulphonation & sulphation
(Sulphurex F)
Double-step Neutralisation
Alpha olefins hydrolysis
Gas scrubbing
SO3 absorption in H2SO4 column
Heat recovery
Mazzoni SOCS Process
Chemither SO3 Sulphonation
SO3 generation
Sulphonation
Annular falling film reactor
Neutraliser system
Exhaust gas cleaning up system
Allied chemical thin film sulphonation
Stepan chemical process
Manufacture of fatty alcohol sulphonates
Sulphonation with chloro sulphonic acid
Manufacture of alpha olefin sulphonate
Wax cracking
Ethylene polymerisation
The natural route
Comparison of AOS and methyl ester
sulphonate
Comparison of AOS and LABs in various
products
Dish-washing liquids
Fine cloths washing liquids
Laundry soaps
Toilet soaps
Personal care products
Detergent cakes
Comparison of AOS with alcohol based
surfactants
Alfodet
Product usage
Ethoxylation Process
Ethylene oxide
Fatty acid
Fatty alcohol
Natural process
Synthetic process
Sodium reduction process
High pressure hydrogenation
OXO Process
ALFOL Process
Alkyl phenols
Manufacture of lauric d-ethanol amide
(Ninol AA 62)
Method of manufacture
Manufacture of super amide (2:1 type)
Manufacture of methyl ester
 Manufacture of super-amide
Manufacture of sulphate alkanolamides
IGEPON B
Manufacture of Igepon B conc. paste
Recent Developments in Sulphonation
 Technology
Direct Production of Extremely Viscous
Sulphonic Acids Without the Use of Solvents
Developments in Detergent Manufacture
for Consumer Products
Minimization of 1, 4-Dioxane
Sodium Alpha Sulpho Methyl Ester
(SASMA) Production
Dry Active Detergent Manufacturing

5. Manufacture of Finished Detergents
Powders
Simple Absorption
Combined Absorption and Neutralization
Dry Mixing of Powders
Spray-drying of Powders
Colour
Particle Size and Spread
Bulk Density
Residual Moisture
Stickiness
Product Uniformity
Separation of Powder
Wet Scrubbing
Use of Fines
Combination of Spray-dried and Dry-mixed
Powders
Ballestra 'Complex' System
Patterson-Kelley Systems
Anhydro System
Drum-Drying of Powders
Liquid Detergents
Toilet Preparations
Paste Detergents
Calcium Sulphonates
Solid Detergents
Detergent Toilet Bars
Household Scrub Bars
Fabric Softeners
Abrasive Cleaners

6. Application and Formulation of Detergents
   Foam
   Household Cleaning
   Heavy-Duty Laundering
   Foam Control
   Light-Duty Household Products
   General-Purpose Detergents
   Choice of Non-ionic
   Concentrated Powders
   Cold Water Washing
   Hard-Surface Cleaners
   Machine Dishwashing
   Abrasive-Type Cleaners
   Miscellaneous Household Cleaners
   Commercial Laundering
   Solvent Detergents
   Carpet and Upholstery Cleaners
   Textile Dressing
   Mercerizing
   Food and Dairy Industries
   Advantage of sulphamic acid
   Detergent Sanitizers
   Metal Cleaners
   Miscellaneous Cleaners
   Lavatory Cleaner
   Hand Cleansers
   Waterless Hand Cleansers

