

# Bihar Board Class 12 Chemistry Question Paper 2016

## INTERMEDIATE EXAMINATION - 2016

(ANNUAL)

### CHEMISTRY

Time-  $3\frac{1}{4}$  Hours

Full Marks: 70

#### Instruction for the candidates:

- 1) Candidates are required to give their answers in their own words as far as practicable.
- 2) Figures in the right hand margin indicate full marks.
- 3) While answering the question, candidate should adhere to the word limit as far as practicable
- 4) 15 Minutes of extra time has been allotted for the candidates to read the questions carefully
- 5) This question paper is divided into two sections- **Section-A** and **Section-B**
- 6) In **Section-A**, there are **28 objective type questions** which are compulsory, each carrying **1 mark**. Darken the circle with blue/ black ball pen against the correct option on OMR Sheet provided to you.  
**Do not use Whitener/ Liquid/ Blade/Nail on OMR Paper, otherwise the result will be invalid.**
- 7) In **Section- B**, there are **11 short answer type questions** (each carrying **2 marks**), out of which any **11 questions** are to be answered. Apart from this, there are **4 long Answer Type questions** (Each Carrying **5 marks**). Each question has alternate option.
- 8) Use of any electronic device is prohibited.

#### Section-I

The following Question Nos. 1 to 28 there is only one correct answer against each question. For each question mark the correct option on the answer sheet :  $1 \times 28 = 28$

1. Oxidation number of gold metal is
- |        |                  |
|--------|------------------|
| (a)+1  | (b)0             |
| (c) -1 | (d) all of these |

Sol:

Correct option is B

2. which one of the following is lyophilic colloid?

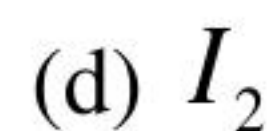
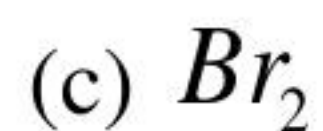
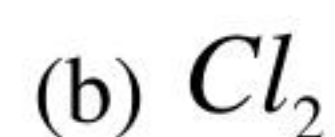
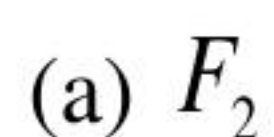
- |         |           |
|---------|-----------|
| (a)Milk | (b) Gum   |
| (c) Fog | (d) Blood |

SOL:

Correct option is B



3. Which one in the following is the strongest oxidizing agent?



SOL:

Correct option is A

4. Which of the following compounds has tetrahedral geometry?



SOL:

Correct option is D

5.  $t_{\frac{1}{2}}$  for first order reaction is

(a)  $\frac{0.6}{k}$

(b)  $\frac{0.693}{k}$

(c)  $\frac{0.683}{k}$

(d)  $\frac{0.10}{k}$

SOL:

Correct option is B

6. Faraday's law of electrolysis is related to

(a) Atomic number of cation

(b) Speed of cation

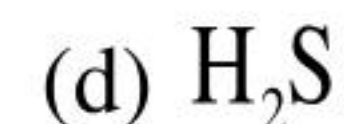
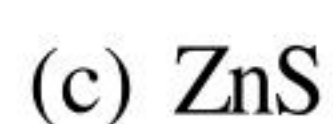
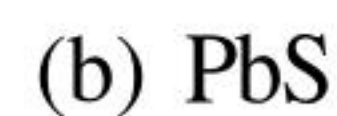
(c) Speed of anion

(d) Equivalent weight of electrolyte

SOL:

Correct option is D

7. Cinnabar is



SOL:



Correct option is A

8. Atomic mass is equal to

- (a) number of electrons of an atom
- (b) sum of the numbers of electrons and protons of an atom
- (c) sum of the numbers of neutrons and protons of an atom
- (d) none of these

SOL:

Correct option is C

9. When Quicklime is immersed in water the reaction is

- (a) exothermic
- (b) endothermic
- (c) explosive
- (d) none of these

SOL:

Correct option is A

10. Shape of d-orbital is

- (a) spherical
- (b) dumb-bell
- (c) double dumb-bell
- (d) none of these

SOL:

Correct option is C

11. Washing soda is

- (a)  $Na_2CO_3 \cdot 10H_2O$
- (b)  $Na_2CO_3 \cdot 5H_2O$
- (c)  $Na_2CO_3$
- (d)  $NaOH$

SOL:

Correct option is A

12. Electronic configuration of alkaline earth elements is

- (a)  $ns^2$
- (b)  $ns^1$
- (c)  $np^6$
- (d)  $ns^0$

SOL:



Correct option is A

13. Slaked lime is

(a)  $\text{CaO}$

(b)  $\text{CaCO}_3$

(c)  $\text{Ca(OH)}_2$

(d)  $\text{CaCl}_2$

SOL:

