

## Extraction of natural dyes from rose, pomegranate rind, common marigold, and walnut

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### ABSTRACT

Batches were done on sonicator using different natural resources like common marigold flower, rose, pomegranate rind, walnut. And batches for common marigold flower 10, 15 20 & 25 days were taken at room temperature. Analysis was done on UV spectrophotometer. Results showed that sonicator gave good results for common marigold flower as compared to day's batches. Pre mordanting dyeing was done on khadi cotton cloth.

**Keywords:** UV spectrophotometer, absorbance, & wavelength.

### INTRODUCTION

The word is derived from the Latin word flavus meaning yellow, their color in nature are a class of plant secondary metabolites. Flavonoids were referred to as Vitamin P (probably because of the effect they had on the permeability of vascular capillaries) from the mid-1930s to early 50s, but the term has since fallen out of use. There are four main types of flavonoids and other less common ones. Flavonoids are water-soluble compounds with molecules derived from 2-phenyl-1, 4 benzopyrone. Flavones and flavonols have yellowish colours. The colours are sensitive to pH. The yellow becomes much deeper in solutions of high pH. The colours of flavones tend not to fade in strong light as flavonols do, but they are paler. The yellow colour of onion skins is due to a mixture of flavones and flavonols: quercetin, kaempferol and quercetin-3-glucoside. Anthocyanidins and anthocyanins are the most highly coloured of the flavonoids. They are responsible for the scarlets, reds, violets and blues in many flowers, fruits and vegetables. When anthocyanidins bond to sugar molecules they become anthocyanins. Anthocyanins are found in plants far more commonly than the parent anthocyanidins. Anthocyanins are soluble in water and easily extracted into weakly acidic solution. However, the colour is pH dependent.

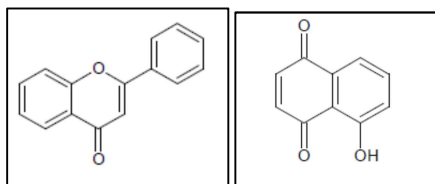


Fig. 1: (Left) Flavones structure and(Right)Juglone

Anthracene is a solid polycyclic aromatic hydrocarbon of formula  $C_{14}H_{10}$ , consisting of three fused benzene rings. It is a component of coal tar. Anthracene is used in the production of the red dye alizarin and other dyes. Anthracene exhibits a blue fluorescence under ultraviolet light. There are two major groups: anthraquinones and

naphthoquinones. They contain several well-known dyes. Here above is the structure of a naphthoquinone called juglone. It can be extracted from walnut rind.

## MATERIALS AND METHODS

### I] Procedure for sonicator method:

In this method we took 10 gm of natural source i.e. flaked marigold flower petals and 100ml of water. The batch was kept at 45°C for 1 hour and then filtration was done. After filtration analysis of dye was done on UV spectrophotometer to find out maximum absorbance for maximum wavelength. Other natural sources such as rose, pomegranate rind, walnut were used with ethanol for dye extraction also. From all the solvents used, we can conclude that ethanol was the optimum solvent for extraction.

### II] Procedure for day's batch method:

In this method we took 10 gm of natural source i.e. flaked marigold flower petals and 200ml of solvent. Solvent used was distilled water. Two different batches were kept with crushed and uncrushed marigold flower. Temperature was room temperature. Time as changing parameter. Time duration was 10 days, 15 days, 20 days, and 25 days. And then filtration was done. After filtration analysis of dye was done on UV spectrophotometer to find out maximum absorbance for maximum wavelength.

### III] Procedure for pre mordanting dyeing:

Washing of khadi cotton cloth at 45 °C for 45 minutes in distilled water. Preparation of mordanting solution by adding 2gm alum in 40 ml water. Mordanting of khadi cotton at temperature of 45 °C in mordanting solution for 45 minutes. Dyeing of mordanted khadi cotton in 40 ml of extracted dye at temperature of 45 °C in for 45 minutes.

## RESULTS

### I) Sonicator method:

#### i) Natural source: 10 gm marigold flower

Temperature: 45 °C                      Time: 1 hour

Ratio of natural source v/s solvent is 1:10

**Table 1: Sonicator results**

Solvent (100 ml)	Absorbance at Maximum Wavelength	Maximum Wavelength (nm)	Absorbance at 1100 nm	Amount of Solvent Retained (ml)
Water	2.503	205	0.036	97
Ethanol	2.517	324	0.807	85

#### ii) Natural source: 4.7gm rose flower

Temperature: 45 °C                      Time: 1 hour

Ratio of natural source v/s solvent is 1:10

**Table 2: Sonicator rose batch results**

Solvent (47 ml)	Absorbance at Maximum Wavelength	Maximum Wavelength (nm)	Absorbance at 1100 nm	Amount of Solvent Retained (ml)
Ethanol	2.542	324	0.124	40

#### iii) Natural source: 10gm pomegranate rind

Temperature: 45 °C                      Time: 1 hour

Ratio of natural source v/s solvent is 1:20

**Table 3: Sonicator pomegranate rind batch results**

Solvent (200 ml)	Absorbance at Maximum Wavelength	Maximum Wavelength (nm)	Absorbance at 1100 nm	Amount of Solvent Retained (ml)
Ethanol	2.509	303	0.107	190

