The Complete Technology Book on Printing Inks

Author:- NIIR Board Format: paperback Code: NI109 Pages: 640 Price: Rs.1000US\$ 100 Publisher: NIIR PROJECT CONSULTANCY SERVICES Usually ships within 5 days

The beginning of ink making is something of a mystery. It is certain however, that the development of the art of writing preceded the invention of ink by almost a thousand years. Today inks are divided into two classes: printing inks and writing inks. Printing is a process for reproducing text and images, typically with ink on paper using a printing press. It is often carried out as a large scale industrial process, and is an essential part of publishing and transaction printing. Different techniques and printing equipments are employed for each printing practices. The demand for innovative printing practices has been on a high in recent times. There are various kinds of printing processes; lithographic process, the gravure process, offset printing process etc. different types of inks derived from different processes are ball pen inks, bleachable inks, fluorescent inks, fast drying ink, automatic press inks, rotary press inks, coated paper inks, planographic inks, lithographic inks, offset tin printing inks etc. The Printing Ink industries have grown significantly during the last decade and this industry is characterized by exceeding high margin profit. As we read newspapers, magazines, and books on a daily basis therefore inks are found in almost every aspect of human activity. The worldwide printing inks market is projected to register a CAGR of about 2.8%. Printing inks market embodies the strength of the global as well as regional economies. With its high correlation to a national GDP, the printing inks market is cyclical in nature, with economic ups and downs amplifying the demand patterns. The world printing inks market is projected to grow moderately over the next couple of years.

The major contents of the book are pigment in the printing inks, manufacturing of printing inks, storage and testing of raw materials, planographic inks, lithographic inks, factors effecting visual appearance of ink film, factors effecting visual appearance of ink film, method of mixing metallic powder and varnish, the principle of reproducing photographs by printing methods, etc. In this book an attempt has been made to bring together the useful manner as possible the fundamental Principles of ink making. The book contains formulae processes and other relevant information of the manufacturing of different types of printing inks.

Introduction
Printing Inks
Printing Ink Vehicles
Vegetable Drying Oils
Linseed Oil and Linseed Oil Varnishes
Lithographic Varnish
China Wood Oil or Tung Oil
Soya Bean Oil

Perilla Oil Other Vegetable Drying Oils The Vegetable Semi-Drying Oils **Cottonseed Oil** Rapeseed Oil The Vegetable Non-Drying Oils **Mineral Oils** Animal Oils **Terrestrial Animal Oils** Marine Animal Oils Rosin Oils **Pitch Varnishes** 4. Pigment in the Printing Inks Pigments Nature **Minerals** Carbonic sources **Botanical** From animals **Black Pigments** Lamp black Russian black Coal or gas Wooden coal lvory coal **Bones** Parish black Lead and graphite Composition black White Pigment White lead Antimony Chinese white Transparent white Blainfix white Yellow Pigments Chrome yellow Cadmium yellow Ochres yellow Gummy material **Minerals Red Pigment** Vermillion Carmine Lac Lake pigment Kothenial lake Madar **Blue Pigment** Prusian blue Ultramarine blue Reflex blue **Oriental blue**

Cobalt blue Indigo blue **Green Pigment** Emerald green Chrome green 5. Manufacturing of Printing Inks Storage and Testing of Raw Materials Mixing operation Mixing machines Milling process Delivery part of the machine Quality control Packing and selling 6. Typographic Printing Inks Job Press Inks Job Black Job Press Bright Red Job Press Green Automatic Press Inks Automatic Press Black Automatic Press Red Flatbed Cylinder Press Inks Cylinder Press Black Cylinder Press Peacock Blue **Rotary Press Inks Rotary Press Red Rotary Press Black** Web Press Inks Web Press News Black Perfecting Press Red The Relation of Ink to Stock Bond and Ledger Paper Inks **Bond Bronze Blue** Bond Black **Coated Paper Inks Coated Paper Red Coated Paper Yellow Lake** Super-calendered Paper Inks Super Paper Red Super Paper Blue **Parchment Paper Inks** Parchment Black Parchment Red **Carton Stock Inks** Carton Yellow Carton Red Inks for Machine Finished Paper Machine Finished Red Machine Finished Blue Glassine and Cellophane Inks **Glassine Violet Glassine Green** Halftone Black Inks

