

Sample paper - 1

GENERAL INSTRUCTION

1. You will not be allowed to write during the 15 minutes. This time is being spent in reading the question paper.
2. The time given at the head of this paper is the time allowed for writing the answer.
3. Attempt all questions from **Section A** and any 4 questions from **Section B**.
4. The intended marks for questions or parts of questions are given in brackets []

Time: 2Hrs

Max.

Marks:80

SECTION A [40 marks]

1.

(a) Fill in the blanks from the choices given in brackets.

(i) An element with atomic number 17 belongs to.....period.(first, third)

Sol:

Third

(ii) Write the electronic configuration of magnesium atom after losing 2 electrons.....(neon, argon)

Sol:

Neon

(iii) Whose example is ammonium hydroxide.....? (weak, strong)

Sol:

Weak

(iv) Write the oxidized product when the H_2S reacts with dil. HNO_3

(sulphur, nitrogen)

Sol:

Sulphur

(v) Write the molecular formula of the compound when ethyne reacts with chlorine($C_2H_4Cl_2$, $C_2H_2Cl_2$)

Sol:

$C_2H_2Cl_2$

(b) Choose the correct answer from the option

(i) Which law groups the elements in family of three

(a) Law of triads

- (b) Newland's law of octaves
- (c) Mandeleev's periodic law
- (d) None of the above

Sol: a

Law of octaves

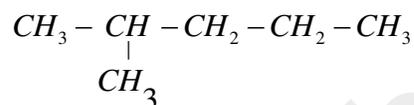
- (ii) Which of the following is the greenhouse gas?

- (a) Propane
- (b) Methane
- (c) Phosgene
- (d) None of these

Sol: b

Methane

- (iii) Write the IUPAC name of the following compound



- (a) 2-methyl pentane
- (b) Hexane
- (c) 4-methyl pentene
- (d) Pentane

Sol: a

2-methyl pentane

- (iv) Heat energy is evolved in which energy?

- (a) Enthalpy change reaction
- (b) Exothermic reactions
- (c) Endothermic reactions
- (d) None of the above

Sol: b

Exothermic reaction

- (v) What is the number of moles of HCl present in 16.5g of it?

- (a) 0.45mol
- (b) 2mol
- (c) 3.0mol
- (d) 4mol

Sol: a

0.45mol

- (c) Determine the substance which is underlined in each of the following.

- (i) An alkene that shows both chain and position isomers.

Sol:

Butene

- (ii) Acid also known as aqua fortis.

Sol:

HNO₃

- (iii) An unsaturated hydrocarbon used for cutting and welding metals.

Sol:

Ethyne

- (iv) A gas is evolved when liquor ammonia is kept exposed to air.

Sol:

Ammonia

- (v) A gas is evolved when zinc metal reacts with dil. HCl,

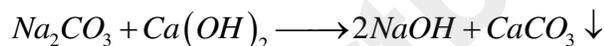
Sol:

H₂

- (d) Give the balanced chemical equation.

- (i) Sodium carbonate reacts with calcium hydroxide

Sol:



- (ii) Silver nitrate reacts with aqueous HCl

Sol:



- (iii) Sodium reacts with ethyl alcohol.

Sol:



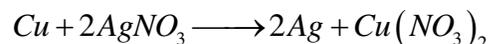
- (iv) Ammonium chloride is exposed to heat.

Sol:



- (v) Copper reacts with silver nitrate solution.

Sol:

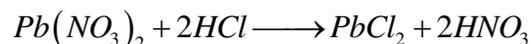


- (e) Give one relevant observation for each of the following

- (i) Action of dilute hydrogen chloride on lead nitrate solution.

Sol:

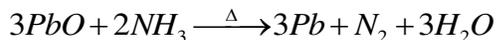
A white precipitate of lead chloride ($PbCl_2$) is obtained that is soluble in hot water but insoluble in cold water.



