**2024**

**CHEMISTRY-I**

*Full Marks : 100*

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

*Answer 1 is Compulsory and any four from 2 to 7.*

1x20=20

1. (a) Which of the following is a weak electrolyte:

   i) NaCl

   ii) $HNO_3$

   iii) KOH

   iv) $NH_4OH$

   (b) The reaction: $Cu^{2+} + 2e \rightarrow Cu$ is an example of

   i) Oxidation Reaction

   ii) Reduction Reaction

   iii) Can be both oxidation and reduction reaction

   iv) None of the above

   (c) Which of the following compound will not dissociate into ions in aqueous solution?

   i) $Na_2SO_4$

   ii) $CH_3COOH$

   iii) Glucose

   iv) NaOH

   (d) Which pair of the following metal salts are responsible for permanent hardness in water?

   i) $CaCl_2$ and $MgCl_2$

ii) $CaCO_3$ and $MgCO_3$

iii) $Ca(HCO_3)_2$ and $Mg(HCO_3)_2$

iv) $Ca(OH)_2$ and $Mg(OH)_2$

(e) Which of the following metal is responsible for the tragedy of Minamata (Japan)?

i) Cd

ii) Hg

iii) As

iv) Pb

(f) The general formula of alkane is

i) $C_nH_{2n+2}$

ii) $C_nH_{2n-2}$

iii) $C_nH_{2n}$

iv) $C_nH_{2n+1}OH$

(g) "COOH" group indicates the

i) Aldehyde

ii) Ketone

iii) Carboxylic acid

iv) Ether

(h) Lactic acid is an

i) Optically active compound

ii) Optically inactive compound

iii) Both optically active & inactive compound

iv) Alkyne compound

(i) Pyrolysis is happened in the absence

i) Oxygen/Air

ii) Nirogen

iii) Helium

iv) Argon

(j) An organic compound with molecular formula $C_2H_6O$ exhibits

i) Positional isomer

ii) Functional isomer

iii) Chain isomer

iv) Chiral compound

(k) Charge on a neutron is

i) Uni-positive

ii) Uni-negative

iii) Zero

iv) None of above

(l) Atomic number and atomic mass of sulphur are respectively

i) 16 and 32

ii) 16 and 36

iii) 17 and 32

iv) 17 and 36

(m) Example of solid lubricant

i) Graphite

ii) Grease

iii) CNG

iv) Mineral oil

(n) Stoichiometric burning of propane gives ____ water molecules.

i) 2

ii) 3

iii) 4

iv) 5

(o) Which of the followings is not a fossil fuel?

i) Biodiesel

ii) Coal

iii) Petroleum

iv) Natural gas

(p) Which of the following statement is correct?

i) Cellulose is an example of synthetic polymer

ii) PE is an addition polymer

iii) PVC is a copolymer

iv) None

(q) Sulphide ores can be concentrated by

i) Froth-flotation method

ii) Magnetic separation method

iii) By smelting process

iv) None

(r) $SiO_2$ is an example of

i) Basic flux

ii) Acidic Flux

iii) A slag

iv) None

(s) Which one of the following statements is not correct?

i) Silver can be extracted by amalgamation method

ii) Sulphide ores are concentrated by roasting

iii) Roasting is an oxidation reaction

iv) None

(t) Which one of the following is synthetic polymer?

i) Nitrocellulose

ii) Nylon

iii) cellulose

iv) None

2. (a) Define (i) Primary pollutants and (ii) Secondary pollutants with examples. 3

(b) Point out the differences between B.O.D. and C.O.D. 4

(c) Discuss Faraday's 1st law of electrolysis. Define electrochemical equivalent. 4

(d) How much charge is carried by 1 mole of electrons? Calculate. 3

(e) How much coulombs of electricity are required for the following conversion: 1 mole of $Cr^{+2}$ (aq) to Cr (s). 3

