

INTERNATIONAL INDIAN SCHOOL -- DAMMAM  
PRELIMINARY EXAMINATION (2014 – 2015)  
SET-A

CLASS – XII  
SUBJECT-CHEMISTRY

Time : 3Hours  
Max Marks : 70

General Instructions:

- All the questions are compulsory.
- Questions 1 to 5 are very short answer type questions and carry one mark each.
- Questions 6 to 10 carry two marks each.
- Questions 11 to 23 carry three marks each.
- Question 23 is value based question carrying four marks.
- Questions 24 to 26 carry five marks each.
- Logarithmic table is allowed .
- Calculator is not allowed

- 1 Solid A is very hard electrical insulator both in solid and molten state. It melts at extremely high temperature. Which type of solid is it? Identify the force of attraction between the particles. 1
- 2 Out of  $C_6H_5CH_2Cl$  and  $C_6H_5CHClC_6H_5$  which is more easily hydrolysed by aqueous KOH? 1
- 3 Complete the following reaction: 1  
 $C_6H_5OC_2H_5 + HBr \rightleftharpoons$
- 4 Write the IUPAC name of the following compound 1  
 $(CH_3)_2C=CH-CO-CH_3$
- 5 Distinguish between physisorption and chemisorption.(any two) 1
- 6 Write short notes on 2  
 1. Coupling reaction.  
 2. Hoffman's bromide degradation reaction.
- 7 For a certain chemical reaction 2  
 $A + 2B \rightarrow 2C + D$

Expt.	[A] <sub>0</sub>	[B] <sub>0</sub>	Initial Rate
1	0.30	0.30	0.096
2	0.60	0.30	0.384
3	0.30	0.60	0.192
4	0.60	0.60	0.768

For this reaction,

1. Describe the order of the reactions with respect to A and B
2. Write the rate law

8 Account for the following

1. Actinoids exhibit a greater range of oxidation states than the lanthanoids.
2. Enthalpies of atomization of transition elements are quite high.

OR

Why are  $Mn^{2+}$  compounds more stable than  $Fe^{2+}$  towards oxidation to their +3 state?

2

- 9 Mercury cell has a constant cell potential throughout its life term. Explain this with cell reaction. 2
- 10 Account for these: 2
1. Amines are more basic than alcohols of comparable molecular mass.
  2. Diazonium salts of aromatic amines are more stable than that of aliphatic amines.
- 11 1) A metal (atomic mass 50) has a body centered cubic crystal lattice. The density of the metal is  $5.91 \text{ g cm}^{-3}$ . Find the volume of unit cell. ( $N_A = 6.022 \times 10^{23}$ ) -2  
2) Explain the point defect that alters the density of a solid? 1
- 12 1) Explain the role of -  
a) Cryolite in the electrolytic reduction of alumina. 2  
b) Carbon monoxide in the purification of nickel.  
2) What is the significance of leaching in the extraction of aluminium? 1
- 13 A copper – silver cell is set up. The copper ion concentration is 0.10M and the concentration of silver ions is not known. The cell potential of above cell is 0.422V. Determine the concentration of silver along with the representations of the cell. 3  
 $[E^0 \text{ Ag}^+/\text{Ag} = +0.80\text{V}, E^0 \text{ Cu}^{2+}/\text{Cu} = +0.34\text{V}]$   
**OR**
- Define molar conductivity of a solution. Explain with diagram the variation of molar conductivity for strong and weak electrolyte with dilution.
- 14 1) Identify the IUPAC name and draw the geometrical isomers exhibited by the following coordination compounds 2  
a)  $[\text{PtCl}_2(\text{en})_2]^{2+}$  b)  $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$   
2) Draw the splitting of d-orbital of central metal ion in an octahedral crystal field. 1
- 15 Primary alkyl halide (A)  $\text{C}_4\text{H}_9\text{Br}$  reacts with alcoholic KOH to give compound (B). Compound B reacts with HBr to give (C) which is an isomer of (A). When (A) reacts with Na metal it gives a compound (D)  $\text{C}_8\text{H}_{18}$  that was different from the compound when n-butyl bromide was reacting with sodium. Give the structural formula of A to D with equations. 3
- 16 1) What are the following substances? 2  
a) Invert sugar b) Polypeptides  
2) Write the reaction of glucose with bromine water. 1
- 17 What happens in the following activities and define the terms: 1  
1. An electrolyte is added to a hydrated ferric oxide sol in water. 1  
2. A beam of light is passed through a colloidal solution. 1  
3. An electric current is passed through a colloidal solution. 1
- 18 A poly atomic yellow solid (A) on heating above 1000K gives a paramagnetic species (B) which on burning produces a choking compound (C). When (C) is heated in air in presence of a heterogeneous catalyst, compound (D) is obtained which is mixed with (E) to form (F). Dilution of (F) with water produces (E). Identify the compounds. 3
- 19 1) How do antiseptics differ from disinfectants? Give one example each 2  
2) What are the main constituents of Dettol? 1
- 20 1) Write the mechanism involved in the conversion of ethanol to ethene. 2  
2) Give one reaction that shows the acidity of phenol. 2
- 21 1) Describe the preparation of potassium dichromate from chromite ore. 1  
2) How does the nature of metal oxygen bonding in oxides of lower oxidation states differ from those in higher oxidation states? 2

