How Ink is made?

Inks for Writing, Printing, Offset, Inkjet.

Raw Materials and Formulations with Process.

www.entrepreneurindia.co
Modern Technology of Printing & Writing INKS

(with Formulae & Processes)
Information about the Book

Title: Modern Technology of Printing & Writing Inks (with Formulae & Processes) 2nd Revised Edition

Author: NIIR Board of Consultants & Engineers

Format: Paperback

ISBN: 9788178330822

Code: ENI75

Pages: 480

Published: 2015

Publisher: Asia Pacific Business Press Inc.

www.entrepreneurindia.co
Ink is a liquid or paste that contains pigments or dyes and is used to colour a surface to produce an image, text, or design. Ink is used for drawing or writing with a pen, brush, or quill. Thicker inks, in paste form, are used extensively in letterpress and lithographic printing. Ink can be a complex medium, composed of solvents, pigments, dyes, resins, lubricants, solubilizers, surfactants, particulate matter, fluorescents, and other materials.
The components of inks serve many purposes; the ink’s carrier, colorants, and other additives affect the flow and thickness of the ink and its appearance when dry. India is among the fast growing printing & writing ink markets globally spurred by the rapid expansion of the domestic print markets.
Backed by a strong demand from key end user segments such as package printing, newsprint, publishing and other commercial printing, the printing ink market in India has registered strong growth over the years. The printing ink industry is fragmented with hundreds of manufacturers and a large number of players in the unorganised sector.
Printing ink sector in India witnessed a growth of around 7.5% per annum during the Past years. Printed packaging accounts for around 27% of the demand for printing inks in India followed by newspapers at 20%. Commercial printing/promotional and printed advertising together account for around 19% of the demand.
Other key end user segments for printing inks include books and stationery. With the print sector forecast to grow at around 8% per annum, in coming years, printing ink segment is expected to grow strongly. This handbook is designed for use by everyone engaged in the printing & writing ink industry and the associated industries. It provides all the information required by the ink technical for the day-to-day formulation of inks.
It supplies the details of the manufacturing methods, including large-scale production, and gives guidance on achieving quality assessment and total quality management specifications. The book also describes properties and uses of the raw materials used in the formulation of printing & writing inks.
The major content of the book are the colour and colour matching, raw materials, printing inks, ink formulations, applications problems, writing inks, project profile, how to estimate, order & handle ink, testing of writing & miscellaneous inks, testing of printing inks, rollers, waterborne inkjet inks. The book contains addresses of raw material suppliers, plant & machinery suppliers with their Photographs. This book will be a mile stone for the entrepreneurs, existing units, libraries etc.
1. INTRODUCTION

Visual Characteristics of Inks
The colour of Inks
The Transparency and opacity of printing inks
The gloss of printing inks
The nature of Printing Inks As Determined By
The printing Process
Flexographic and gravure inks
Lithographic and letterpress inks
Screen Inks
The drying characteristics
Absorption drying
Oxidation drying
Evaporation drying
Chemical drying
Radiation induced drying
The Adhesive Nature of Printing Inks
The Resistance properties of Printing Inks
Lightfastness
Heat resistance
Abrasion resistance
Product resistance
Weathering
2. THE PRINTING PROCESSES

The Letterpress Process
Press Configurations
The Platen press
Flat-bed cylinder press
Rotary presses
Letterpress forme production
Original plates
Line Plates
Halftone plates
Duplicate plates
Make-ready:
Substrates
Applications

www.entrepreneurindia.co
Rotary Ink
Quickset Ink
High-gloss Ink
Moisture-set Ink
Water-Washable Ink
New Ink
Miscellaneous Job Ink
The Offset Lithographic Process
The Printing unit
The damping system,
The offset blanket
Press Configurations
The small offset press
Larger sheet-fed presses

www.entrepreneurindia.co
Web offset presses
Blanket-to-blanket press
Common-Impression drum presses
Three-cylinder presses
Orthographic platemaking
Presensitised surface plates
Wipe-on Plates
Deep-etch plates
Multi-metal plates
Electrostatic imaged plates
Chemical diffusion transfer plates
Photodirect plates
Laser exposed plates
Direct image plates
The driographic plate
Process control
Platemaking control
Control in colour printing
Inkduct pre-setting and control
Substrates and inks
Ultra-violet (UV) euring inkds 25
Infra-red radiation 25
Inks for lithography
Dry offset of Letterst
Fundamentals of Lithography
Lithographic Problems
The Gravure process
The printing unit
The inking system