High Grade Halftone Black Publication Halftone Black Process Inks Process Transparent Yellow **Process Blue** Process Red 7. Planographic Inks Lithographic Inks High Grade Lithographic Black Lithographic Peacock Blue Ink Lithographic True Blue **Offset Printing Inks** Offset Red for Lake C Offset Milori Blue Offset Tin Printing Inks Tin Printing Reddish Blue Tin Printing Medium Yellow **Dry Offset Printing Inks** Dry Offset Red for Lake C Dry Offset Bronze Blue Photogelatin Inks Photogelatin Blue Photogelatin Black 8. Intaglio Printing Inks **Copper Plate Engraving Inks Copper Plate Black Copper Plate Blue** Steel Plate Engraving Inks Steel Plate Black Toner Blue Ink for Plate Black **Steel Plate Orange** Stamping Inks **Gloss Stamping Red Dull Stamping Black** Photogravure Inks Photogravure Picture Black Photogravure Brown **Rotary Photogravure Inks** Plateless Engraving or Thermographic Inks **Dense Black for Plateless Engraving** True Blue for Plateless Engraving 9. Printing Inks and Colour Subtractive Theory of Colours Additive Theory of Colours Reproduction of Colour By Printing Ink **Classification of Colours** Primary colours Secondary colours Tertiary colours Examples of tertiary colours Factors effecting visual appearance of ink film Influence of colours Cold colours

Warm colours Terminology Related to Colour Contrast Harmony Hue Tint Shade Tone Analogous colours Complementary colours Density in colour Transparent and opaque colours 10. Qualities of Offset Inks Working Qualities **Optical Qualities** Effects After Printing 11. Gravure Printing Inks Characteristics of Gravure Inks Vehicles in the Gravure Inks **Considerations for Purchasing Inks** 12. Printing Inks for Letterpress News ink Inks for platen and cylinder machines Moisture-set inks Important Points Quick-set inks Cheque inks Heat-set inks Important Points Metallic inks Method of mixing metallic powder and varnish Precautions Aniline inks Neo-set Inks 13. The Nature of Printing Ink The Three Main Printing Systems Typographic Method Lithographic Method Intaglio Method **General Properties of Letterpress Inks** The Silk Screen Method The Principle of Offset Printing Methods of Ink Drying Relation between the Printing Process, Ink, And Paper The Principle of Reproducing Photographs by Printing Methods The Actinic Tanning of Gelatine Letterpress Half-tone Plate Reproduction The Principle of Photogravure Half-tone Printing Using Dots Letter Press (or Litho) Photogravure Printing Using Square Cells **Print Recognition** Differences in Litho and Offset-Litho Printing **Differences in Typographic Printing**

14. The Colloidal Nature and Rheology of **Printing Inks** Ink Compared to Colloidal Dispersions Flocculation Types of Flow Fluidity Newtonian Flow Plasticity **Plastic Flow** Consistency Thixotropy Measurement of Thixotropy **Pseudo-plastic Flow Dilatant Flow** The Empirical Flow Test Rheological Specifications of An Ink Flow Requirements of Letterpress Inks Supply of Ink from the Duct Behaviour of Ink in the Duct Distribution of Ink on the Press Impression Special Flow Requirements of News Inks Flow Requirements of Offset Inks Flow Requirements of Copper-plate Inks Ink Tack Nature of Tack Measurement of Ink Tack Elasticity and Plastic Flow Elasticity **Relaxation Time Fundamental Rheological Properties** 15. Inorganic Pigments and Extenders Nature of Pigments The Oil Adsorption of Pigments **Opaque White Pigments Transparent White Pigments And Extenders Barytes And Blanc Fixe** Alumina Hvdrate **Gloss White** Whiting or Chalk, Caco3 Mica Silica, Sio2 Magnesium Carbonate The Use of Extenders In Printing Inks Ultramarine Bronze Blue, Iron Blue, Or Ferrocyanide Blue Lead Chromes **Orange Basic Chrome** Chrome Red Molybdade Orange and Molybdated Scarlet Chrome Zinc Chrome on Zinc Yellow **Cadmium Pigments** Red Lead, Pb3o4