Correct option is A

14. Outermost configuration  $3d^6 4s^2$  is of

(a) Ca

(b) Zn

(c) Mg

(d) Cu

SOL:

Correct option is C

15. Chemical name of borax is

(a) Sodium tetraborate

(b) Sodium metaborate

(c) Sodium orthoborate

(d) none of these

SOL:

Correct option is B

16. Boron shows diagonal relation with

(a) Al

(b) C

(d) Si

(d) Sn

SOL:

Correct option is A

17. Good conductor of electricity and heat is

(a) Anthracite coke

(b) Diamond

(c) Graphite

(d) Charcoal

SOL:

Correct option is C

18. In which of the following allotropes of carbon, percentage of carbon is maximum?



(a) Wood charcoal

(b) Coconut charcoal

(c) Graphite

(d) None of these

SOL:

Correct option is C

19. The hybridization of carbon in diamond is

(a)  $sp^3$

(b)  $sp^2$

(c) sp

(d)  $dsp^2$

SOL:

Correct option is A

20. Organic compound must contain an element

(a) Oxygen

(b) carbon

(c) hydrogen

(d) nitrogen

SOL:

Correct option is B

21. Catenation property is maximum in

(a) phosphorus

(b) carbon

(c) sulphur

(d) zinc

SOL:

Correct option is B

22. Which one of the following is an electrophilic reagent?

(a)  $BF_3$

(b)  $NH_3$

(c)  $H_2O$

(d) None of these

SOL:

Correct option is A

23. Alkene gives which of the following reactions ?

(a) Addition reaction

(b) Substitution reaction

(c) specific gravity

(d) none of these



SOL:

Correct option is A

24. Single bond length between carbon-carbon is

(a)  $1.34 \text{ \AA}$

(b)  $1.20 \text{ \AA}$

(c)  $1.54 \text{ \AA}$

(d) none of these

SOL:

Correct option is C

25. Valency of carbon is

(a) 1

(b) 2

(c) 3

(d) 4

SOL:

Correct option is D

26. Criteria for purity of organic solid is

(a) boiling point

(b) melting point

(c) specific gravity

(d) none of these

SOL:

Correct option is A

27. Element found from sea water is

(a) Magnesium

(b) Sodium

(c) Iodine

(d) none of these

SOL:

Correct option is C

28. The main constituent of CNG is

(a) Methane

(b) Ethane

(c) Butane

(d) Isobutane

SOL:

Correct option is A



## Section-II

Question Nos. 1 to 11 are of short answer type. Each question carries 2 marks. 11  
x 2 = 22

(1) Define standard electrode potential.

Sol:

**Standard electrode potential :** It is the measure of individual potential of a reversible electrode at standard state which is with solution at an effective concentration of 1 mol dm<sup>-3</sup> and gases at a pressure of 1 atm.

(2) Transition elements from coloured compound. Explain.

Sol:

The value of electrode potential depends upon the heat of sublimation and ionization energy  $CH_3^+$ . Due to the influence of ligand d-orbitals of transition metals divided into two unequal energy containing sets. Unpaired electrons absorb sunlight and jump from one orbit into another orbit and one colour is reflected.

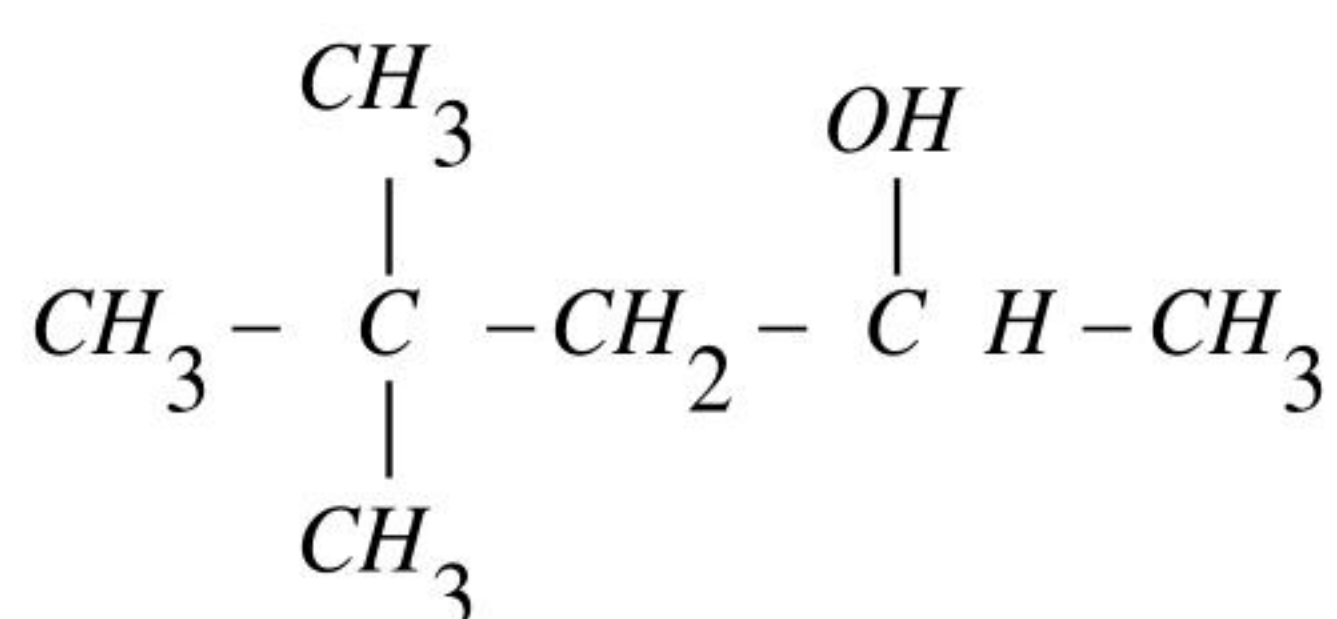
(3) Write the structural formulae of the following :

