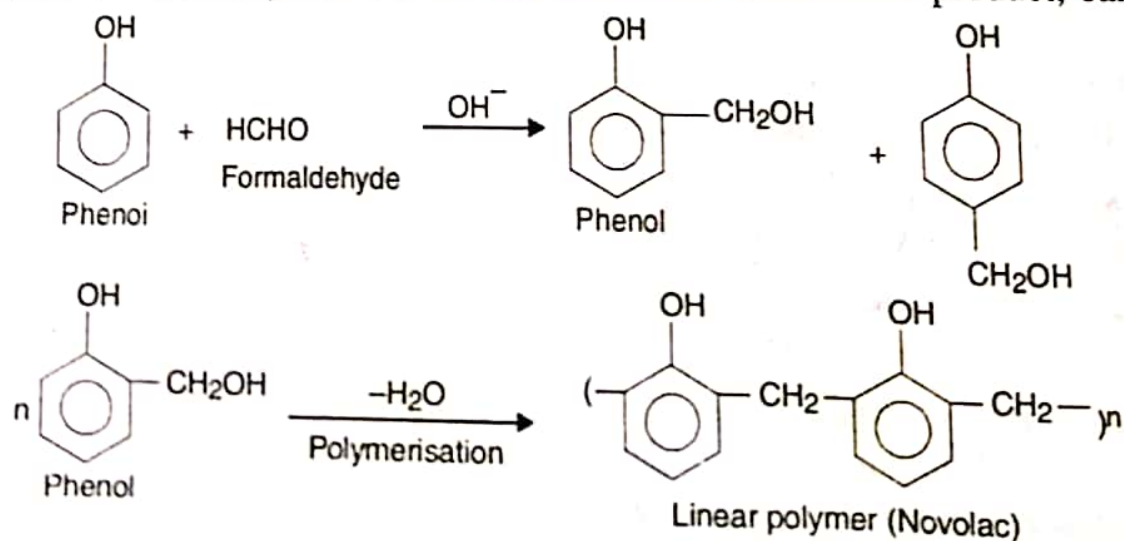


(a) **Bakelite.** In the production of bakelite, two monomers are used.

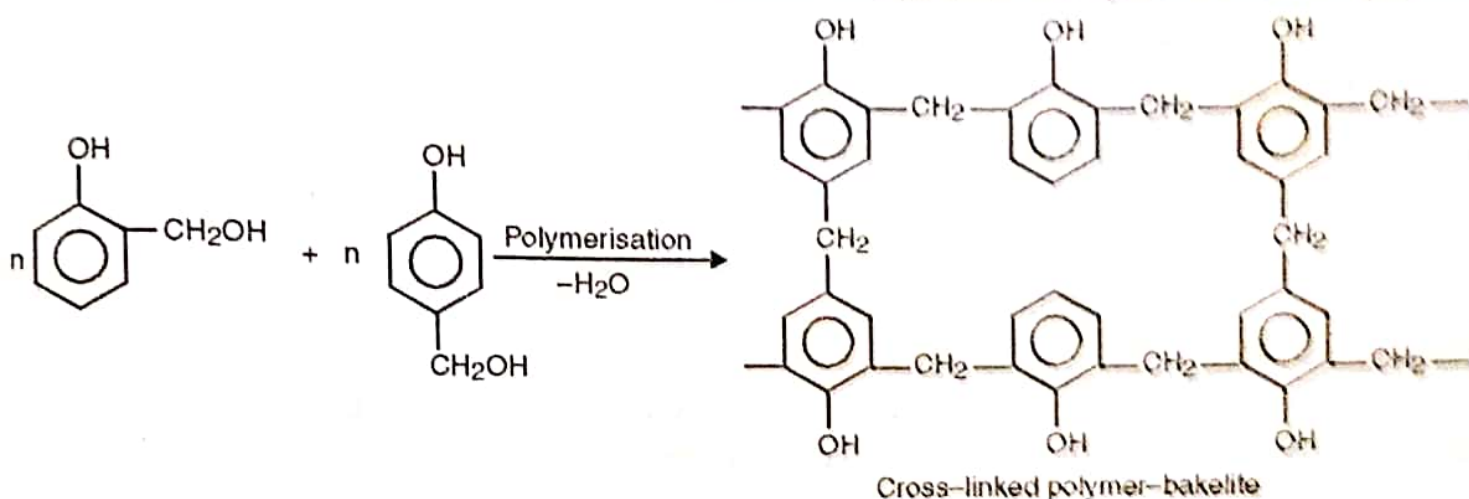
These are (i) Phenol and (ii) Formaldehyde. It is also called Phenol-Formaldehyde resin.

Phenol reacts with formaldehyde in presence of acid or dilute alkali as catalyst. A resinous polymer known as phenol-formaldehyde resin or bakelite results. The reaction involves the formation of methylene ( $-CH_2-$ ) bridges in ortho, para or both ortho and para positions. As a result, either linear or crosslinked material is obtained. The reaction is difficult to control because condensation of ortho and para hydroxy methyl phenol leads to the formation of polymeric products. The final product is a dark, brittle and cross-linked product, called **bakelite**.



Novolac is used for the preparation of Paints.

Cross linking is also possible in the two isomeric benzyl alcohols to give cross-linked polymer.



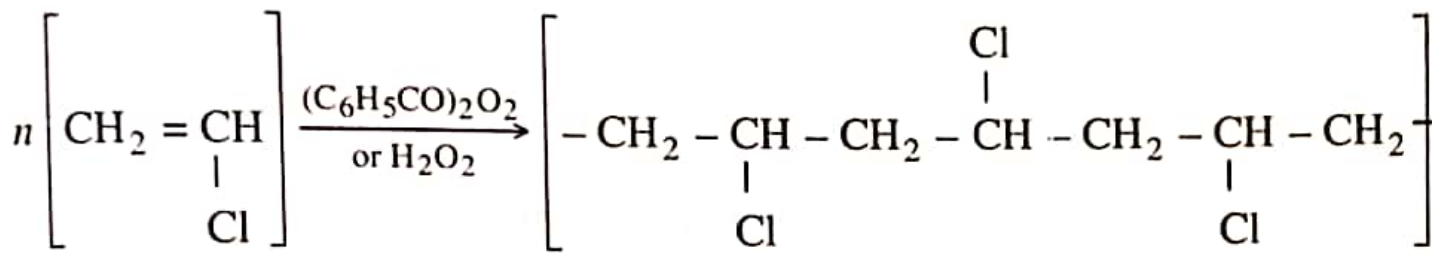
Low degree of polymerisation leads to the formation of **soft bakelites** which find use as binding glue for laminated wooden plank and in varnishes and lacquers. High degree of polymerisation lead to the formation of **hard bakelites** which are used for making combs, phonograph records, electrical goods, fountain pen barrels, formica table tops etc. **Sulphonated bakelites** are used as ion exchange resins for softening hard water. **Cross-linked bakelite** is a thermo-setting bakelite.

