4-5

Fertilizers

⇒ Cement, Glass, ink,

Gun powder,

SAFALTA CLASS™

An Initiative by अमर उजाला

DELHI POLICE
CONSTABLE

By

ONE OF THE MOST EXPERIENCED
FACULTY TEAM FROM DELHI

100+ Hrs | 60 Days

DELHI POLICE – CONSTABLE - 60 DAYS COURSE

NEW BATCH STARTS 17th AUGUST 2020

Session Time - SESSION -1: 3:30 PM TO 4:30 PM & SESSION- 2: 5: 00 - 6:00 PM

Course *Benefits*

SAFALTA CLASS™
An Initiative by अमर उजाला

- Live Interactive Classes on Zoom
- Accessible from Desktop or Mobile
- Access to recorded classes
- Weekly mock tests to evaluate progress
- PDF Study material to boost your preparation
- Special Q&A Sessions
- Daily Current Affairs
- Special Vocabulary Sessions
- Dedicated Telegram group
- Personalized Counselling Sessions

For more details follow the link or Scan the QR Code

https://bit.ly/33MNcpb

CEMENT

- Definition
- Type
- Manufacturing Components
- Uses

Composition:- Binding material

Lime, chalk = (1) Calcarious Comp: Carbon Compound

(2) Argillarious comp:- Clay, Mari

- Lime → 65% [62-67%] ⇒ CaO
- Silica → [17-25%] ⇒ SiO_2
- Alumina → [3-8%] ⇒ Al_2O_3
- Cal. Sulphate → [3-4%] ⇒ $[CaSO_4]$
- Iron oxide → [3-4%] ⇒ $[Fe_2O_3]$
- magenese → [1-2%] ⇒ [MgO]
- Sulphur → [1-3%] ⇒ S
- Alkalies → [0.2-0.4%] ⇒ $[Na_2O, K_2O]$

Lime :- [Strength, Soundness] {unsound} excess

*Silica :- setting time ↓, strength ↓

Alumina :- quick setting, cement weak.

* Calcium Sulphate :- Gypsum (initial Setting ↑)

* Iron oxide :- Hardness, Color (Red- Brown)

Magnesia:- Strength, Hardness, color [yellow] {unsound}

Sulphur:- Volume change, { unsound → VC }

Alkalies:- Staining { white & Gray Spot }

* PC :- Portland Cement
- Dicalcium Silicate :- $[Ca_2SiO_4]$ ⇒ 26% ✓
- Tricalcium Silicate - $[Ca_3SiO_4]$ ⇒ 51%
- Tricalcium Aluminate - $[Ca_3Al_2O_6]$ ⇒ 11%

* Celite ✓ ⇒ [illegible] ⇒ 24 → [ ] $\{C_3A\}$ ✓

* Tetra Calcium Alumino Ferrite :- $[4CaO \cdot Al_2O_3 \cdot Fe_2O_3]$
$[C_4AF]$ [Felite] ⇒ 10-18% ⇒ Hydration ✓

* Descending order Heat of Hydration :-

$\Rightarrow C_3A > C_3S > C_4AF > C_2S.$

* Descending order of rate of Hydration :-

$\Rightarrow C_4AF > C_3A > C_3S > C_2S$

- **Cement :** Combination of CaO with clay containing silica, SiO_2 along with the oxides of aluminum, iron and magnesium leads to the formation of cement.

- Portland cement gets its strength from chemical reactions between the cement and water. The process is known as hydration.

- **Manufacture of cement :** Portland cement is manufactured by crushing, milling and proportioning the following materials:

  - Lime or calcium oxide, CaO: from limestone, chalk, shells, shale or calcareous rock
  - Silica, SiO_2: from sand, old bottles, clay or argillaceous rock
  - Alumina, Al_2O_3: from bauxite, recycled aluminum, clay
  - Iron, Fe_2O_3: from clay, iron ore, scrap iron and fly ash
  - Gypsum, $CaSO_4.2H_20$: found together with limestone

Silicon dioxide (silica)	SiO_2	S
Aluminum oxide (alumina)	Al_2O_3	A
Iron oxide	Fe_2O_3	F
Water	H_2O	H
Sulfate	SO_3	S

• Composition of Portland cement

- CaO = 50-60%;
- SiO_2 = 20-25%;
- Al_2O_3 = 5-10%;
- MgO = 2-3%;
- Fe_2O_3 = 1-2%
- SO_3 = 1-2%.

