34 (NS)

(English Version)

Instructions : 1. *The question paper has four parts. All parts are compulsory.*

2. *Part-A carries 10 marks. Each question carries one mark.*

Part-B carries 10 marks. Each question carries two marks.

Part-C carries 15 marks. Each question carries three marks.

Part-D carries 35 marks. Each question carries five marks.

3. *Write balanced chemical equations and draw diagrams wherever necessary.*

4. *Use log tables and the simple calculator if necessary. [Use of scientific calculator is not allowed.]*

PART – A

I. Answer **all** the questions. Each question carries **one** mark. [Answer each question in **one word** or in **one sentence**] : **(10 × 1 = 10)**

1) How does molarity varies with temperature?

2) 10 mL of liquid 'A' is mixed with 10 mL of liquid 'B', the volume of the resultant solution is 19.9 mL. What type of deviation expected from Raoult's law?

3) Write the mathematical expression for limiting molar conductivity of sodium chloride [NaCl].

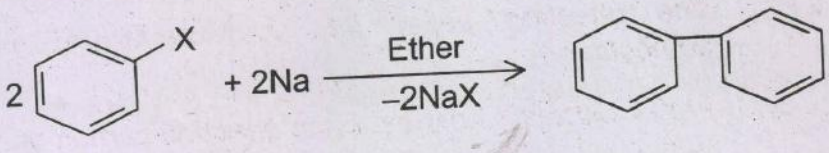
4) Define collision frequency.

5) Name the adsorbent used to removal of colouring matter from solution.

6) Give an example of a metal purified by Mond process.

7) Which noble gas is most abundant in atmospheric dry air?

8) What is the name of the following reaction?



9) Formaldehyde [HCHO] undergoes Cannizzaro reaction : Give reason.

10) Deficiency of which vitamin causes the disease scurvy.

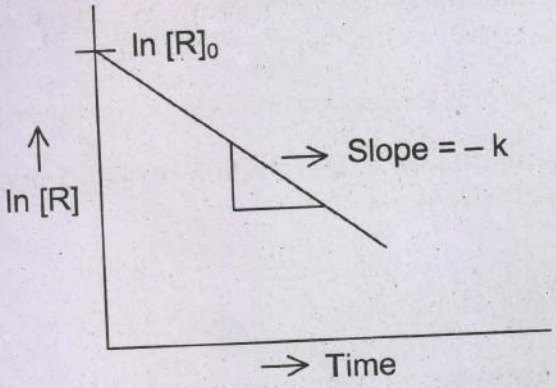
PART – B

II. Answer **any five** of the following. Each question carries **2** marks : **(5 × 2 = 10)**

11) Give the differences between crystalline and amorphous solids with respect to shape and melting point.

12) Write the cathodic and anodic cell reactions of Hydrogen-Oxygen fuel cell.

13) From the following graph, identify order of reaction and mention the unit of its rate constant.



14) What is lanthanide contraction? Mention the cause for it.

15) How anisole reacts with acetyl chloride [CH_3COCl] in the presence of anhydrous $AlCl_3$? Write the chemical equation for the reaction.

16) What is the action of ammonia [NH_3] on benzoic acid? Write equation.

17) Give an example for i) Non-narcotic analgesics ii) Antiseptics.

18) What are anionic detergents? Give an example.

PART – C

III. Answer **any five** of the following. Each question carries **3** marks : **(5 × 3 = 15)**

19) During the extraction of aluminium by Hall-Heroult process,

i) Write neat labelled diagram of electrolytic cell. **(1)**

ii) Write over all cell reaction. **(1)**

iii) At which electrode oxygen gas is liberated? **(1)**

20) In the manufacture of ammonia by Haber's process, write the flow chart and chemical equations with optimum conditions. **(3)**

21) i) Mention any two reasons for the anomalous behaviour of oxygen. **(2)**

ii) Write the balanced chemical equation for the action of concentrated sulphuric acid on copper metal. **(1)**

