ADHESIVE TECHNOLOGY & FORMULATIONS HAND BOOK (HAND BOOK OF ADHESIVES)

INTRODUCTION

Why adhesive bonding
Advantages and Disadvantages of Adhesive Bonding
Advantages
Disadvantages
Ideal Adhesive
Application area for Adhesive Bonding

HISTORICAL DEVELOPMENT OF ADHESIVES AND ADHESIVE BONDING

Introduction
Early History of Adhesives and Sealants
Modern Adhesives and Sealants

TYPES OF ADHESIVES

Physical Classification
Chemical Classification
Thermoplastic Adhesives
Thermosetting Adhesives
Rubber Resin Blends

EMULSION AND DISPERSION ADHESIVES

Type of Emulsion Adhesives
Setting Mechanism
Methods of Application
Advantages and Limitations
Engineering Advantages
Engineering Design with Adhesive

TESTING OF ADHESIVES

Introduction
Standard Tests
Some Selected Standards
A Test for Adhesive Joint Strength
Tensile Tests
Shear Tests
Peel Tests
Environmental and Related Considerations
Fracture Mechanics Techniques

PROTEIN ADHESIVES FOR WOOD

Introduction
Soybean Adhesives
Raw Material Source and preparation
Formulation
Mixing, Application and Pressing
Blended Formulations
Soybean Blood Glues
Soybean Casein Glues
Blood Glues
Raw Material Sources and Preparation
Formulation
Mixing, Application and Pressing
Casein Glues
Raw Material Sources and Preparation
Formulation
Mixing, Application and Pressing
Other Proteins

HOT MELT ADHESIVES

Introduction
Composition
Advantage of Melt Adhesives
Limitations of Melt Adhesives
Application Methods
Use of Melt Adhesives

ANIMAL GLUES AND ADHESIVES

Introduction
Chemical Composition
Types of Animal Glue
Manufacture of Animal Glue
Properties of Animal Glues
Grades and Testing
Preparation of Animal Glues
Flexible and Nonwarp Glues
Liquid Animal Glues
Glue Application
End Uses
Bookbinding
Paper
Paper Converting
Abrasives
Woodworking
Matches
Ore and Metal Refining
Gummed Tape
Miscellaneous Applications
Textiles
Rubber compounding
Luggage and case covering
Gaskets
Glass Chipping
Other Applications

POLYVINYL ACETATE/ALCOHOL BASED ADHESIVES

Polyvinyl Acetate Adhesives
Properties
Applications
Formulations
Fevicol Type Adhesive
Polyvinyl (Alcohol)
Properties
Applications
Formulations

ETHYLENE -VINYL ACETATE COPOLYMERS

Properties

POLYVINYL ACETAL ADHESIVES

Properties
Uses
Plasticizers and Solvents
Polyvinyl Butyral Adhesives
Phenolic Vinyl Butyral Adhesives
Formulations
Laminated Safety Glass
Polyvinyl Formal Adhesives
Polyvinyl Formal Phenolic Adhesives

Formulation

**SILICONE ADHESIVES**

Silicone Resins
Silicone Rubbers
Expoxy Silicons

**EPOXIDE ADHESIVES**

A Mine hardeners
Acid Annydride Hardeners
Other hardeners

**POLYESTER ADHESIVES**

Unsaturated Polyester Adhesives
Properties
Applications

**FURANE ADHESIVES**

Properties
Applications

**PHENOLIC RESIN ADHESIVES**

Phenol Formaldehydehyde Resin Adhesives
Properties
Applications
Dry Glue Film
Phenolic Baking Cement
Phenolic Resin Putty
Phenolic Resin Rubber Cement
Resourcinol Formaldehyde Adhesives
Properties
Applications

**CELLULOSE DERIVATIVE ADHESIVES**

Cellulose Ester Adhesives
Cellulose Nitrate Adhesives
Applications
Cellulose Caprate Adhesives
Cellulose Acetate Butyrate Adhesives
Cellulose Ether Adhesives
Methyl Cellulose Adhesives
Ethyl Cellulose Adhesive
Other Cellulose Ether Adhesives
Fabric Lining Composition