**Uses.** It is used

- (i) for making electrical insulation parts like switches, plugs, heated handles etc.
- (ii) for moulded articles like telephone parts, radio and television cabinets.
- (iii) for impregnating fabrics, wood and paper.
- (iv) as a binder for grinding wheels.
- (v) in paints and varnishes
- (vi) as an ion-exchange in the softening of water.

(1) ... .. manufacturing buckets, tubes etc.

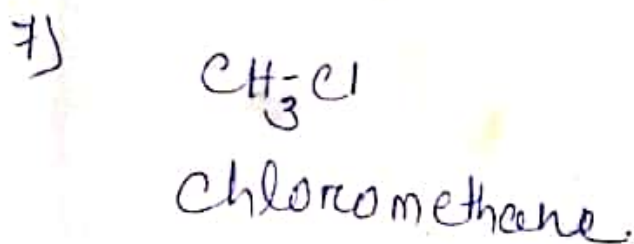
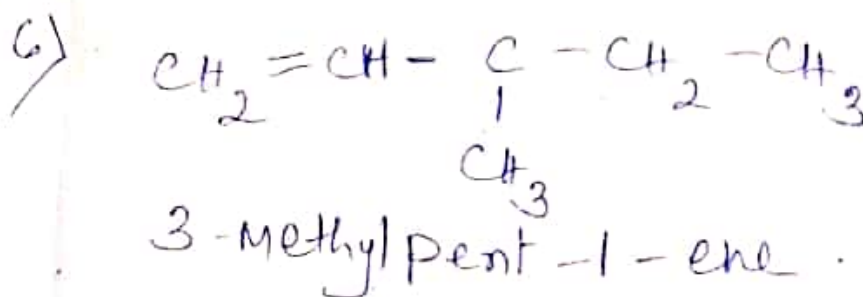
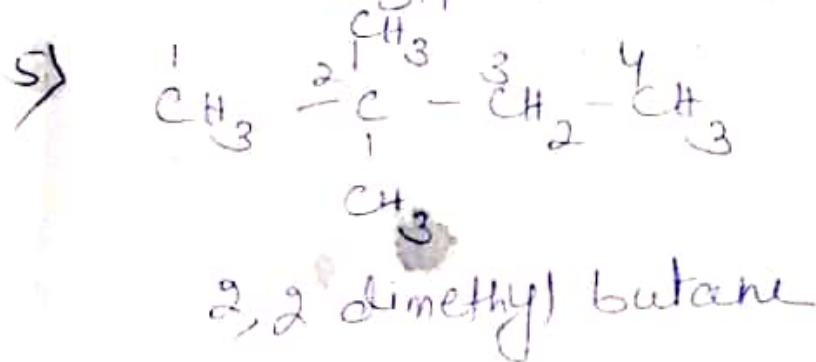
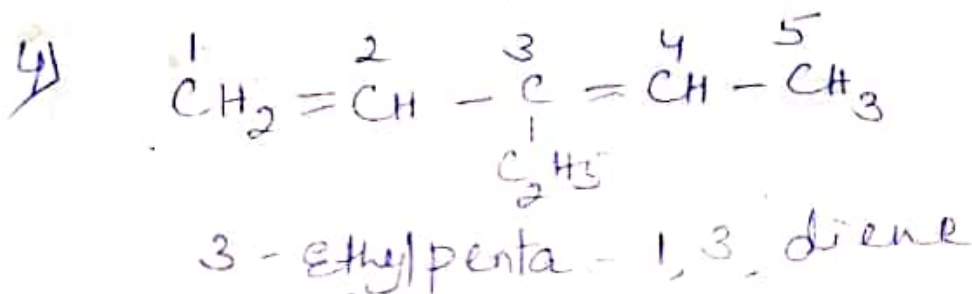
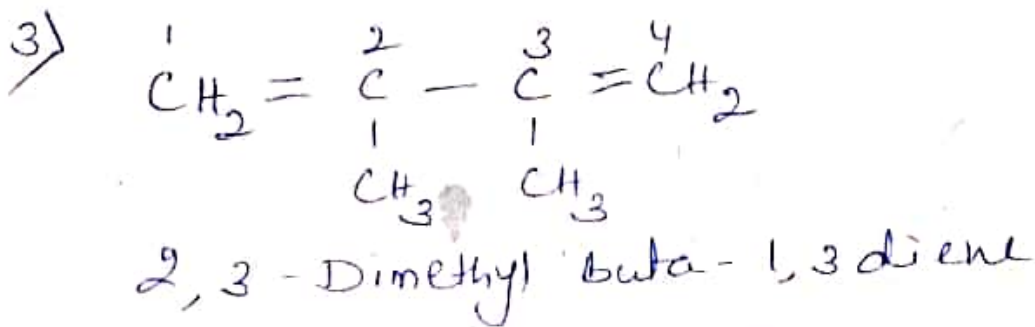
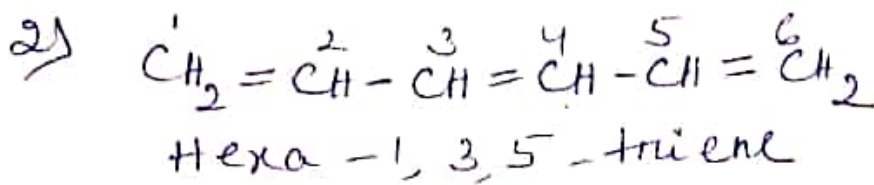
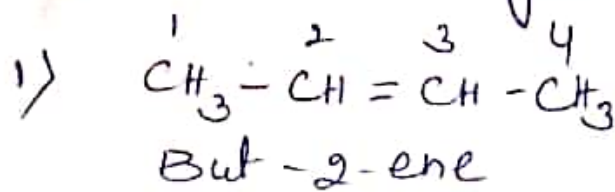
**2. Poly-Vinyl Chloride.** Poly-vinyl-chloride (PVC) is obtained by heating water and vinyl chloride in presence of a small amount of benzoyl peroxide or  $H_2O_2$  in an autoclave (pressure) under pressure.



