

First Terminal Examination 2016 - 2017

Class - XII

Subject - Chemistry

Time : 3 Hours

Max. Marks : 70

General Instructions :

- All questions are compulsory.
- Q. 1 to 5 are very short answer questions carrying 1 mark each.
- Q. 6 to 10 are short answer questions carrying 2 marks each.
- Q. 11 to 22 are also short answer questions carrying 3 marks each.
- Q. 23 is a value based question carrying 4 marks.
- Q. 24 to 26 are long answer questions carrying 5 marks each.
- Use log tables if necessary. Calculators are not allowed.

- Give an example of solid showing both Schottky and Frenkel defect.
- Name a physical factor on which solubility of solid solute in liquid solvent does not depend.
- Why is it not possible to determine λ_m° for weak electrolytes by extrapolation?
- The decomposition of ammonia gas on platinum surface has a rate constant $k = 2.5 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$. What is the order of the reaction?
- Give IUPAC name of : $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}(\text{Cl})\text{CH}_3$
- Using the data given below, predict the strongest :
 - Oxidizing agent
 - Reducing agent(Given : $E^\circ_{\text{Cr}_2\text{O}_7^{2-}/\text{Cr}^{3+}} = 1.33 \text{ V}$, $E^\circ_{\text{Cl}_2/\text{Cl}^-} = 1.36 \text{ V}$,
 $E^\circ_{\text{MnO}_4^-/\text{Mn}^{2+}} = 1.51 \text{ V}$, $E^\circ_{\text{Cr}_3^+/\text{Cr}} = -0.74 \text{ V}$)
- The rate of a particular reaction triples when temperature changes from 50°C to 100°C . Calculate the activation energy of the reaction. ($R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$)
- Which of the following compounds will be coloured in solid state? Give reason for your answer :
 - Ag_2SO_4
 - CuF_2
 - ZnF_2
 - Cu_2Cl_2

9. Write a well labeled mechanism of ethanol giving ethoxyethane in presence of acid at 413 K.
10. Write the equation for reaction of dichromate ions with (a) ferrous ions (b) sulphide ions in acidic medium.
11. (a) A sample of ferrous oxide has actual formula $\text{Fe}_{0.93}\text{O}_{1.00}$. In this sample, what fraction of metal ions are Fe^{2+} ions?
(b) Why is glass considered a super cooled liquid?
12. For a cell $\text{Cu}/\text{Cu}^{2+} (0.1\text{M})//\text{Ag}^+/\text{Ag}$, the EMF generated is 0.422 V. Calculate concentration of Ag^+ ions. ($E^\circ_{\text{Cu}^{2+}/\text{Cu}} = 0.34\text{ V}$, $E^\circ_{\text{Ag}^+/\text{Ag}} = 0.80\text{ V}$)
13. Three electrolytic cells A, B and C containing solution of zinc sulphate, silver nitrate and copper sulphate are connected in series. A steady current of 2 amperes was passed through them until 1.08 g of silver was deposited at cathode of cell B.
(a) How long did the current flow?
(b) What mass of copper is deposited at cell C? (Molar Mass_{Cu} = 63.5, Molar Mass_{Ag} = 108)
14. During nuclear explosions, one of the products is ^{90}Sr with half life of 28.2 years. If 2 mg of ^{90}Sr was absorbed in the bones of a newly born baby instead of Ca, how much of it will remain after 40 years?
15. (a) Show that the time required for 99% completion of a first order reaction is twice the time required for 90% completion.
(b) Explain the term collision frequency in context of collision theory of chemical reactions.

OR

- (a) A reaction is first order in A and second order in B.
(i) Write the rate law expression.
(ii) How is the rate affected of increasing the concentration of B three times?
(iii) How is the rate affected when concentration of both A and B are doubled?
- (b) Explain the term steric factor in context of collision theory of chemical reactions.

16. Give suitable reason for the following :

- (a) On addition of conc. H_2SO_4 to a chloride salt, colourless fumes are evolved but in case of iodide salt, violet fumes come out.
- (b) ClF_3 exists but FCl_3 does not.
- (c) Oxygen exists as a gas but sulphur as a solid.

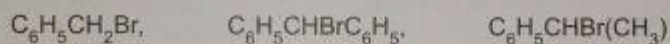
17. (a) Write equations to show how iron (III) catalyses reaction between iodide and persulphate ions.
(b) Give any 2 physical/chemical properties of interstitial compounds of d-block elements.

18. (a) Allyl chloride is hydrolysed more readily than n-propyl chloride. Why?

(b) Which of the following molecules is chiral in nature?

- (i) 2-Bromobutane
- (ii) 1-Bromobutane
- (iii) 2-Bromopropane
- (iv) 2-Bromopropan-2-ol

(c) Arrange the following compounds in order of reactivity towards S_N2 displacements :



19. An element with molar mass 27 gmol^{-1} forms a cubic unit cell with edge length $4.05 \times 10^{-8} \text{ cm}$. If its density is 2.7 g cm^{-3} , what is the nature of the cubic unit cell? Also calculate the radius of the atom of that element.

20. (a) Draw the structure of 1-Bromo-4-sec-butyl-2-methylbenzene.

