



Review On Manufacturing Of Natural Dyes.

Rutuja Walunj¹, Vaibhavi Bhosale², Shreyas Dalvi³, Mrudula Mane⁴ Mr. Prashant Ingole⁵

^{1,2,3,4} Second year student, Chemical Engineering Department, Datta Meghe College Of Engineering, Navi Mumbai, Maharashtra, India

⁵ Assist. Prof., Chemical Engineering Department, Datta Meghe College of Engineering, Navi Mumbai

Abstract:

Synthetic dyes, as well as any dyeing operations, are hazardous to human health. Most of the natural dyes showed a very good fastness property in researches. The processing of textile is one of the most polluting events on earth. Small quantities of dyes are also used in colouration of paper, leather, shoe polish, wood, cane, candles, etc.. Natural dyes are dyes derived from animal or plant materials by using least amount of Chemicals. They are obtained from sources like flowers, leaves, insects, bark roots etc.; however, they are not readily available and involve an extraction process. They're made from things like flowers, leaves, insects, and bark roots, but they're hard to come by and require an extraction procedure. Plants, invertebrates, and minerals provide natural dyes and colourants. Vegetable colours are derived from plant materials such as roots, berries, bark, leaves, and wood, as well as other biological sources such as fungus. Because of the toxicity of synthetic dyes on human skin, natural dyes have become very popular in the textile business. These colours are stable in cotton, silk, and wool, as well as being highly eco-friendly to skin cells. As a result, scientists all around the globe are attempting to separate natural colours from various crops and flowers. This review is aimed for different raw materials used for the extraction of natural dyes, the extraction process for different natural dyes, and the properties of fabric dye

Keywords: Natural dyes from flower, *Tagetes erecta*, *Hibiscus rosa-sinensis*, Dye potential, Soxhlet Extraction

INTRODUCTION

Dyeing is a centuries-old craft that precedes written records. Archaeological evidence, on the other hand, suggests that dyeing was a widely practised economic activity in India. With time, techniques for utilizing natural colours from diverse sources such as plants, animals, and minerals got increasingly complex. They are bio-resource goods that are renewable and have a low environmental effect. Food substrate, cosmetics, leather, wood, and textiles are all coloured using these dyes. Natural dyes are made up of colourants (dyes

and pigments) that are extracted from natural sources without the use of chemicals. Color yield, dyeing process complexity, restricted hues, and poor fastness qualities are some of the drawbacks of using natural dyes. Chemicals, on the other hand, can be used to solve those problems.^[1] More than 500 dye-producing plants have been given to us by Mother Nature. *Tagetes erecta*, sometimes known as Marigold, is one such dye-producing plant. Marigold flowers, which range in colour from yellow to orange red, are high in lutein and carotenoid pigments. Natural dyes are used to colour textiles, meals, pharmaceuticals, and cosmetics. Small amounts of dyes are also used to colour paper, leather, shoe polish, wood, cane, candles, and other materials. Even while synthetic dyes are readily available and inexpensive for commercial usage, they are hazardous to one's health and the environment since they generate a large quantity of trash. And now, more than ever, environmental concerns are on the rise. This is the main reason for choosing natural dyes rather than Synthetic dyes. The main purpose of using natural dye is to make the process eco-friendly and hygienic.^[2]

Materials and Methods

(*Tagetes erecta* L.) : The Marigold flower (*Tagetes erecta* L.) has been used to extract natural colourants, primarily flavonoids and carotenoids, using the Soxhlet extractor and other conventional techniques under various operating circumstances. Marigold is a perennial or annual plant that belongs to the sunflower family of herbaceous plants. *Tagetes* is the scientific name for marigold, which belongs to the Daisy family. Their height and width range from 4 to 48 inches tall and 6 to 24 inches broad. It comes in three colours: yellow, orange, and red. It takes relatively little upkeep.^[3]

Chemical Properties: Marigold contains a high concentration of Lutein, a carotenoid pigment responsible for its fading qualities.

Hibiscus is a perennial flowering plant that belongs to the Plantae kingdom and the Malvaceae family. *Hibiscus Rosa-sinensis* originates to the Malvaceae family and has a scientific name of *Hibiscus Rosa-sinensis*. Their width varies between 8 and 10 centimetres. It comes in various colours including yellow, white, pink, and red.^[3]

Chemical Constituents - Hibiscus possesses a pigment called anthocyanin, which is responsible for its fading qualities.

Both flowers are obtained from waste generated at temples and are dried under shade before using.

Method of Extraction

Extraction process: It has been seen that extraction of dye from natural sources mainly done by some methods. Extraction mainly carried out by drying, grinding and mixing with water or ethanol solution. Soxhlet extraction machine are used for extraction of dyes in bulk amount for industrial use.^[5]