22 1) What is the effect of temperature on the rate constant of a reaction? How can this temperature effect on rate constant be represented quantitatively? 2

2) Distinguish between order and molecularity. 1

23 After the ban on plastic bags, students of one school decided to create awareness among the people about the harmful effects of plastic bags on the environment and the Yamuna River. To make it more impactful, they organized a rally by joining hands with other schools and distributed paper bags to vegetable vendors, shopkeepers and departmental stores. All students pledged not to use polythene bags in future to save the Yamuna River.

After reading the above passage, answer the following questions:

i) What values are shown by the students? 2

ii) What are biodegradable polymers? Give one example. 1

iii) Is polythene a homo polymer or copolymer? 1

24 1) The molal freezing point depression constant for benzene is  $4.90 \text{ K Kg mol}^{-1}$ . Selenium exists as polymer  $\text{Se}_x$ . When 3.26g of selenium is dissolved in 226g of benzene, the observed freezing point is  $0.112^\circ\text{C}$  lower than for pure benzene. Find the molecular formula of selenium. (At. Wt. of selenium is  $78.8 \text{ g mol}^{-1}$ ). 3

2) What is an azeotropic mixture? Which type of azeotrope can be obtained by mixing ethanol and acetone? 2

OR

1) State Raoult's law for a solution of volatile liquids. Explain the deviation of a mixture of carbondisulphide and acetone from Raoult's law with diagram. 3

2) The vapour pressure of water is 12.3 KPa at 300K. Calculate the vapour pressure of 1 molal solution of a non-volatile solute in it. 2

25 1) Arrange the followings in the increasing order of property indicated: 2

$\text{AsH}_3$ ,  $\text{BiH}_3$ ,  $\text{NH}_3$ ,  $\text{PH}_3$ ,  $\text{SbH}_3$  (basic strength)

$\text{HCl}$ ,  $\text{HI}$ ,  $\text{HBr}$ ,  $\text{HF}$  (acidic strength) 2

2) Complete the reactions:

a)  $\text{Cu} + 2 \text{HNO}_3 (\text{dil}) \longrightarrow$

b)  $\text{P}_4 + 3 \text{NaOH} + 3 \text{H}_2\text{O} \longrightarrow$  3

c)  $\text{XeF}_6 + 3 \text{H}_2\text{O} \longrightarrow$

OR

1) Identify the geometry and draw the structures of the following compounds

a)  $\text{XeOF}_4$

b)  $\text{SF}_4$  2

2) Account for the followings:

a) Phosphorous has a greater tendency for catenation than nitrogen. 3

b) Iron dissolves in  $\text{HCl}$  to form  $\text{FeCl}_2$  and not  $\text{FeCl}_3$ .

c)  $\text{NO}$  is paramagnetic and less stable.

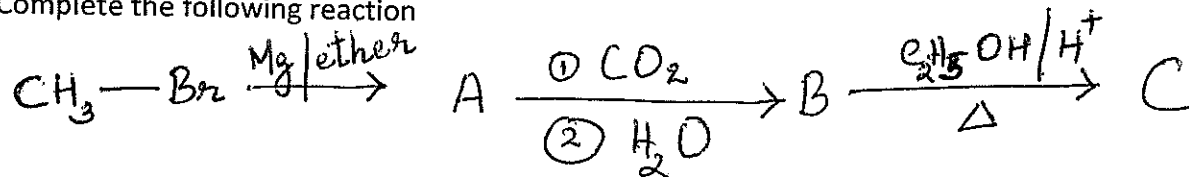
26 1) Bring out the following conversions:

a) Propanal to Butanone

b) Benzene to Benzoic acid 3

c) Ethanol to 3 hydroxy butanal.

