



MANUFACTURING OF PAINT USING NATURAL OBTAINED MATERIAL

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Abstract: The main objective of manufacturing of paint is to reduce the use of volatile materials present in paint. To supply the non-volatile paints which are helpful in killing bacteria and harmful organisms and serving a healthy friendly atmosphere. It can be further developed by making it washable and more durable. Better shelf-life cow dung acts as an insulator. It makes the room cooler in summer and warmer in winter comparatively to exterior temperature. In ancient times it had a medical importance, and considered as antiseptic in nature and it is widely available hence cost production is very low.

Keywords: Insulator, Antiseptic, Non-Volatile, Natural.

1.0 INTRODUCTION

Paint is any pigmented liquid, liquefiable, or solid mastic composition that, after application to a substrate in a thin layer, converts to a solid film. It is most commonly used to protect, color, or provide texture. Paint can be made in many colors—and in many different types. Paint is typically stored, sold, and applied as a liquid, but most types dry into a solid. Most paints are either oil-based or water-based and each has distinct characteristics [1].

2.0 TYPES OF PAINT

- Oil Paint.
- Enamel Paint
- Emulsion Paint.
- Cement Paint.
- Bituminous Paint.
- Aluminum Paint.
- Anti-Corrosive Paint.
- Synthetic Rubber Paint. (1)

2.1 Components of Paint

2.1.2 Vehicle

The vehicle is composed of the binder; or, if it is necessary to thin the binder with a diluent like solvent or water, it is the combination of binder and diluent.[3]

2.1.3 Binders

The binder is the film-forming component of paint. It is the only component that is always present among all the various types of formulations. Many binders are too thick to be applied and must be thinned. The type of thinner, if present, varies with the binder. (3)

2.1.4.1 Thermoplastic Mechanism

Some films are formed by simple cooling of the binder. For example, encaustic or wax paints are liquid when warm, and harden upon cooling. In many cases, they re-soften or liquify if reheated. Paints that dry by solvent evaporation and contain the solid binder dissolved in a solvent are known as lacquers. (3)

2.1.4.2. Thermosetting Mechanism

Paints that cure by polymerization are generally one- or two-package coatings that polymerize by way of a chemical reaction, and cure into a cross-linked film. Depending on composition they may need to dry first, by evaporation of solvent. Classic two-package epoxies or polyurethanes would fall into this category. The "drying oils", counter-intuitively, actually cure by a crosslinking reaction even if they are not put through an oven cycle and seem to simply dry in air. (3)

2.1.5 Thinner

The main purposes of the diluent are to dissolve the polymer and adjust the viscosity of the paint. It is volatile and does not become part of the paint film. It also controls flow and application properties, and in some cases can affect the stability of the paint while in liquid state. Its main function is as the carrier for the non-volatile components.

2.1.6 Pigment and filler

Pigments are granular solids incorporated in the paint to contribute color. Dyes are colorants that dissolve in the paint. Fillers are granular solids incorporated to impart toughness, texture, give the paint special properties, or to reduce the cost of the paint. Pigments can be classified as either natural or synthetic. Natural pigments include various clays, calcium carbonate, mica, silicas, and talcs. Synthetics would include engineered molecules, calcined clays, blanc fixe, precipitated calcium carbonate, and synthetic pyrogenic silicas. (3)

3.0.0 Impact on environment due to pollution

- VOCs consist of various classes of carbon-containing chemicals that are gases at room temperature. They are released into the environment from petrol and diesel, especially the former, by evaporation or as combustion products. Some VOCs (e.g., benzene) are human carcinogens while others are either respiratory tract irritants or neurotoxic
- Benzene, a VOC, is a minor constituent of petrol. It is produced from combustion and evaporation of both petrol and diesel, especially the former
- Combustion of petrol is the largest source (70% of total emissions) of benzene in air. Airborne benzene is primarily absorbed through the respiratory tract and then transported by blood to critical target organs.
- Biological agents present in polluted air may cause several diseases. The biological contaminants include bacteria, moulds, mildew, viruses, animal dander and cat saliva, house dust, mites, cockroaches, and pollen

4.0.0 Necessity of Eco-Friendly paint

- As day- day there is increase in pollution due to various factors. The increase in pollution is causing adverse effect on environment as well as on human being also in this case paint which we use in our general practice is also a leading parameter in performing the pollution activities.
- To reduce the use of volatile organic compound (VOC's) present in paint which reacts with oxygen which forms ozone layer in presence of sunlight this parameter is contributory factor for air pollution, Ozone depletion and formation of greenhouse gas.
- Reduction of petroleum products in paint. Petroleum is widely used in some products in paint industry. This Petroleum acts as leading contributory factor in environmental issues. The petroleum use leads to depilation of natural resources in under developed nations and protentional causing life loss.
- Reduction of Lead in manufacturing of paint. When an old building is under phase of renovation then the scrabble powder of old paint is formed and it contain Lead in it when it comes in contact with air, weather and soil there are chances of pollution which causes adverse effect on human health and surrounding environment.