- Strong heating of clay and lime results in their fusion followed by the formation of cement clinker which is then mixed with 2-3% by weight of gypsum($CaSO_4 2H_2O$). This leads to the formation of cement.

•Important ingredients of Cement:

- Dicalcium silicate (Ca_2SiO_4) = 26%,
- Tricalcium silicate (Ca_3SiO_5) = 51%
- Tricalcium aluminate ($Ca_3Al_2O_6$) = 11%

Compound	Formula	Shorthand form	% by weight[1]
Tricalcium aluminate	$Ca_3Al_2O_6$	C_3A	10
Tetracalcium aluminoferrite	$Ca_4Al_2Fe_2O_{10}$	C_4AF	8
Belite or dicalcium silicate	Ca_2SiO_5	C_2S	20
Alite or tricalcium silicate	Ca_3SiO_4	C_3S	55
Sodium oxide	Na_2O	N	)
Potassium oxide	K_2O	K	)Up to 2
Gypsum	$CaSO_4.2H_2O$	$C\underline{S}H_2$	5

• Settling of cement:

- Addition of water to cement hydrates the molecules of the constituents. Gypsum is added in order to slow down the process of setting of the cement to make it get hardened.

- It is used to prepare concrete in plastering and constructing bridges, dams and buildings.

Properties of cement compounds

- **Tricalcium aluminate, C3A:-** It liberates a lot of heat during the early stages of hydration, but has little strength contribution. Gypsum slows down the hydration rate of C3A. Cement low in C3A is sulfate resistant.

- **Tricalcium silicate, C3S:-** This compound hydrates and hardens rapidly. It is largely responsible for portland cement's initial set and early strength gain.

- **Dicalcium silicate, C2S:** C2S hydrates and hardens slowly. It is largely responsible for strength gain after one week.

- **Ferrite, C4AF:** This is a fluxing agent which reduces the melting temperature of the raw materials in the kiln (from 3,000o F to 2,600o F).

It hydrates rapidly, but does not contribute much to strength of the cement paste.

- By mixing these compounds appropriately, manufacturers can produce different types of cement to suit several construction environments.

Grey Ordinary Portland Cement and White Cement

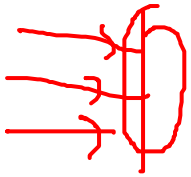
	Sources	Grey Cement	White Cement
1	Raw Materials	Raw materials contain a high amount of Iron Oxide and Manganese Oxide.	Raw materials contain a very little amount of Iron Oxide and Manganese Oxide.
2	Fineness	Usually less fine than white cement.	Usually finer than gray cement.
3	Kiln Fuel	Coal, petroleum coke, fuel oil, natural gas.	Oil is used to avoid contamination by coal ash.
4	Energy Consumption	Low.	High.
5	Cost	Less expensive.	Expensive than gray cement.
6	Uses	Construction purpose. Read more: Uses of Cement	Architectural beauty, interior, and exterior decorations, floorings, ornamental concrete products such as idols. Read more: Uses of White Portland Cement

GLASS

- Glass is a non-crystalline amorphous solid that is often transparent and has widespread practical, technological, and decorative usage in,
- for example, window panes, tableware, and optoelectronics.

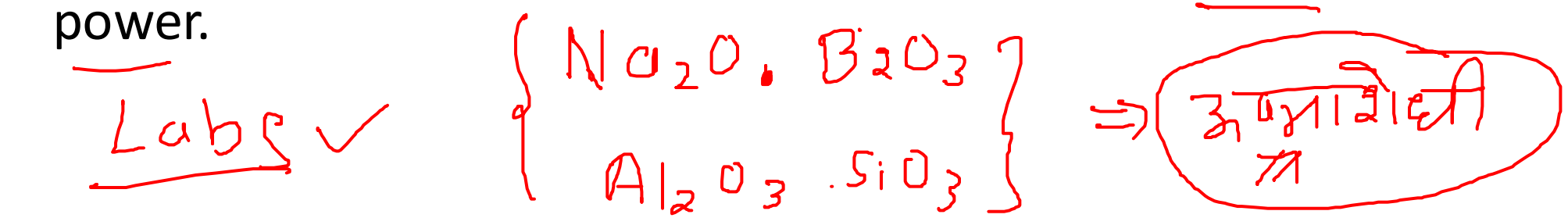
•Types of Glass

- **Water glass:** It is manufactured from the compound of sodium silicate (Na_2SiO_3) by heating sodium carbonate and silica. It is soluble in water.



