

CHEMICAL ANALYSIS OF MAJOR CHEMICAL DYES: A REVIEW

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Abstract:

This paper contains application of natural dye extracted from major natural sources of dyes. Natural dyes produce very uncommon, soothing and soft shades as compared to synthetic dyes. On the other hand, synthetic dyes are widely available at an economical price and produce a wide variety of colors; these dyes however produce skin allergy, toxic wastes and other harmfulness to human body. Here I try to conclude some major dyes, which were well known by Indian artisans.

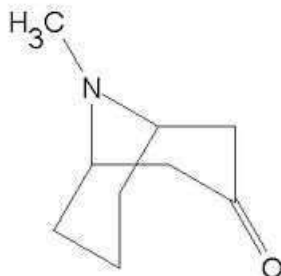
Key words: Chemical Dyes, Synthetic Dyes, Skin Allergy, Toxic wastes

Introduction

Natural dyes are well known for their use in coloring of food substrate, leather as well as natural protein textile like wool, silk and cotton and cotton silk mix as major areas of application since pre-historic times. The use of non-allergic, non-toxic and eco-friendly natural dyes on textiles have become a matter of significant importance due to the increased environmental awareness in order to avoid some hazardous synthetic dyes. Research into new natural dyes sources along with eco-friendly, robust and cost-effective technologies for their processing and application have greatly aided in widening the scope of natural dyes in various traditional and advanced application disciplines. This paper contains application of natural dye extracted from major natural sources of dyes. Natural dyes produce very uncommon, soothing and soft shades as compared to synthetic dyes. On the other hand, synthetic dyes are widely available at an economical price and produce a wide variety of colors; these dyes however produce skin allergy, toxic wastes and other harmfulness to human body. Here I try to conclude some major dyes, which were well known by Indian artisans.

Dyes extracted from pomegranate peel

The main coloring agent in the pomegranate peel is granatone, which is present in the alkaloid form N-methyl granatone. Solvent extraction method, was used for the extraction of the dye. The pomegranate peel dye was used for dyeing of scoured cotton cloth using two mordents-copper sulphate and ferrous sulphate in the ratios 1:1, 1:3.



Structure of Granatonine

The pomegranate peels are collected and washed thoroughly with water to remove any impurities. They are dried at room temperature; the samples were ground into powder with the help of grinder. They are shown in the figure given below.



Extraction of Crude Dyestuff:

The crude dyestuff is manufactured by taking 100 g of powder in a round bottom flask and 500ml of solvent (ethanol water) in the ratio 40:60 was added to it. The flask was heated in a water bath at 60°C for 60minutes. The solution was then filtered to obtain crude dyestuff. We used different concentrations of solvent (e crude dyestuff is 18.52%. When laboratory grade 75% thanol) while extracting the crude dye stuff. When laboratory grade 95% Ethanol was used the yield of the Ethanol was used the yield of the crude dyestuff is 13.21%.²

Dyes extracted from Indigo:

Indigo is the only important natural blue dye. Leaves of the plant indigofera Tinctoria are the best source of this dye. This very important dye popularly known as the “king of natural dyes” has been used from ancient times till now for producing blue color and is today most popular for denim fabrics. The coloring matter is present in indigo plant leaves as a light yellow substance called indicant 1H-indol-3yl b-D-glucoside). The leaf production from one acre of cultivated indigo plants is approximately 5,000 kg which can yield about 50 kg of pure natural indigo powder after processing. It is produced by fermenting the fresh plant leaves, and cakes thus prepared are used for dyeing purposes. Apart from indigofera species, there are several plants that can be used to produce indigo dye Woad is a natural indigo-producing plant in Europe. Apart from this, dyers knotweed (Polygonum tinctorium) and Pala Indigo (Wrightia tinctoria) are some of the plants used to produce indigo traditionally.

Indigo exhaust dyeing recipe.³

Indigo	1.5%	Dye
Sodium dithionite	3.0%	Reducing agent
Dextrose	2.0%	Stabiliser

These are the main aspects for indigo dye.