22) i) Complete the following equations. **(2)**

a) $2NaOH + Cl_2 \longrightarrow$ (cold and dil)

b) $Cl_2 + 3F_2 \xrightarrow{573K}$ (excess)

ii) Write the structure of chlorous acid [HOClO]. **(1)**

23) i) Calculate the spin-only magnetic moment of Fe^{2+}. [Atomic number of iron = 26]. **(2)**

ii) Which element of 3d series exhibits maximum oxidation state? **(1)**

24) How is $KMnO_4$ [Potassium permanganate] is prepared from MnO_2? Write equations. **(3)**

25) Explain hybridization, geometry and magnetic property of $[Ni(CN)_4]^{2-}$ ion using Valence Bond Theory (VBT). [Atomic number of Ni is 28]. **(3)**

26) i) Write the cis and trans isomeric structures of $[Fe(NH_3)_2(CN)_4]^-$. **(2)**

ii) What is the co-ordination number of Fe in $[FeCl_2(en)_2]Cl$? **(1)**

PART – D

IV. Answer **any three** of the following. Each question carries **5** marks : **(3 × 5 = 15)**

27) a) Calculate packing efficiency in simple cubic lattice. **(3)**

b) An element having atomic mass 63.1 g/mol has face centred cubic unit cell with edge length 3.608×10^{-8} cm. Calculate the density of unit cell. [Given : $N_A = 6.022 \times 10^{23}$ atoms/mol]. **(2)**

28) a) 1.0 g of non-electrolyte solute dissolved in 50 g of benzene lowered the freezing point of benzene by 0.4 K. Find the molar mass of the solute. [Given : Freezing point depression constant of benzene = 5.12 K. kg mol^{-1}]. **(3)**

b) How solubility of a gas in liquid varies with i) Temperature and ii) pressure? **(2)**

29) a) The electrode potential for the Daniell cell given below is 1.1 V.

$Zn(s)\left|Zn^{2+}(aq)\right|\left|Cu^{2+}(aq)\right|Cu(s)$

Write overall cell reaction and calculate the standard Gibb's energy for the reaction. [F = 96487 c/mol]. **(3)**

b) Mention any two factors which affects the conductivity of electrolytic solution. **(2)**

30) a) Derive an integrated rate equation for rate constant of a zero order reaction. **(3)**

b) Write **(2)**

i) Arrhenius equation.

ii) The formula to calculate half life period of zero order reaction.

31) a) Give any two differences between lyophilic and lyophobic colloids. **(2)**

b) Write the two steps involved in the mechanism of enzyme catalysed reaction. **(2)**

c) What is the entropy change (Δs) for adsorption? **(1)**

V. Answer **any four** of the following. Each question carries **5** marks : **(4 × 5 = 20)**

32) a) Write SN^2 mechanism for conversion of methyl chloride to methyl alcohol. **(2)**

b) Aryl halides are extremely less reactive towards nucleophilic substitution reactions. Give any two reasons. **(2)**

c) What is asymmetric carbon? **(1)**

33) a) Explain Kolbe's reaction with equation. **(2)**

b) Write the three steps involved in the mechanism of acid catalysed dehydration of ethanol to ethene. **(3)**

34) a) How benzene is converted into benzaldehyde by Gatterman-Koch reaction? Write equation. **(2)**

b) Complete and name the following reaction. **(2)**

$$>C=O \xrightarrow[HCl]{Zn-Hg}$$

c) What is the effect of electron withdrawing group on the acidity carboxylic acid? **(1)**

35) a) How primary amine is prepared by Hoffmann bromamide degradation reaction? Write equation. **(2)**

b) i) Write IUPAC name of $CH_3CH_2NH_2$.

ii) Arrange the following amines in the order of their increasing basic strength in aqueous solution.
$(CH_3)_3N, (CH_3)_2NH, CH_3NH_2$. **(2)**

c) Complete the following equation.

$$C_6H_5NH_2 + NaNO_2 + 2HCl \xrightarrow{273-278\,K}$$ **(1)**

36) a) Write the Haworth structure of maltose. **(2)**

b) Give an example for **(2)**

i) Globular proteins.

ii) Naturally occurring optically inactive amino acid.

c) Name the nucleic acid which is responsible for genetic information. **(1)**

37) a) Explain the preparation of Buna-N with equation. **(2)**

b) Name the monomer present in the following polymer **(2)**

i) Poly vinyl chloride.

ii) Natural rubber.

c) Give an example of bio-degradable polymer. **(1)**