- **Photo chromatic glass:** This is a special type of glass which turns black in sharp shining light thus such glasses are used as light protector and eyes reliever and thereby utilised in making eye lenses and goggles.
- The main reason of being black of such glasses is the presence of silver iodide.

- **Pyrex glass:** It is also called borosilicate glass. It has some specific characteristics of chemical durability and more thermal imalleable resistance power.



- **Lead crystal glass:** This is a special type of glass which is used in making various ornamental items by the appropriate decorative, cutting and designing. In fact on cutting such glasses the optical phenomenon of total internal reflection takes place very sharply and thus a pleasureous dazzling light is produced.

- **Soda glass:** It is also called soft glass which is brittle and the cheapest and most commonly existing glasses. This can be broken very conveniently and by the alternation of temperature some cracks appear in such glasses.

Low melting point [$Na_2O.CaO.6SiO_2$]

Bottle, Test Tube, windows

- **Xena Glass:** It is the best form of glass and from it chemical containers and equipments for the scientific purposes are manufactured.

This glass is basically composed from zinc and barium borosilicate which produces the soft and good quality of glass.

Zn, Ba

∃ {Reinforced}

- **Flint Glass:** It is manufactured from sodium, potassium and lead silicates which are used in making idol objects of cultural importance, costly glass equipments or devices. Such glasses are also used in making electric bulbs, lenses of telescopes, microscopes, camera and prisms, etc.

→ R.I. (μ) → High)

$K_2O.PbO.SiO_2$

- **Crown glass:** Usually this is a soda-lime-silica glass and it is frequently used in making lenses of eye glasses.

- **Crookes glass:** In this glass mainly cerium oxide (CiO_2) is present which sharply absorbs the ultraviolet rays from the sunlight so utilised in making lenses of eye glasses.

$K_2O \cdot PbO \cdot CiO_2 \cdot SiO_2$

- **Quartz glass:** This is also called silica glass because it is obtained by melting silica and ultraviolet rays emerge out through it. Thus it is used in making bulb of ultraviolet lamp, in making container of chemical reagents, laboratories equipments etc.

$SiO_2 \rightarrow$ Pure

Glasses, composition and uses

Glasses	Composition	Uses
Soda Glasses	Sodium Carbonate, Calcium Carbonate and Silica	In making tube light, bottles, equipments of laboratory, daily useable domestic utensils
Flint Glass	Potassium Carbonate	In making of electric bulbs, lenses of camera and telescope etc.
Crooks Glass	Cerium Oxide and Silica	In making lenses of goggles.
Potash Glass	Potassium Carbonate, Calcium Carbonate and Silica	In making glass container and laboratory equipments, glass utensils which are heated up to very high temperature.
Pyrex Glass	Barium Silicate and Sodium Silicate	In making laboratory equipments and pharmaceutical containers or vessels.
Crown Glass	Potassium Oxide, Barium Oxide and Silica	In making lenses of eyes glass.
Lead crystal glass	Potassium Carbonate, lead Oxide and Silica	In making costly glass containers or vessels etc.