(ii) **Reaction of ammonia with lead with heated yellow lead oxide**

Sol:

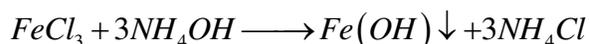
On passing ammonia through yellow lead oxide, it changes to silver white lead with evolution of N₂ gas



(iii) **When ammonia hydroxide solution is added to a solution of Iron(III) chloride.**

Sol:

A reddish brown precipitate of ferric hydroxide is formed which is insoluble in excess of NH₄OH.



(iv) **Action of dilute sulphuric acid on barium chloride.**

Sol:

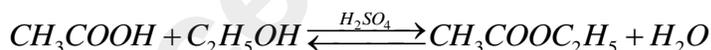
On action of dilute sulphuric acid with barium chloride solution, a thick white precipitate of barium sulphate which is insoluble in all mineral acids is formed. Hydrochloric acid is also obtained.



(v) **When acetic acid and ethyl alcohol reacts in the presence of sulphuric acid**

Sol:

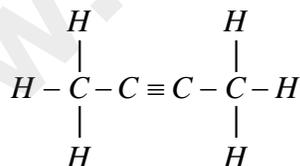
Process of esterification takes place and ethyl acetate is formed.



(f) **Draw the structural formula for each of the following.**

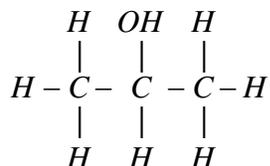
(i) **But-2-yne**

Sol:



(ii) **Propan-2-ol**

Sol:



(g)

(1) **Determine the number of molecules present in 2.2g of carbon dioxide.**

Sol:

\therefore 44g of CO_2 contains 6×10^{23}

\therefore 22.2g of CO_2 will contain $= \frac{6 \times 10^{23}}{44} \times 22.2$

$= 3 \times 10^{22}$ molecules

(2) Determine the number of moles of sulphur and oxygen atoms present in one mole of each of H_2SO_4 and H_2SO_3 .

Sol:

One mole of H_2SO_4 contains 1 mole of sulphur atoms and 4 moles of oxygen atoms.

One mole of H_2SO_3 contains 1 mole of sulphur atoms and 3 moles of oxygen atoms.

(h) Match the columns.

- | | |
|--|---------------|
| (1) A metal with atomic number 3 | (a) Boron |
| (2) A metal with electronic configuration 2, 2. | (b) Lithium |
| (3) An element which has highest electronegativity | (c) Beryllium |
| (4) A metal with the valiancy 3 | (d) Fluorine |
| (5) A noble gas element | (e) Neon |

Sol:

- (1) Lithium
- (2) Beryllium
- (3) Fluorine
- (4) Boron
- (5) Neon

SECTION B

2.

(a) Arrange the following as per the instruction.

(I) Na, Mg, Al, Si, Cl (increasing order of non-metallic character)

Sol:

$Na < Mg < Al < Si < Cl$

(II) Li, Be, C, O, F (decreasing order of metallic character)

Sol:

$Li > Be > C > O > F$

(III) Mg, Al, Na, Si (increasing order of atomic size)

Sol:

$Si < Al < Mg < Na$

(IV) Li, Be, B, C (decreasing order of atomic size)

Sol:



(b) Explain the following.

(1) Pure nitric acid takes a yellowish brown color when exposed to light

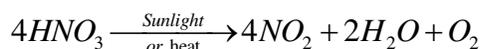
Sol:

Pure nitric acid gets decomposed in the presence of light to give a reddish brown NO_2 which dissolved in un-decomposed nitric acid to give yellowish brown colour.

(2) A nitrate which does not decompose on heating.

Sol:

Nitric oxide is oxidized by the oxygen of air to form coloured nitrogen dioxide.

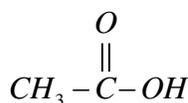


3.

(a) Write the structural formula and identify the functional group

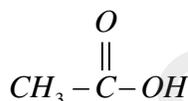
(I) Ethanoic acid

Sol:



(II) Ethanol

Sol:

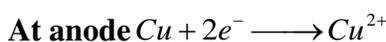
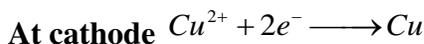


(b) Determine which of the following will get preferentially discharged at cathode and anode, respectively?

