

Quarterly Examination - 2017-2018

Chemistry

Time : 3 Hrs. + 15 min.

Std. : XII

F. M. : 70

[Question 1 is of 20 marks and all questions are compulsory. Question 2 to 8 carry 2 marks, with two questions having internal choices. Question 9 to 15 carry 3 marks each with two questions having internal choices. Question 16 to 18 carry 5 marks each and each question have an internal choice.]

PART I (20 Marks)

(Answer all questions)

- Q1. a. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (4)
- Vant Haff factor of acetic acid solution is _____ than one and value of normal colligative property is _____ than observed colligative property.
 - Half-life period of a _____ order reaction is _____ of the concentration of the reactant.
 - In the compound [Fe (EDTA)], the coordination number and the oxidation number of the central metal ion are _____ and _____ respectively.
 - Benzaldehyde undergoes _____ reaction due to _____ of α hydrogen atom.
- b. Complete the following by selecting the correct alternatives from the choices given : (4x1=4)
- When acetaldehyde is treated with Grignard reagent followed by hydrolysis, the product formed is
A. primary alcohol B. secondary alcohol C. carboxylic acid D. tertiary alcohol
 - On heating chloroform with aqueous potash we get
A. butanoic acid B. propanoic acid C. Ethanoic acid D. Methanoic acid
 - At any stage of the reaction $3A \rightarrow 2B$ the reaction rate $+\frac{dB}{dt}$ will be equal to
A. $-3 \frac{dA}{dt}$ B. $-\frac{dA}{dt}$ C. $-\frac{2}{3} \frac{dA}{dt}$ D. $-\frac{3}{2} \frac{dA}{dt}$
 - Which of the following 0.1 (M) aqueous solution has lowest freezing point?
A. K_2SO_4 B. NaCl C. Urea D. Glucose

- c. Match the following : (4x1=4)
- | | |
|--|---|
| i. First order reaction | a. Acetone |
| ii. Chloropicrin | b. Formaldehyde |
| iii. $[\text{Co}(\text{NH}_3)_6]^{3+}$ | c. Sec^{-1} |
| iv. Iodoform | d. $\text{Mole L}^{-1} \text{Sec}^{-1}$ |
| | e. Octahedral |
| | f. Insecticide |

- d. Answer the following questions : (4x2=8)
- i. a. Write a chemical test to distinguish between acetone and phenol.
 b. Which substituent out of $-\text{CN}$ and $-\text{NH}_2$ increases the acid strength of phenol?
- ii. a. The rate of first order reaction is $1.5 \times 10^{-2} \text{ mol L}^{-1} \text{ min}^{-1}$ at 0.5(M) concentration of the reactant. What is the half life of the reaction?
 b. Write the rate law and order of the reaction
 $\text{AB}_2 + \text{C}_2 \longrightarrow \text{AB}_2\text{C} + \text{C}$ (slow)
 $\text{AB}_2 + \text{C} \longrightarrow \text{AB}_2\text{C}$ (fast)
- iii. Write two balanced equations for the preparation of potassium dichromate from sodium chromate.
- iv. a. Draw the structure of permanganate ion.
 b. Draw two geometrical isomers of $[\text{CoCl}_2(\text{en})_2]^+$ ion

PART II

Q2. For a reaction $\text{A} + \text{B} \longrightarrow \text{C} + \text{D}$ if concentration of A is doubled without altering that of B, rate doubles. If concentration of B is increased nine times without altering that of A, rate triples. What is the order of the reaction?

OR

For the reaction $\text{A} \longrightarrow \text{B} + \text{C}$, the following data were obtained :

Time in second \longrightarrow	0	900	1800
Concentration of A \longrightarrow	60.6	19.7	7.82

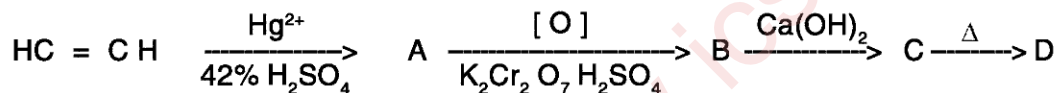
Find the order of the reaction

3. Explain : a) vapour pressure of an aqueous solution of glucose is lower than that of water.
 b) Two liquids A & B boils at 145°C and 190°C respectively. Which of them has higher vapour pressure at 80°C ? Explain.
4. Write IUPAC names of the following compounds :
- | | |
|---|--|
| i. $\text{K}_2[\text{Zn}(\text{OH})_4]$ | ii. $[\text{Cr}(\text{NH}_3)_5\text{CO}_3]\text{Br}$ |
| iii. $[\text{Co}(\text{ONO})_6]^{3-}$ | iv. $[\text{CoCl}_2(\text{en})_2]_2\text{SO}_4$ |

5. Give balanced equations for the following :
- Potassium iodide is treated with acidified KMnO_4 solution
 - Sulphuric acid is treated with hydrogen sulphide.

OR

- Sulphurdioxide acts as an oxidising agent as well as reducing agent. Give one reaction each to show its oxidising nature and its reducing nature.
6. What type of isomerism is exhibited by the following pairs of compounds?
- $[\text{Cr}(\text{SCN})(\text{H}_2\text{O})_5]^{2+}$ & $[\text{Cr}(\text{NCS})(\text{H}_2\text{O})_5]^{2+}$
 - $[\text{Cu}(\text{NH}_3)_4][\text{PtCl}_4]$ & $[\text{Pt}(\text{NH}_3)_4][\text{CuCl}_4]$
 - $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$ & $[\text{CrCl}(\text{H}_2\text{O})_5]\text{Cl}_2 \cdot \text{H}_2\text{O}$
 - Cis - $[\text{Pt}(\text{NH}_3)(\text{H}_2\text{O})\text{Cl}_2]$ & trans $[\text{Pt}(\text{NH}_3)(\text{H}_2\text{O})\text{Cl}_2]$
7. Identify A, B, C, D :



8. a. Account for the following :
- Sodium metal can not be used for drying alcohol.
- b. Arrange the following in the increasing order of acidity : ethanol, phenol and 4-nitro phenol
9. a. 2g of benzoic acid dissolved in 25g of benzene shows a depression in freezing point equal to 1.62K. What is the percentage association of benzoic acid if it forms a dimer in solution? [K_f of benzene = 4.9 K Kg mol^{-1}]
- b. Aquatic animals are more comfortable in cold water in comparison to warm water. Explain.
10. Give all the reactions for the extraction of silver from silver glance.