7. Important Formulations of Synthetic Detergent
   Detergent Powder
   Market Potential & Scope
   Synthetic Detergent Powder
   Manufacture of Household Detergent Powders
   Process
   Formulations for Detergent Powders
   General Purpose Powder
   Raw Material Requirements (per month)
   Process of Manufacture and Formulations
   Heavy Duty Liquid Detergents
   Opaque Lotion-Type Heavy Duty Liquid Detergent
   Process of Manufacture of Liquid Detergent
   Dish Washing Liquid Detergents
   Process of Manufacture
   Liquid and Cream Soap Products
   Liquids for the Washing of Fabrics
Thick Liquids and Creams
Machine Dishwashing Products
The Composition of Powder
Liquid Cleansers for Hard Surface
Window Panes Cleaning Liquid
Dry Cleaning Detergent
Process of Manufacture
List of Plant & Machineries
Raw Material Requirements (per month)
Soap Powders
Introduction
Spray-Chilled Powders
Formulation for Spray Chilled Soap Powders
Spray Dried Powders
Spray Drying Practice
Cleansing Powder (Vim Type)
Manufacturing Process
Formulation for Cheap Cleansing Powder
List of Plant and Machinery
Raw Material Requirements
Market Potential
Liquid Detergents
Requisites of Surfactants for Formulating
Liquid Detergents
Surfactants most Commonly Used
Builders
Viscosity Controllers
Other Ingredients
Household Liquid Detergents for Laundering
Heavy Duty
Procedure
Light Duty: (for silk, wool etc.)
Procedure

8. Packaging of Detergents
Packaging of Detergent Powder
Types of Packaging
Packaging of Detergent Bars
Packaging Material Specifications
Package Testing Methods
Introduction
Physical Tests
Substance
Dimensions
Bursting strength
Compression resistance
Tensile strength
Scuff resistance
Moisture content
Other Tests
Wax/polythene substance in coated wrappers
Stability to alkali
Stability to soap
Water absorption
Type of fluting
Machine direction of paper and board
Stiffness of board
Miscellaneous Tests
Packaged Commodities Rules
Introduction
Declarations to be Made on Every Package
Permissible Errors of Quantity
Commodities to be Packed in Specified Quantities
Management of Detergent Factories
Technical Efficiency
Introduction
Yield
Fatty acid yield
Glycerol yield
Active detergent yield
Over/under usage of materials
Packing loss/gain
Oil usage pattern
Scrap and downgrading losses
Productivity
Steam, water, electricity
Financial Summary
Pollution Control
Introduction
Sources of Pollution
Oil spills
Chemical spills
Bleaching
Chemical treatment
Glycerine Recovery
Synthetic Detergents
Sulphonation
Detergent powder manufacture
Handling of Raw Materials
Slurry Making, Wash Water
Tower and Air Lift Exhausts
Powder Spillages
Fluidiser Exhaust Air
Boiler House
Coal spillages
Water treatment section
Boiler Blow Down
Chimney exhaust
Boiler ash
Space and location
Effluent characteristics
The requirements of treated effluent
Effluent treatment methodology
Treatment of Gaseous Effluents
Chemical bleaching
Lime soap
Protein stains
Iron compounds
Stains due to dyes
Mildew stains
Physical methods of stain removal
Assessment of stain removal

9. Analysis of Detergents
   Introduction
   Synthetic Detergents
   Active Matter
   Principle
   Standard sodium lauryl sulphate
   solution-0.004M
   Determination of the purity of sodium lauryl
   sulphate
   Molarity of sodium lauryl sulphate
   Standard benzethonium chloride
   (hyamine 1622) soln. 0.004M
   Determination of anionic active matter
   Moisture of Detergent Powders and Cakes
   Principle
   Process
   pH of 1% solution
   Principle
   Procedure
   TFM and Combined Glycerol in Oils
   Combined glycerol in oils
   Principle
   Procedure
   Estimation of TFA

10. Enzymatic Detergents Empower, Metrizyme
    Detergezyme
    The importance of cleaning instruments
    prior to disinfection
    The definition and properties of enzymes
    The benefits associated with incorporation
    of enzymes into detergents
    The properties and benefits of surfactants
    in enzymatic detergents
    Practical usage of enzymatic detergents
    Comparative assessment of Metrex and
    competitor enzyme products

Directory Section

List of Raw Material Suppliers
Plant and Machinery Suppliers
Photographs of Machinery and Equipment
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.


NPCS also publishes varies 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.