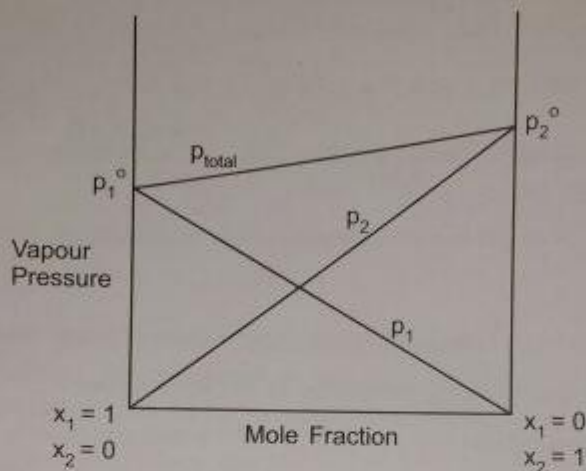
(b) For preparation of chloroalkanes, treatment of corresponding alcohol with thionyl chloride is the preferred method. Why?

(c) Write a short note on Freons.

21. Give reason why :

- (a) Actinoids show more variation in oxidation states than lanthanoids.
- (b) Zinc is not considered as a transition element.
- (c) $E^\circ_{M^{2+}/M}$ decrease along 3d series.

22. Given below is a graph between vapour pressure (y-axis) and mole fraction (x-axis) of the two components 1 and 2 of a solution. Based on the graph answer the following questions :



- (a) Is the graph depicting ideal or non-ideal solution ?
 - (b) How will the vapour pressure of solution vary on increasing mole fraction of component 1 ?
 - (c) Which law governs the variation of partial vapour pressure with respect to mole fraction in solution ?
23. Priya and Rekha planned for a start up of bleaching agents. There were two types of bleaching agents that they can work upon, one is chlorine water and the other was sulphur dioxide gas. Rekha suggested use of chlorine water.
- (a) Which of the two is a better bleaching agent and why ?
 - (b) What are the harmful effects of using sulphur dioxide ?
 - (c) What values are shown by Rekha's decision ?
24. (a) Give suitable explanation for the following :
- (i) 0.5 M solution of NaCl shows a higher value of osmotic pressure than 0.5 M glucose solution at the same temperature.

- (ii) Deep sea divers use oxygen cylinders diluted with helium.
- (iii) Mixture of ethyl alcohol and water cannot be separated completely by fractional distillation.
- (b) Calculate the boiling point of a solution containing 0.456 g of camphor (mol. mass = 152) dissolved in 31.4 g of acetone. (B.P. of pure acetone = 56.30°C , K_b for acetone = 17.2°C).

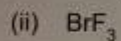
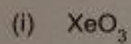
OR

- (a) Why are soft drink bottles sealed under higher pressure?
- (b) What will be the value of Van't Hoff factor for a species which exists as octatomic molecule assuming 100% association?
- (c) Give one example of natural and one of manmade SPM.
- (d) Calculate the osmotic pressure of a solution obtained by mixing 100 cm^3 of 0.25 M solution of urea and 100 cm^3 of 0.1 molar solution of cane sugar at 293 K. ($R = 0.082\text{ L atm mol}^{-1}\text{ K}^{-1}$)
25. (a) Write short note on Kolbe's reaction.
- (b) Carry out the conversion : methyl magnesium bromide to 2-methylpropan-2-ol.
- (c) How will you distinguish between phenol and cyclohexanol?
- (d) Name the reagents used in the following reactions :
- (i) Oxidation of primary alcohol to aldehyde
- (ii) Butan-2-ol to butanone
- (e) Why is phenol more acidic than cyclohexanol?

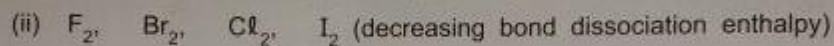
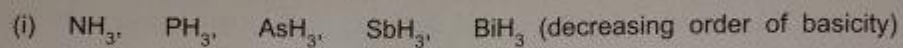
OR

- (a) Write the equation involved for preparation of t-butyl ethyl ether using Williamson's ether synthesis.
- (b) Carry out the following conversion : ethyl magnesium chloride to propan-1-ol.
- (c) How will you distinguish between 2-methyl propanol and propan-2-ol?
- (d) Write short note on Reimer Tiemen reaction.
- (e) Why is ortho nitro phenol more acidic than ortho methoxy phenol?

26. (a) Draw structure of the following :



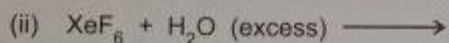
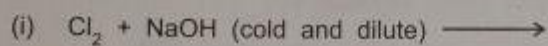
(b) Arrange in the order as indicated with reason :



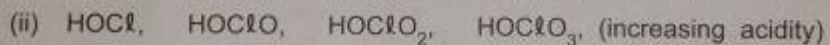
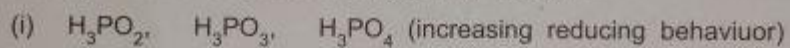
(c) Give two uses of H_2SO_4 .

OR

(a) Complete the equations :



(b) Arrange in the order as indicated with reason :



(c) Draw structure of $\text{H}_2\text{S}_2\text{O}_7$.