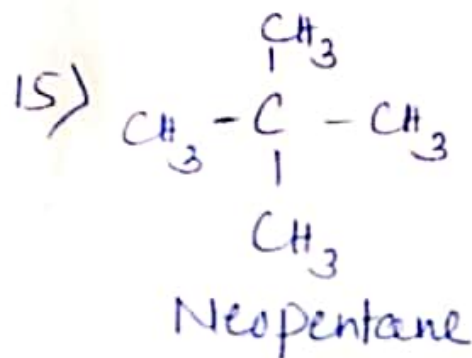
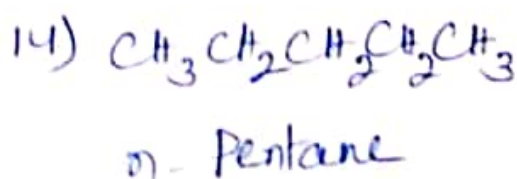
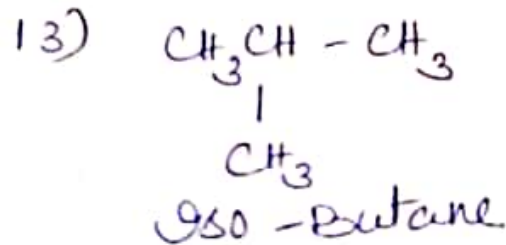
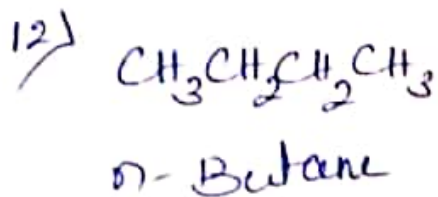
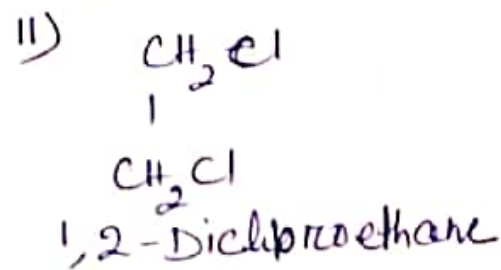
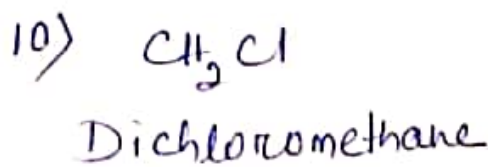
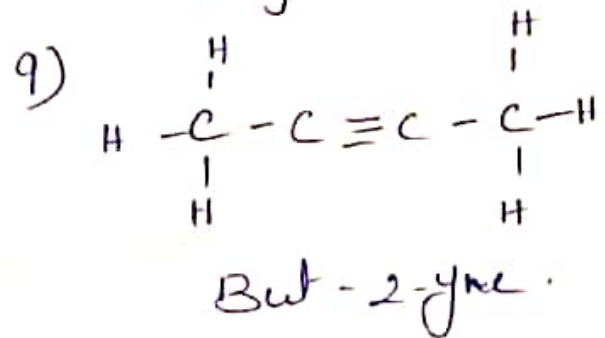
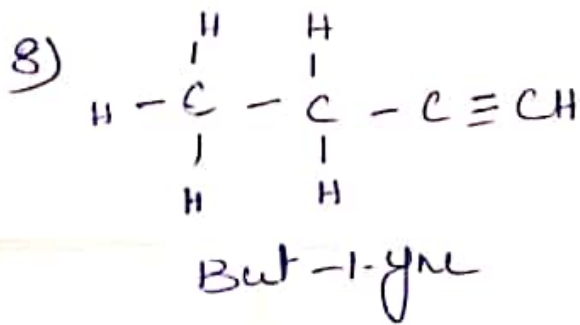
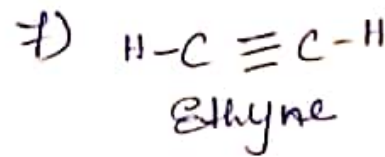
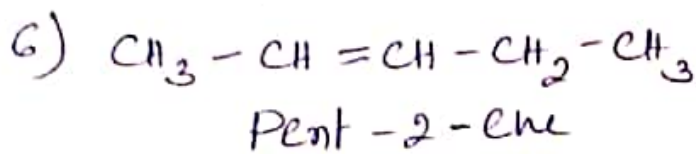
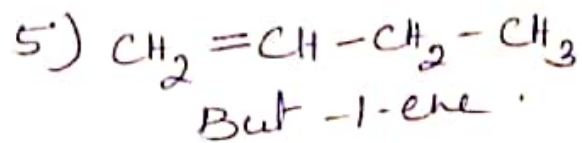
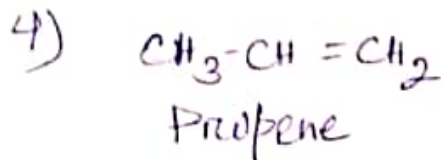
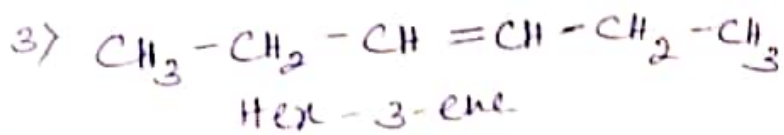
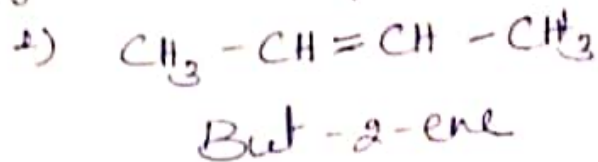
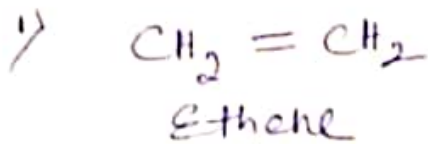
There are two types of PVC