Hence the rapid growth in various forms of pollution creates an adverse impact on Environment as well as on human health. Henceforth considering the need of today it is important to study on minimizing the cause of pollution. We decided to manufacture an environmental base paint which will contain natural ingredients and will compute the chemical present in paint. Which helps in minimizing the cause of pollution on environment. Hence it is basic need of today to produce eco-friendly paint.

5.0.0 Components of paint (Paint made by using naturally obtained ingredients)

5.1 Binder

Binder refers to substances that hold the particles of pigment together in paint. All paints include binder of some sort because this is what it keeps the pigment in place after the paints dries. In this paint the Binding property is served by using starch which comprises of glucose monomer. The chemical composition of starch molecule is(C₆H₁₀O₅).

This component which is listed above are included proportionally according to the quantity of paint required for production of cured film which holds together firmly.

5.2 Thinner

The main purpose of the diluent are to dissolve the polymer and to adjust the viscosity of paint. It controls the flow and application properties. Thinner should be added in adequate in proportionate form to provide fair viscosity if in case the proportion or ratio of thinner is increased then the paint stability can be affected.

In the paint manufactured from naturally obtained ingredients the thinner is used as fresh water with chemical composition of (H₂O). It helps in diluting the paint in adequate form to provide adequate viscosity for the paint.

5.3 Pigment

Pigment are the granular solids incorporated in the paint to contribute colour. In some cases, the pigment is used in powder form in addition to liquid to gain the desired colour.

In paint manufactured from naturally obtained mineral the pigment are as follows,

Red colour (Vermilion cinnabar) HgS

Yellow colour (Hexamethylene diisocyanate) $(CH_2)_6(NCO)_2$ (1)

5.4 Filler

The filler can adjust the rheological properties of the coating such as thickening, anti-setting, Etc. Filler can also improve the mechanical strength of the coating film, such as improving wear resistance and durability.

Filler is component of paint which keeps the pigment in place after the paints dries. In this paint the Binding property is served by used of Gypsum which holds the pigment firmly. Gypsum is soft mineral composed of calcium sulphate dihydrate. the chemical formula of gypsum is $CaSO_4 \cdot 2H_2O$.

In this paint filler property is served by Gypsum powder which gives the proper result after getting mixed with adequate amount of water.

5.5 CMC

Carboxymethyl Cellulose (CMC) is formed from cow dung which is used for heat insulation of paint. When CMC is added to paint it serves the property of heat insulation to the structure which is applied. Carboxymethyl cellulose OR cellulose gum is cellulose derivative with carboxymethyl groups ($-CH_2-COOH$)

5.5.1 Composition of CMC

- Carboxymethyl cellulose is groups of bonds to some of the hydroxyl group of glucopyranose monomers that make up the cellulose backbone. It is often use as sodium salt, sodium carboxymethyl cellulose. Carboxymethyl cellulose OR cellulose gum is cellulose derivative with carboxymethyl groups ($-CH_2-COOH$). It is formed from Cow dung with use of water and chemical such as caustic soda and hydrogen Fer oxide.
- Initially the fresh cow dung is taken in a container and water is added to it only for dilution purpose.
- When cow dung is properly diluted then the container is kept on gas burner and heated to a specific temperature until each of the cow dung particle is boiled.
- When cow dung starts boiling then the container is removed from gas burner and then the caustic soda and Hydrogen Fer oxide is added to solution simultaneously and then reaction take place in between cow dung and added chemicals.
- The reaction takes up to 6-7 hrs. to settle down the particles and then after the fibrous particle settle down and the useful matter is removed out from that liquid with help of mesh. And hence the formation of CMC is done the mesh used is of 100mm-150mm micron. Then the formed CMC is taken out the mixture and stored in a container

6.0 RESEARCH METHODOLOGY

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7.0.0 Manufacturing procedure of Eco-friendly Paint (Using Natural Obtained Ingredients)

- Weighing machine, measuring cylinder, Rotating shaft with attached drill machine, empty vessel, stop Watch. All the material should be present in neat and clean condition.
- Weigh the gypsum and take 250gm of it exactly. Take measured water of about 250ml of it in measuring cylinder. Take starch 10gm and pigment of 28 gm.
- Again, by using measuring cylinder measure oil 35ml and again by help of measuring cylinder take CMC of 10ml.