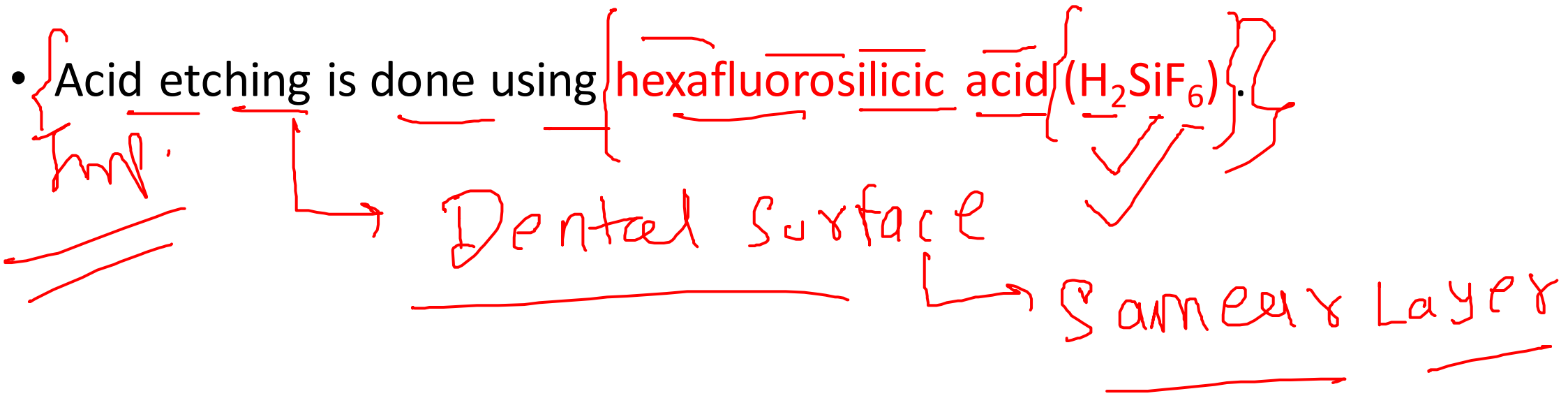
- **How glasses get coloured?**

- During the preparation of glasses its various components in the molten state are sometimes altered (replaced) or more appropriately some extraneous substances like metallic oxides are accessed or added, then glasses become coloured.

Substance used for colouring the glass	Colour of glasses
Cobalt Oxide	Deep Blue
Sodium Chromate or Ferrous Oxide	Green
Selenium Oxide	Orange red
Ferric Salt or Sodium Uranet	Fluorescent Yellow
Gold Chloride or Purple of Cassias	Ruby red
Cuprous Oxide, Cadmium Sulphide	Glitter red
Cupric salt	Peacock Blue
Potassium dichromate	Green and green yellow
Manganese dioxide	Blue to light orange
Cuprous salt	Red
Cadmium sulphide	Yellow like lemon
Carbon	Brownish black

For example;

- On accessing ferric oxide in ordinary fused glass a brown colored glass produces.
- the substances like chromic oxide, manganese dioxide, cobalt oxide etc. on mixing (accessing) in fused glass, green, red and blue coloured glasses are produced.
- Acid etching is done using hexafluorosilicic acid (H_2SiF_6).



- **Composition of Glass:**
- The glass is not a single compound. it may generally be expressed as follows –
- $aX_2O, bYO, 6SiO_2$
- Where, a and b are numbers of molecules,
- X = an atom of an alkali metal such as Na, K, etc.
- Y = an atom of a bivalent metal such as Ca, Pb, etc.

Dye Dye

Paints

Paint is a type of coating which is used for the desired appearance and colouring purpose along with serving other properties like protection from corrosion, conductivity etc.

Components of a paint

A paint is formulated as a mixture of four ingredients:

- Binder
- Solvent
- Pigment
- Additives

Binders

- Binders are polymers (resins) forming a continuous film on the substrate surface.
- good adhesion of the coating to the substrate.
- holds the pigment particles distributed throughout the coating.
- dispersed in a carrier (water or organic solvent either in molecular form (true solutions) or as colloidal dispersions (emulsions or sols).

Common binders are as follows:

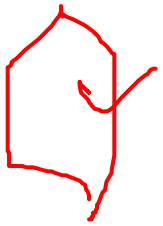
- **Alkyd resins** are prepared by the condensation polymerization in the reaction of fatty acid and polyols (commonly glycerol) with polybasic acids.
- **Acrylic resins** are prepared by polymerization of acrylic or methacrylic esters.
- **Latex (PVA)** is a vinyl polymer prepared by free radical vinyl polymerization of the monomer vinyl acetate.

- **Phenolic resins** are thermosetting polymers prepared by the reaction of simple phenol with aldehydes (eg. formaldehyde).
- **Urethane resins (polyurethanes)** are prepared by the step-growth polymerization of isocyanates reacting with monomer molecules containing hydroxyl (alcohol) groups.
- **Epoxy resins** is a thermosetting polymer formed as a result of cross-linking a resin containing short molecules in the presence of a hardener.
- **Chlorinated rubber** is prepared through polymerization of the degraded natural rubber (in the presence of atoms of chlorine participating in cross-linking.

Solvents

- Solvent (water or organic solvent) is a medium where the binder, pigment and additives are dispersed in molecular form (true solutions) or as colloidal dispersions (emulsions or sols).
- Solvents (thinners) are also used for modification of the paint viscosity required for the application methods: brush, roller, dip, spray.
- The solid coating is formed due to evaporation of solvent therefore the evaporation rate is one of the important properties of solvents. Other important properties are the ability to dissolve the paint ingredients and toxicity.

