

# The Complete book on Natural Dyes & Pigments

**Author:** NIIR Board of Consultants & Engineers

**Format:** Paperback

**ISBN:** 8178330326

**Code:** NI160

**Pages:** 448

**Price:** Rs. 1,100.00 US\$ 29.73

**Publisher:** Asia Pacific Business Press Inc.

Usually ships within **5** days

Natural dyes are dyes or colorants derived from plants, invertebrates, or minerals. The majority of natural dyes are vegetable dyes from plant sources. Dyeing is the process of imparting colors to a textile material. Different classes of dyes are used for different types of fiber and at different stages of the textile production process, from loose fibers through yarn and cloth to completed garments. There are technologies that manufacture the pigments for plastics, rubber and cosmetics. Therefore; dyes and pigments have a vast area of applications and have a huge demand in industry. Contrary to popular opinion, natural dyes are often neither safer nor more ecologically sound than synthetic dyes. They are less permanent, more difficult to apply, wash out more easily, and often involve the use of highly toxic mordant. Of course, the colour possibilities are far more limited; the color of any natural dye may be easily copied by mixing synthetic dyes, but many other colors are not easily obtained with natural dyes. However, some mordant are not very toxic, and the idea of natural dyestuffs is aesthetically pleasing. Applying natural dyes in your fabric production using enzymes will reduce your production cost and improve control. There are various kind of natural dyes; quinonoid dyes, cyanine dyes, azo dyes, biflavyonyl dyes, omochromes, anthraquinone, coprosma gesus etc. The use of natural dyes in cloth making can be seen as a necessary luxury to trigger off a change in habits. Dyes which stand out for their beauty and ecological attributes would never be employed on just any material but on noble fabrics such as wool, silk, linen or cotton, made to last more than one season. Market value will benefit from consumer preferences for environmentally friendly products, which will support consumption of high performance dyes and organic pigments.

This book basically deals with the use of carotenoids as food colours , bianthraquinones and related compounds, intermediate degradation products of biflavonyls, dyestuffs containing nuclear sulphonic and carboxylic acid groups, quinonoid dyes, cyanine dyes, optical whitening agents, natural dyes for food, stability of natural colourants in foods effect of additives, pyrimidine pigments, the total synthesis of the polyene pigments, red pigment from geniposidic acid and amino compound, effect of acid and amine on the formation of red pigment from geniposidic acid, effect of the substituted position of amino group and chain length of amino compound etc.

Due to pollution problems in synthetic dyes and pigments industry, the whole world is shifting towards the manufacturing of natural dyes and pigments. The present book contains techniques of producing different natural dyes and pigments, which has huge demand in domestic as well as in foreign market. It is hoped that entrepreneurs, technocrats, existing units, institutional libraries will find this book very useful.

## Contents

### 1. Ommochromes

- Distribution
  - A. Ommatins
  - B. Ommins
- Isolation and Purification
  - A. Ommatins
  - B. Ommins
- Structure of the Ommochromes\*
  - Xanthommatin
  - Ommatin D
  - Rhodommatin
  - Ommin A X
- Biogenesis
  - 2. Bisdehydrocanthaxanthin
  - 3. Carotenoids Field
- Carotenoid Biogenesis
- Carotenoid Total Syntheses
- The use of Carotenoids as Food Colours
- 4. Black pigments
- Animal Pigments
  - Melanins
  - Sclerotization
- Plant Pigments
  - Humic acids
  - 1,8-Dihydroxynaphthalene polymers
- 5. Anthraquinone
- Plant Pigments
- Insect Pigments
- 6. Coprosma genus
- 7. Bianthraquinones and related compounds
- Skyrin
  - Oxyskyrin
  - Skyrinol
  - Iridoskyrin
  - Rugulosin
  - Luteoskyrin and Rubroskyrin
  - Lumiluteoskyrin
  - Flavoskyrin
- Biogenesis
- 8. The Biflavonyl Pigments
  - The First Investigations
  - The Work of Nakazawa on Ginkgetin
  - The Work of the Bristol Group
  - On Ginkgetin and Isoginkgetin
  - The Work of Kariyone and Kawano on
  - Sciadopitysin, 1956
  - Further Work of Brispol Group on
  - Ginkgetin and Sciadopitysin
  - The Work of Kawano on Sciadopitysin and GINKGETIN, 1959
  - The Synthesis of Ginkgetin Tetramethyl ether, Nakazawa, 1959
  - The Structure of Ginkgetin
  - The Structure of Isoginkgetin
  - The Structure of Kayafyavone
  - The Structure of Sotetsuflavone