Vermilion, Hgs Brunswick Green And Milori Green Zinc Chrome Greens Guignet's Green, Chrome Oxide Green Natural Iron Oxide Pigments Manufactured Iron Oxide Pigments Uses of Inorganic Pigments in Printing Inks 16. Ink in Relation to Paper The Nature of Paper The Fundamentals of Paper Making Conversion of Raw Materials to 'Half Stuff' Rag Half Stuff **Esparto Half Stuff** The Treatment of Wood Sulphite Method For Chemical Wood Caustic Soda Method For Chemical Wood Soda Sulphate Method For Chemical Wood Mechanical Wood Treatment Beating Hand-made Paper Machine-made Paper Methods or Glazing Paper **Special Finishes Opacity Improvements** Watermarking Wove, Laid, and Twin-wire Paper Storage of Printing Papers Paper Troubles And Remedies Fading of Tinted Printings Fluffing or Dusting **Picking or Plucking** Static Electricity In The Stock Types of Printing Paper The Penetration of Ink Into Paper Measurement of The Penetration of Ink into Paper The Penetration of Slow-drying Inks Into Paper Drying by Absorption The Transfer of Letterpress Inks from Forme to Paper Complete Contact of Paper Surface with Ink Film Maximum Ink Acceptance Capacity of the Paper Excess Ink on the Forme General Requirements of Printing Paper Printability of Offset Paper General Requirements of Printing Ink in Relation to Stock 17 The Typographic Process Stereotypes Half-tone Engravings in zinc and Copper Line Blocks **Printing Machines** The Hand Press **Platen Machines** Vertical Platen Machines Automatic Platens

Cylinder Machines The Vertical Miehle Miehle Two-revolution Cylinder Machine Letterpress Rotaries Machine Design And Make-ready in Relation to Ink Letterpress, Typographic, or Relief Printing Inks Factors Involved In Formulating the Ink Making Platen and Cylinder Inks **Rotary News Inks** Type of News Ink Formulation Ink Spray or Fly. Berk's Heat-set Black News Ink Flated News Inks Type of Flatbed News Ink Formulation **Cheap Magazine Inks** Type of Cheap Rotary Magazine Ink Slow-speed Rotary Magazine Inks Formulation Uses Drying Oil Black Ink Letterpress Inks Based on Special Varnishes: Non-reactive Resin in Drying Oil Non-reactive Resin in Drying-oil Ink Letterpress Inks Based on Synthetic Resins Letterpress Ink Formulations Thinning and Reducing Platen and Cylinder Inks **Double-tone Letterpress Inks** I.C.I. Double-tone Letterpress Inks Yellow-black Double-tone Ink Nitrocellulose Inks Special Letterpress Inks Letterpress Ink Worries and Cures Caking Collecting Dirt Colour Drift or Colour Variation Colour Fade Crystallization Fast Drying Ink Ink Flying or Spraying Ink Retreat From Fountain Roller **Insufficient Gloss** Mottle Picking or Plucking Powdering or Chalking **Repeats or Ghost Duplicates** Set-off or Offset Show-through Slur Trapping Wipe 18. Special Inks **Ball Pen Inks Bleachable Inks**

Fluorescent Inks **Phosphorescent Pigments Fluorescent Pigments Pigment Manufacture** Printing Silk-screen Fluorescent Printing **Power Press Printing** Invisible or Sympathetic Inks Heat-sensitive Type Water-sensitive Type Chemically-sensitive Type Metallic Inks **Pigments** Stock Media Letterpress Metallic Inks **Gravure Metallic Inks** Silk-screen Ceramic Metallic Inks **Printing Metallic Inks** Pigmentation Summary Washable Fabric Inks and Textile Marking Inks Water-colour Inks Inks for Special Reuirements Low Odour Inks **Rub-resistant Inks** 19. Natural Resins, Modified Natural Resins, and Bituminous Materials Nature of Resins **Classification of Resins** Congo Copal Manila Copal Sierra Leone Copal Zanzibar Copal Amber Damar Rosin or Colophony Rosin Oil **Polymerized Rosin** Hydrogenated and Oxidized Rosins Tall Oil Shellac Sandarac Mastic Zein Modified Natural Resins Ester Gum Lime-hardened Rosin **Bituminous Materials Nature** Asphalts Bitumens Pitches Firnigrals and Iranolins Uses in Printing Inks

20. Aniline, Dye-spirit, or Flexographic Inks **Transparent Aniline Inks Uses And Advantages** Basic Dyes Suitable for Transparent Aniline Inks Media **Pigmented Flexographic Inks** Synthetic Resins For Spirit Inks Maleics **Pure Phenolics** Unesterified Rosin Modified Cresol-formaldehyde Resins Unesterified Rosin Modified Phenol-formaldehyde Resins **Miscellaneous Phenolics** Ketone-aldehyde Base Synthetic Resins Spirit Type, Flexographic Ink Formulations Flexouraphic Inks Not Based On Alcohol **Aniline Machines** 21. Drying Oils, The Nature of Drying Oils The Acids Present In Drying Oils Properties of Semi-drying Oils Linseed Oil Production of Raw Linseed Oil The Refining of Linseed Oil **Bleaching of Refined Linseed Oils** Comparison of the Properties of Acid **Boiled Linseed Oil** Blown Linseed Oil Heat-bodied Linseed Oil Or Stand Oil Plant For Making Stand Oils Catalysts For Bodying Linseed Oil **Improved Stand Oils** The Chemical Changes in the Heat Bodying of Linseed Oil Tung Oil Properties of Tung Oil Dehydrated Castor Oil (D.C.O.) Castor Oil Following The Dehydration D.C.O. Stand Oils Blown Dehydrated Castor Oil Perilla Oil **Oiticica Oil** Stillingia Oil Soya Bean Oil Sunflower Oil **Tobaccoseed Oil** The Drying Oil Fatty Acids Linseed Oil Fatty Acids (L.O.F.A.) Dehydrated Castor Oil Fatty Acids (D.C.O.F.A.) Semi-drying Oil Fatty Acids **Further Drying Oils** Improved Drying Oils By Processing