(a) 4,4 dimethyl-2-pentanol

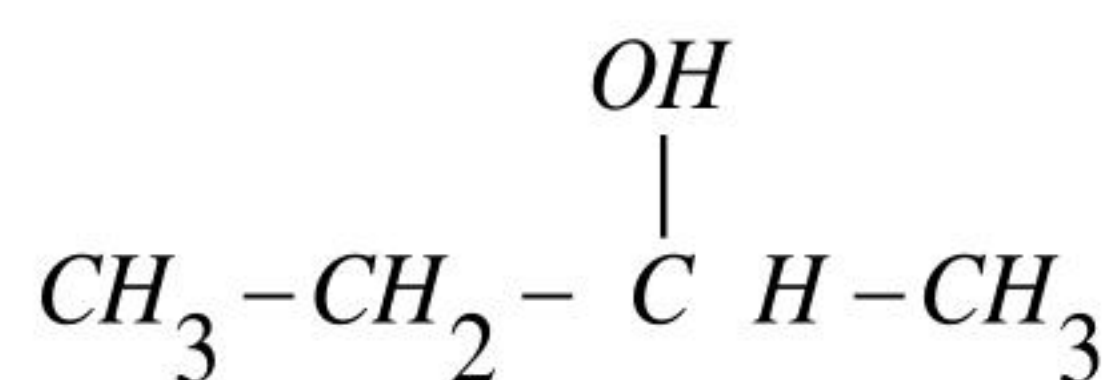
(b) 2-butanol.

Sol:

(a)



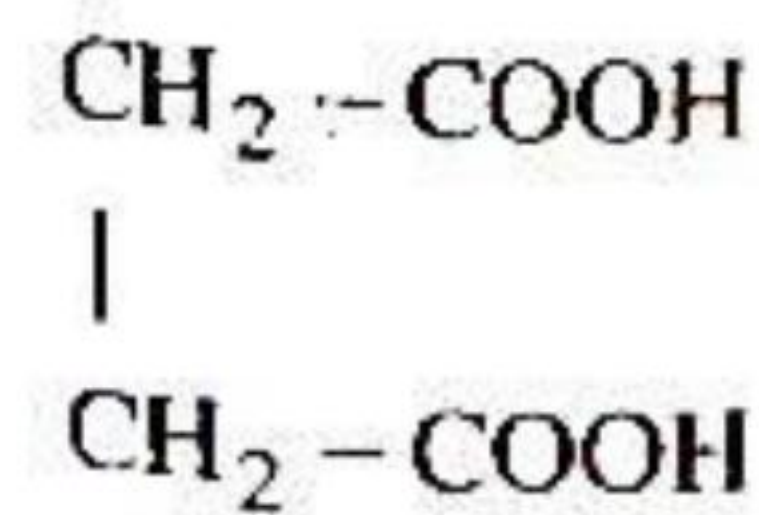
(b)





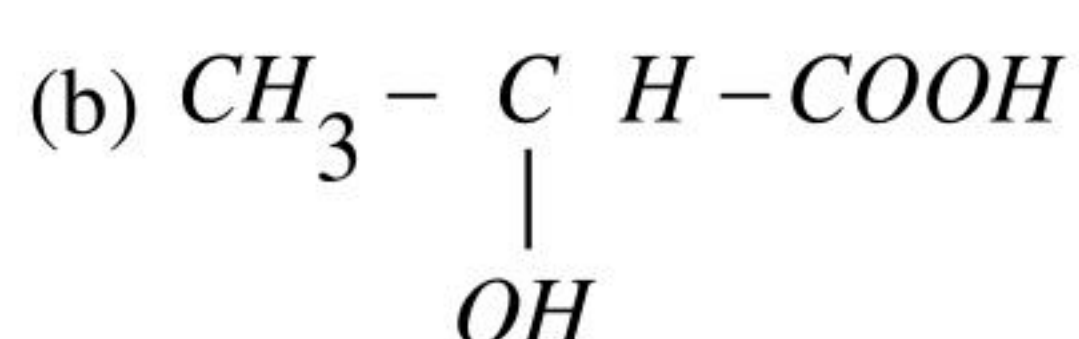
4. Give I.U.P.A.C. names of the following:

(a)



Sol:

Butane-1,4-dioic acid



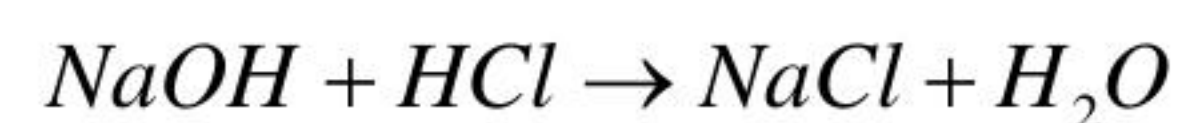
Sol:

2-Hydroxy propan-1-oic-acid

5. Define heat of neutralization.

Sol:

It is the amount of heat evolved one gram equivalent of an acid compound neutralization of one gram equivalent of a base in dilute solution.



Base      acid

$$\Delta H = - 13.7 \text{ k-cals}$$

6. (a) State law of mass action.

Sol;

Law of mass action: The rate of chemical reaction is directly operational to the product of the concentration (active mass) of the reacting distances.

$$\text{Active mass} = \frac{\text{No. of moles}}{\text{vol. in litre}}$$

(b) What is the effect of temperature on reaction?

Sol;

In general substances react faster when heated. Many reaction rates roughly doubling are double for  $10^\circ$ . (Rise in temperature)



## 7. Discuss the following terms

### (a) Co-ordination number

Sol:

**Co-ordination number:** The total number of co-ordinate bonds formed by the ligands in the complex is called co-ordination number



$$\therefore CN = 2$$

### (b) Effective atomic number

Sol:

**Effective atomic number:** The difference between atomic number of metal and oxidation number plus 2 x co-ordination number is called effective atomic number. EAN of  $Ke[Fe(CN)_6] = (26 - 2) + 2 \times 6 = 36(Kr)$

## 8. What is the difference between Schottky defect and Frenkel defect?

Sol:

$$\text{As we know that } \pi = \frac{n_{urea}RT}{V}$$

$$\text{Number of moles in urea} = \frac{5}{60} = 0.083$$

$$\text{Volume of Solution} = \frac{100}{1000} = 0.1 \text{ litre}$$

$$\text{Hence, Osmotic Pressure } \pi = \frac{0.083 \times 0.821 \times 272}{0.1} = 18.53 \text{ atm}$$

## 9. When 10g of a non-volatile solute is dissolved in 100g of benzene its boiling point raised by 10. What is the molecular mass of the solute? [ $K_b$ for benzene = $2.53 \text{ km}^{-1}$ ]

Sol;

The property, which depends upon number of atom or molecule of the solute and not on their nature is called colligative properties. There are four type colligative properties.

### 10.(a) State Faraday's 1<sup>st</sup> law of electrolysis.

Sol:

**Faraday's 1<sup>st</sup> law of electrolysis-** This law states that the mass of a substance produced at an electrode is directly proportional to the quantity of electricity passed.



$$m \propto Q$$

$$m \propto I \times t$$

$$m = z \times I \times t$$

Where,

$Q \rightarrow$  quantity of electricity.

$I \rightarrow$  current in amperes.

$T \rightarrow$  time

$Z \rightarrow$  Electrochemical equivalent

**(b) Define electrochemical equivalent.**

Sol:

**Electrochemical** – The amount of substance liberated at the electrode, when current of one ampere is passed through the electrolyte for one second.

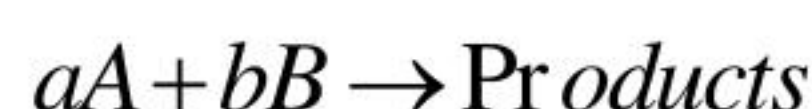
**11. Define the following:**

**(a) Order of reaction**

Sol:

**Order of reaction-** It is an important parameter for every chemical reaction. Which refers to the number of reacting particles.

**Order of reaction-** It is defined as the sum of powers or exponents to which the concentration terms are raised in the rate law expression.



$$\text{Rate} = K[A]^m[B]^n$$

Then, order of reaction is  $= (m + n)$

**(b) Threshold energy**

Sol:

**Threshold energy-** The minimum amount of energy which the colliding particles must possess in order to bring about chemical reaction is called threshold energy.



(Long answer type questions)

Question Nos. 12 to 15 are of long answer type. Each question carries 5 marks.  $4 \times 5 = 20$

12.(a) What do you mean by the term 'elevation of boiling point'?