## Summary of Biflavonyl Structures

Intermediate Degradation Products of Biflavonyls

Optical Inactivity of the Biflavonyls

The Structure of Hinokiflavone

Natural Occurrence of Biflavonyls

9. Azo dyes

10. Dyestuffs

Introduction

Primary Products for VS-Dyestuffs

1. Methods of preparation

2. Reactions

Processes for the Manufacture of VS-Dyestuffs

Fastness and Dyeing Properties of VS-Dyestuffs

1. VS-Dyestuffs free from nuclear sulphonic and carboxylic acid groups

2. Dyestuffs containing nuclear sulphonic and carboxylic acid groups

Summary

11. Disperse dyes

Light Fastness

Gas Fastness

Sublimation Fastness

Wash Fastness

Structural Modifications Leading to All-Round Fastness

12. Quinonoid dyes

13. Cyanine dyes

Chemistry of 2, 3-Dichloro-1,4-Naphthoquinone (I)

Chemistry of Chloranil (II)

Vat Dyes from Chloranil

Benzodipyrrocolinequinones Pyrrocolinequinones,

Unsymmetrical Dipyrrocolinequinones and Naphth of Uranopyrrocolinequinones

2-alkylamino-(arylamino)-3-chloro-1,

4-naphthoquinones And Di-3-(2-chloro-1,

4-naphthoquinonyl)-alkylamines And Arylamines

Cellulose Acetate Dyes From (i) And (ii)

Synthesis Of Non-coplanar Quinonoid Dyes

14. Fluorescent brightening agents

15. Optical whitening agents

Introduction

Physical Considerations of Fluorescence and Optical Whitening

Chemical constitution of Optical Whitening Agents

1. Stilbene derivatives

2. Benzidine derivatives

3. Benzthiazole, benzoxazole and benzimidazole derivatives

4. Coumarins

5. Pyrazolines

6. Other types

Some Specific Applications of Optical

Whitening Agents

1. Soaps and detergents

2. Textile applications

16. Natural dyes for Food

- Natural Colourants
  - Natural Colours Presently Used in Food
  - Methods of Improving Natural Colourants
- Novel Sources of Natural Colourants
  - Microbial Sources
  - Animal Sources
  - Plant Source
  - General Reviews
  - Colourants from By-products
  - Gardenia Extracts
  - Other Sources
  - Feasibility of Novel Sources
- Stability of Natural Colourants in Foods Effect of Additives
  - Ascorbic Acid and Derivatives
  - Effect of Metal Ions
  - Effect of Neutral Salts
  - Effect of Organic Acids
  - Photoprotection
  - Miscellaneous Additives
  - Conclusion
- Stable Forms of Natural Colourants Found in Vivo
- Stabilised Forms Of Natural Colourants Flavonoids
  - Chemical Features Affecting Stability
  - Self association
  - Complex formation
  - Copigmentation
  - Condensation
  - Chemical modifications
- Porphyrins
- Others
- 17. Pyran Pigments : I. Flavones and Flavonols
- Flavones
  - Chrysin (IV)
- General Methods of Synthesis of Flavones
  - A. From Aromatic Diketones
  - B. From o-Hydroxyacetophenones
  - C. From o-Hydroxychalkones
  - D. From Phenols
- Flavonols
  - The Wessely-moser and Related
  - Rearrangements of Flavones
  - The Formation of Salts by Flavones and Flavonols
  - The Reduction of Flavones
- Isoflavones
  - The Synthesis of Isoflavones
- 18. Pyran Pigments : II. Anthocyanins and Anthocyanidins
- Cyanidin (III)
  - The Synthesis of Anthocyanidins
  - The Synthesis of Anthocyanins
  - Color Reactions of The Anthocyanidins and Anthocyanins
- Anhydrobases
  - Carajurin (XCIX)
  - Dracorubin (CXXV)