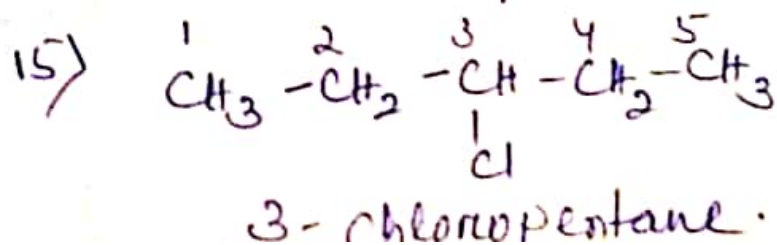
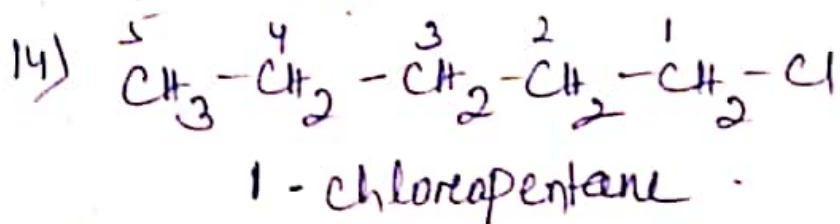
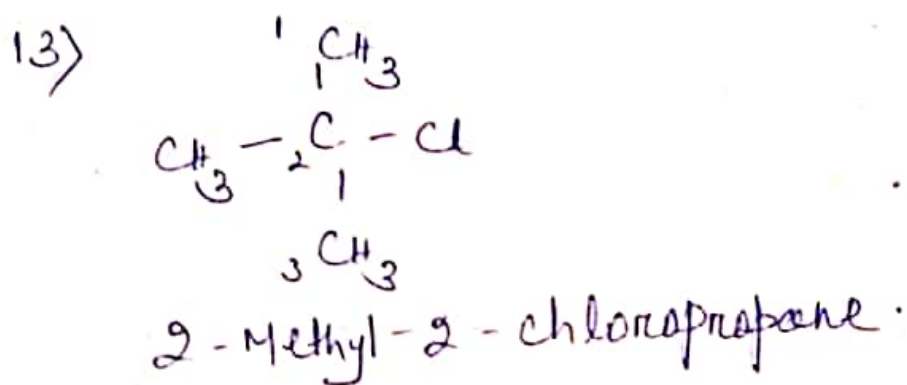
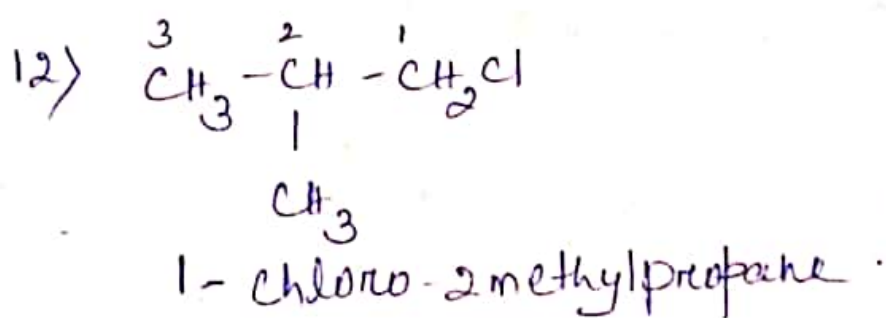
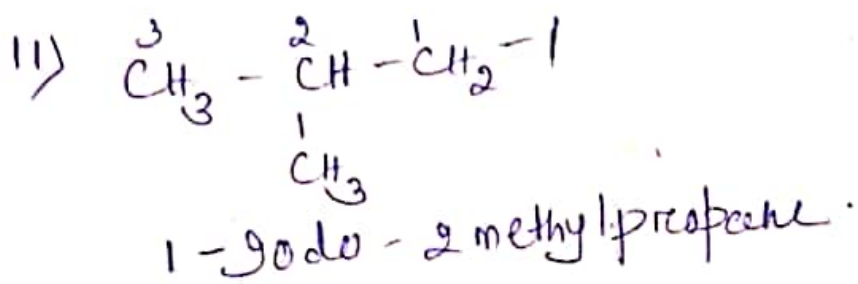
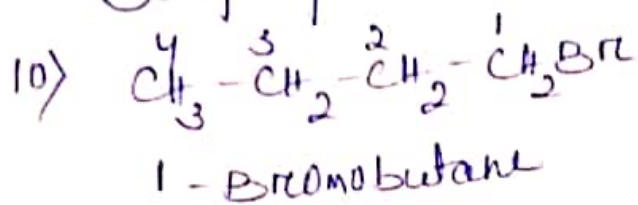
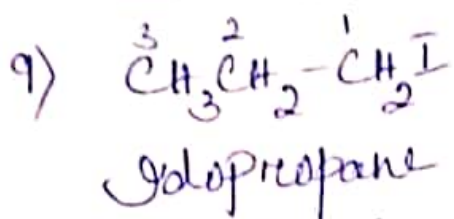
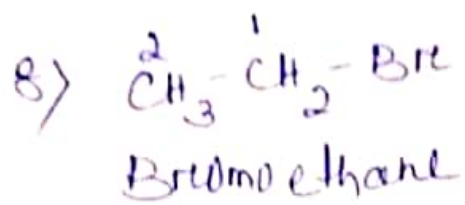
Plasticized and unplasticized PVC. In plasticized PVC, some plasticizers like Triphenyl Phosphate, Dibutyl phthalate are used

# Organic Chemistry



# Organic chemistry.





# ① Difference between Ionic compound & covalent compound.

## Ionic compound

## covalent compound

- |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>i) These are formed by the transfer of one or more electrons from one atom to another.</li><li>ii) These are consist of ions.</li><li>iii) These are hard solids with high melting &amp; boiling points.</li><li>iv) These are soluble in water but in soluble in organic solvents.</li><li>v) These are conduct electricity in fused as well as in aqueous sol<sup>n</sup>.</li></ul> | <ul style="list-style-type: none"><li>i) These are formed by sharing of one or more electrons between the bonded atoms.</li><li>ii) These consist of individual molecules.</li><li>iii) These exist as gases, liquids or soft solids with low melting or boiling point.</li><li>iv) These are insoluble in water but soluble in organic solvents.</li><li>v) These don't conduct electricity.</li></ul> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