OR

Write all the reactions for extraction of copper for roasting, smelting and self reduction process.

11. a. A certain reaction is 50% complete in 20 minutes at 300 K and the same reaction is again 50% complete in 5 mins. at 350 K. Calculate the activation energy if it is a first order reaction. [$R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$]
- b. Identify the reaction order from each of the following rate :
- $K = 2 \times 10^5 \text{ L mol}^{-1} \text{ S}^{-1}$
 - $K = 3.1 \times 10^{-4} \text{ mol L}^{-1} \text{ S}^{-1}$
12. Write a test to distinguish between the two compounds :
- a. Ethyl alcohol and propan - 2 - Ol

- b. Acetaldehyde and acetone
c. Phenol and formaldehyde
13. a. The rate constant of a first order reaction is $4.5 \times 10^{-2} \text{ Sec}^{-1}$. What will be the time required for the initial concentration of 0.4 M of the reactant to be reduced to 0.2 M?
b. The molal freezing point constant of water is $1.86 \text{ Kkg Mol}^{-1}$. Therefore the freezing point of 0.1 (M) NaCl in water is expected to be
a. -1.86°C b. -0.372°C c. $+0.372^\circ\text{C}$
14. Carry out the following conversions
a. Benzene to o-chloronitrobenzene
b. Chloroform to acetylene
c. Acetaldehyde to propene - 2 - al

OR

- a. Ethanol chloride to ethanal
b. Bromo ethane to diethyl ether
c. Phenol to nitrobenzene
15. Write balanced equations for the following named reactions :
a. Cannizzaro's reaction
b. Kolbe's reaction
c. Carbylamine reaction.
16. a. What type of structural isomers are $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$?
Give a chemical test to distinguish the isomers.
b. Account for the following :
i. Why is H_2S more acidic than H_2O ?
ii. The decreasing order of basicity of hydrides of group 15 is $\text{NH}_3 > \text{PH}_3 > \text{BiH}_3$.
c. Give the structural formula of the following compounds :
i. Sodium dithiosulphato argentate (I)
ii. tri (oxalato) chromate (III) ion
iii. triammine chlorido cyanido nitrito cobalt (III)

OR

- a. Draw the structures of three isomers of the compound $[\text{CoCl}_2(\text{en})_2]^+$

- b. Write balance equations for the following :
- Hydrolysis of phosphorus pentachloride
 - Ozone is passed through mercury
- c. For the compound $[\text{CoF}_6]^{3-}$
- What is oxidation number of cobalt in the complex?
 - How many unpaired electrons are there in the complex?
 - State the magnetic behaviour of the complex.
17. a. Define Raoult's law for solutions containing non volatile solutes
- b. The rate law for a reaction is given by $r = K [\text{NO}]^2 [\text{O}_2]$. How will the rate change if the volume of the reaction vessel is reduced to one fourth of its initial volume?
- c. The time taken for completion of 3/4th of a first order reaction is -
- $(2.303/K) \log 3/4$
 - $(2.303 / k) \log 4$
 - $(2.303 / k) \log 4/3$
- d. The osmotic pressure of 0.01 molar solution of an electrolyte is found to be 0.65 atm at 27°C. Calculate the Vant Hoff factor. What conclusion can you draw about the molecular state of the solute in the solution?

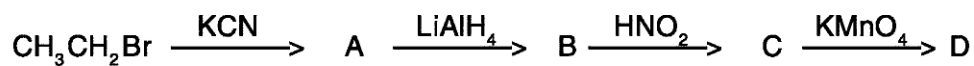
OR

- a. Define ebullioscopic constant
- b. Which of the following will react fastest i.e., produce more products in a given time? explain
- 5 mol of X & 5 mol of Y in a 5L vessel or
 - 2 mol of X & 2 mol of Y in a 1L vessel?
- c. The half life of a reaction is halved as the initial concentration of the reactants is doubled. The order of the reaction is
- 0.50
 - 2
 - 1
- d. Ethylene glycol is used as antifreeze agent. Calculate the amount of glycol to be added to 4 kg of water to prevent it from freezing at -6°C . [K_f of water = $1.85 \text{ K Kg mol}^{-1}$]
18. a. Write one observation when :
- Phenol is reacted with benzene diazonium chloride.
 - Acetone is reacted with crystals of iodine and sodium hydroxide
 - Acetaldehyde is treated with a mixture of alkaline solution of copper sulphate and sodium potassium tartrate.
 - Phenol is treated with bromine water.

- b. An organic compound A has the molecular formula C_7H_6O . When A is treated with NaOH followed by acid hydrolysis it gives two products B and C. When B is oxidised it gives A, When A and C are each separately treated with PCl_5 , they give two different products D & E. Identify A, B, C, D, E

OR

- a. Identify A, B, C, D



- b. Write balanced equations for the following reactions :
- Chloroform is heated with phenol and caustic alkali
 - Formation of propane from acetone
 - Formation of urotropin from formaldehyde