19. Pyran Pigments : III. Xanthones  
 Ravenelin (II)  
 Mangostin (XI)  
 Pyran Pigments : IV. Rottlerin  
 Pyran Pigments : V. Brazilin and Hematoxylin  
 Brazilin (XXXII)  
 Hematoxylin (XL)  
 Trimethylbrazilone (XLI)  
 Brazilein (LXXIX, R - H)  
 The Synthesis Of Brazilin  
 Pyrrole Pigments : I. The Porphyrins  
 Hemin (cxxxvii)  
 The Synthesis of Dipyrromethenes  
 The Synthesis of Porphyrins  
 The Structure of Hemin  
 Pyrrole Pigments : II. Chlorophylls  
 Pheoporphyrin, Chloroporphyrin, and Phylloerythrin  
 The Vinyl Group in Chlorophyll  
 The Structure of Chlorophyll  
 Position of the Phytol Group in Chlorophyll  
 The Phase Test  
 Allomerization  
 Approaches to the Synthesis of Chlorophyll  
 Chlorophyll-b  
 Bacteriochlorophyll  
 20. Pyrrole Pigments : III. The Bile Pigments  
 Bilirubin (XXXII)  
 Verdins  
 Violins  
 Bilenes  
 Bilanes  
 Stereochemistry and Tautomerism  
 Complex Salts of the Bile Pigments  
 Pyrrole Pigments : IV. Prodigiosin  
 21. Pyrimidine Pigments : The pterins  
 The Gmelin Reaction  
 Pterorhodin  
 22. Quinonoid Pigments  
 Benzoquinonoid Pigments  
 Perezone (XII)  
 Polyporic Acid (XIV)  
 Astromentin (XXVIII)  
 Phoenicin (LXI)  
 Napthaquinonoid Pigments  
 Lapachol (LXXI)  
 Eleutherin (CXXI)  
 Alkannin and Shikonin (CXLIX)  
 Anthraquinonoid Pigments  
 Helminthosporin (CLVIII)  
 Kermesic Acid (CLXI)  
 Skyrin (CLXXVIII)  
 Extended Quinone Pigments  
 The Aphin Pigments

Erythroaphin-fb (CCXVI) or (CCXVII)  
 Hypericin (CCXXV)

23. Polyene Pigments  
 Bixin (X) and Crocetin (XI) the Carotenes  
 β-Carotene (LV)  
 Lycopene (LXXIII)  
 The Total Synthesis of the Polyene Pigments  
 Combination of Units in the Order C19 + C2 + C19  
 Combination of Units in the Order C16 + C8 + C16  
 Combination of units in the Order C14 + C12 + C14  
 Combination of Units in the Order C10 + C20 + C10  
 The Dehydro - Retrodehydrocarotenoids Epoxides  
 and Furanoid Oxides

24. Anthocyanins from Indian varieties of Grapes  
 Material and Methods  
 Extraction  
 Purification  
 Total anthocyanins  
 Separation  
 Partial hydrolysis of anthocyanin  
 Aglycone and sugar  
 Acyl moieties  
 Spectral measurements  
 Thin layer chromatography  
 Results and Discussion  
 Recovery of anthocyanin  
 Separation of pigments by paper chromatography  
 Absorption spectra of pigments  
 Partial hydrolysis of anthocyanins  
 Aglycones  
 Sugar identification  
 Acyl moieties

25. Red pigment from Geniposidic Acid and Amino Compound  
 Materials and Methods  
 Preparation of geniposide (GS) and GSA solution  
 Preparation of other iridoid compounds  
 Enzyme and reagents  
 General method of preparation of pigment  
 Evaluation of pigment  
 Identification and quantification of carbon dioxide  
 HPLC and NMR measurement  
 Structural relationship of iridoids to red pigment production  
 Acidity and evolution of carbon dioxide  
 Time course of enzymic reaction  
 Acidity and atmosphere on the reaction  
 HPLC monitoring of the pigment formation from GAA  
 and α-alanine  
 NMR monitoring of the pigment formation from GAA  
 and methylamine  
 Results and Discussion  
 The relationship between the evolution of carbon dioxide  
 and reaction pH  
 The process of formation of red pigment

Molecular mass and colour evaluation of red pigment derived from GAA and  $\alpha$ -alanine

NMR spectroscopy of red pigment formed from GAA and methylamine

Monitoring of the reaction by NMR

The formation mechanism of red pigment

26. Effect of Acid and Amine on the formation of Red Pigment from Geniposidic Acid

Materials and Methods

Preparation of geniposide (GS)

Preparation of geniposidic acid (GSA) solution

Enzyme and reagents

General procedure for the red pigment formation

Evaluation of pigment

Kind of acid

The concentration of organic acid

The substituted position of amino group and chain length of amino compound

Kind of amino compound

Results and Discussion

Effect of acidz

Effect of the substituted position of amino group and chain length of amino compound

Kind of amino compound

## 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.

