

PRELIMINARY EXAMINATION
CLASS—XII CHEMISTRY— (February-2014)
SET - A

MAX.MARKS:70
TIME: 3 HOURS

General Instructions:

1. All questions are compulsory.
2. Question nos 1 to 8 are very short answer questions and carry 1 mark each.
3. Question nos 9 to 18 are short answer questions and carry 2 marks each.
4. Question nos 19 to 27 are short answer questions and carry 3 marks each.
5. Question no 28, 29 & 30 are long answer questions and carry 5 marks each.
6. Use log tables if necessary.

- 1 What is the shape of the graph between $\log K$ versus $1/T$? What is the relationship between its slope and activation energy? 1
- 2 Write the IUPAC name of the following compound. 1
 $C_6H_5CH(OH)CH_3$.
- 3 What type of colloidal solutions are formed in the following: 1
(i) Sulphur vapours are passed through cold water.
(ii) white of an egg is mixed with water.
- 4 Draw the structure of $H_2S_2O_7$. 1
- 5 Write two uses of ClO_2 1
- 6 Square planar complexes with coordination number of four exhibit geometrical isomerism whereas tetrahedral complexes do not why? 1
- 7 Arrange the following compounds in the increasing order of acidic character. 1
Benzoic acid, 4-nitro benzoic acid, 3, 4-dinitro benzoic acid, 4-methoxy benzoic acid
- 8 Give the structure of A and B 1
$$CH_3COOH \xrightarrow{\Delta, NH_3} A \xrightarrow{NaOBr} B$$
- 9 (i) Why FeO is solid not found in stoichiometric composition? 2
(ii) In corundum, oxide ions are arranged in hexagonal close packing and aluminum ions occupy two-third of the octahedral voids. What is the formula of corundum?
- 10 (i) Write the anode and cathode reactions taking place in mercury cell. 2
(ii) Why does a mercury cell give a constant voltage throughout its life?
- 11 Distinguish between rate expression and rate constant of a reaction. 2
- 12 Give reasons: 2
(a) The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride.
(b) Grignard reagent should be prepared under anhydrous conditions

13 What happens when 2
(i) Aniline is treated with concentrated sulphuric acid.
(ii) Benzene diazonium chloride is treated with potassium iodide.
Write chemical reactions involved

14 The thermal decomposition of HCOOH is a first order reaction with a 2
rate constant of $2.4 \times 10^{-3} \text{ s}^{-1}$ at a certain temperature. Calculate how
long will it take for three-fourths of the initial quantity of HCOOH to
decompose.

15 How will you bring about the following conversion? 2
(i) Ethanol to ethyl fluoride.
(ii) Benzene to biphenyl.

16 Arrange the following compounds in the order of the property 2
indicated.
(i) $\text{C}_2\text{H}_5\text{NH}_2$, $\text{C}_6\text{H}_5\text{NHCH}_3$, $(\text{C}_2\text{H}_5)_2\text{NH}$ and $\text{C}_6\text{H}_5\text{NH}_2$ (increasing
 pK_b values)
(ii) $\text{C}_2\text{H}_5\text{OH}$, $(\text{CH}_3)_2\text{NH}$, $\text{C}_2\text{H}_5\text{NH}_2$. (increasing order of boiling point)

17 Describe the state of hybridization, the shape and the magnetic 2
behavior of the following complexes:
(i) $[\text{Cr}(\text{H}_2\text{O})_2(\text{C}_2\text{O}_4)_2]^-$
(ii) $[\text{Co}(\text{NH}_3)_6]^{3+}$
(Atomic Number: Cr = 24, Co = 27)

OR

Explain

- (i) Low spin octahedral complexes of nickel are not known.
(ii) The π - complexes are known for transition elements only.

18 An element X with an atomic mass of 60g/mol has a density of 6.23g 2
per cubic cm. If the edge length of its cubic unit cell is 400pm,
identify the type of cubic unit cell. Calculate the radius of an atom of
this element.

19 (a) How do you explain the functionality of a monomer? 3
(b) How does vulcanization change the properties of rubber?
(c) Write the monomers of terylene.

20 Synthetic detergents are cleansing agents which have all the 3
properties of soap but which actually do not contain any soap.
This can be used in both hard as well as soft water as they give
foam even in hard water. Some of the detergents give foam even in
ice-cold water.

(i) What type of detergents is used in toothpaste?

used in air conditioners?

(iii) Liquid dish washing detergents are of which type?

(iv) What is the main problem in using detergents?

(v) What is the solution to above problem? How can we save our environment?

21 (a) Explain how the phenomenon of adsorption finds application in each of the following processes: 3

(i) Production of vacuum (ii) Heterogeneous catalysis.