- The solvents used as the carrier in paints:
- Water
- White spirits (mineral turpentine spirits). White spirit is a mixture of is a mixture of saturated aliphatic and alicyclic hydrocarbons.
- Xylene is a pure aromatic solvent having benzene ring structure in its molecule (C8H10).
- Toluene is also a pure aromatic solvent with benzene ring structure (C6H5CH3).
- Alcohols (n-butanol, isopropanol) are organic compounds having a hydroxyl groups (-OH) bound to the carbon atoms of an alkyl group.
- Ketones is an organic solvents, in which carbonyl group (C=O) is bonded to two other carbon atoms.



Pigments of paints

- Pigment is a solid substance dispersed throughout the coating to impart it a color, opacity (hide the substrate surface).
- Pigments may protect the substrate from UV light.
- Pigments change the paint appearance (gloss level) and properties: increase hardness and decrease ductility. Pigments may be natural, synthetic, inorganic or organic.
- Fillers and extenders are also referred to pigments. Fillers and extenders are non-expensive commonly natural inorganic materials added to the paint in order to increase its volume, to increase the paint film thickness, to impart toughness or abrasion resistance to the coating.
-

Pigments commonly used in paints:

- Titanium Dioxide (TiO_2) is a white synthetic inorganic pigment existing in two crystalline forms: rutile and anatase. Titanium dioxide has high refractive index (anatase 2.52, rutile 2.76). Anatase is photochemically active but provides clear white color therefore its main application is interior paints. Photochemically inert rutile is used for protection of paints from degradation by light. Titanium oxide is the most widely used pigment.
- Zinc Oxide (ZnO) is a white synthetic inorganic pigment having refractive index 2.01.
- Zinc Yellow (Yellow 36) is Zinc Chromate ($ZnCrO_4$).
- Yellow Dyes are stable yellow non-toxic organic pigments with good opacity.
- Benzidine YellowsBenzidine Yellows are yellow-to-red organic pigments for interior applications. They are resistant in chemicals and stable at elevated temperatures (up to 300°F / 150°C).
- Chrome Oxide Green is olive-green inorganic pigment with a high level of opacity. Chrome Oxide Green is the most stable green pigment.

- Phthalocyanine Green imparts green-blue color. It is used as the pigment for decorative applications. The pigment is resistant to heat, solvents and alkalis.
- Phthalocyanine Blues are widely spread pigments. They provides a wide spectrum of color: from reddish-blue to yellowish-green. The pigments are non-toxic and resistant to solvents, chemicals and elevated temperatures.
- Ultramarine Blue is natural pigment made of the semiprecious mineral lapislazuri. The pigment is resistant to fading. It is stable at elevated temperatures.
- Vermilion is a natural orangish red pigment consisting of toxic mercuric sulfide (HgS).
- Pigment Brown 6 is red inorganic pigment based on Iron(III) oxide (Fe_2O_3).
- Red 170 is a synthetic organic pigment widely used in automotive industry.
- Dioxazine Violet is organic synthetic pigment.It is non-toxic and has high tinting strength.
- Carbon Black is the pigment obtained from organic materials (wood, bones) by charring (thermal decomposition in a limited amount of Oxygen). large quantities of Carbon Black are used for coloring and reinforcing automobile tires.
- Iron (II) Oxide (FeO) is inorganic black pigment.

Extenders / Fillers

- Extenders are paint additives that are insoluble in the binder and solvents of the formula and have little or no opacity or color effect on the film.
- They are added to modify the flow and mechanical properties of the paint as well as the, permeability, gloss, and leveling characteristics of the paint film.
- Quartz sand (SiO_2). Finely ground quartz is a filler increasing the abrasion resistance of the paints.

Additives

insoluble

Additives

- Additives are chemicals added to paint, usually in small quantities, to achieve special effects.
- **Driers** accelerate the paints drying (hardening) by catalyzing the oxidation of the binder.
- **Plasticisers** increase the paints flexibility.
- **Fungicides, Biocides** and **Insecticides** prevent growth and attack of fungi, bacteria and insects.
- **Flow control agents** improve flow properties.

