



# GOVERNMENT OF ANDHRA PRADESH COMMISSIONERATE OF COLLEGIATE EDUCATION



## **PAINTS** Subject

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## Introduction:

- Paint is essentially a coating or covering material applied on metallic or non-metallic surfaces for decorative or protective purposes. Usually they may be a protective as well as decorative finish.
- Paint is a unique homogeneous mixture of three major ingredients namely Binder, Pigment, VOC & additives, which when applied on the surface as a thin layer that forms a solid dry adherent film after oxidation/evaporation/ polymerization. Paint consists of a particular pigment, dispersed in a particular binder, dissolved in a particular solvent

## **Pigments**

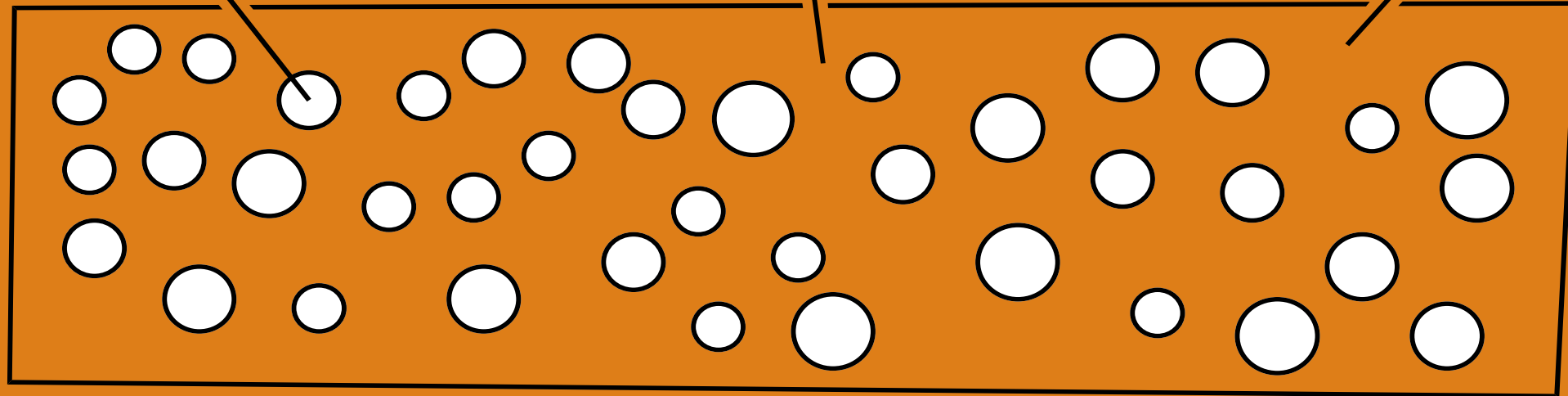
Fine Solid Particles  
Protection, Opacity &  
Colour

## **Binder**

Oil Or Resin  
Film Former Cohesion

## **Solvent**

Organic or Water  
Dissolves Binder  
Reduces viscosity



# Paint Definition:

- Dispersion of **pigment** ( *colouring substance* ) in a suitable drying oil in the presence of a **solvent** ( *paint thinner* ) is known as **paint**.

# PROPERTIES OF AN IDEAL PAINT:

- 1. It should be possible to apply easily and freely available
- 2. It should form hard and durable surface.
- 3. It should dry in reasonable time
- 4. It should not be easily affected by atmosphere.
- 5. It should not be harmful to the health of workers.
- 6. It should possess attractive and pleasing appearance.
- 7. It should form a thin film of uniform nature i.e., it should not crack.
- 8. It should possess good spreading power.
- 9. It should have **sufficient consistency** (property to resist **permanent** change of shape) for a **particular** purpose for which the **paint** is to be used.
- 10. It should be cheap.

# Purpose of Paint

- 1. To restrict the **corrosion** of paint.
- 2. The paint should provide resistance against the corrosive effect **of** sun, wind, rain, frost, atmospheric pollution & other natural elements, heat, moisture, **gases**, etc.
- 3. It provides delays in rusting.
- 4. It Provides an Aesthetic look to materials & a smooth surface for **easy** cleaning.

# Constituents of Paints

- The main constituents of paints are pigments, oil (vehicle) and some other materials to impart various desirable properties.

# (1) Pigments

- Pigments are the organic or inorganic insoluble substances, which are widely used, in surface
- coatings. They protect the film by reflecting the destructive ultra violet light, to strengthen the film.
- The important pigments used for making paints are:
  - (i) White: White lead, titanium dioxide, and zinc oxide.
  - (ii) Red: Red lead, Iron oxides, and cadmium reds
  - (iii) Blue: Cobalt blue, Iron blues, etc.
  - (iv) Green: Chromium oxide, chrome green

## (2) Extenders or fillers

- The extenders or fillers are the low cost materials. These are added to the paint in order to decrease the cost of the paint. These supplement the pigment in increasing the covering and weathering power of the film. Talc, china clay, gypsum, silica, barite, glass flakes, asbestos and anhydrite, etc. are used as fillers in paints.

## (3) Film forming materials

- ▶ The vehicle or film forming materials serves dual purpose in the surface coating formulations.
- ▶ These are usually called drying and semi-drying oils, depending on the degree of unsaturation. Linseed oil, soyabean oil, tung oil, castor oil, varnishes, casein, fish oil, etc. are used as vehicles or drying oils.

## (4) Driers

- Certain driers (which are oxygen carriers) have also been used in the paints, in order to accelerate the drying of the film through oxidation and polymerization. Earlier,  $\text{PbO}$  , naphthenates, etc.