- In initial stage take empty cylinder and put 250gm of gypsum in it, then take water and add the water of 150ml initially then with the help of rotating shaft mix the mixture of gypsum and water. Then after 10min of proper mixing add the remaining water 100ml partly in 50ml sessions.
- When 200ml water is added then add 10ml of CMC to mixture, and then add remaining 50ml of water to it and continue mixing till further 10 min. Then take starch of 10gm and add to the mixture.
- When the mixture is mixed unto 20min firmly then add Pigment to the mixture of 28gm to it Simultaneously. And again, mix the mixture up to 5min Thoroughly in 2.5min interval and then check the material.
- When material becomes firm enough and thoroughly mixed then add oil of 35ml simultaneously to it and again rotate the shaft till 5min with 2.5min interval of time. At the end the paint will be ready for us.

Table 1: Comparison Between Ordinary Paint and NOI Paint.

General Components of Paint	Ordinary Paint	Environmental Paint
Binder	Epoxylene	Starch
Thinner	Turpentine	Water
Pigment	Hydrated Chromium Oxide	Natural Pigment
Filler	Magnesium Silicate	Gypsum

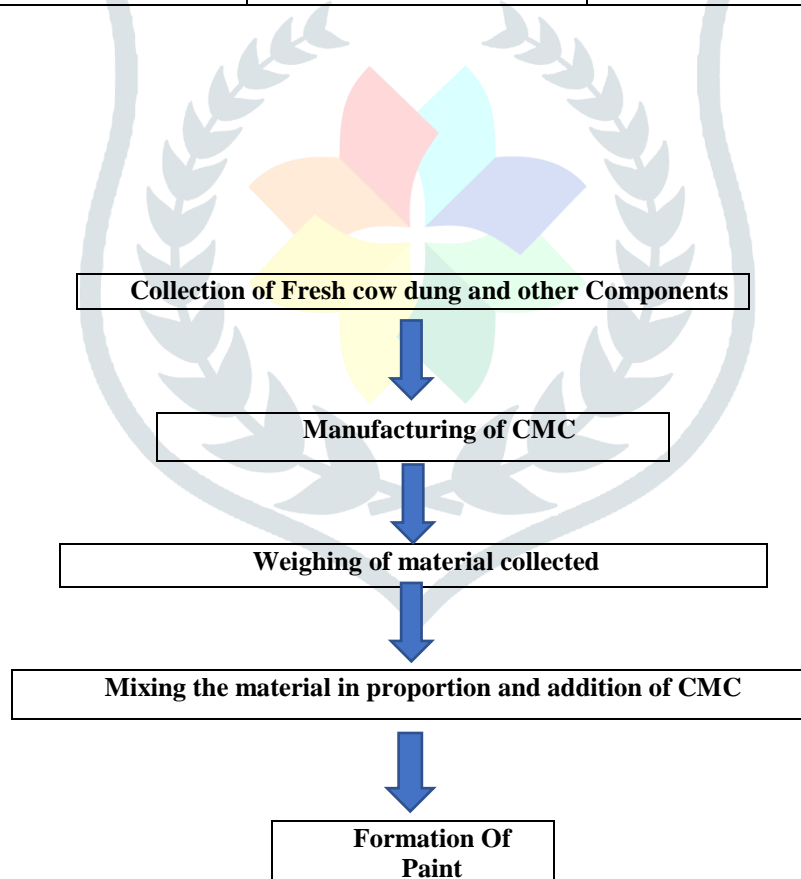




Figure 1 : Sample of paint



FIGURE 2 : Color Manufacturer

Table 2: Temperature Test on Paint

Sr.no.	Testing of paints:	Result
1	Scribble Test	No scratch found
2	Temperature	Colour Change
I.	45 Degree	No Variance found
II.	50 Degree	No variance found
III.	55 Degree	No variance found

Cost comparison table*Table 3: Cost Comparison*

BRAND OF PAINT	PRICE (RS)
BEST BUILT AQUA CELLING	195/-
ASIAN PAINTS A POLITE PREMIUM	220/-
ASIN PAINTS TRACTOR EMULSION	167/-
BERGER PAINTS WALL MAT	200/-
ASIAN PAINTS TRACTOR EMULSION SMOOTH FINISH	199.65/-
NATURAL OBTAINED INGREDIENT PAINT (NOI)	150/-

Manufacturing Cost of Paint.*Table 4: Manufacturing Cost*

Material	Cost
Gypsum	5
Water	2.5
Pigment	40
Cow dung	1.66
Starch	20
Fuel For Heating	40
Grand Total	110

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PAINT POLLUTION HARMFUL EFFECTS ON ENVIRONMENT. Tina Porwal
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