- **Defoamers** prevent formation of air bubbles entrapped in the coatings.
- **Emulsifiers** are wetting agents increasing the colloidal stability of the paints in liquid state.
- **UV stabilizers** provide stability of the paints under ultra-violet light.
- **Anti-skinning agents** prevent formation of a skin in the can.
- **Adhesion promoters** improve the adhesion of the coating to the substrate.
- **Corrosion inhibitors** reduce the corrosion rate of the substrate.
- **Texturizers** impart textures to the coatings.

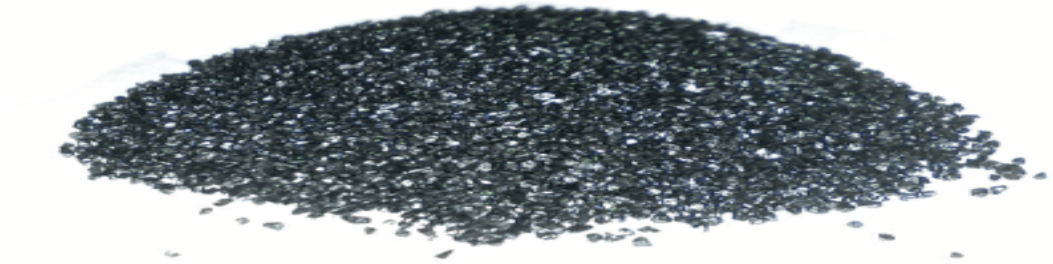
- Talc having the lamellar structure serves as a reinforcing phase in the coating. Talc also protects the substrate from the penetrating water.
- Baryte ($BaSO_4$) is a colorless or white inorganic mineral having high hardness and chemical resistance. It is used as a reinforcing additive.
- Kaoline Clay is a natural colloid containing finely dispersed particles of hydrated aluminum silicate. Kaoline Clay is used in emulsion paints as a gloss reducing additive.
- Limestone (calcium carbonate, $CaCO_3$) is used in emulsion paints as a filler extending expensive

Composition

Ingredient	Amount (%) by weight
Binder	60%
Pigment	15%
solvent	20%
Additives	5%

- Pigment being costly is used at low amount just to achieve optimum properties in minimum amount.
- Binder is the base and main ingredient of a paint composition therefore maximum amount of binder is taken to get a strong film.
- Solvent being less costly and recoverable is taken in optimum amount to control the viscosity of the paint.
- Requiremnet of additives is less, a small amount of additive can serve the purpose of propert optimisation, theis generally taken maximum 5% by weightr for it.

THE CHEMISTRY OF GUNPOWDER



CHARCOAL

Consists of broken down cellulose and provides carbon and other fuel for the reaction.

SALTPETRE

Saltpetre is a common name for potassium nitrate. It supplies oxygen for the combustion reaction.

SULFUR

Sulfur, also referred to as brimstone, lowers the ignition temperature required to start the reaction.

PRODUCTS OF COMBUSTION

- 56% SOLID PRODUCTS
- 43% GASEOUS PRODUCTS
- 1% WATER

ENERGY DENSITY

3 MEGAJOULES PER KG

75%	15%	10%
Potassium Nitrate	*Charcoal*	*Sulfur*
KNO_3	C	S

A SIMPLIFIED EQUATION FOR THE BURNING OF BLACK POWDER

$$10KNO_3 + 8C + 3S \longrightarrow 2K_2CO_3 + 3K_2SO_4 + 6CO_2 + 5N_2$$

© COMPOUND INTEREST 2014 - WWW.COMPOUNDCHEM.COM
SHARED UNDER A CREATIVE COMMONS ATTRIBUTION-NONCOMMERCIAL-NODERIVATIVES 4.0 INTERNATIONAL LICENCE

GUN POWDER

- It consists of potassium nitrate (75% by weight), charcoal (15% by weight), and sulfur (10% by weight). Each of these components plays an important role in the combustion of gunpowder.

- Potassium nitrate, also known as ‘saltpetre’, or ‘saltpeter’, decomposes at high temperature to provide oxygen for the reaction.

Fertilizers

- Fertilizers are chemical substances supplied to the crops to increase their productivity. These are used by the farmers daily to increase the crop yield.

- The fertilizers contain the essential nutrients required by the plants, including nitrogen, potassium, and phosphorus.

- They enhance the water retention capacity of the soil and also increase its fertility.

- **Urea** has the highest nitrogen content of all solid fertilizers at 46% N.

Types of Fertilizers

- **Inorganic Fertilizers :** Inorganic fertilizers are chemical fertilizers that contain nutrient elements for the growth of crops made by chemical means.