Fundamentally Modified Drying Oils Vulcanized or Sulphurized Oils Styrenated Oils Maleinized Oils Epoxidation And Hydroxylation Of Drying Oils The Use Of Drying Ois In Printing Inks 22. Printing Ink Driers or Siccatives Nature of Ink Driers General Use of Driers Paste And Liquid Driers Theory of the Promotion of Drying Methods of Preparation of Liquid Driers **Properties of Liquid Driers** Appearance of The Driers **Standard Specifications** The Use of Driers In Printing Inks 23. Ink on Surfaces other than Paper **General Principles Cellophane Printing** Moisture-proof Viscous Film Printing Polyethylene or Polythene Film Printing Printing on Lacquers and Varnished Surfaces Printing on Rubber Printing on P.V.C. Printing on Metal and Metal Foil Printers' Use For Roller Coating **Roller Coatings** Cold-set Inks 24. Solvents, Diluents, and Plasticizers **General Properties of Solvents Boiling Range** Flash Point **Evaporation Rate** Solvent Retention Solvent Balance Viscosity Changes During Drying Solvent Power **Undesirable Solvent Properties Instability** Bad Odour **Bad Colour** Impurities Toxicity Petroleum Alkanes Natural Petroleum Petroleum Ether S.B.P. Spirit Petroleum Spirit, Ligroin Or Gasoline White Spirit (W/S) **Mineral Oils** Coal-tar Hydrocarbons Benzene C6h6 Toluene, C6H5CH3, Methyl Benzene Solvent Naphthas

Light Naphtha Heavy Naphtha or Aromatic White Spirit (A.W.S.) **Terpene Solvents** Turpentine **Oxidized Turpentine** Dipentene, C10H16 **Pine Oils** Hydrogenated Naphthalene Solvents Decalin, C10H18 Tetralin C10H12 **Alcohol Solvents** Ethanol, Ethyl Alcohol, CH3CH2OH Isopropanol Butanol CH3CH2CH2CH2OH Methyl Isobutyl Carbinol (M.I.B.C.) **Diacetone Alcohol Or Dical** Benzyl Alcohol C6H5CH2OH **Glycol Solvents** Ethylene Glycol HO.CH2CH2OH (E.g.) Diethylene Glycol HO.CH2CH2O.CH2CH2OH. (D.E.G.) Propylene Glycol Ch3.CHOH. CH2OH (P.G.) Dipropylene Glycol HO. (CH2)3.O. (CH2)3OH (D.P.G.) Hexylene Glycol, 2 Methyl, (2, 4) Pentanediol (H.G.) Ethers Di-ethyl Ether, C2H5.O. C2H5 The Ether Alcohols or Cellosolves Methyl Cellosolve / CH3.O.(CH2)2.OH Cellosolve, Ethylene Glycol Monoethyl Ether Butyl Cellosolve CH3.(CR2)3.O.(CHZ)2OH The Carbitols Carbitol Methyl Carbitol **Ketones** Acetone Methyl Ethyl Ketone (M.E.K.) CH3.CO. C2H5 Methyl Isobutyl Ketone (M.i.b.k.) Isophorone, C9H14O Sextone B, Methyl Cyclohexanone Acetonyl Acetone, 2.5 Hexanediol Furfural Ester Solvents Butyl Acetate. C4h9.coo.ch3 Butyl Lactate C4H9COO.CHOH.CH3 **Plasticizers** Di-butyl Phthalate (D.B.P.) Tri-phenyl Phosphate (T.P.P.) Tri-cresyl Phosphate (T.C.P.) Triacetin **Ethyl Abietate** Solvents From Petroleum 25. Printing Ink Carbon Blacks Carbon Black Manufacture of Impingement Channel Blacks