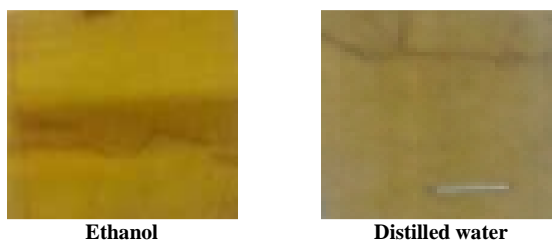
#### iv) Natural source: 10gm walnut

Temperature: 45 °C                      Time: 1 hour

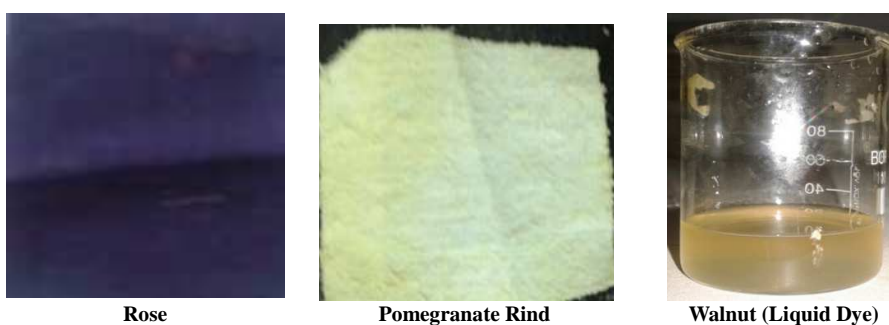
Ratio of natural source v/s solvent is 1:20

**Table 4: Sonicator walnut batch results**

Solvent (200 ml)	Absorbance at Maximum Wavelength	Maximum Wavelength (nm)	Absorbance at 1100 nm	Amount of Solvent Retained (ml)
Ethanol	2.506	434	1.475	183



**Fig. 2: Dyed cloth of common marigold flower**



**Fig. 3: Dyed clothes of sonicator batches**

**II] Days batch method:**

- i) Natural source: 10 gm uncrushed marigold flower
- Solvent: 200 ml distilled water
- Ratio of natural source v/s solvent is 1:20

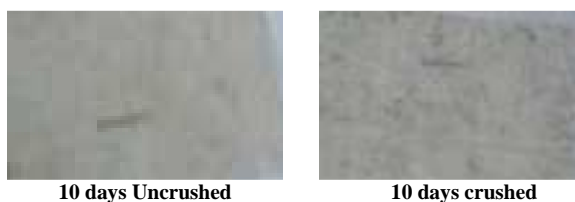
**Table 5: Days batch method (Uncrushed) results**

Time days	Absorbance at Maximum Wavelength	Maximum Wavelength (nm)	Absorbance at 1100 nm	Amount of Solvent Retained (ml)
10	2.534	324	0.334	27
15	Rotting of flowers was observed			
20				
25				

- ii) Natural source: 10 gm crushed marigold flower
- Solvent: 200 ml distilled water
- Ratio of natural source v/s solvent is 1:20

**Table 6: Days batch method (Crushed) results**

Time days	Absorbance at Maximum Wavelength	Maximum Wavelength (nm)	Absorbance at 1100 nm	Amount of Solvent Retained (ml)
10	2.539	324	0.390	35
15	Rotting of flowers was observed			
20				
25				



**Fig. 4: Days batch method dyed cloth**

## DISCUSSION

### I) Sonicator method:

Ethanol is the optimum solvent for extraction as the colour quality obtained from it is very good as compared to distilled water. Rose which changes its colour during dyeing because of release of water molecule from hematoxylin to form brazilin. Pomegranate rind contains flavonoid and sub group luteolin which is crystalline hence texture of cloth becomes rough. Walnut contains juglone which is hard to dye the cloth. Extracted dye from marigold flower, rose and pomegranate rind was flavonoid and sub type for marigold flower and rose (not for pomegranate rind) is flavones. This was concluded from colour extracted and from maximum wavelength obtained, that was 324 nm for most of the batches and which is within the flavonoid range of 200-500 nm, and for flavones it is 310-350 nm and 250-280 nm. Walnut had brown colour and maximum wavelength of 434 nm we can conclude from this that it had Anthracenes and sub type naphthoquinones and further sub class is juglone. As anthracenes have range between 400-500 nm.

### II] Days batch method:

Rotting of flowers was observed at 15 days, 20 days, and 25 days batches. Sludge type dye is formed at 10 days batch which has a peculiar smell. Extracted dye from marigold flower flavonoid and sub type is flavones. This was concluded from colour extracted and from maximum wavelength obtained, that was 324 nm for most of the batches and which is within the flavonoid range of 200-500 nm, and for flavones it is 310-350 nm and 250-280 nm. Colour quality is very poor hence these batches are unfavorable.

## CONCLUSION

Ethanol is the optimum solvent for extraction as the colour quality obtained from it is very good. common. Extracted dye from marigold flower flavonoid. Pomegranate rind contains flavonoid and sub group luteolin which is crystalline hence texture of cloth becomes rough. Rose dye changes its colour during dyeing. For days batch rotting of flowers was observed at 15 days, 20 days, and 25 days batches. Sludge type dye is formed at 10 days batch which has a peculiar smell.

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