EPOXY POLYURETHANE ADHESIVES

Epoxy Phenolic Adhesives
One Component Adhesives
High Temperature Adhesives

POLYISOCYANATE/POLYURETHANE ADHESIVE

Effectiveness of Polyisocyanate Adhesives
Isocyanate Adhesives
Isocyanate modified Adhesives
Polyurethane Adhesives

AMINO (UREA & MELAMINE) FORMALDEHYDE ADHESIVES

Urea Formaldehyde Adhesives
Properties
Applications
Melamine Formaldehyde Adhesives
Properties
Applications

PAPER, BOARD & PACKAGING ADHESIVES

Selection of Adhesives
Laminated papers
Corrugated Board
Book Binding Adhesives
Paper Impregnate
Paper Bag and Cartons
Multiwall Bag seam past Water Resistant
Carton Sealing
Envelopes
Self Sealing Envelopes Adhesives
Stamps
Labels

REMOISTENABLE ADHESIVES

Formulation
Stamps
Labels
Decalcoamnials
Tapes

UM ARABIC ETC. ADHESIVES
FOOTWEAR APPLICATIONS OF ADHESIVES

Adhesives for Sole Attaching Process Requirements
Development of Adhesive and Primers
Solvent Hazards
Adhesive for Ancillary Operations
Topline Folding
Linings
Toe Puff and heel Stiffener
Lasting
Shank
Heel Covering

HIGH TEMPERATURE ADHESIVES

Introduction
Traditional Adhesives Systems
Recent Development

DISPENSING OF ADHESIVES

Basic Dispensing Principles
Pressure Time Controlled System
Static Pinch Valve
Pressure Time Using Advancing Valve
Pressure Time Using a Rotospray Unit
Cartridge/Syringe Dispensers
Screen Printing of Adhesives

NATURAL RUBBER BASED ADHESIVES

Introduction
Latex Adhesives
Solution Adhesives
Pressure Sensitive Adhesive Tapes

POLYSULFIED SEALANTS AND ADHESIVES

Introduction
Chemistry of Polysulfide Polymers
Preparation of Conventional Polysulfide Polymers
Modified Polysulfide
Other Mercaptan Terminated Polymers
Polythioether Polymers
Properties of Polysulfieed Polymers
Compounding, Processing and Manufacture of Polysulfide Sealants
Polysulfide Sealant Characterization and Testing
Polysulfide/Epoxy Adhesives
Adhesion Considerations
PHENOLIC RESIN ADHESIVES

Introduction
Chemistry
Acid Catalysis
Alkaline Catalysis
Metallic Ion Catalysis and Reaction Orientation
Chemistry and Technology of Application of Phenolic Resin Adhesives for Wood
General Principles of Manufacture
Curing Acceleration Under Alkaline Conditions
Physical Properties of Phenol Formaldehyde Resins
Applications
PF Wood Binders
Properties of Phenolic Adhesives for Plywood
Additives
Formulation of Plywood Glue Mixes
General Observations on Particleboard Manufacture
Dry Out Resistance
Foundry Sand Binder and Mineral Fiber Binders
Binders from PF Copolymers with Other Resins

UREA FORMALDEHYDE ADHESIVES

Introduction
Chemistry of UF Resins Urea Formaldehyde Condensation
General Principles of Manufacture and Application
Plywood Adhesives
Particleboard Adhesives
UF Adhesives for Low Formaldehyde Emission Particleboard
Other UF Adhesives Applications
Analysis
Formulation

MELAMINE FORMALDEHYDE ADHESIVES

Introduction
Uses for MF Resins
Chemistry
Condensation Reactions
Mechanisms and Kinetics
Mixed Melamine Resins
Resin Preparation Glue Mixing and hardening
Chemical and Physical Analysis
Formulations