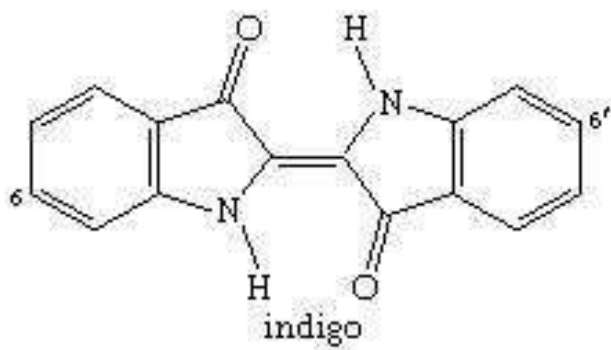
Formula: C₁₆H₁₀N₂O₂

Molar mass: 262.27 g/mol

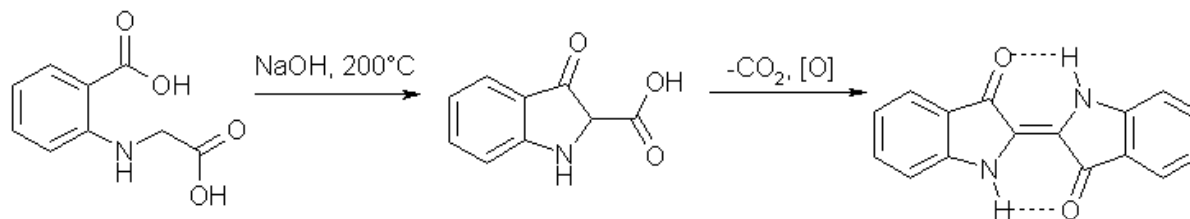
Density : 1.2 g/cm³

Melting point 390^{oc}

The colour and the nature of the dye is depend on the chemical synthesis actual properties of the products. This is the simple synthesis of indigo.



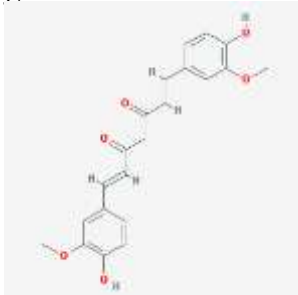
But Karl Heumann⁴ explain it as in its wide and original form as



Therefore, this is a basic structure of the formation of indigo dye in natural way.

Dyes extracted from Turmeric (*Curcuma longa*)

Turmeric (*Curcuma longa*) is a plant native to south India and Indonesia. It is also cultivated in China and the whole of South East Asia. It is also called "*Haldi*". Its tuberous rhizomes have been used as a condiment, a colourant and an aromatic stimulant since antiquity. Turmeric consists of various molecular constituents, including three gold colour alkaloidal curcuminoid, curcumidesmethoxy curcumin and bisdemethoxy curcumin. The curcuminoid content responsible for colour, depends upon the turmeric variety and within a variety on the maturity at harvest. It may be present to the extent of 4 to 8 % in turmeric harvesting at the right maturity being an important factor for colour and aroma⁵ Turmeric is rich in sources of phenolic compounds, namely, curcuminoids called bisdemthoxy and demethoxy curcumin.



Chemical structure of soluble curcumin

Curcumin is extracted from the dried root of the rhizome *Curcuma Longa*. The process of extraction requires the raw material to be ground into powder, and washed with a suitable solvent that selectively extracts colouring matter. This process after distillation of the solvent yields an oleoresin with colouring matter content in the region of 25-35 percent along with volatile oils and other resinous extractives. The oleoresin so obtained is subjected to further washes using selective solvents that can extract the curcumin pigment from the oleoresin. This process yields a powdered, purified food colour, known as curcumin powder, with over 90 percent colouring matter content and very little volatile oil and other dry matter of natural origin. The selection of solvents is done with care to meet extractability and regulatory criteria. The following solvents are considered suitable.

So these are some major dyes and their chemical structure . now days it is in more trend to dye without chemical. Popularly vegetables dyes are costly but not harmful for body skin. Some indigenous and government efforts come to result on this research. This is the fine area for the scholars for research on such topics.

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