2) Complete the following reaction



OR

1) Account for the followings:

- a) Carboxylic acid does not show the characteristic reactions of carbonyl group.
- b) There are two  $\text{NH}_2$  groups in semicarbazide. However only one is involved in the formation of semicarbazones.
- c)  $(\text{CH}_3)_3\text{C-CHO}$  doesn't undergo aldol condensation.

2) Give a chemical test to distinguish between the following pairs.

- a) Benzophenone and Acetophenone.
- b) Salicylic acid and Benzoic Acid.

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SET-B

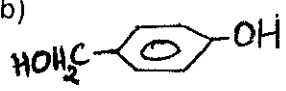
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- 1 Ionic solids, which have anionic vacancies due to metal excess defect develop colour. Why? Give an example. 1
- 2 What happens when methyl chloride is treated with AgCN? 1
- 3 Complete the following reaction 1  
 $(\text{CH}_3)_3\text{C-O-C}_2\text{H}_5 + \text{HI} \rightleftharpoons$
- 4 Write the IUPAC name of the following compound. 1
- 
- 5 What are the two differences between lyophobic and lyophilic colloids? 1
- 6 Write Short notes on 2  
 a) Carbylamine test  
 b) Gabriel Phthalimide Synthesis
- 7 For the reaction  $\text{A} \rightarrow \text{B}$ , the rate of reaction becomes three times when the concentration of A is increased by nine times. What is the order of reaction? 2
- 8 1) Account for the following:  
 a) The transition elements have greater tendency for complex formation.  
 b) The highest oxidation state of a metal is exhibited in its oxides and fluorides.
- OR
- 9 1) What happens when  $\text{KMnO}_4$  is heated? Write two consequences of lanthanoid contraction. 2  
 Solutions of two electrolytes A and B are diluted. The  $\lambda_m$  of B increases 1.5 times while that of A increases 25 times. Which of the two is a strong electrolyte? Justify your answer. 2
- 10 Account for the following: 2  
 a) Aniline on nitration results in substantial amount of meta nitro aniline.  
 b) Tertiary amines are more basic than primary amines.
- 11 1) Aluminium crystallises in a cubic closed packed structure. Its metallic radius is 125pm. 2  
 1) What is the length of side of the unit cell?  
 2) How many unit cells are there in 1.00cm of aluminium?
- 12 1) Write the principle involved in purifying metals used as semiconductors? 1

- 2) Name the common elements present in the anode mud in the electrolytic refining of copper. Why are they so present? 1
- 3) How is cast iron different from pig iron? 1
- 13 1) A current of 1.5A was passed through an electrolytic cell containing  $\text{AgNO}_3$  solution with inert electrodes. The weight of Ag deposited was 1.5g. How long did the current flow? [At. Wt Ag = 108] 2
- 2) Write the cell reaction taking place at the anode and cathode of the above cell. 1
- OR**
- 1) Define corrosion. Explain corrosion of iron in atmosphere along with cell reactions. 2
- 2) Rusting of iron is quicker in saline water than in ordinary water. Why? 1
- 14 1) Identify the IUPAC name of the co-ordination compound  $[\text{Co}(\text{en})_3]\text{Cl}_3$  1
- 2) Draw the geometrical isomers of  $[\text{CrCl}_2(\text{ox})_2]^{3+}$  1
- 3) Draw the splitting of d-orbital of central metal ion in a tetrahedral crystal field 1
- 15 1) Complete the following reactions:
- a)  $\text{C}_6\text{H}_5\text{N}_2\text{Cl} + \text{KI} \longrightarrow$  1
- b)  + HCl  $\longrightarrow$  1
- 2) Why ethyl iodide undergoes  $\text{S}_\text{N}2$  reaction faster than ethyl bromide? 1
- 16 1) What are the following substances? 1
- a) globular proteins b) Polypeptides 2
- 2) Write the reaction of glucose with concentrated nitric acid? 1
- 17 Explain the following observations: 1
- a) Physical adsorption is multilayered, while chemisorption is mono layered. 1
- b) Cottrell's smoke precipitator is fitted at the mouth of chimney used in factories. 1
- c) Medicines are more effective in the colloidal form. 1
- 18 An amorphous solid A burns in air to form a gas B. The gas is also produced as a by-product during the roasting of sulphide ore. This gas decolourises acidified aqueous  $\text{KMnO}_4$  solution and reduces  $\text{Fe}^{3+}$  to  $\text{Fe}^{2+}$ . Identify the solid A and gas B along with equations. 3
- 19 1) How do antiseptics differ from disinfectants? Give one example each. 2
- 2) Why are metal hydroxides better antacids than sodium hydrogen carbonate? 1
- 20 a) Write the mechanism involved in the conversion of ethene to ethanol. 2
- b) Give the reaction for the preparation of phenol from chlorobenzene. 1
- 21 1) Describe the preparation of potassium dichromate from chromite ore. 2
- 2)  $\text{Cu}(\text{I})$  is not stable in aqueous solution. Why? 1
- 22 1) What is the effect of catalyst on the activation energy of a reaction? Explain the effect with diagram. 2
- 2) Distinguish between rate and rate constant of a reaction. 1
- 23 After the ban on plastic bags, students of one school decided to create awareness among the people about the harmful effects of plastic bags on the environment and the Yamuna River. To make it more impactful, they organized a rally by joining hands with other schools and distributed paper bags to vegetable vendors, shopkeepers and departmental stores. All students pledged not to use polythene bags in future to save the Yamuna River.
- After reading the above passage, answer the following questions:

- a) Is polythene a homo polymer or copolymer? 1
- b) What are biodegradable polymers? Give one example 1
- c) What are the values shown by the students ? 2
- 24 1) What happens when
- i) Chlorine is passed through a hot concentrated solution of NaOH.
- ii)  $\text{XeF}_4$  undergoes hydrolysis.
- 2) Arrange the following in the increasing order of the property indicated. 2+3
- a)  $\text{Cl}_2$ ,  $\text{Br}_2$ ,  $\text{I}_2$ ,  $\text{F}_2$  ( Bond dissociation energy)
- b)  $\text{HClO}_3$ ,  $\text{HClO}$ ,  $\text{HClO}_2$ ,  $\text{HClO}_4$  (Acidic Strength)
- c)  $\text{HCl}$ ,  $\text{HF}$ ,  $\text{HBr}$ ,  $\text{HI}$  ( Boiling Point)

OR

- 1) Account for the following:
- i)  $\text{N}_2$  is inert in atmosphere.
- ii) Bond angle of  $\text{PH}_4^+$  is greater than  $\text{PH}_3$  3+2
- iii) Solid phosphorous pentachloride behaves as an ionic compound.
- 2) Draw the structures of the following compounds
- 1) pyrophosphoric acid
- 2) cyclotrimeta phosphoric acid
- 25 1) 2g of benzoic acid ( $\text{C}_6\text{H}_5\text{COOH}$ ) dissolved in 25g of benzene shows a depression in freezing point equal to 1.62K. Molal depression constant for benzene is 4.9K Kg/mol. What is the percentage of acid if it forms dimer in solution. (c-12, H-1, O-16) 3+2
- 2) What is an azeotropic mixture? Which type of azeotrope can be obtained by mixing ethanol and acetone?

OR

- 1) State Raoult's law for a solution of volatile liquids. Explain the deviation of a mixture of chloroform and acetone from Raoult's law with diagram. 3+2
- 2) Define the term osmotic pressure. Describe how the molecular mass of a substance can be determined by a method based on measurement of osmotic pressure.
- 26 1) Account for the following:
- a) Acetone is less reactive than propanal towards nucleophilic addition reaction. 3+2
- b)  $\text{HCOOH}$  does not undergo HVZ reaction.
- c) Sodium bisulphite can be used for the purification of aldehydes and ketones.
- 2) An organic compound A  $\text{C}_8\text{H}_{16}\text{O}_2$  was hydrolysed with dilute sulphuric acid to give a carboxylic acid B and an alcohol C. Oxidation of C with chromic acid produced B. Identify the compound along with equations

OR

- 1) Bring out the following conversions:
- a) Ethanol to Propanone
- b) Toluene to Benzene.
- c) Ethanol to 3-hydroxy butanal. 3+2
- 2) Give a chemical test to distinguish between the following pairs:
- a) Propanal and Ethanal.
- b) Benzoic acid and Phenol.