Sol:

Elevation in boiling –The boiling point of a liquid may be defined as the temperature at which its vapor pressure becomes equal to atmospheric pressure.

When we add a solute in any pure solvent, then the boiling point of the solution gets increased. This incensement is know as the elevation in boiling point.

(b) State Raoult's law. How is it useful in determining the molecular weight of non-electrolyte solute?

Sol:

According to this law, the vapour pressure of a solution containing non- volatile solute is directly proportional to the mole fraction of the solvent.

If a solution contains two components A (volatile solvent) and B (non-volatile solute) the vapor pressure of solution is given as-

$$\left[ \begin{array}{c} \text{vapour pressure} \\ \text{of solution} \end{array} \right] = \left[ \begin{array}{c} \text{vapour pressure of} \\ \text{solvent insolution (P}_A\text{)} \end{array} \right] \propto \left[ \begin{array}{c} \text{Mole fraction of} \\ \text{solvent (X}_a\text{)} \end{array} \right]$$

where, K is a proportionality constant.

$$P_A \propto X_A$$

$$P \propto KX_A$$

OR, (a) what is carbonation? Explain.

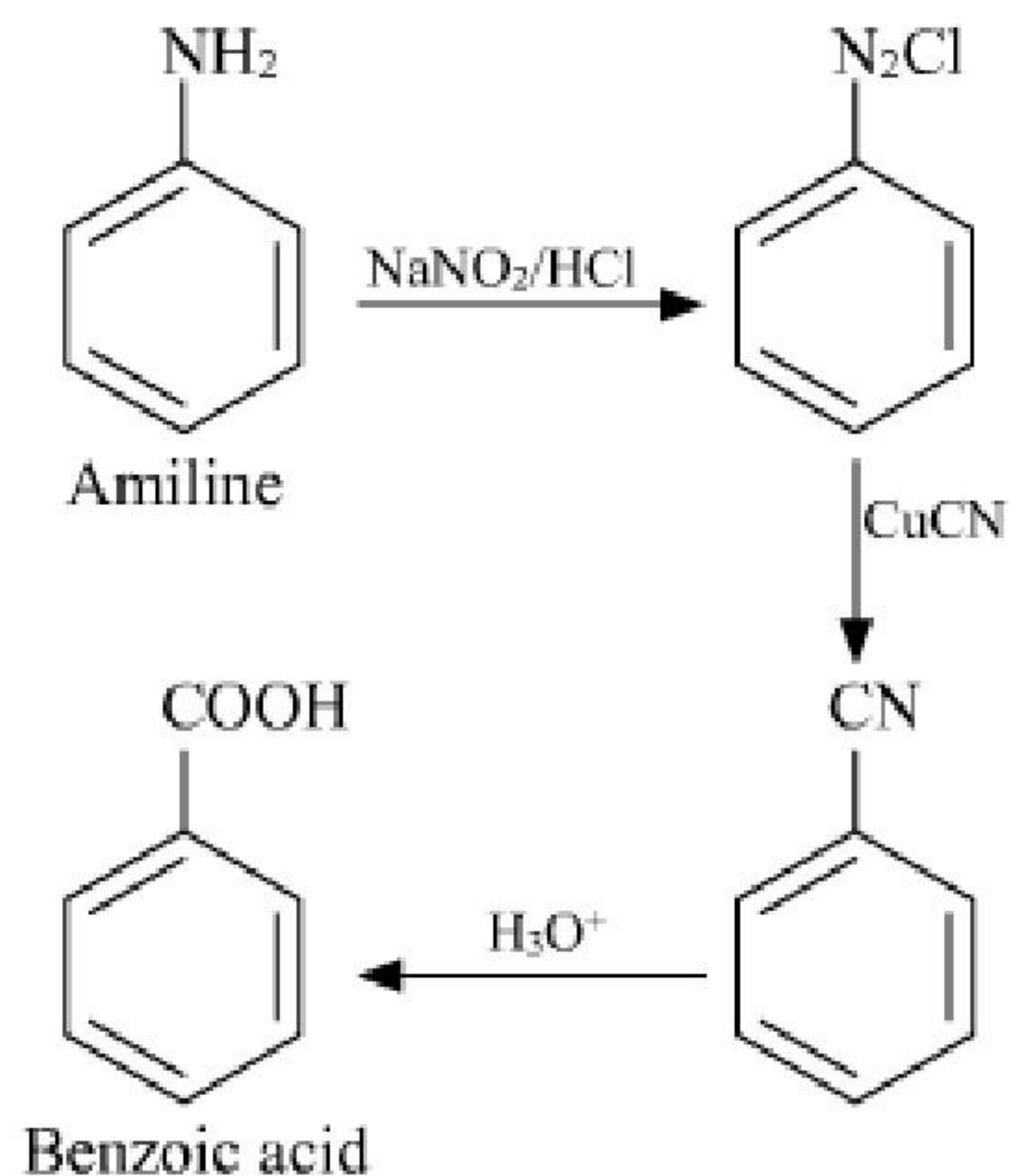
Sol:

**Carbocation:** A carbocation is an ion with positively – charged carbon atom. Among the simplest example methenium  $CH_3^+$  ethanium  $C_2H_7^+$ . Some carbocations may have two or more positive charges, on the same carbon atom or on different atom such as ethylene dictation  $(C_2H_4^{2+})$ . It is classified in two categories according to the valence of the charged carbon.