www.entrepreneurindia.co
Doctor blades
The impression roll
Drying system
Press Configurations
Gravure cylinder preparation
Conventional etching
Single bath etching
Halftone Process
Double positive system-halftone gravure
Halftone gravure
Mechanical engraving
Lasergravure
Press control systems
Substrates and inks
Applications

www.entrepreneurindia.co
Gravure Inks
The Flexographic Process
The printing unit
Press configurations
Flexographic platemaking
Rubber plates
Photopolymer plates
Plate mounting
Applications
Flexographic Inks
Flexographic Problems,
The screen printing process
Press configurations
Screen Stencil Manufacture

www.entrepreneurindia.co
Mounting the Screen
Application of the stencil
After treatment
Substrates and inks
Application
Electrostatic Printing
Copper Plate and Die Stamping
Non-Impact Printing processes
Ink-jet Printing
Continuous jet
Impulse or drop on demand
Electrophotography
Print Recognition
Letterpress

www.entrepreneurindia.co
Flexography
Lithography
Offset Letterpress
Gravure
Screen Printing
Non_Impact printing
Substrate Selection
General Paper properties
Runnability
Printability
3. COLOUR AND COLOUR MATCHING

The Physical nature of Colour
Light Sources
The Perception of colour
The eye
Defective colour vision
Chromatic adaptation and colour constancy
Metamerism
Dichrosim
Illumination quality and levels
Additive and Subtractive Colour Mixing
The additive primaries
The subtractive primaries
The CIE System
Origins of colour in Printed Material

www.entrepreneurindia.co
Pigments
Dyes
Origins of colour
Transparency and opacity
Colour Strengths
Substrate effects
Colour Index Classification
Graphic Reproduction
Three-colour printing
Four-Colour printing
Under colour removal
Masking
Half-tone dots
Dot gain
Dot Generation

www.entrepreneurindia.co
The Measurement of Colour
Colorimeters
Densitometer
spectrophotometers
Optical geometry
The Recording of Colour data And the Specification of colour
Colour Difference
Colour Matching
Selection of raw materials
Matching techniques
The colour circle
Procedures
Oil Inks
Liquid Inks
Instrumental Colour match Prediction

www.entrepreneurindia.co
4. RAW MATERIALS

Pigments
Yellow Pigments
Diarylide Yellows
Ironoxide yellows
Tartrazine yellow lake
Chrome yellows
Cadmium yellows
Fluorescent yellow
Orange Pigments
DNA Orange
Pyrazolone orange
Diarylide orange
Fast Orange 52G
Benzimidazolone orange HL
Ethyl lake red C
Red Pigments
Para Red
Naphthol Red (Or Permanent Red Frre)
Toluidine Red
Permanent Red 'R' (Chlorinated Para Red)
Carmine F.B.
Naphthol F4R
Naphtho Red LF
Permanent Red FRL
Bordeaux FRR (F4R)
Naphthol Red
Naphthol Red Light
Naphthol Red Dark

www.entrepreneurindia.co
Lithol reds
Bon Red (Lack red C Bon)
Lake Red C
Lithol Rubin 4B
BON Maroon
PMTA Pink, rhodamine 6 G
Molybdate Orange, Chrome Scarlet, Orange Chrome
Calmium Red
BON Arylamide Red, Naphthol Red FGR
Quinacridone MagentaY
Naphthol Carmine FBB
Copper Ferrocyanide Pink
Naphthol Red F5RK
Benzimidazolone Carmine HF3C
Naphthol Rubine F6B
Benzimidazolone Carmine HF4C
Rubine Red 6B
Quinacridone Magenta B
Benzimidazolone Red HF2B
Naphthol Red F6RK
Azo Magenta G
Anthraquinone Scarlet
Quinacridone Violet
Benzimidazolone Bordeaux HF 3 R
Green Pigments
Blue Pigments
Violet Pigments
Brown Pigments
Black Pigments

