

INTERNATIONAL INDIAN SCHOOL - DAMMAM  
SECOND TERMINAL EXAMINATION – DECEMBER 2015  
CHEMISTRY – XII  
SET A

allowed: 3 hours

Maximum Marks:70

**General Instructions:**

All questions are compulsory.

Questions number 1 to 5 are very short answer questions and carry 1 mark each.

Questions number 6 to 10 are short answer questions and carry 2 marks each.

Questions number 11 to 22 are also short answer questions and carry 3 marks each.

Question number 23 is a value based question and carry 4 marks.

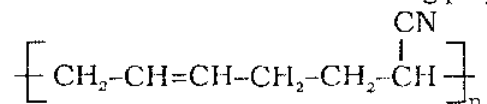
Questions number 24 to 26 are long answer questions and carry 5 marks each.

Use log tables, if necessary. Use of calculators is **not** allowed.

CO is a stronger ligand than  $\text{NH}_3$ . Give reason. 1

Define the term molecularity of a reaction. 1

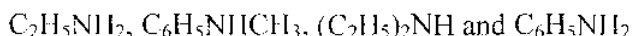
Name the monomers in the following polymer. 1



Predict the products of electrolysis of aqueous solution of  $\text{AgNO}_3$  with silver electrodes. 1

Write the electronic configuration of Lawrencium ( $_{103}\text{Lr}$ ) and comment on its possible oxidation state. 1

a) Arrange the following in the increasing order of their basic strength. 1



b) Give a chemical test to distinguish between aniline and N-methylaniline. 1

At  $25^\circ\text{C}$  the saturated vapour pressure of water is 23.75 mm Hg. Find the saturated vapour pressure of a 5% aqueous solution of urea at the same temperature. (Molar mass of urea =  $60.05 \text{ g mol}^{-1}$ ) 2

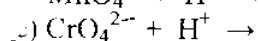
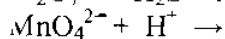
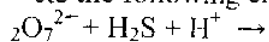
OR

Calculate the boiling point of a solution prepared by adding 15.0 g of NaCl to 250.0 g of water. ( $K_b$  for water =  $0.512 \text{ K kg mol}^{-1}$ , atomic mass of Na = 23, Cl = 35.5)

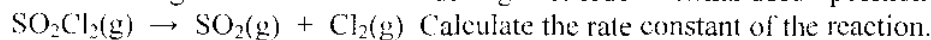
- 8 Explain what is observed when?  
 a) An electrolyte NaCl is added to hydrated ferric oxide sol.  
 b) Freshly prepared precipitate of  $\text{Fe}(\text{OH})_3$  is shaken with a small amount of electrolyte.
- 9 Write equations for the reactions taking place when:  
 a) Chlorine is passed through hot and concentrated NaOH solution.  
 b) Sulphur dioxide gas is passed through an aqueous solution of Fe(III) salt.
- 10 a) Write a chemical equation to confirm the presence of a primary alcoholic group in glucose. 1  
 b) Why cannot vitamin C be stored in our body? 1
- 11 Account for the following: 3  
 a) Ce(IV) is a good oxidising agent.  
 b) Transition metals are good catalysts.  
 c) Zr and Hf have similar atomic and ionic sizes.
- 12 a) With the help of a suitable example illustrate Ammonolysis of alkyl halides. 1  
 b) Write the structure of A and B in the following reactions:  
 i)  $\text{C}_6\text{H}_5\text{NH}_2 \xrightarrow[0^\circ\text{C}]{\text{NaNO}_2 + \text{HCl}} \text{A} \xrightarrow[\Delta]{\text{H}_2\text{O}} \text{B}$  1  
 ii)  $\text{CH}_3\text{CH}_2\text{CN} \xrightarrow{\text{LiAlH}_4} \text{A} \xrightarrow[0^\circ\text{C}]{\text{NaNO}_2 + \text{HCl}} \text{B}$  1
- 13 a) The variation of rate constant 'k' of a reaction with temperature 'T' is given by Arrhenius equation. Draw a graph for  $\log k$  vs  $1/T$ . If the slope of the straight line obtained in this graph is  $-4250 \text{ K}$ , calculate activation energy  $E_a$  for the reaction. ( $R=8.314 \text{ J K}^{-1}\text{mol}^{-1}$ ) 2  
 b) A reaction is first order in A and second order in B. How is the rate affected when concentration of both A & B is doubled? 1
- 14 a) Arrange the following in the increasing order of the property indicated: 2  
 i)  $\text{H}_2\text{S}, \text{H}_2\text{Te}, \text{H}_2\text{O}, \text{H}_2\text{Se}$  (acidic strength)  
 ii)  $\text{SbH}_3, \text{PH}_3, \text{BiH}_3, \text{NH}_3, \text{AsH}_3$  (basic strength)  
 b) Which allotrope of sulphur is thermally stable at room temperature? 1
- 15 How do you convert the following: 3  
 a) Ethanal to But-2-enal  
 b) Benzoic acid to Benzaldehyde  
 c) But-2-ene to ethanal
- 16 Explain the following terms with one example in each case: 3  
 a) Antiseptics  
 b) Antacids  
 c) Artificial sweeteners

Write the following chemical equations and balance them:

3



6a) The following data were obtained during first order thermal decomposition of  $\text{SO}_2\text{Cl}_2$ .