(b) How does a delta form at the meeting place of sea and river water?

22 Describe how the following changes are brought about: 3

(i) pig iron into steel

(ii) Bauxite into pure alumina

(iii) Impure copper into pure copper.

23 (i) Write the structural difference between DNA and RNA. 3

(ii) Write any two reactions of glucose which cannot be explained by open chain structure of glucose.

24 (a) Arrange the following compounds in the order of the property indicated. 3

(i) M-F, M-Br, M-Cl, M-I (Decreasing ionic character)

(ii) PH_3 , H_2S , HCl (Increasing acid strength)

(b) How is ozone estimated quantitatively?

OR

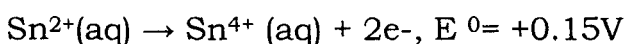
Write chemical equations for the following processes:

(i) Chlorine reacts with a hot concentrated solution of sodium hydroxide.

(ii) Orthophosphorous acid is heated

(iii) PtF_6 and Xenon are mixed together.

25 (i) The two half reactions of an electrochemical cell are given below: 3



Construct the redox reaction from the two half-cell reactions and predict if this reaction favours the formation of reactants or products shown in the equation.

(ii) Predict the products of electrolysis of an aqueous solution of silver nitrate using silver electrodes.

26 (i) Write the mechanism of hydration of ethene to ethanol. 3

(ii) What products are obtained when phenyl benzyl ether is treated

27 Account for the following: 3

(i) Phosphinic acid behaves as a monobasic acid.

(ii) Halogens are coloured.

(iii) The N - O bond in NO_2^- is shorter than the N - O bond in NO_3^-

28 (a) What types of non-idealities are exhibited by cyclohexane and ethanol mixture? Explain with the help of a graph. 5

(b) What concentration of nitrogen should be present in a glass of water at room temperature? Assume a temperature of 25°C , a total pressure of 1 atmosphere and mole fraction of nitrogen in air of 0.78. (K_H for nitrogen = 8.42×10^{-7} M/mm Hg)

(c) How does molarity of a solution change with temperature?

OR

(a) Define Henry's law about solubility of a gas in a liquid.

(b) What is the van't Hoff factor for a compound undergoes dimerization in an organic solvent?

(c) A solution prepared by dissolving 8 g of BaCl_2 in 100 g water raises the boiling point of water by 0.52°C . Calculate the percentage dissociation of barium chloride. K_b for water is $0.52 \text{ K kg mol}^{-1}$. (Molecular mass of barium chloride is 208 g mol^{-1})

29 (a) Assign reason for the following: 5

(i) From element to element the actinoid contraction is greater than lanthanoid contraction.

(ii) The E^0 value for the $\text{Mn}^{3+}/\text{Mn}^{2+}$ couple is much more positive than for $\text{Cr}^{3+}/\text{Cr}^{2+}$.

(iii) Scandium ($Z = 21$) does not exhibit variable oxidation states and yet it is regarded as a transition element.

(b) Write complete chemical equations for;

(i) Oxidation of Fe^{2+} by $\text{Cr}_2\text{O}_7^{2-}$ in acid medium

(ii) Oxidation of $\text{S}_2\text{O}_3^{2-}$ by MnO_4^- in basic medium.

OR

(i) A violet coloured compound of manganese (A) decomposes on heating to liberate oxygen and compounds (B) and (C) of manganese are formed. Compound (C) reacts with KOH in presence of potassium nitrate to give compound (B). On heating compound (C) with conc. sulphuric acid and NaCl, chlorine gas is liberated and a compound (D) of manganese along with other products is formed. Identify compounds A to D and also explain the reactions involved.

(ii) Why are Zn, Cd and Hg normally not regarded as transition metal?

- 30 (a) How are the following conversions done?
- (i) 3-Nitrobromobenzene to 3-Nitrobenzoic acid.
 - (ii) Benzyl alcohol to phenyl ethanoic acid.
 - (iii) Ethanol to But-2-enal.

(b) State chemical tests to distinguish between pairs of compounds:

- (i) Acetophenone and Benzophenone
- (ii) Ethanal and Pentan-3-one.

OR

(a) Write notes on the following reactions.

- (i) Wolff-Kishner reduction (ii) Hell-Volhard-Zelinsky reaction.
- (b) An organic compound (A) on treatment with acetic acid in presence of Sulphuric acid produces an ester (B). (A) on mild oxidation gives (C). (C) with 50% KOH followed by acidification with dilute HCl generates (A) and (D). (D) with PCl_5 followed by reaction with ammonia gives (E). (E) on dehydration gives hydrocyanic acid (HCN). Identify A, B, C, D and E.
