Std. : 12 th
Time : 3 Hours

1-60

Chemistry

HSC Prelium examination

Total Marks : 70

: General Instructions :

1) The question paper is divided into four sections.
2) Section 'A' contains Q. No. 1 [(i) to (x)] of multiple choice type of questions carrying one mark each.
   Q. No. 2 [(i) to (viii)] are very short answer type of questions carrying one mark each.
3) Section 'B' contains Q. No. 3 to 14 of short answer type of questions carrying two marks each. Attempt any eight.
4) Section 'C' contains Q. No. 15 to 26 of short answer type questions carrying three marks each. Attempt any eight.
5) Section 'D' contains Q. No. 27 to 31 of long answer type questions carrying four marks each. Attempt any three.
6) Use of log table is allowed. Use of calculator is not allowed.
7) Figures to the right indicate full marks.
8) For each MCQ, correct answer must be written along with its alphabet.
9) Physical constants :
   Avogadro's no. $(N_A) = 6.022 \times 10^{23}$,
   Atomic Mass : Na = 23, Cu = 63.5, S = 32, O = 16;
   Atomic number (Z) : Cu = 29;
   K_b for $CS_2 = 2.42\ K\ kg\ mol^{-1}$, $R = 8.314\ J\ mol^{-1}\ K^{-1}$

Section - A (1 mark each)

Q. 1 Select and write the correct answers. **(10)**

i) Glucose, on oxidation with dilute nitric acid gives .....
   a) saccharic acid b) oxalic acid
   c) gluconic acid d) malonic acid

ii) Calculate the work done during the reaction represented by the following thermochemical equation at 300K.
$C_2H_5OH_{(l)} + 3O_{2(g)} \longrightarrow 2CO_{2(g)} + 3H_2O_{(l)}$
   a) – 2.494 KJ b) + 2.494 KJ
   c) – 24.94 KJ d) + 24.94 KJ

iii) In interhalogen compounds, which halogen is never the central atom ?
   a) I b) F c) Br d) Cl

iv) Identify the chiral molecule from the following.
   a) 1-Bromobutane b) 1,1-dibromobutane
   c) 2,3-dibromobutane d) 2-Bromobutane

v) The pOH value for solution is 4. Its hydrogen ion concentration will be .....
   a) 10^{-4} M b) 10^{-10} M
   c) 10^{-6} M d) 10^{-8} M

vi) The pair $[CO(NH_3)_5(SO_4)]Br$ and $[CO(NH_3)_5Br]SO_4$ exhibits ..... isomerism.
   a) co-ordination b) ionization
   c) linkage d) optical

vii) In crystal lattice formed by bcc unit cell, the void volume is .....
   a) 68% b) 74% c) 32% d) 26%

viii) In carbinol system of nomenclature, tert-butyl alcohol is named as .....
   a) trimethyl carbinol
   b) dimethyl ethyl carbinol
   c) methyl carbinol d) ethyl carbinol

ix) The SI unit of molar conductivity is ..... .
   a) $Sm^2\ mol^{-1}$ b) $Scm^2\ mol^{-1}$
   c) Sm^2 d) $Sdm^2\ mol^{-1}$

x) The colourless transition metal ion amongst the following is ..... .
   a) Cu^+ b) Cu^{++} c) Ni^{++} d) Co^{++}

Q. 2 Answer the following. **(8)**

i) Write the monomer unit of teflon.

ii) What is the product in the following reaction :
$C_6H_5 - CH = CH_2 + HBr \xrightarrow{\text{peroxide}} (A)$?

iii) 0.020 mol of glucose is dissolved in 200 mL of water at 300K. Calculate the osmotic pressure of the solution.
($R = 0.0821\ Latmmol^{-1}K^{-1}$)

iv) Write the structure of Hinsberg's reagent.

v) Write an expression showing relation between enthalpy change and internal energy change for gaseous phase reaction.

vi) Write the formula for tetraamineplatinum (II) chloride.

vii) Write a mathematical expression for integrated rate law for zero order reaction.

viii) Write the value of $\frac{2.303\ RT}{F}$ in Nernst equation.