# ② Difference between Raw Rubber and Vulcanised Rubber.

## Raw Rubber

## Vulcanised Rubber

- |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>i) It is plastic in nature.</li><li>ii) Water absorption tendency is high.</li><li>iii) It has no resistance towards non-polar solvents.</li><li>iv) It swells in organic solvents.</li><li>v) It is less durable.</li><li>vi) It is attacked by oxidising agents like <math>\text{HNO}_3</math>, <math>\text{H}_2\text{SO}_4</math> etc.</li></ul> | <ul style="list-style-type: none"><li>i) It is less plastic. It is workable between <math>-40^\circ</math> to <math>100^\circ\text{C}</math>.</li><li>ii) Water absorption tendency is low.</li><li>iii) It is resistant towards polar solvents.</li><li>iv) It does not react with organic solvents.</li><li>v) It is more durable.</li><li>vi) It is not attacked by oxidising agents like <math>\text{HNO}_3</math>, <math>\text{H}_2\text{SO}_4</math> etc.</li></ul> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

# ③ Advantages of Vulcanisation →

- i) It has high resistance to oxidation, abrasion, wear etc.
- ii) It has high chemical resistance to organic solvents.
- iii) It has much better electrical insulation power.
- iv) It has good tensile strength & load bearing capacity.
- v) It has useful temperature range i.e.  $-40$  to  $100^\circ\text{C}$ .

# Write the purpose of Lubricant →

- i) It reduce wear & tear.
- ii) It minimise loss of energy.
- iii) It reduces expansion of metal.
- iv) Some times it acts as a seal.

5) Examples and uses of pesticides, insecticides, herbicides, fungicides. page - 02

- pesticides → DDT, Acephate Boric Acid.  
Weedkilling weeds and other unwanted vegetation.
- Insecticides → Aldrin, Endrin  
Used Against insect eggs, Used in agriculture medicine.
- Herbicides → Diclofop, alinoseb, diglut  
Used to kill unwanted plants.
- fungicides → Captan, sulfur, mancozeb  
Used to kill or prevent the growth of fungi.

⑥ **Biofertilizers** → These are the substance that contains microorganisms living or latent cells. Increase the nutrients of hosts plants when applied to their seeds, plant surface or soil by colonizing the rhizosphere of the plant.

Example → Azospirillum, Azotobacter, Rhizobium.

Uses → fix atmospheric nitrogen in the soil and root of legume crops and make it available to the plant.

⑦ **Write the composition & uses of producer gas and water gas.**

Producer gas →  $CO = 22 - 30\%$ ,  $H_2 = 8 - 12\%$ ,  
 $N_2 = 52 - 55\%$ ,  $CO_2 = 3\%$ .

Calorific value =  $1300 \text{ kcal/m}^3$

Uses → i) Heating open - hearth furnaces.  
ii) As a reducing agent in metallurgical operation.

Water gas →  $H_2 = 51\%$ ,  $CO = 41\%$ ,  $N_2 = 4\%$ ,  $CO_2 = 4\%$ .

Calorific value =  $2800 \text{ kcal/m}^3$

Uses → i) As a source of hydrogen.  
ii) Used for welding purposes.

⑧ **Write the composition and uses of L.P.G & CNG** →

L.P.G → n-butane =  $27\%$ , isobutane =  $25\%$ ,  
butene =  $43\%$ , propene =  $2.5\%$ ,  
propane =  $2.5\%$ .

Uses → Domestic & industrial fuel, motor fuel.

CNG →  $CH_4 = 70 - 90\%$ ,  $C_2H_6 = 4 - 9\%$ ,  
Traces of propane & butane.

Uses → Traces for vehicles.



9) Write the composition & uses of coal gas. Page - 03

Ans →  $CH_4 = 32\%$ ,  $C_2H_2 = 2\%$ ,  $C_2H_4 = 3\%$ ,  
 $N_2 = 4\%$ ,  $H_2 = 4\%$ ,  $CO = 7\%$ ,  $CO_2 = 1\%$

Uses → As a reducing agent in metallurgical operation.

10) Write the composition and uses of petrol, kerosene and diesel →

Petrol →  $C = 84\%$ ,  $H = 15\%$ ,  $N + S + O = 1\%$

Calorific value = 11,250 kcal/kg

Uses → Internal combustion engine of automobile and aeroplane.

Kerosene →  $C = 84\%$ ,  $H = 16\%$ ,  $S \leq 1\%$

Calorific value = 11,100 kcal/kg

Uses → Domestic fuel, Jet engine fuel for making oil gas.

Diesel →  $C = 85\%$ ,  $H = 12\%$ ,  $Resid = 3\%$

Calorific value = 11,000 kcal/kg

Uses = Diesel engine fuel.

11) **Polymers** → poly means many units or parts. These are macromolecules built by linking together of large number of smallest one.

Monomer → The smallest part of polymer is called monomer.

Polymerisation → The reaction by which monomers combine to form polymer is called polymerisation.

12) **Thermosetting polymer**

- i) These are formed by condensation polymerisation.
- ii) crosslinked structure.
- iii) These cannot be remoulded & reshaped.
- iv) These are more brittle & insoluble in organic solvents.
- v) Ex → Bakelite, formaldehyde.
- vi) These are formed by addition of polymerisation.
- vii) Linear structure.
- viii) These can be remoulded and reshaped.
- ix) These are less brittle and soluble in organic solvents.
- x) Ex → polythene, PVC

Answers of short questions.

- ① J. J. Thomson's charge is negative.
- ②  $\alpha$ -rays are  $He^{2+}$  ion.
- ③  ${}^1H^1$  - Protium,  ${}^2H^2$  - deuterium,  ${}^3H^3$  - Tritium.
- ④  $Cr = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^4$  - (Unstable)  
 $Cr = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$  - (stable)  
 $Fe = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$
- ⑤ Electrons are filled in s, p, d, f orbitals according to their increasing energy.
- ⑥ Hund's rule states that every orbital in a sublevel is singly occupied before any orbital is doubly occupied. All of the electrons in singly occupied orbitals have the same spin.
- ⑦  $H_2SO_4, HCl$
- ⑧  $NaCl, CaSO_4$
- ⑨ LPG - Liquefied Petroleum gas
- ⑩ PVC - Poly Vinyl Chloride.
- ⑪ The monomer of PVC is Vinyl chloride.
- ⑫ pH of the sol<sup>n</sup> is defined as the negative logarithm of the  $H^+$  ion concentration to the base 10.
- ⑬ The amount of heat energy evolved when 1 gm of a substance completely burns in air.
- ⑭ Lubricants are substances which are applied between two sliding surfaces to reduce frictional resistance.
- ⑮ Graphite, Petroleum oil, Blendid oils, Animal & vegetable oil.
- ⑯ Calcination is the process of heating the concentrated ore in absence of air below the melting point of the metal.
- ⑰ Roasting is the process of heating the concentrated ore in presence of air below the melting point of the metal.
- ⑱ Flux is a chemical which combines with impurities during smelting.  
 $Fe_2O_3, xH_2O$  - Rut
- ⑲ Alloy is a homogenous ~~mixture~~ <sup>solid</sup> of a metal with another metal or a non metal like carbon.
- ⑳ The process in which unwanted materials like oxides gets deposited on metal when exposed to air and moisture is called corrosion.