Furnace Combustion Blacks Furnace Thermal Decomposition Blacks Lamp Black Charcoal Black Bone Black Mineral Black Graphite **Cabot Nigrometer Scale** 26. Waxes Nature of Waxes Mineral Waxes Paraffin Wax Microcrystalline Wax Petroleum Jelly Ozokerite Montan Wax Vegetable Waxes Carnauba Wax Candelilla Wax Animal Waxes Beeswax Wool Wax or Lanolin Tallow Synthetic Waxes Carbowaxes Condensation Waxes or Glycol Ester Waxes Acrawax **Chlorinated Naphthalenes Polyethylene Waxes Polyamide Waxes** Other Waxes Uses of Waxes in Printing Inks 27. Selection of Media and Pigments for Printing Suitability of a Resin for Letterpress and Planographic Inks Suitability of a Resin for Gravure Inks **Common Film Defects** Blooming or Blushing Bubbling Chalking Checking Cissing Cracking or Flaking Orange Peel Pin-holding or Pitting Wrinkling or Shrivelling Webbing Selection of Pigments Comparison of Bronze, Ultramarine, and Monastral Blues Nature of the Pigments Masstone **Reduced Tones** Density and Oil Adsorption

Ease of Grinding Resistance to Soap, Fats, Solvents, Water and Oils Stability to Chemicals Stability to Heat Stability to Light **Pigmentation Limit** Length and Rheological Properties Expense **Special Faults Recommendations** Comparison of Chrome, Hansa, and Benzidine Yellows Nature of Pigments Specific Gravity, Opacity, Oil Adsorption and Brilliancy Grinding and Rheological Properties Stability to Heat and Light Stability to Acids and Alkalis Resistance to Fat, Soap, Wax, Oil, Alcohol, and Water **Special Advantages and Defects** Four-colour Process Pigments Madder Lake Scale Test 28. Surface-Active Agents, Anti-oxidants, And Adhesives Surface-active Agents **Properties** Mode of Action **Evidence of Action** Types of Surface-active Agents Lecithin Uses in Printing Inks Anti-oxidants Guaiacol Methyl Ethyl Ketoxime Adhesives **Gum Arabic** Starch Dextrin 29. Analysis and Calculation **Detection of Driers in Varnishes** Identification of White Pigments Examination of Ash for Inorganic Pigments Ink Analysis Method Ink Technology Calculations 30. Principles of Ink Formulation **Colour Matching** Grinding Consistency **Drying Times** Length of Ink **Printed Appearance** Machine Performance Fading **Special Requirements**

31. The Intaglio Process **Copper Plate Engraving** Mezzotinting Principles of Photogravure Preparing the Photogravure Copper Sleeve **Rotogravure Machines Offset Gravure Die Stamping** Hand Die-stamping Machines **Counter-sunk Dies** Power Press Die Stamping Intaglio Inks Types of Media for Copper-plate Inks Principles and Characteristics of Steel-plate Photogravure Inks Rotary Photogravure (Rotogravure) **Rotogravure Ink Characteristics** Simple Examples of Gravuxe Inks Synthetic Resins for Gravure Gravure Printing on Foil and Plastic Sheeting **Special Gravure Inks** Howard's Gravure Formulations **Die-stamping Inks** Characteristics of Die-stamping Inks **Die-stamping Media** Letterpress Imitation Die-stamping Gravure Ink Worries and Cures Hard and Porous Prints Pearling **Poor Highlights Poor Neutral Greys** Static Electricity in the Paper Sticking When Re-reeling the Wed Weak or Patchy Reproduction 32. The Lithographic Process Branches of Lithographic Reproduction Senefelder's Lithographic Stone Modern Lithographic Plates Photolithography **Bimetallic Plates Trimetallic Plates** Offset Lithography Pantone Dry Lithography Collotype Direct Lithography **Direct Lithographic and Offset Machines** Principle of Offset Rotary Machines **Xerographic Printing** The Lithographic Process Principle of Lithography **Essential Properties of Lithographic Inks** The Importance of Correct Ink-water Balance Offset Ink Formulation Conventional Direct Litho and Offset Inks

Defective Offset Media Anomalous Lithographic Drying **Dry-offset Inks Bronze Preparations** Tin Printing Offset Inks Lithographic Ink Worries and Cures **Drying Too Fast** Embossing the Blanket Fluffing Greasing Image Detail Disappears Image Thickens Ink Retreating from Fountain Roller Piling **Rollers Stripping** Scumming Spotty Ink Drying Tinting Worries Due to Using Etch 33. Directory Section

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, Startup 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 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.

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: <u>npcs.india@gmail.com</u> Website: <u>NIIR.org</u>

Sat, 03 May 2025 17:38:57 +0000