

DETAIL STUDY OF INK FORMULATION FROM NATURAL COLOURANTS

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ABSTRACT: *In this paper, detail study of ink formulation from natural colorants is discussed. As we know colourant is a most important part of any ink it may be synthetic inks or a natural inks, But as the technology grow day by day human become more aware about the health issues and people come to know more about the demerits of synthetic inks can cause to our health. However environmental issue in production and application of synthetic inks revived the consumer interest towards the natural inks.*

Keywords: *Natural Colorants, Natural inks, jamun (black current)*

I. INTRODUCTION

The method of natural inks preparation is not new it is as old as our civilization. The art of using natural colour is very old and still used in some parts of India, but on small scale, due to easily availability of synthetic dyes, long lasting colour and low cost. But synthetic inks have some disadvantages like health problem and environmental issues which cause great boost to the natural inks research work, In 1996 Germany was the first country which ban the azo dye (synthetic dye) from the printing industry which cause harmful effect to the environment with emission of the Volatile Organic Compounds (voc).

On other hand natural inks are considered eco-friendly because they are derived from natural resource like plant leaves, root, fruits, and minerals source. There are more than 500 dye yielding plants in nature giving different shades of colour. China dated 2600 BC was the first country to use natural dyes. There is an increasing interest among consumers for natural dyes and inks especially those who are aware about the harmful effects of synthetic inks and dyes but there are several challenges in this field where we need more technology to make this possible. In this study an attempt was made to generate water based ink with simple aqueous method using jamun (black current). These natural inks are different from synthetic inks. Synthetic inks have colourants (titanium dioxide, calcium carbonate, lithol etc.), resins (ethyl cellulose, acrylic resins, polyvinyl acetate etc.), solvents (toluene, mineral oil, acetone, methanol etc.), additives (phenol, titanium chelates, silicones, cobalt & manganese compound) while in this study natural agents were used such as colourant (betanin and vulgaxanthin from beetroot, curcumin from turmeric, tannic acid from amla powder), resin (gum acacia), solvent (water) and additives (vinegar, salt).

II. RESEARCH OBJECTIVES

Objective of this research was to prepare inks from natural colourants by aqueous extraction method. Which are safe to the human health and free from voc emissions and we can provide a safe and good quality inks for printings. All inks were found to be effective, easy to apply and the prints were stable too. Though, the inks need proper preservation and storage.

III. RESEARCH METHODOLOGY

Steps Followed for Natural Ink preparation are:

- Collection of the raw materials like fruits, vegetables etc.
- Reducing the size of natural colourant.
- Extraction of colouring components from fruits and vegetables by Aqueous Extraction. It is a traditional method for extracting colour from natural resources. In this method, colour containing compound is dry broken down into small pieces or in powdered form by grinding and soaked with water in vessel for some time to loosen the cell structure. If colour containing compound is in wet form then it is chopped down to fine pieces or grinded to fine paste. Then these broken down pieces are boiled in water to get the colouring component dissolved in water. This solution is filtered to separate colouring solution and non-colouring remnant. Both can be used easily to impart colour to different things. There are some disadvantages associated with this extraction method like slow process, high temperature requirement, large volume of water requirement, heat sensitive colouring substances gets reduced at high temperature low dye yield, only water soluble colouring components can be extracted.
- Fine filtration of the aqueous.
- Adding resin and additives for ink preparation.
- Packing of prepared ink for its long term use.

IV. INK PREPARATION FROM DIFFERENT FRUITS AND VEGETABLES USING NATURAL COLOURANTS

Extraction of purple ink from jamun by Aqueous Extraction:

Materials requireds:

250g jamun pulp, 200ml water, 1tbsp salt, 3/2 tbsps of arrow root powder, 1tbsp of gum acacia.

Steps involved in ink preparation were as follows:

- 250 gm of jamun pulp is grinded with 200ml of water for 2 minutes. Now this paste is boiled at
- 70°C for 30 minutes so that harmful bacteria and enzymes present in the sap becomes inactive.
- During this boiling process the colouring component anthocyanin present in jamun dissolved properly in water and gives purple colour.
- Sap is filtered using muslin cloth and boiled again to bring the final concentration to 100 ml.
- Now 1 tbsp of salt as preservative, 1½ tbsp of arrow root powder for viscosity, 1 tbsp of gum acacia paste as resin are added in the sap and sap is boiled till the consistency of ink changes.
- Now the prepared ink is used for printing on paper
- Prepared ink gives good colour strength of purplecolour.



Following data was collected for Components of Synthetic Inks and Natural Inks

On the bases of this data we can compare the basic components of both the natural inks and the synthetic inks. We all know the ink has 4 basic components which are;

- Pigment
- Solvent
- Resin
- Additives

Comparative study of Components of Synthetic Ink and Natural Ink:

Sr. No.	Components of Ink	Synthetic Ink	Natural Ink
1	Solvent	toluene, mineral oil, acetone, methanol etc.	Water
2	Resin	ethyl cellulose, acrylic resins, polyvinyl acetate etc.	gum acacia
3	Pigment	titanium dioxide, calcium carbonate, lithol etc.	betanin and vulgaxanthin, curcumin, ferric tannate

4	Additive	phenol, titanium chelates, silicones, cobalt & manganese compound etc.	vinegar, salt, arrow root powder
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V. RESULT AND DISCUSSION

Natural jamun ink gives good color strength of purple color when printed on paper. Its easy to prepare, economical and gives good print quality.

VI. CONCLUSION

Following are the conclusion from this research work

- Jamun ink is feasible for printing on paper.
- Prepared ink is eco-friendly and easy to decompose.
- This can be concluded that prepared purple jamun ink can be a good alternate to synthetic inks more research required in this field to standardized
- It's good to use only fresh vegetables and fruits for ink preparation.
- Lives of prepared inks are from 40-45 days but quality of print is as good as other inks.
- Storage of inks should be proper in cool and dark place, else inks will be spoiled.
- Different variation of shades can be produced by changing the concentration of colorant.

Easy to dispose because of no harmful chemicals used as raw material as in synthetic inks.

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