(22) water contains calcium, magnesium bicarbonate, chloride or sulphate. so water is hard.

(23) Deposition of a thin layer of zinc on iron is called galvanisation.

(24)  $C_n H_{2n+2}$  - Alkane

$C_n H_{2n}$  - Alkene

$C_n H_{2n-2}$  - Alkyne

(25) Saturated hydrocarbon  $\rightarrow$  When the four valence electrons of a carbon atom share with an electron of four hydrogen atom or with the neighbouring carbon atom forming single covalent bond.

Unsaturated hydrocarbon  $\rightarrow$  Hydrocarbon having double bond, triple bond are called unsaturated hydrocarbon.

(26) Formula of soap  $\rightarrow C_{17}H_{35}COONa$

(27) These are the substances <sup>that</sup> contains microorganisms living or latent cells. Increase the nutrients of hosts plants when applied to their seeds, plant surface or soil by colonizing the rhizosphere of the plant.

(28) Fuel may be defined as any substance which on combustion release a large amount of heat energy without producing excess residue or by-product.

(29) Composition of producer gas  $\rightarrow$  CO = 22-30%

H<sub>2</sub> = 8-12%

N<sub>2</sub> = 52.55%

CO<sub>2</sub> = 3%

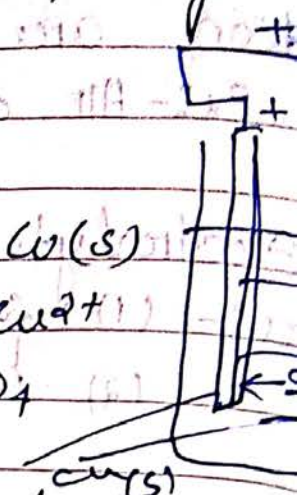
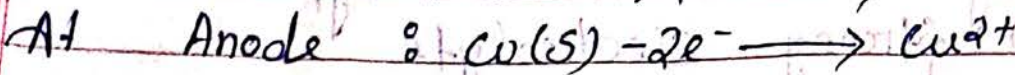
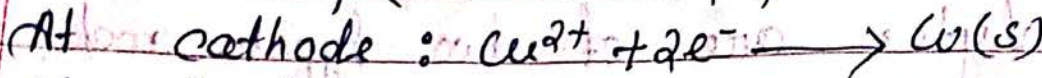
(30) Poly means units or parts. These are macromolecules built by linking together of large number of smallest one.

→ procedure:-

In a beaker solution of  $\text{CuSO}_4$  water is taken. 'A' cathode (-ve) and anode (+ve charged) are dipped

It will be observed that ions start flowing towards oppositely charged electrodes.

→ principle:-



→ Faraday's law of Electrolysis:-

(i) First law:-

The law states that "The mass of substance deposited during electrolysis on an electrode is directly proportional to the quantity of current passed."

$w$  = mass of substance

$Q$  = quantity of current passed

$c$  = current

$t$  = time

$$\therefore Q = c \cdot t$$

∴ According to first law,  $w \propto Q$

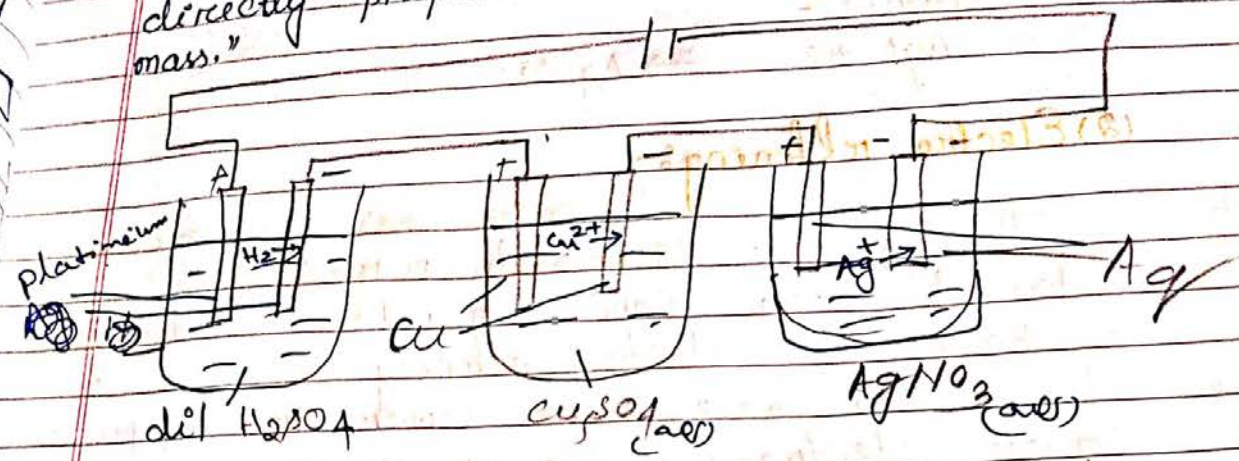
$$\therefore w \propto Q$$

$$w \propto c \cdot t$$

$$w = Z \cdot c \cdot t$$

here;  $Z$  is a constant & is called electrochemical equivalent.

(ii) second law:-  
The law states that, "If numbers of cell are connected in series & same amount of current is passed through them then the mass of substances deposited is directly proportional to their equivalent mass."



∴ According to Faraday's law mass of substance deposited  $\propto$  equivalent mass.