Section - B (2 marks each)

Attempt any Eight. **(16)**

Q. 3 Complete and write the following table.

	Reaction	Name of catalyst
i)	Manufacture of HDPE polymer	----------
ii)	----------	V_2O_5

Q. 4 **Distinguish between :**
Ionic solids and Molecular solids

Q. 5 Estimate the standard enthalpy of combustion of $CH_{4(g)}$ if $\Delta_f H^\circ (CH_4) = -74.8\ KJmol^{-1}$; $\Delta_f H^\circ (CO_2) = -393.5\ KJmol^{-1}$ and $\Delta_f H^\circ (H_2O) = -285.8\ KJmol^{-1}$.

Q. 6 Explain Cannizzaro reaction with suitable example.

Q. 7 What is the action of concentrated H_2SO_4 on :
i) CaF_2 ii) Cane sugar

1-60 12th Chemistry 2/2

Q. 8 Write the name and formulae of the monomers used for the preparation of dacron.

Q. 9 What are the bidentate ligands ? Give one example of it.

Q. 10 State and explain Hess's law of constant heat summation.

Q. 11 A solution of citric acid $C_6H_8O_7$ in 50 g of acetic acid has a boiling point elevation of 1.76 K. If K_b for acetic acid is 3.07 K kg mol^{-1}, what is the molality of solution ?

Q. 12 Describe the laboratory method of preparation of glucose.

Q. 13 What is a cell constant ? What are its units ?

Q. 14 Mention two applications of co-ordination compounds.

Section - C (3 marks each)

Attempt any Eight. **(24)**

Q. 15 Write the reaction for the following conversions :
a) Benzene to Benzaldehyde
b) Propanone to Propane
c) 4-Nitrobenzoic acid to Nitrobenzene

Q. 16 The half life of a first order reaction is 1.7 hours. How long will it take for 20% of the reactant to react ?

Q. 17 What is action of acetic anhydride on ethyl amine, diethyl amine and triethyl amine ?

Q. 18 Obtain the relationship between freezing point depression of a solution and molar mass of solute.

Q. 19 Write chemical equations indicating the action of following on bromobenzene.
a) CH_3COCl / Anh. $AlCl_3$
b) Fuming H_2SO_4
c) conc. HNO_3 / conc. H_2SO_4

Q. 20 Draw the structures of the following compounds :
a) Sulphuric acid
b) Peroxy disulphuric acid
c) Thioslphuric acid

Q. 21 Derive an equation which implies that the degree of dissociation of weak acid is inversely proportional to the square root of its concentration.

Q. 22 Define Faraday. What current strength in amperes will be required to produce 2.4g of Cu from $CuSO_4$ solution in 1 hour ?
(Molar mass of Cu = 63.5 gmol^{-1})

Q. 23 Write IUPAC name of mesityl oxide. Explain Aldol condensation with suitable example.

Q. 24 Write the reaction for preparation of carbolic acid from aniline. What is the action of conc. H_2SO_4 on carbolic acid at 373K ?

Q. 25 Manganese in the +2 oxidation state is more stable than +3 oxidation state, whereas iron is stable at +3 oxidation state than +2 oxidation state. Explain why ?

Q. 26 What are cationic, anionic and neutral complexes ? Give one example of each.

Section - D (4 marks each)

Attempt any Three. **(12)**

Q. 27 i) Write the name of sugar present in DNA.
ii) Write the name and formula of raw material of Nylon-6 polymer.
iii) Which nanomaterial is used in sunscreen lotion ? Write its use.

Q. 28 i) A compound crystallizes in bcc structure. What is unit cell edge length if diameter of its atom is 120 pm ?
ii) Derive the equation : pH + pOH = 14

Q. 29 i) Describe the action of the following on anisole.
a) Br_2 in acetic acid b) conc. HNO_3
ii) **Match the following pairs :**

Column I	Column II
a) $CH_3-\underset{\displaystyle X}{\underset{\vert}{CH}}-CH_3$	i) Vinyl halide
b) $CH_2=CH-CH_2-X$	ii) alkyl halide
c) $CH_2=CH-X$	iii) benzyl halide
d) C_6H_5-X	iv) allyl halide
	v) aryl halide

Q. 30 i) Why $La(OH)_3$ is the strongest base, while $Lu(OH)_3$ is the weakest base ?
ii) Give two uses of Neon and Argon each.

Q. 31 i) Derive an expression for the maximum work.
ii) **Distinguish between :**
Order of reaction and Molecularity