POLYURETHANE ADHESIVES

Introduction
Applications Overview
UNSATURATED POLYESTER ADHESIVES

Introduction
Synthesis
Reaction Between Dicarboxylic Acids or Anhydrides and Diols
Kinetics and Mechanisms
Side Reactions
Catalysts
Resin Reactivity
Cross Linking Mechanism
Structure Properties Relationships
Glass Fiber Lamination

REACTIVE ACRYLIC ADHESIVES

Introduction
Chemical Reactions in Acrylic Adhesives
Handling of Acrylic Adhesives: Do's and Don'ts with Acrylics
Bond Strengths Available with Acrylic Adhesives
Typical Formulations
HP Acrylic Adhesive
Typical Formulations
Heat Resistant Epoxy Acrylic Hybrid
U.S.Patents
Substrates

TECHNOLOGY OF CYANOACRYLATE ADHESIVES FOR INDUSTRIAL ASSEMBLY

Introduction
Chemistry of The System
Hot Strength
Speed of Cure
Activators
Improved Commercial Cyanoacrylate Compounds
New Flexible Cyanoacrylates
New Cure Through Gap Cyanoacrylates
New Ultrafast Cure Surface Insensitive Cyanoacrylates
New Low Odor Cyanoacrylates
Significant Cyanoacrylate Characteristics
Polypropylene and Polyethylene Bonding
Medical Grade Materials
Thermal Conductivity
Durability
Chlorosis

SILICONE ADHESIVES AND SEALANTS

Introduction
Cure Chemistry
Processing Consideration
Property Deferminations
Basic Formulations
High Modulus Oxime Sealant
Medium Modules Oxime Sealant
Substrate Bonding

EPOXY RESIN ADHESIVES

Introduction
Chemistry of Epoxy Resins
Properties of Epoxies
Resins
Hardeners
Mixed Product
Formulating Epoxy Adhesives
Resins
Curing Agents
Reactive Diluents
Plasticizers
Fillers
Solvents
Additives
Elastomers
Applications
Building and Construction
Metal Bonding
Road Making
Wood Bonding
Engineering Applications
Electrical Applications
Film Adhesives
Miscellaneous Applications
Guide Formulations
Water Based Epoxy Primer
Epoxy Adhesive for Bonding new Concrete to Old Metal to Metal Adhesives
Grouting Adhesive
Cable Jointing Epoxy
Film Adhesives for Preimpregnation
Fast Setting Retail Epoxy Liquid

PRESSURE SENSITIVE ADHESIVES

Introduction
Product Types
Solvent based Adhesives
Hot Melt Adhesives
Water Based Adhesives
Formulating
Applications
Tapes
Labels
Other Applications
Coating Methods
Testing
Tack
Peel
Shear Strength
Guide Formulations
Solvent based Adhesives
Hot Melt Adhesives
Water Based Adhesives

ADHESIVES IN THE AUTOMOTIVE INDUSTRY

Introduction
Adhesive Applications in The Automotive Industry
Adhesives for Mechanical Applications
Adhesive Applications in the Body Shop
Adhesives and Sealants in the Plant Shop
Adhesive and Sealant Applications in the Assembly Shop
Adhesive Applications in Component Manufacturing
Some Considerations Regarding Trends in Automotive Adhesive Bonding

ADHESIVE BASED ON VINYL ACETATE

Plant & Machinery
Fixed Capital
Raw Materials
Total Working Capital/Month
Total Capital Investment
PRINTING GUMS (GUAR GUM BASED)

Plant & Machinery
Fixed Capital
Raw Materials
Total Working Capital/Month
Total Capital Investment
Turn Over/Annum

LEATHER BASED ADHESIVE

Plant & Machinery
Fixed Capital
Raw Materials
Total Working Capital/Month
Total Capital Investment
Turn Over/Annum

LATEX RUBBER BASED ADHESIVE

Plant & Machinery
Fixed Capital
Raw Materials
Total Working Capital/Month
Total Capital Investment
Turn Over/Annum

OFFICE PASTE

Plant & Machinery
Fixed Capital
Raw Materials
Total Working Capital/Month
Total Capital Investment
Turn Over/Annum