www.entrepreneurindia.co
Marine oils
Non-drying oils
News inkd oils
Non-drying vegetable oils
Resins
Natural Resins
Shellac
Manila copal
Asphalts
Starch and dextrin
Gum arabic
Synthetic resins
Pure phenolic resins
Rosin-modified phenolic resins

www.entrepreneurindia.co
Pigment Interactions
Hard resin interactions
Film-forming properties
Hydrocarbon resins
Polystyrene resins and copolymers
Terpene resins
Silicone resins
Alkylated urea formaldehyde resins
Alkylated melamine formaldehyde resins
Polyamide resins
Poly (amide imide) resins
Chlorinated rubber
Cyclised rubber (isomerised rubber)
Vinyl resins
Polyvinyl alcohol
Ketone resins
Acrylic resins
Epoxide resins
Polyisocyanates and polyurethanes
Nitrocellulose, N/C (Cellulose nitrateCN)
Ethyle cellulose
Ethyl hydroxyethyl cellulose (EHEC)
Cellulose acetate propionate (CAP)
Cellulose acetate butyrate (CAB)
Sodium carboxymethyl cellulose (CMC)
Chemical constitution
Section V: Solvents
Hydrocarbon Solvents

www.entrepreneurindia.co
Low boiling petroleum distillate-alipatic
White spirit
Paraffin oil (kerosene)
High boiling petroleum distillates-aliphatic
Hydrocarbon solvents-naphthenic
Aromatic hydrocarbons
High boiling aromatic solvents
Alcohols
Glycols
Ketones
Esters
Section VI: Plasticisers
Section VII: Waxes
Synthetic waxes
Polyethylene waxes
Polytetrafluoroethylene
Halogenated hydrocarbon waxes
Fatty acid amides
Petroleum waxes
Slack wax
Scale wax
Fully refined paraffin wax
Pettrolatum or petroleum jelly
Microcrystalline waxe
Ceresin wax
Montan wax
Montan esters
Natural waxes
Beeswax
Carnauba wax
Miscellaneous natural waxes
Section VIII: Driers
Liquid Driers
Cobalt
Paste Driers
Section IX: Miscellaneous Additives
Chelating Agents
Antioxidants
Surfactants
Anionic Surfactants
Cationic surfactants
Non-Ionic surfactants
Amphoteric surfactants
Deodorants and Reodorants
Pure Chemicals
Alkalis
Defoaming Agents
Laking Agents
Tannic Acid
Tannic acid substitutes
Raw Materials For Radiation Curing Systems
Pigment Selection
Prepolymers
Epoxy acrylates
Polyester acrylates and unsaturated polyesters
Urethance acrylates
Reactive Diluents
Photoinitiators
Additives and Inhibitors

www.entrepreneurindia.co
5. PRINTING INKS
Manufacture of Inks and varnishes
General Requirements
The Manufacturing Processes
The manufacture of oleo-resinous systems
Deaeration and potting
The manufacture of polymer/solvent systems
Varnish manufacture
Cavitation mixer
Rotor/stator mixer
Manufacture of additives
Liquid ink manufacture
Ball mills
Bead Mills
Chips
Pigment chip manufacture
Manufacture of dye-based inks
Mixing Equipment
Butterfly mixers (Change pan)
Rotor and stator high speed mixers.
The 'star' impeller type
The high-speed disperser
The fixed or on-line mixer
High-speed mixing
Milling Equipment
Three-roll mills
Floating-rolling system
Development of single cst rollers
Bead mills

www.entrepreneurindia.co
Open sieve mill
Closed sieve mill
Gap separation mill
John mill
Tex mill
Dyno mill
STS mill
Electronically controlled Copra mill
Boa 500 mill (Buhler Brothers Ltd)
Co-ball mill
Microflow mill
Ball milling
Disavantages of ball mills
Handling, Storage and manufacture of uv Inks

www.entrepreneurindia.co
Manufacture of newspaper Inks
Modern production trends
Computerisation
Costs of production and related subjects
Maintenance strategy in the printing ink industry
On failure maintenance
'Fixed time' maintenance
'Condition based maintenance
Computers and maintenance
The future
Plant control system
Further plant features
Manufacturing plant