4

| Experiment | Time (s) | Total pressure (atm) |
|------------|----------|----------------------|
| 1          | 0        | 0.4                  |
| 2          | 100      | 0.7                  |

2

b) What are zero order reactions? Give an example.

1

OR

a) The rate constant  $K$  for a first order reaction has been found to be  $2.54 \times 10^{-3} \text{ s}^{-1}$ .

2

Calculate its three-fourth life.

b) What are pseudo first order reactions? Give an example.

1

a) Explain the application of adsorption in the production of high vacuum.

b) What is the role of desorption in the process of catalysis?

3

c) What are the dispersed phase and dispersion medium of smoke?

a) Draw the optical isomers of  $[\text{PtCl}_2(\text{en})_2]^{2+}$ .

b) On the basis of crystal field theory, write the electronic configuration for  $d^4$  ion, if  $\Delta_o < P$ .

3

c) Write the hybridization type and magnetic behaviour of the complex  $[\text{CoF}_6]^{3-}$ .

Atomic number of Cobalt = 27

a) Why is sucrose known as non reducing sugar?

b) Differentiate between fibrous and globular protein.

3

c) Explain the term peptide linkage.

a) Distinguish between addition polymerisation and condensation polymerisation.

b) Classify the following as homopolymers and copolymers:

3

Bakelite, Neoprene, Teflon, PHBV

c) Arrange the following polymers in the increasing order of their intermolecular forces:

Nylon 6, Buna-S, Polyvinyl chloride

Scuba divers cope with high concentrations of dissolved gases while breathing air at high pressure underwater but when they come towards the surface, the pressure gradually decreases resulting in a painful and dangerous medical condition. To avoid this medical condition due to the toxic effects of high concentration of nitrogen gas, the air is diluted with helium. After reading the above passage, answer the following questions. 4

a) What is the name of this painful medical condition and how can this be overcome by diluting the air with helium?

b) State the law used to calculate the concentration of gases in solution.

- c) Why does the solubility of gases in liquids generally decrease with increase in temperature?
- d) Mention the value associated with providing divers air diluted with helium.
- 24 a) Write the cell reaction and calculate the cell potential for the following cell at 298 K. 3  
 $\text{Cr}_{(s)}/\text{Cr}^{3+}(0.01\text{M})//\text{Fe}^{2+}(0.1\text{M})/\text{Fe}_{(s)}$  ( $E^0 \text{Cr}^{3+}/\text{Cr} = -0.74 \text{ V}$ ,  $E^0 \text{Fe}^{2+}/\text{Fe} = -0.44 \text{ V}$ )
- b) Write the reactions taking place at anode and cathode of  $\text{H}_2\text{-O}_2$  fuel cell. 1
- c) State Kohlrausch law of independent migration of ions. 1

OR

- a) An aqueous solution of  $\text{CuSO}_4$  was electrolysed between platinum electrodes using a current of 0.25 ampere for 50 minutes. Write the cathodic reaction and calculate the mass of copper deposited at the cathode. (Atomic mass of  $\text{Cu} = 63.5 \text{ g/mol}$ ) 3
- b) Explain how corrosion is an electrochemical phenomenon. Write chemical equations. 2
- 25 a) With the help of a suitable example illustrate the following reactions: 2  
 i) Stephen reaction  
 ii) Cannizzaro reaction
- b) Draw the structure of 3-Bromo-4-phenylpentanoic acid. 1
- c) Arrange the following in the increasing order of reactivity towards nucleophilic addition: 1  
 Acetone, Di-tert-butyl ketone, Acetaldehyde, Methyl tert-butyl ketone
- d) Give a chemical test to distinguish between ethanal and propanal. 1

OR

- a) An organic compound (A) with molecular formula  $\text{C}_7\text{H}_6\text{O}$  has a characteristic odour. (A) on reaction with conc.  $\text{NaOH}$  undergoes disproportionation and forms (B) and (C). (A) reacts with  $\text{Zn-Hg}$  and conc  $\text{HCl}$  to give (D) which changes to (A) by  $\text{CrO}_2\text{Cl}_2$ . (B) on heating with soda lime gives an aromatic hydrocarbon (E). Identify (A) to (E) and write all equations. 3
- b) Give reasons for the following: 2  
 i) Cyclohexanone forms cyanohydrin in good yield but not 2,2,6-trimethylcyclohexanone.  
 ii) There are two  $-\text{NH}_2$  groups in semicarbazide. However, only one is involved in the formation of semicarbazones.
- 26 a) Account for the following: 3  
 i)  $\text{H}_3\text{PO}_2$  is a stronger reducing agent than  $\text{H}_3\text{PO}_3$ .  
 ii) White phosphorus is more reactive than red phosphorus.  
 iii) Reducing character decreases from  $\text{SO}_2$  to  $\text{TeO}_2$ .
- b) Draw the structures of the following: i)  $\text{XeOF}_4$  ii)  $(\text{HPO}_3)_n$  Polymetaphosphoric acid 2

OR

- a) Account for the following: 3  
 i) Phosphorus has a greater tendency for catenation than nitrogen.  
 ii) Although electron gain enthalpy of fluorine is less negative as compared to chlorine, fluorine is a stronger oxidising agent than chlorine.  
 iii) Iron on reaction with  $\text{HCl}$  forms  $\text{FeCl}_2$  and not  $\text{FeCl}_3$ .
- b) Draw the structures of the following: i)  $\text{XeF}_6$  ii)  $(\text{HPO}_3)_3$  Cyclotrimetaphosphoric acid 2