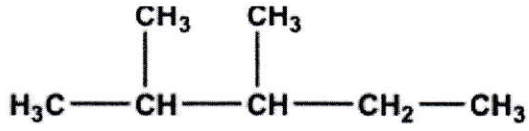
(f) Describe purification of Aluminium by Hoop's method 3

3. (a) Name the alkane compounds if carbon contains 1x4=4

(i) 1
(ii) 2
(iii) 3
(iv) 4

(b) Write the IUPAC names of the following compounds 4x1/2=2

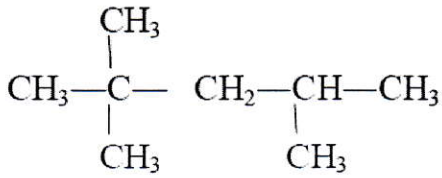
(i)



(ii) $CH_3$-CH=CH-$CH_2$

(iii) $CH_2Cl_2$

(iv)



(c) Draw the structures of the following compounds 4x1/2=2

(i) 2,3-Dimethyl heptane

(ii) Lactic acid

(iii) Tans-but-2-ene

(iv) Propyne-1

| | | | |
|---|---|---|---|
| | (d) | An organic compound with molecular formula $C_5H_{12}$, write down the possible structures/isomers and their IUPAC names. | 5 |
| | (e) | Give a laboratory preparation method for alkene with equation. | 3 |
| | (f) | Write short notes of Portland Cement. | 4 |
| 4. | (a) | Who discovered proton and neutron? What is meant by atomic number? | 1+1+1 = 3 |
| | (b) | What is an orbital? Give the shapes of s and p orbitals. | 2+2 = 4 |
| | (c) | Explain the use of Aufbau principle, Pauli's exclusion principle and Hund's rule in writing the electronic configuration of nitrogen. | 3 |
| | (d) | State the modern periodic law. Mention briefly about the periods and groups present in the modern periodic law. | 2+3 = 5 |
| | (e) | Define the term lubricant and give two examples. Mention two functions of lubricants. | 2+1+2 = 5 |
| 5. | (a) | Distinguish between co-polymer and homo-polymer. Give two examples of each. | 2+2= 4 |
| | (b) | Write short notes on (any two): | 2x 2= 4 |
| | | i) Bakelite | |
| | | ii) Terylene | |
| | | iii) PE | |
| | | iv) PS | |
| | (c) | "All ores are minerals but all minerals are not ore." Explain the statement. | 2 |
| | (d) | Give a schematic representation for metal extraction methods from concentration of ores to refining of metal. | 3 |
| | (e) | Distinguish between calcination and roasting. | 3 |
| | (f) | Define flux. Give examples of acidic and basic flux with proper example. | 2+2=4 |
| 6. | (a) | What are the differences between electrolytic cell and electrochemical cell? | 3 |
| | (b) | Write short note on (any one): (a) Hardness of water (b) acid rain | 2 |
| | (c) | Write down the Wurtz reaction. | 2 |
| | | Or | |
| | | Write short note on Hydraulic cement. | |
| | (d) | Write down the ozonolysis reaction with their products. | 3 |

| | | | |
|---|---|---|---|
| | (e) | How is ethanol manufactured from starch? | 2 |
| | (f) | Mention two important properties of an ideal fuel. Give an example of nuclear fuel. | 2+1 = 3 |
| | (g) | Explain froth flotation method for concentration of sulfide ores. Give schematic diagram. | 5 |
| 7. | (a) | What are the major air pollutants present in populated cities? Mention minimum three instrumental methods to control air pollution. | 2+3=5 |
| | (b) | What is an alloy? What are two different types of alloy? Give example of each. | 1+2+2=5 |
| | (c) | What is combustion of fuels? Differentiate between gross and net calorific vales of fuels. | 2+3 = 5 |
| | (d) | Give a preparation method for alkynes in laboratory. | 3 |
| | (e) | Write down the reaction products when Grignard reagent is hydrolysed. | 2 |

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