www.entrepreneurindia.co
6. INK FORMULATIONS

Letterpress Ink
Platen ink for absorbent papers
Cylinder press ink of uncoated papers
Quick-set inks of cated paper
Letterpress ink dryign by oxidation
Water-reducible inks
Process inks
Newspaper Coloured Inks
Rotary black inks for newspapers
Formula A: General-Purpose low mist black
Formula B : Ink rail
Formula C : Page-Pak
Formula D : Keyless Inking (Indirect flexo)
Lithographic Inks
Typical inks and Varnishers
Inks and varnishes for sheet-fed paper printing
Sheet-feed label inks
Small -offset
Inks and varnishes for sheet-fed carbon board printing
Ink for sheet-fed impervious substrate printing
Inks for web-offset paper printing
Coldset
Heatset
Gravure Inks
Publication Inks
Inks for catalogue printing
Packaging inks for paper and board labels
Metallic labels
Paper wrapper inks
Carton Inks
Foil inks
Foil board laminates
Inks for polyethylene film
Inks for treated polypropylene films
Coated polypropylene films
Cellulose films
Polyester films
Wallcoverings
Inks for paper
Vinyl coated wallcoverings
Speciality systems

www.entrepreneurindia.co
Metallic inks
Aluminium-based inks
Pearlescent inks
flexographic Inks
Sye-based inks
Pigmented inks for specific substrates
Paper and board
Nitrocellulose coated films
PVdC Co-polymer coated film
Polyolefin films
Metal and metallised substrates Aluminium foil
Metallic inks
Screen Inks
Inks for paper and board
Thin film screen inks

www.entrepreneurindia.co
Ultra thin film screen inks
Oxidation drying gloss inks
Inks for Impervious surfaces
Metal signs
Metal containers
Inks for sheet plastic
Inks for glass
Inks for Plastic containers
Polythene containers
PVC containers
Textile Inks
Daylight fluorescent Inks
Process inks
Uv and Electron Beam curing Inks
Inks for day offset application on plastics and metal

www.entrepreneurindia.co
Ultraviolet curable silk screen
Ultraviolet curable varnish and coatings
Non-Mipact Printing
Electrostatic imaging
Inks for jet printing
Typical ink formulations
Inks for the Electronics Industry
Printed circuit products
Inks for Wallcoverings
Textile Transfer Inks
Sterilisation Inks
Metal Decorating Inks.
Decoration of sheets
Printing a pre-formed container
Letterset Printing

www.entrepreneurindia.co
7. APPLICATION PROBLEMS
Stocking in the Pile or Rewind picking
Fill In
Poor Binding and Rub
Setoff
Piling and Caking
Trapping
Show Through and Strike Through
Ink Not Following the Fountain
Ink flying and Misting
Ghosting, Shadow, Streaks, and Slurs
Ink Drying on rollers
Plate Wear
Crystallization
8. WRITING INKS
Manufacture of Writing Inks
Packing
Inks for writing and Fountain Pens
Ferrogalo-tannate inks
Standard Copying and Record Ink
Standard Writing ink
Iron gallate Inks : (Ink Powders and Tablets)
Manufacture of Inks Tablets
Action of Hydrochloric Acid and Sulphuric Acid in Inks
Formulae for Various Blue-Black Inks
Manufacture fo iron gallo-tannate inks
Manufacture
Aging of writing
Dating a document
Dye based Fountain Pen Inks
Washable Inks
Quick drying Inks
Alkaline Writing Inks
blue Alkaline Writing Inks
Prussian Blue Inks
Ball Point Pen Inks
Stamp-Pad Inks
Basic dyes
Acid dyes
Method of Manufacture
Inks for Recording Instruments
Drawing Inks-Black and Coloured

www.entrepreneurindia.co
Black Drawing Inks
Coloured Drawing Inks
Marking Inks
Preparation of silver Inks
Aniline black Inks
Inks containing other metals
Coloured marking Inks;
Ink for Multiple Copies purposes
Hectograph Inks;
Method of Preparation
Stencil Duplicating Inks
Inks of Hectograph Carbon Papers, Carbon Papers and Typewriter Ribbons
Inks or Carbon Papers
Hectograph Carbon Papers
Stencil Sheets
Felt, Pen, Sign Pen, Fibre Tip Inks
Method of Manufacture
Alcohol Based Inks
Hydrocarbon Based Inks
Invisible or Sympathetic Inks
Inks for Special Materials
Inks for Plastics
Ink for Marking Photographs
Ink for stamping oiled stencils
Inks for Glass and Porcelain
Ceramic Inks