⇒ Application of Electrolysis:-

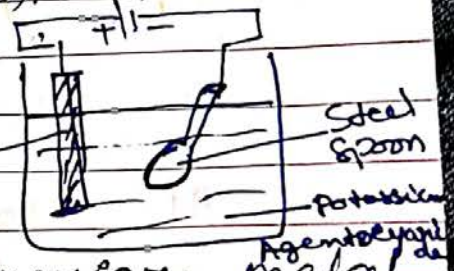
① Electroplating:-  
Definition:-

The process in which superior metal is deposited on base metal is called electroplating.

- By this
- ① Increases beauty
  - ② Avoid rusting & corrosion.

⇒ process:-

To have silver plating of a steel spoon, the spoon is used as cathode. A thin silver rod is used as anode. potassium Argentocyanide



### Inorganic Chemistry:-

**Mineral:-** Compound of metals dug from the mine called mineral.

- eg:- Minerals of iron ore
- $Fe_2O_3$  (Haematite)
  - $Fe_3O_4$  (Magnetite)
  - $FeS_2$  (Iron pyrites)

### Ore:-

Ore is a mineral from which a metal is extracted economically and profitably.

- eg:-
- ①  $Fe_2O_3$  (Haematite) is the ore of iron
  - ②  $Al_2O_3 \cdot 2H_2O$  (Bauxite) is the ore of Aluminium.

### Native:-

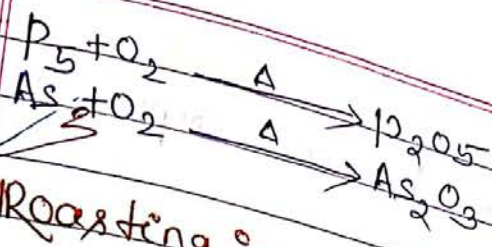
Some metals like gold, platinum, silver, and copper are present under earth in free state. They are called native.

### ① Concentration of the Ore:-

The ore is crushed into pieces by jaw crushers and grinded into fine powder by stamp mills.

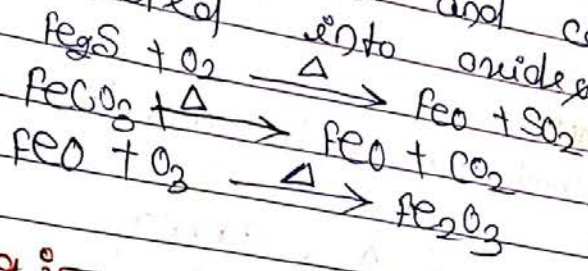
The powdered ore is concentrated by one of the following methods.

- ② Magnetic separation



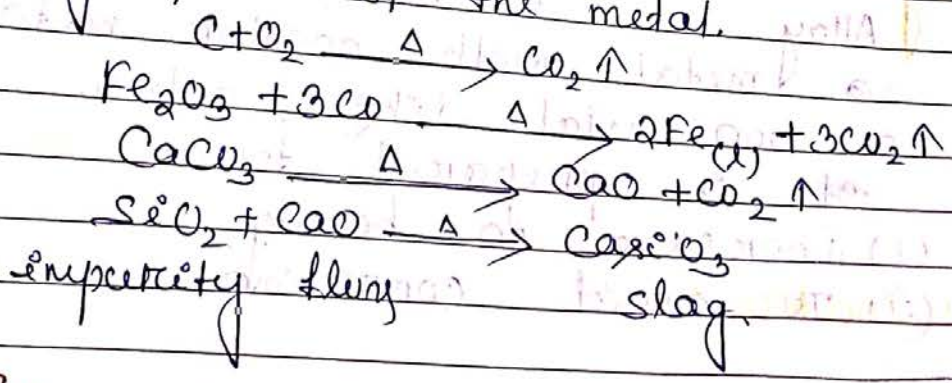
③ Roasting :-

Roasting is the process of heating the concentrated ore in presence of air below the melting point of the metal. By this process sulphide and carbonate ores get converted into oxides.



④ Smelting :-

Smelting is the process of heating the roasted ore in presence of coke and flux in excess air above the melting point of the metal.

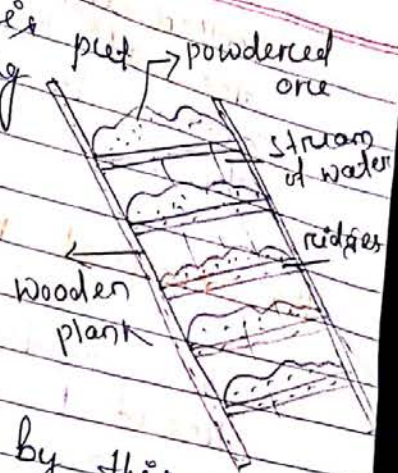


flux :-

Flux is a chemical which combines with impurities during smelting and gets removed as slag during smelting and gets removed as slag. It is of two types :-

**(I) Gravity separation method:-**

The powdered ore is put in an inclined wooden plank having ridges and racking motion. Stream of water is allowed to flow over it. Lighter impurities are crushed away leaving behind heavier ore.

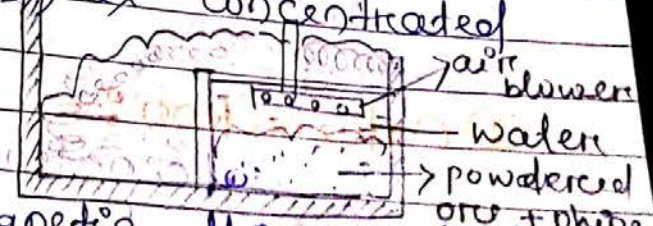


Haematite is concentrated by this method.

**(II) Flotation method:-**

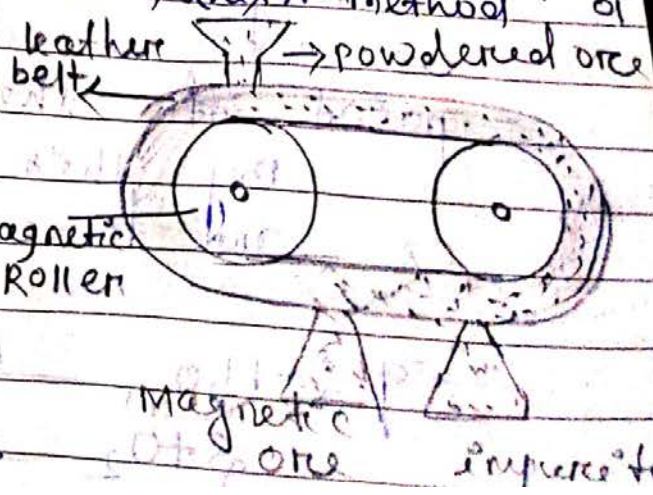
The powdered ore is put in a tank, mixed with pine oil and water. The mixture is covered by water and strong air is blown through it. Lighter ore sticks to pulp of oil float on the surface as froth, it is transferred into another tank, allowed to settle and headed to dryness.

eg:- Copper glance ( $Cu_2S$ ) is concentrated by this method.