(I) Cu^{2+} OR Zn^{2+}

Sol:

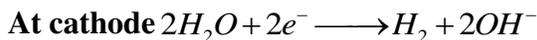
As the electrolysis is carried out, weight of cathode increases as copper metal deposits on the surface of cathode and weight of anode decreases as copper atoms would be oxidized to copper ions in enters in the solution



(II) OH^- SO_4^{2-}

Sol:

At cathode hydrogen gas is liberated while at anode oxygen gas is liberated.





4.

(a) Give the balanced chemical equation for the following.

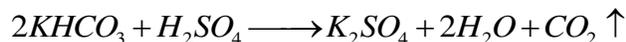
(1) Sodium nitrate and concentrated sulphuric acid.

Sol:



(2) Potassium Hydrogen Carbonate sulphuric acid.

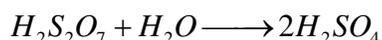
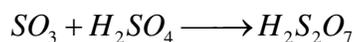
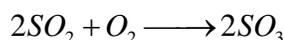
Sol:



(b) Give the balanced chemical equations for the three chemical reactions that take place during the conversion of sulphur dioxide to sulphuric acid in the contact process.

Sol:

The chemical equations are given below



5.

(a) Deduce the chemical formula (P=31, Cl=35.5). if an organic compound has the following percentage composition P=22.4%, 77.45%.

Sol:

Element	%	Atomic weight	Relative number of atoms	Simplest ratio
P	22.45	31	$\frac{22.45}{31} = 0.72$	$0.72 \div 0.72 = 1$
Cl	77.45	35.5	$\frac{77.45}{35.5} = 2.18$	$2.18 \div 0.72 = 3$

Hence, the formula of compound is PCl₃

(b) $AgNO_3 + NaCl \longrightarrow AgCl + NaNO_3$. How many gram of silver nitrate is required to precipitate 287g of silver chloride? (N=14, O=16, Cl=35.5, Ag=108)

Sol:

$$\text{Molar mass of } AgNO_3 = 108 + 14 + 48 = 170g$$

$$\text{Molar mass of } AgCl = 108 + 35.5 = 143.5g$$

$$143.5g \text{ } AgCl \text{ was precipitated by } 173g \text{ of } AgNO_3$$

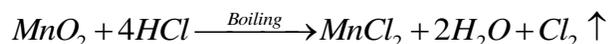
287g of $AgCl$ will be precipitated by $\frac{170}{143.5} \times 287$
 $340g AgNO_3$

6.

(a) Write the balanced chemical equations for the dilute hydrochloric acid with each of the following.

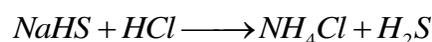
(1) Manganese dioxide

Sol:



(2) Sodium hydrogen sulphide

Sol:



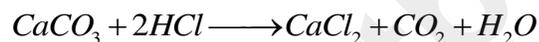
(3) Ammonium hydroxide

Sol:



(4) Calcium carbonate

Sol:



(b) Write the name the following:

(1) A hydrocarbon used as an industrial fuel in chemical industries.

Sol:

Ethane

(2) The next higher homologue of ethyl alcohol.

Sol:

Propyl alcohol

(3) An acid used for removing ink stains.

Sol:

Oxalic acid

7.

(1) Write the name of the following

(a) Name the chief ore of aluminium

Sol:

Bauxite

(b) Name the process used to concentrate the aluminium ore.

Sol:

Baeyer's process

(c) Name a process used for concentration of zinc blende.

Sol:

Froth flotation

(2) Answer the following questions with reference to Haber's process:

(a) What are reactants

Sol:

Sources of reactants

Nitrogen gas Obtained by the fractional distillation of liquid air.

Hydrogen gas Obtained from water gas

(b) What is favorable condition?

Sol:

Temperature Optimum temperature is 450-500°C

Pressure above 200 atm

Catalyst Finely divided iron

Promoter Al_2O_3

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