www.entrepreneurindia.co
Ink for Metals
Time Card Ink
Meat Stamping Ink
Show Card Inks
Embossing Inks
Ruling Inks
Artist Colours
Colour Combination
a) Water Pints

www.entrepreneurindia.co
9. PROJECT PROFILE

10. HOW TO ESTIMATE, ORDER & HANDLE INK
Estimating Ink Requirements
Ordering Ink
Handling Inks

11. TESTING OF WRITING & MISCELLANEOUS INKS
Writing Inks
Sedimentation Test
Hue and Intensity
Clogging Test

www.entrepreneurindia.co
Stability Test
Total Solids
Iron Content
Gravimetric Method
Determination of Corrosion
Ball Point Pen Inks
Stamps pad Inks
Determination of Glycerol Content
Assessing the performance of stamp-pad ink
Drawing Inks
Opacity or Transparency
Mold Growth
<table>
<thead>
<tr>
<th>Marking Inks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stencil Inks</td>
</tr>
<tr>
<td>Viscosity</td>
</tr>
<tr>
<td>Drying time</td>
</tr>
<tr>
<td>Presence of toxic and noxious materials</td>
</tr>
<tr>
<td>Caution</td>
</tr>
<tr>
<td>Presence of Aniline Oil</td>
</tr>
<tr>
<td>Miscibility with thinner</td>
</tr>
<tr>
<td>Stability</td>
</tr>
<tr>
<td>Skinning property</td>
</tr>
<tr>
<td>Duplicating Inks</td>
</tr>
<tr>
<td>Test for Lead</td>
</tr>
</tbody>
</table>

www.entrepreneurindia.co
## 12. TESTING OF PRINTING INKS

<table>
<thead>
<tr>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Gravity</td>
</tr>
<tr>
<td>Viscosity</td>
</tr>
<tr>
<td>Penetration</td>
</tr>
<tr>
<td>Molecular Refraction</td>
</tr>
<tr>
<td>Refractive Index</td>
</tr>
<tr>
<td>Covering Power and Gloss</td>
</tr>
<tr>
<td>Evaporation Rate</td>
</tr>
<tr>
<td>Acid Number</td>
</tr>
<tr>
<td>Sponification Number</td>
</tr>
<tr>
<td>Iodine Number</td>
</tr>
</tbody>
</table>

www.entrepreneurindia.co
Detection of Chinawood Oil
Detection of Rosins and Resins
Testing of Pigments
Light Resistance
The Resistance of Pigments of Bleeding
Resistance to Acids and Alkalies
Particle Size of Pigments 375
Wettability and Absorption
The Testing of Finished Inks
13. ROLLERS
Inks and Rollers Used

14. DIRECTORY
India Standards on Inks and Allied Products
List of Suppliers for Printing & Writing Ink Machinery
List of Suppliers of Raw Materials to Ink Industries
List of Major Manufacturers for Printing Inks in India
Directory of Ink & Allied Products Manufacturer's In India

www.entrepreneurindia.co
See more

https://goo.gl/bVxBjA

https://goo.gl/HrELqv
Take a look at Niir Project Consultancy Services on #Street View
https://goo.gl/VstWkd

Locate us on Google Maps
https://goo.gl/maps/BKkUtq9gevT2
Our inexhaustible Client list includes public-sector companies, Corporate Houses, Government undertaking, individual entrepreneurs, NRI, Foreign investors, non-profit organizations and educational institutions from all parts of the World. The list is just a glimpse of our esteemed & satisfied Clients.

Click here to take a look

https://goo.gl/G3ICjV
Download Complete List of Project Reports:

- Detailed Project Reports

NPCS is manned by engineers, planners, specialists, financial experts, economic analysts and design specialists with extensive experience in the related industries.