STARCH AND DEXTRIN BASED ADHESIVE

Plant & Machinery
Fixed Capital
Raw Materials
Total Working Capital/Month
Total Capital Investment
Turn Over/Annum

ADHESIVE FOR CORRUGATION DRY POWDER AND PASTE

Plant & Machinery
Fixed Capital  
Raw Materials  
Total Working Capital/Month  
Total Capital Investment  
Turn Over/Annum  

**ADHESIVE (DIFFERENT TYPE)**  
Plant & Machinery  
Fixed Capital  
Raw Materials  
Total Working Capital/Month  
Total Capital Investment  
Turn Over/Annum  

**ADHESIVE INDUSTRIES (LAMINATED, FEVICOL, STICKER DDL AND OTHER TYPES OF ADHESIVE)**  
Plant & Machinery  
Fixed Capital  
Raw Materials  
Total Working Capital/Month  
Total Capital Investment  
Turn Over/Annum  

**RUBBER ADHESIVE**  
Plant & Machinery  
Fixed Capital  
Raw Materials  
Total Working Capital/Month  
Total Capital Investment  
Turn Over/Annum  

**ADHESIVE (POLYVINYL BUTYRAL BASED)**  
Plant & Machinery  
Fixed Capital  
Raw Materials  
Total Working Capital/Month  
Total Capital Investment  
Turn Over/Annum  

**SELF ADHESIVE LABELS**  
Plant & Machinery  
Fixed Capital  
Raw Materials  
Total Working Capital/Month
Total Capital Investment
Turn Over/Annum

ESTER GUMS (FOOD GRADE)

Plant & Machinery
Fixed Capital
Raw Materials
Total Working Capital/Month
Total Capital Investment
Turn Over/Annum

VULCANIZING RUBBER SOLUTION/CEMENT FOR AUTOMOBILE TYRES

Plant & Machinery
Fixed Capital
Raw Materials
Total Working Capital/Month
Total Capital Investment
Turn Over/Annum

INDUSTRIAL ADHESIVE BASED ON STARCH GUM, DEXTRINE SILICATE

Plant & Machinery
Fixed Capital
Raw Materials
Total Working Capital/Month
Total Capital Investment
Turn Over/Annum

SUPPLIERS OF PLANT AND MACHINERIES

Adhesive Tape Machinery
Chemical Plant Machinery
Storage Tanks
Boilers Industrial
Evaporators
Stirrers: Chemical
Adhesive Applying Machinery
Adhesion Tester
Adhesive Mixer
Adhesives Dispensers
Adhesive Pumps
Gumming Machinery
Coating Machinery
Label Printing Applying Machinery

SUPPLIERS OF RAW MATERIALS

Sodium Hydroxide
Borax
Urea Formaldehyde Resins
Dextrin
Glycerin
Neoprene Rubber
Toluene
Methylmethacrylate
Zinc Oxide
Calcium Carbonate
Antioxidants
Phenolic Resins
Magnesium Oxide
hexane
Fillers Chemical
Rosin
Thickeners
Gelatine
Starches
Casein
Acrylic Acid
Ethylene Oxide
Plasticisers
Defoaming Agents
Caustic Soda
Pigment Dispersions
Boric Acid
Formaldehyde
Hardeners: Epoxy Resin
Phosphoric Acid
Ethyl Acetate
Ammonium Chloride
Sulphur
Butyl Acetate
Nitrile Rubber
Epoxy Resins Sulphur Dioxide
Fumedsilica
Carbon Black
Shellac
Titanium Dioxide
Alumina
Iron Oxide
Calcium Oxide
Wax
Silica
Stearic Acid
Meleic Anhydride
Polybutene Resins
White Oil
Talc
Clay
Surfactants
Bentonite
Gypsum
Gyclohexanol
Aromatic Oil
Isoprene
Resorcinol
Zinc Dust
Xylenes
Wood Rosin
Copper Sulphate
Hydrated Lime
Zinc Chloride
Hydroxhloric Acid
Sodium Bicarbonate