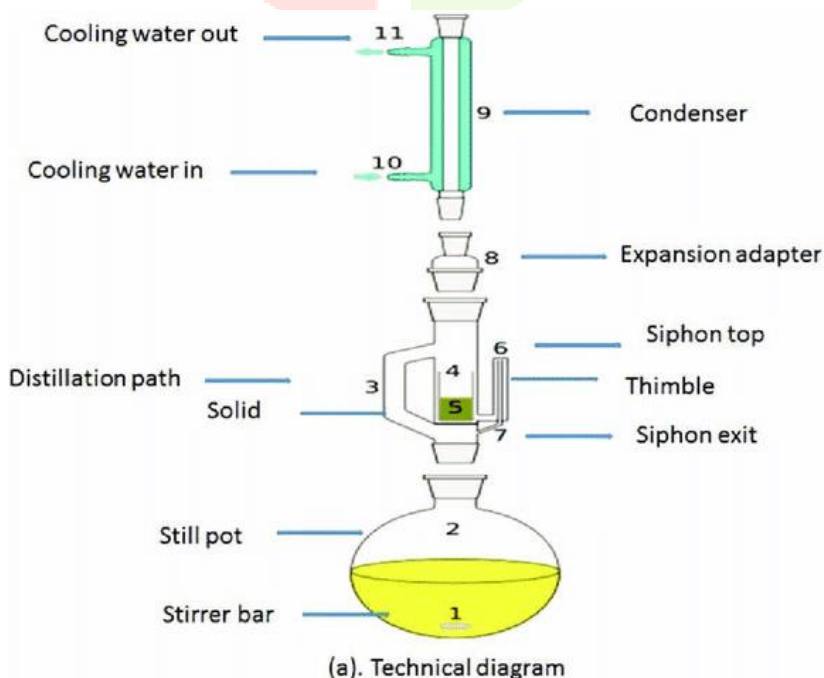
Principle of Soxhlet Extraction

The solvent reflux and siphon principle to continuously extract the solid matter by pure solvent, which saves the solvent extraction efficiency and high efficiency.

Soxhlet Extraction

The Soxhlet extraction method is used to eliminate solvent and residue filtering and improve separation efficiency. Organic solvents such as ethanol, methane, and hexane are employed in this extraction. The F/s ratio was calculated using the weighed quantity of raw ingredients and the measured volume of solvent. The raw material is maintained in a Soxhlet extractor thimble, and the solvent was emptied into a round bottom flask, which was then equipped with a condenser with a high water flow rate. The extraction takes 4-5 hours, after which the volume of the solutions is measured. Plant components are gathered for extraction, such as leaves, stem, roots, and flowers. Fresh or dried plant matter Using a pestal or mortar, smash the plant material. When a substance comes into contact with a solvent, it is necessary to crush it so that it has a larger surface area. For this procedure, ethanol is utilized as a solvent.^[6]

In a round bottom flask connected to a soxhlet extractor and condenser, the solvent (250 mL ethanol) is introduced. The crushed plant material is inserted into a thimble (made of thick filter paper or cellulose) and placed in the thimble chamber. Glass wool is used to lag the side arm. The isomantle heats the solvent, Below 75°C, which begins to evaporate as it passes through the device to the condenser. The condensate drops into the reservoir, which holds the thimble. When the solvent reaches the syphon, it flows back into the flask, restarting the cycle. As a result, the soxhlet extraction process is referred to as a continuous process. Following the completion of the procedure, the ethanol should be evaporated using a rotary evaporator, yielding a yield of extracted plant material in the glass bottom flask. No filtration is required. The extract is collected and stored^[7]



Results and Discussion

Test for Properties:

MARIGOLD

Wash fastness: Astha and Junia Laldaihzovi discovered that Marigold flower dye had a wash fastness of 4-5 when dyed at 30 degrees Celsius for 30 minutes.

Wash fastness of marigold coloured cotton 4-5 for different kinds of mordant [28] was discovered in another study by D.Jothi (2008).^[8]

Rubbing Fastness

Wash fastness: After dyeing, at 30°C for up to 60 minutes, produces the same results for dry rubbing the 3-4, and all other tests indicate ordinary dry rubbing fastness. (evaluation by) (April 2021, Sayem Anm, Ahmed F. Saha P, and Talukder conducted research)

Color strength:

Marigold Flower dyes the cotton sample at 90°C for 45 minutes for the greatest colour strength. Color strength has a value of 15.20 (Sayem Anm, Ahmed F. Saha P, and Talukder conducted research)

HIBISCUS

Washing fastness was determined using the 105-CO2 test technique. As a washing liquor, a solution containing 5 gpl non-ionic soap solution was employed, and samples were treated in a laundrometer for 45 minutes at 50°C with a material to liquor ratio of 1:50. After rinsing and drying, samples were tested for staining using a grey scale. (November 2019) (Researched by Astha, Sapna Kushwaha, and Neeraj Bala)^[9]

Rubbing fastness

Rubbing fastness was tested using the IOS-105-X12 test technique. The "crock-meter" was used to do a dry and wet rubbing test with 10 strokes of rubbing, and the staining was assessed using grey scale ratings. (November 2019) (Researched by Astha, Sapna Kushwaha, and Neeraj Bala)^[9]

Colour Strength

Hibiscus coloured colours are pale and the dyeing rate is modest. In the post mordanting process utilising alum mordant, the hibiscus coloured sample had the highest K/S (0.729) value. In the post mordanting process, the hibiscus coloured sample had the greatest K/S (1.167) when copper sulphate was used as a mordant. Hibiscus dyed samples with alum mordant had a lightness value of 77.407 in post mordanting, while hibiscus dyed samples with copper sulphate mordant had a lightness value of 73.099 in post mordanting.

(November 2019 research by Astha, Sapna Kushwaha, and Neeraj Bala)^[9]

CONCLUSION:

People are becoming more conscious of environmental issues and environmentally friendly items. Natural dyes are non-toxic, non-allergic, and result in less pollution and fewer negative effects, therefore they have become a popular option in the textile dyeing industry.

We have studied different types of extractions but we found Soxhlet process more efficient than others. And the following is a review of natural dye manufacture with references to several research articles.

Marigold flowers may be effectively used to extract natural colouring. The entire extraction procedure is environmentally friendly. The coloured samples have good light, wash, and sweat fastness. The acquired findings demonstrated the marigold flower's dyeing potential as an ideal source for cotton dyeing. The excrement is biodegradable and makes an excellent fertiliser. As a result, the entire dye extraction and application procedure is environmentally friendly.

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