Our Market Survey cum Detailed Techno Economic Feasibility Report provides an insight of market in India. The report assesses the market sizing and growth of the Industry. 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.
And before diversifying/venturing into any product, they wish to study the following aspects of the identified product:

- Good Present/Future Demand
- Export-Import Market Potential
- Raw Material & Manpower Availability
- Project Costs and Payback Period

The detailed project report covers all aspect of business, from analyzing the market, confirming availability of various necessities such as Manufacturing Plant, Detailed Project Report, Profile, Business Plan, Industry Trends, Market Research, Survey, Manufacturing Process, Machinery, Raw Materials, Feasibility Study, Investment Opportunities, Cost and Revenue, Plant Economics, Production Schedule,
Working Capital Requirement, uses and applications, Plant Layout, Project Financials, Process Flow Sheet, Cost of Project, Projected Balance Sheets, Profitability Ratios, Break Even Analysis. The DPR (Detailed Project Report) is formulated by highly accomplished and experienced consultants and the market research and analysis are supported by a panel of experts and digitalized data bank.

We at NPCS, through our reliable expertise in the project consultancy and market research field, have demystified the situation by putting forward the emerging business opportunity in India along with its business prospects......Read more
An ISO 9001:2015 Company
Who are we?

- One of the leading reliable names in industrial world for providing the most comprehensive technical consulting services

- We adopt a systematic approach to provide the strong fundamental support needed for the effective delivery of services to our Clients’ in India & abroad

www.entrepreneurindia.co
We at NPCS want to grow with you by providing solutions that scale to suit your new operations and help you reduce risk and give a high return on application investments. We have successfully achieved top-notch quality standards with a high level of customer appreciation resulting in long lasting relation and large amount of referral work through technological breakthrough and innovative concepts. A large number of our Indian, Overseas and NRI Clients have appreciated our expertise for excellence which speaks volumes about our commitment and dedication to every client's success.
We bring deep, functional expertise, but are known for our holistic perspective: we capture value across boundaries and between the silos of any organization. We have proven a multiplier effect from optimizing the sum of the parts, not just the individual pieces. We actively encourage a culture of innovation, which facilitates the development of new technologies and ensures a high quality product.
What do we offer?

- Project Identification
- Detailed Project Reports/Pre-feasibility Reports
- Market Research Reports
- Business Plan
- Technology Books and Directory
- Industry Trend
- Databases on CD-ROM
- Laboratory Testing Services
- Turnkey Project Consultancy/Solutions
- Entrepreneur India (An Industrial Monthly Journal)
How are we different?

- We have two decades long experience in project consultancy and market research field.
- We empower our customers with the prerequisite know-how to take sound business decisions.
- We help catalyze business growth by providing distinctive and profound market analysis.
- We serve a wide array of customers, from individual entrepreneurs to Corporations and Foreign Investors.
- We use authentic & reliable sources to ensure business precision.

www.entrepreneurindia.co
WWW.NIIR.ORG
Our Approach

Requirement collection

Thorough analysis of the project

Economic feasibility study of the Project

Market potential survey/research

Report Compilation

www.entrepreneurindia.co

WWW.NIIR.ORG
Contact us

NIIR PROJECT CONSULTANCY SERVICES

106-E, Kamla Nagar, Opp. Spark Mall,
New Delhi-110007, India.

Email:  npcs.ei@gmail.com , info@entrepreneurindia.co

Tel: +91-11-23843955, 23845654, 23845886, 8800733955

Mobile: +91-9811043595

Fax: +91-11-23845886

Website : www.entrepreneurindia.co , www.niir.org

Take a look at NIIR PROJECT CONSULTANCY SERVICES on #StreetView

https://goo.gl/VstWkd

www.entrepreneurindia.co

WWW.NIIR.ORG
Follow Us

- https://www.linkedin.com/company/niir-project-consultancy-services
- https://www.facebook.com/NIIR.ORG
- https://www.youtube.com/user/NIIRproject
- https://plus.google.com/+NIIRPROJECTCONSULTANCYSERVICESNewDelhi/posts
- https://twitter.com/npcs_in
- https://www.pinterest.com/npcsindia/
THANK YOU!!!

For more information, visit us at:

www.niir.org
www.entrepreneurindia.co