**(b) How will you convert Aniline into Benzoic acid?**

Sol:



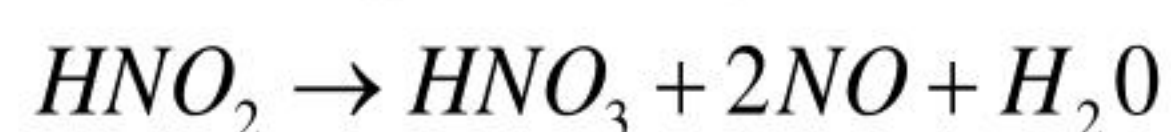
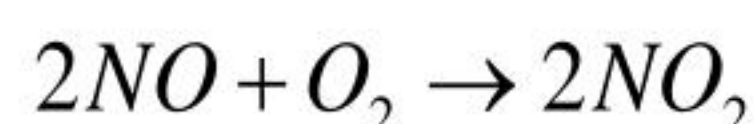
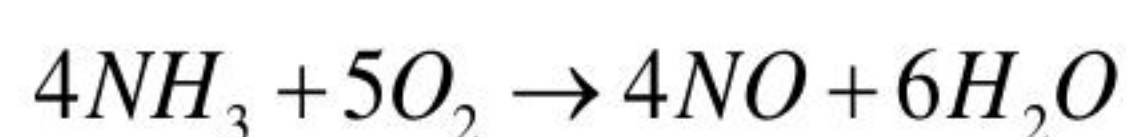
13. (a) Differentiate between Osmosis and Dispersion. How is osmotic pressure determined by Berkely –Hartlay method ?

(b) 18 g of glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) was added to 1 kg water at 1.013 bar atmospheric pressure in a vessel. At which temperature will water boil ?  $K_b$  for water is  $0.52\text{K kg mol}^{-1}$ .

**Or,(a) Give the principle for the manufacture of nitric acid from ammonia**

Sol:

Due to following 11 parts of  $\text{NH}_3$  and 89 part of mixture of air Pt gauze and heated at  $100^\circ$ , then we get (NO).



Thus, from above equations it is clear that NO. Gives  $\text{NO}_2$  due to its oxidation which mix in water and forms  $\text{HNO}_3$ .

**(b) Give the reaction of copper with 50% dilute nitric acid.**

Sol:





#### 14. What happens when-

(a) Ethyne is allowed to react with cold basic  $\text{KMnO}_4$  solution?

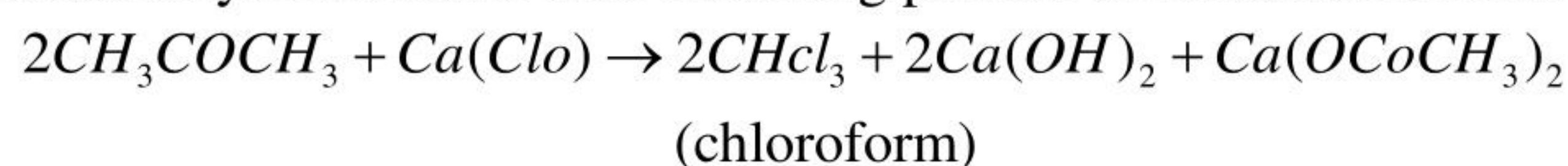
Sol:

**Standard electrode potential:** It is the measure of individual potential of a reversible electrode at standard state which is with solution at an effective concentration of  $1 \text{ mol dm}^{-3}$  and gases at a pressure of 1 atm.

(b) Acetaldehyde is heated with bleaching powder?

Sol:

- (i) when acetaldehyde is heated with bleaching powder to form chloroform.