- **Nitrogen Fertilizers :** Nitrogen fertilizers contain nitrogen necessary for the development of crops. Nitrogen is the main constituent of chlorophyll that maintains a balance in the process of photosynthesis.

- **Phosphorus Fertilizer :** The main nutrient in a phosphorus fertilizer is phosphorus. The efficiency of fertilizer depends upon effective phosphorus content, methods of fertilizing, properties of soil and crop strains.

NITRATE FERTILIZERS

- Sodium nitrate ($NaNO_3$)
- Calcium nitrate ($Ca(NO_3)_2$)

1. They are highly mobile in soil therefore suitable for top dressing.
2. Highly soluble subjected and to leaching.
3. Subjected to denitrification in waterlogged soils.
4. Increase alkalinity as they are basic in their residual effect.

AMMONIACAL FERTILISERS

- Ammonium sulphate ($(NH_4)_2SO_4$)
- Ammonium chloride (NH_4Cl)
- Anhydrous ammonia (NH_3)

- Easily available to the plants as they are readily soluble in water.
- Leaching losses are less as ammonium ions are adsorbed on clay complex.
- Reduce alkalinity as they are acidic in their residual effect on the soils.
- Well suited to submerged soils.

AMIDE FERTILISERS OR ORGANIC FERTILIZERS

- Urea ($CO(NH)_2$)
- Calcium cyanide ($CaCN_2$)

NITRATE & AMMONIACAL FERTILISERS

- Ammonium nitrate (NH_4NO_3)
- $CaNH_4NO_3$ - Calcium ammonium nitrate (CAN)

- Easily available to the plants as they are readily soluble in water.
- Leaching losses are less.
- Reduce alkalinity as they are acidic in their residual effect on the soils.

Fertilizers	Forms of nutrient	N%	Others	Nature
KNO_3	Nitrate	13.85	K_2O-46-47	Basic
$Ca(NO_3)_2$	Nitrate	15.5	Ca-19.4	Basic
$NaNO_3$	Nitrate	16		Basic
$(NH_4)_2SO_4$	Ammoniacal	20.6-21	S-24.5	Acidic
NH_4Cl	Ammoniacal	25.5-26	Cl-66	Acidic
$(NH_4)_2SO_4$. NH_4NO_3	Ammoniacal	26	S-15	Acidic
CAN	Ammoniacal and Nitrate	25-28		Neutral
NH_4NO_3 (Highly hygroscopic)	50%- Ammonium 50%- Nitrate	33-35		Acidic
Anhydrous ammonia	Ammoniacal	80-82		Highly Acidic
Urea $[CO(NH_2)_2]$	Amide	46		Acidic
$CaCN_2$	Amide	20.6-21		Basic

Organic Fertilizers

- Organic fertilizers are natural fertilizers obtained from plants and animals.

It enriches the soil with carbonic compounds essential for plant growth.

- Agricultural Waste
- Livestock Manure
- Industrial Waste
- Municipal Sludge

Examples of ORGANIC FERTILIZERS

- **Garden Compost**
- **Animal Manures**
- **manure, slurry, worm castings, peat, seaweed and guano.**
- **Humus**

Advantages of Fertilizers

- They are easy to transport, store, and apply.
- For supplying a specific nutrient we can select a specific fertilizer due to its nutrient specific nature.
- They are water-soluble and can easily dissolve in the soil. Hence, they are easily absorbed by the plants.
- They have a rapid effect on the crops.

- **Disadvantages of Fertilizers**

- They are expensive.
- The ingredients in the fertilizers are toxic to the skin and respiratory system.
- Excessive use of fertilizers damages the plants and reduces soil fertility.
- Leaching occurs and the fertilizers reach the rivers causing eutrophication.
- Long term use reduces the microbial activity and disturbs the pH of the soil.

- **Uses of Fertilizers**

- They are used to providing additional nutrients to the plants.
- They are added to improve the yield of the crops.
- Nitrogen-rich fertilizers are used for the greening of lawns.
- Organic fertilizers improve the texture and fertility of the soil.
- Gardeners use fertilizers to address certain needs of the plants such as nutritional needs.
- Fertilizers are added to potted plants to replace the lost nutrients.

Don’t Forget to Like / Comment & Share this video

www.Youtube.com/safaltaclass

www.Facebook.com/safaltaclass

www.Instagram.com/safaltaclass

Google Play Store

SAFALTACLASS