## **(5) Thinners or Diluents (Volatile organic compound(VoC))**

- Another ingredient, of paint is thinner. It is added to the paints to dissolve film-forming materials and to dilute concentrated paints for better handling. After adding thinner, the paints may be applied more easily on the surface by brushing, spraying or dipping. Mineral spirits and solvents namely turpentine, maintains the fluidity of the freshly applied film for reasonable period of time.



## (6) Anti skinning Agent

- Certain anti skinning agents are also added to the paints in order to prevent gelling and skinning of the finished product before application of the paints by brushing, spraying or dipping. Polyhydroxy phenols are usually employed as anti skinning agents.



## (7) Plasticizers

- ▶ Plasticizers are added to the paints to provide elasticity to the film and thus prevent cracking of the paint. Chemically, plasticizers are mostly esters. Triphenyl Phosphate, dibutyl phthalate and castor oil etc. are used as Plasticizers.



- **(8) Resins:**

- Varnishes are used as natural or synthetic resins. Examples of natural resins are copal or resin, while that of synthetic resins are Urea formaldehyde, acrylate, vinyl or silicone resins.

- **(9) Binders**

- Binders act to fix the paint on the coated surface and provide tough, tenacious and glossy film on the painted surface.



# Types of paints:

- ▶ Depending upon their constituents there are various types of paints. Some of them are:



# 1. Aluminum Paint

- It contains finely ground aluminum in spirit or oil varnish. It is visible in darkness also. The surfaces of iron and steel are protected well with this paint. It is widely used for painting gas tanks, water pipes and oil tanks.



## 2. Anti-corrosive Paint:

- It consists essentially of oil, a strong drier, lead or zinc chromate and finely ground sand.

It is cheap and resists corrosion well. It is black in colour



## 3. Bituminous Paints:

- ▶ This type of paint is manufactured by dissolving asphalt or vegetable bitumen in oil or petroleum. It is black in color. It is used for painting iron works under water.
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## 4. Cement Paint (Pigment Paint):

- It is available in powder form. It consists of white cement, pigment and other additives. It is durable and exhibits excellent decorative appearance. It should be applied on rough surfaces rather than smooth surfaces. It is applied in two coats.
- i) Applied on wet surface but from excess water and allowed to dry for one day.
- ii) The second coat is then applied which gives good appearance.



## 5. Distemper paint:

- Distemper paint is a type of water-based paint that is widely used. White chalk and thinner are common ingredients in distemper paints. The base material used in the creation of distemper is white chalk.




## 6. Enamel Paint:

- It contains white lead, oil, petroleum spirit and resinous material. The surface provided by it resists acids, alkalies and water very well. It is desirable to apply a coat of titanium white before the coat of enamel is applied. It can be used both for external and internal walls.

## 7. Emulsion Paint

- : It contains binding materials such as polyvinyl acetate, synthetic resins etc. It dries in 1½ to 2 hours and it is easy to apply. It is more durable and can be cleaned with water. For plastered surfaces, first a coat of cement paint should be applied and then the emulsion paint. Emulsion paint needs sound surfaces

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- **8. Oil Paint:** These paints are applied in three coats-i) primer ii) undercoat iii) finishing coat. This paint is cheap and easy to apply.
  - **9. Synthetic Rubber Paint:** It is prepared from resins. It dries quickly and is little affected by weather and sunlight. It resists chemical attack well. This paint may be applied even on fresh concrete. Its cost is moderate and it can be applied easily.

# Paint Removers

- The substances or materials, which are used to remove various surface coatings or paints, are called paint removers. Paint removers are either flammable or non-flammable.
- Flammable paint removers may be liquid removers, semi paste remover and paste removers.
- The common solvents used for the purpose are alcohols such as methanol, ethanol or propanol. Hydrocarbons (benzene, toluene or xylene), acetone and ethyl acetate are also used as paint removers.

# Special Applications of Paints

- ▶ In addition to provide a thin protective layer, paints are also used for other applications some of the special uses are discussed below:
- ▶ (a) Paints are extensively used as acid resisting coats.
- ▶ (b) Oil bound water paints or distempers are widely used for interior decoration of walls.
- ▶ (c) Coal tar products dissolved in mineral spirits have been used as protective coatings of pipe under the name bituminous paints.
- ▶ (d) Bottom of ships are protected by antifouling paints which are prepared by mixing iron oxide mercuric oxide and copper resin dispersed in tung oil.
- ▶ (e) A paint with damp resisting properties is prepared by mixing paraffin wax, rosin, bitumen and gutta parcha dispersed in tung oil.

# What you learnt

- 1. Pigments are various organic and inorganic insoluble substances, which are widely used in surface coatings.
- 2. Titanium dioxide is one of the most important white pigment. Carbon black, graphite and lamp black are the chief black pigments, chromium oxide ( $\text{Cr}_2\text{O}_3$ ) and Guignet's green is green pigments, Chrome yellow, strontium chromate and barium chromate are yellow pigments.
- 3. Some powdered form of metals as well as alloys has also been used as pigments. Finely powdered zinc has been used for protective coating on iron and steel.
- 4. Paints are stable mechanical mixtures of one or more pigments, extenders fillers, driers, thinners or diluents, lacquers, plasticizers, resins and binders.
- 5. Good quality paint should have good colour, high hiding power and also have proper pigment volume concentration range (PVC). For exterior house paint the PVC range should be 28-36%.



# Question

- 1. What is Paint?
- 2. What are the main types of paint?
- 3. What are the properties of an ideal paint?
- 4. What is the main purpose of paint?
- 5. What are the main composite (Ingredients) of paint?
- 6. How many types of paint are there? Explain.
- 7. What are the most common methods for paint?
- 8. What is an advantage of paint?