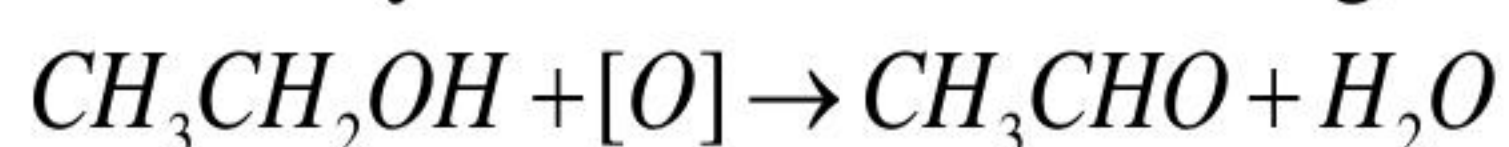


- (ii) When ethyl bromide is heated with KCN to form ethyl cyanide



*Ethyl*                                  Ethyl cyanide + KBr  
*bromide*

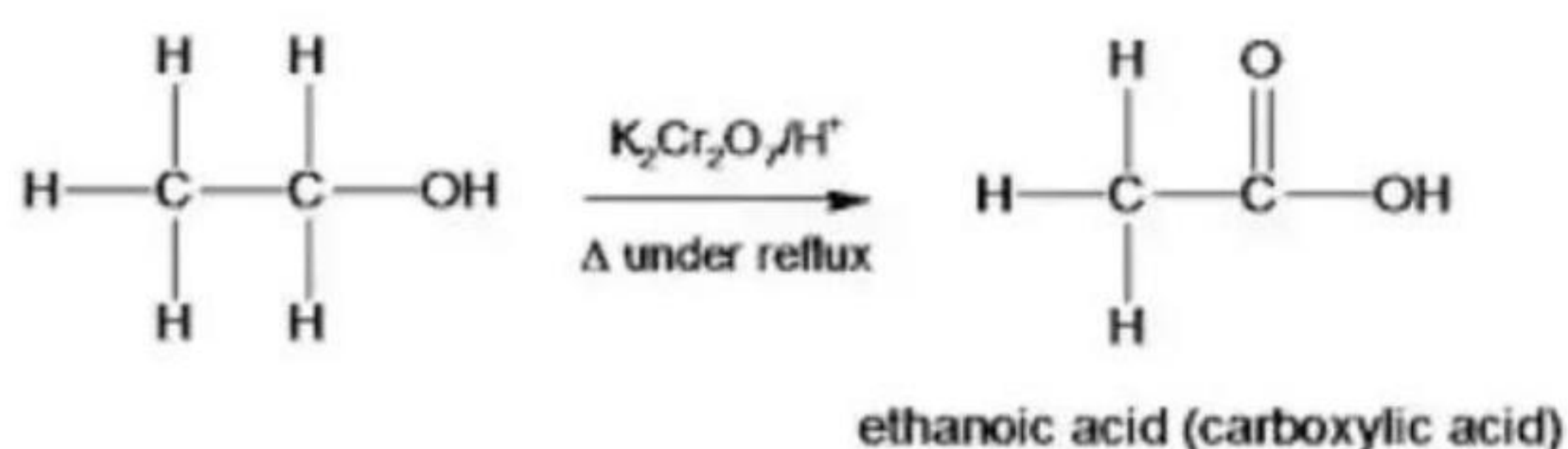
- (iii) When ethyl alcohol is oxidized to give acetaldehyde.



(c) Ethyl alcohol is oxidized?

Sol:

Structural formulae of  $\text{XeOF}_4$



Or,



(a) Differentiate between Methyl alcohol and Ethyl alcohol.

Sol:

Methanoic acid	Ethanoic Acid
(i) It is diffused Fehling's solution	(i) It tends no effect on Fehling's solution.
(ii) It is diffused Tollen's reagent	(ii) It gives no effect on Tollen's reagent.

(b) How will you convert the following?

(i) Phenol from aniline (ii) Phenol to benzene (iii) Ethane to n-butane.

Sol:



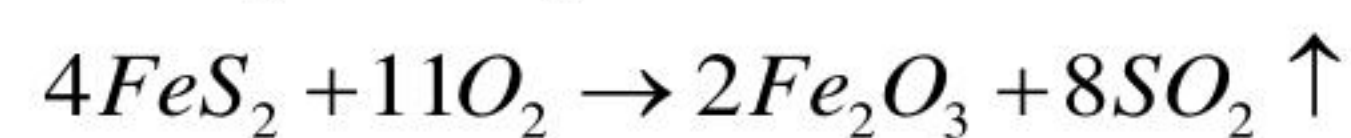
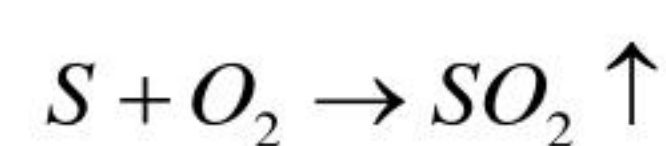
15. Name two important ores of iron. How is iron extracted from its ore?

Give reactions.

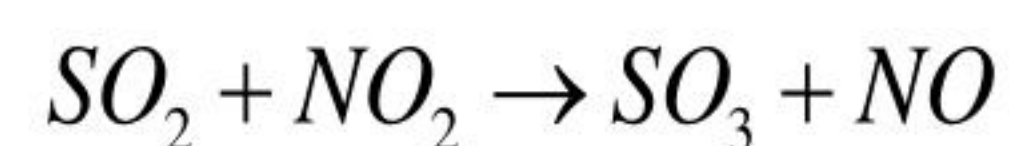
Or, Name the important ore of Al. How is aluminum extracted from its ore? Give reactions.