**(III) Magnetic separation:-**

If the ore is magnetic, this method is used. The powdered ore is put on a leather belt moving on two rollers. Magnetic roller is a strong magnet. When the ore passes over the magnetic

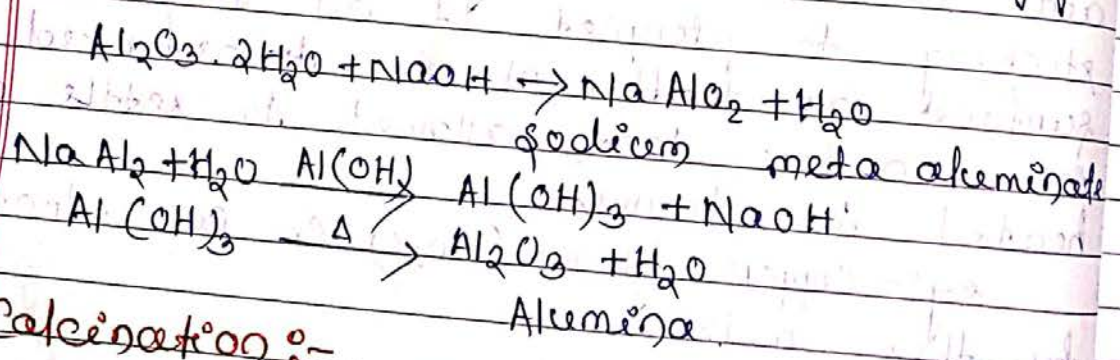




roller, impurity falls down. The magnetic ore sticking to the belt, moves away from the roller and falls down in a separate heap.

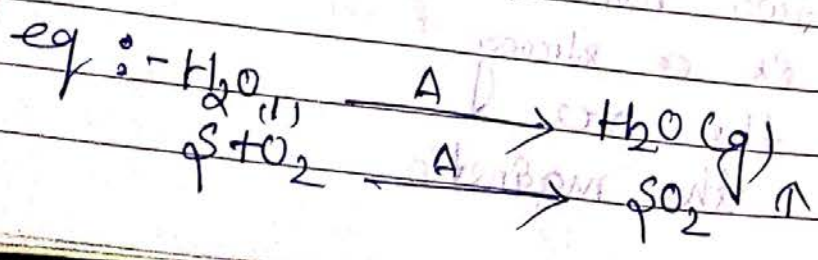
(iv) Chemical method:- / leaching:-

Bauxite is concentrated by this method. The powdered ore is treated with concentrated solution of NaOH soluble sodium meta aluminate is formed. The mixture is filtered. The filtrate is treated with freshly prepared  $Al(OH)_3$  white precipitate of  $Al(OH)_3$  separates which is filtered, heated strongly to get alumina.



(v) Calcination:-

Calcination is the process of heating the concentrated ore in absence of air below the melting point of the metal. By this method volatile impurities are removed.



③ Roast-

the below this get

④ Smelt-

the and melting

flow:-  
with gets and of

- 5 marks questions
- 1 Explain Rutherford's Atomic Model.
  - 2 Explain Bohr's atomic model.
  - 3 Explain Bohr Rury scheme.
  - 4 Write down Faraday's 1st law.
  - 5 Write down the process of electrolysis.
  - 6 What is Alloy? Write the uses and composition of Brass, Bronze, Alnico & duralumin.
  - 7 Define covalent bond?
  - 8 What is bio-fertilizers and write some examples & uses.
  - 9 Write the purpose of lubricant.
  - 10 Write the composition and uses of producer gas?
  - 11 Write down the composition of PVC.
  - 12 Write down the difference between ionic compound and covalent compound.
  - 13 Write down the Arrhenius theory of Acid & Base.

10, Mark Questions.

- 1 ~~Write~~ Explain with the example the formation of ionic, covalent & co-ordinate bond.
- 2 Write down the Arrhenius theory of Acid & base and Bronsted-Lowry theory of Acid & Base.
- 3 Write down the difference between Raw Rubber and Vulcanized rubber.
- 4 Write down the difference between Thermosetting plastic and Thermo plastic.
- 5 Write the composition and uses of petrol, kerosene and diesel?
- 6 Define molarity. Calculate the molarity of potassium carbonate solution which is formed by dissolving 2.51g of it one liter sol<sup>n</sup> (density of sol<sup>n</sup> is 0.85 g/ml).
- 7 What is salt? Write various types of salt.
- 8 Explain Faraday's 2nd law.
- 9 Write down gravity separation method and magnetic separation method.
- 10 Advantages of Hot lime over cold lime process.
- 11 Difference between Aliphatic and Aromatic hydrocarbons.

## Short Questions

2 marks

- 1) Who discovered electron and what is its charge?
- 2) What are  $\alpha$  rays?
- 3) What are isotopes of hydrogen?
- 4) Write the electronic configuration of  $Cr$  &  $Fe$ ?
- 5) Define Aufbau principle?
- 6) State Hund's rule?
- 7) Write down two examples of strong acids?
- 8) Write down two examples of normal salt?
- 9) Write the full form of LPG?
- 10) Write the full form of PVC?
- 11) What is the monomer of PVC?
- 12) Define pH?
- 13) Define calorific value?
- 14) What is lubricant?
- 15) Write some examples of lubricant?
- 16) Define calcination?
- 17) Define Roasting?
- 18) Define flux?
- 19) Write the formula of Rust?
- 20) Define Alloy?
- 21) Define corrosion?
- 22) Why water is hard?
- 23) Define ~~water~~ Galvanisation?
- 24) Write the general formula of Alkane, Alkene and Alkyne
- 25) What is saturated and unsaturated hydrocarbon
- 26) ~~Write down~~ Write down the formula of soap?
- 27) What is bio-fertilizers?
- 28) Define fuel?
- 29) Write down the composition of producer gas?
- 30) Define polymer?