Sol:

**Lead chamber process:** In this process,  $\text{SO}_2$  is produced by burning sulphur or iron pyrites.

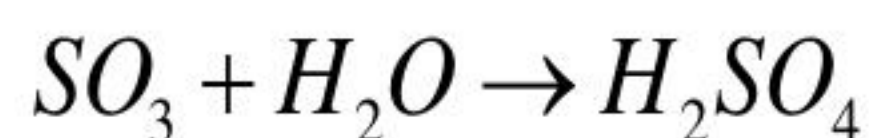


The  $\text{SO}_2$  so, obtained is oxidized to  $\text{SO}_3$  by means of  $\text{NO}_2$

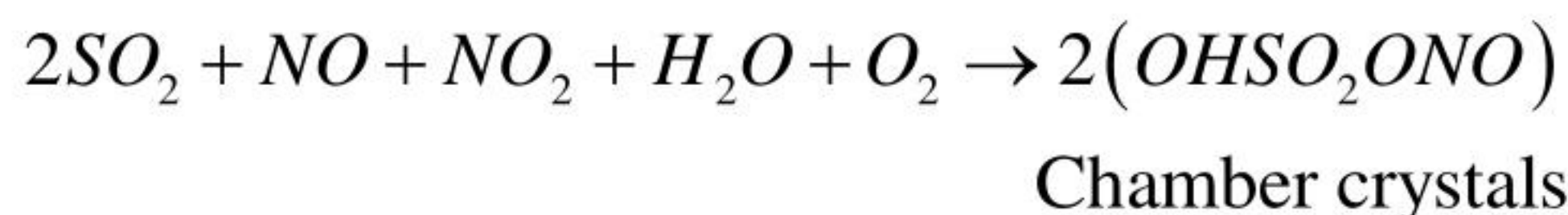


The  $\text{SO}_3$  so, obtained is treated with steam when sulphuric acid is formed.

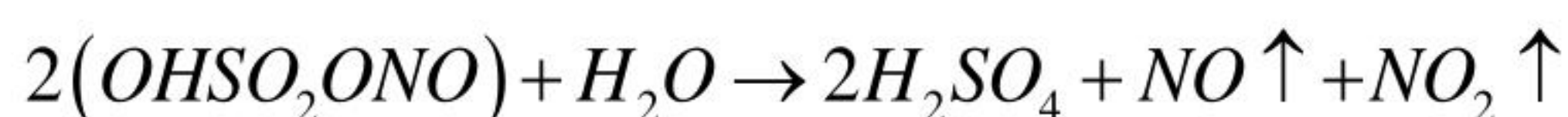




The flow of steam is less white chamber crystals are formed.



When chamber crystals appear the flow of steam is increased when there are converted to sulphuric acid.

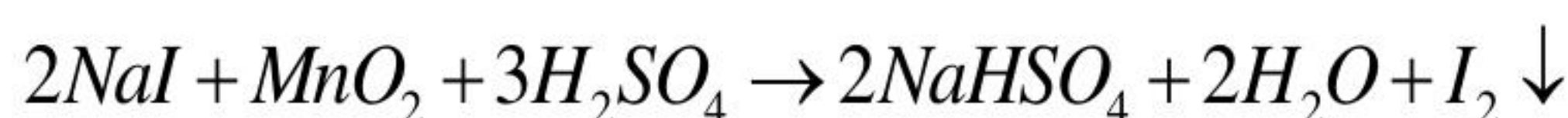


**Or, What are the main sources of iodine? How is iodine extracted from sea weeds?**

Sol:

Natural sources of iodine: Due to its reactivity iodine is not found in nature in Free State. Its main sources are (i) Sea weeds (ii) Chile salt power (iii) Natural brine

**Extraction of Iodine from sea weeds:** Sea weed, laminaria contains iodine sea weed is well dried and burnt in deep pits carefully so, that iodine is not destroyed. The obtained ash is called 'kelp'. Which contains 0.4 to 1.3% iodine. Kelp is dissolved in water and solution is partially crystallised when less soluble KI and NaI remain in the mother liquor. Conc.  $H_2SO_4$  is added when basic sulphides deposit at the bottom, which is filtered and removed. Now the filtrate is mixed with  $MnO_2$  and Conc.  $H_2SO_4$  and heated in an iron vessel. Iodine vapourises due to the reaction and is collected in Aludel. Iodine is now collected as solid after condensation.



Iodine obtained by this method contains  $Cl_2$  and  $Br_2$  as impurities. It is treated with KI to obtain pure iodine.

