



INDIAN SCHOOL SOHAR
PRE FINAL EXAM 2015-2016
CHEMISTRY

STD: XI
Date: 2 February, 2016

MARKS : 70
TIME : 3 Hrs

Instructions:

1. All questions are compulsory.
2. Question nos. 1-5 are very short answer questions and carry 1 mark each.
3. Question nos. 6-10 are short answer questions and carry 2 marks each.
4. Question nos. 11-22 are short answer questions and carry 3 marks each.
5. Question no. 23 is value based question and carry 4 marks.
6. Question nos. 24-26 are long answer questions and carry 5 marks each.
7. Write serial no. of the question before attempting it.
8. Use log tables for calculations.

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1. Which has higher second ionization enthalpy and why ? Na or Mg
 2. A gaseous mixture contains 2.2 bar He, 1.1 bar H₂ and 4.2 bar N₂. What is the mole fraction of N₂ ?
 3. For the reaction N₂(g) + 3H₂(g) \longrightarrow 2NH₃(g), predict whether work is done on the system or by the system and justify your answer.
 4. A solution of silver nitrate was stirred with iron rod. Will it cause any change in the concentration of silver and nitrate ions? $E^{\circ}_{\text{Fe}^{2+}/\text{Fe}} = -0.44\text{V}$; $E^{\circ}_{\text{Ag}^{+}/\text{Ag}} = +0.80\text{V}$
 5. Write the IUPAC name of $\text{CH}_3\text{-CH}(\text{OCH}_3)\text{-C}(\text{O})\text{-CH}(\text{CH}_3)\text{-OCH}_2\text{CH}_3$
 - 6.a) How many atoms are present in 1mL of NH₃ at STP ?
b) Calculate the number of moles of NaOH in 27 cc of 0.15M NaOH solution.
 7. Illustrate bonding and antibonding molecular orbitals based on hydrogen molecule. Explain why bonding molecular orbitals are more stable than antibonding molecular orbitals.
 8. Balance the following chemical equation by ion electron method in basic medium:
 $\text{MnO}_4^- + \text{I}^- \longrightarrow \text{MnO}_2 + \text{IO}_3^-$
 9. What is meant by diagonal relationship? Give any one property of lithium to show its diagonal relationship with magnesium.

OR

Arrange the following ions in the increasing order of their hydration enthalpy and account for your answer: Li⁺, Na⁺, K⁺, Rb⁺, Cs⁺

- 10.a) Write all the isomers of the compound with molecular formula C₃H₈O.
b) CH₂=CH⁻ is a better nucleophile than HC \equiv C⁻
11. Calculate the volume at STP occupied by
 - a) 14g of nitrogen
 - b) 1.5 moles of CO₂
 - c) 10²¹ molecules of oxygen. (Atomic mass of N=14)

- 12.a) Write the electronic configuration of Cr^{3+} ($Z = 24$).
- b) Which quantum number determines i) energy of electron ii) orientation of orbital?
- c) The number of electrons, protons and neutrons in a species are 18, 16 and 16 respectively. Assign proper symbol to the species.
13. Account for the following:
- a) Ionisation enthalpy of nitrogen is more than that of oxygen.
- b) A cation is always smaller than its parent atom.
- c) Noble gases have large positive electron gain enthalpies.
14. What do you understand by 'quantum numbers'? Explain briefly the significance of each.
- 15.a) Define lattice enthalpy. How is it related to the stability of an ionic compound?
- b) How does electronegativity help in predicting whether a covalent bond is polar or non-polar?
16. Write the conditions of temperature and pressure when gases deviate most from the ideal behavior and account for it. Write real gas equation for n moles of a gas.
- 17.a) State Hess law of constant heat summation.
- b) Calculate the standard enthalpy of formation of CH_3OH if the standard enthalpies of combustion of CH_3OH , C and H_2 are -726 , -393 and -286 KJ mol^{-1} respectively.
18. State Le-Chatelier's principle. Using this principle, predict the effect of
- a) decreasing the temperature b) increasing the pressure on the following reaction.
- $$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g}) + \text{Heat}$$
- OR
- a) pK_a values of acids A, B, C and D are 1.5, 3.5, 2.0 and 5.0 respectively. Arrange these acids in the increasing order of their acid strength.
- b) 'All Lewis bases are also Bronsted bases'. Is it true? Justify.
- c) What is the pH of a neutral solution at a temperature at which K_w is equal to 2×10^{-14} ?
- 19.a) What causes temporary and permanent hardness of water?
- b) Why soap cannot be used in hard water?
- c) How is permanent hardness of water removed by zeolite process? Give equations.
20. Give reasons:
- a) Lithium is the strongest reducing agent in spite of its high ionization enthalpy.
- b) LiF and CsI are insoluble in water.
- c) Alkali metals dissolved in liquid ammonia gives blue colored solution.
21. Explain the formation of carbocation and carbanion and differentiate between them.
22. Explain giving equations, what happens when
- a) Vapours of ethyne is passed through a red hot tube at 873K .
- b) Water is added to ethyne in the presence of $\text{dil. H}_2\text{SO}_4$ and mercuric sulphate at 333K .
- c) Propene reacts with HBr in the presence of peroxide.
23. Ramesh attended a seminar on conservation of ozone layer. He came to know that freons are responsible for upsetting the ozone balance. So he decided to minimize the use of air-conditioners.
- a) Explain giving equations, how ozone layer depletion is caused by freons?
- b) What values are shown by Ramesh?
- c) As an individual what measures would you take to prevent ozone layer depletion?

- 24.a) Explain the structure of benzene based on hybridization.
 b) Give the reaction of benzene with the following:
 i) Cl_2 in presence of uv light ii) H_2/Ni iii) CH_3COCl in presence of AlCl_3

OR

- a) Account for the following:
 i) Benzene is extraordinarily stable.
 ii) Alkenes are more reactive than alkanes.
 iii) $-\text{NO}_2$ group attached to benzene ring is meta directing whereas $-\text{OH}$ group is ortho- para directing.
 b) How will you bring about the following conversions?
 i) But-2-ene to ethanal ii) phenol to toluene

25.a) Define solubility product.

- b) The solubility product of Ag_2CrO_4 at 298K is 4×10^{-12} . Find its solubility at this temperature.
 c) State Law of mass action. Derive the expression $K_p = K_c(\text{RT})^{\Delta n}$

OR

- a) The pH of a 0.01M solution of an acid HA is 4.15. Calculate the concentration of the anion, the ionization constant K_a of the acid and its $\text{p}K_a$.
 b) At 473K, the equilibrium constant K_c for the following reaction is 8.3×10^{-3} .



- i) What is the value of K_c for the reverse reaction at the same temperature?
 ii) What would be the effect on K_c if a) pressure is increased b) temperature is increased

26.a) What happens when

- i) Boric acid is added to water
 ii) Aqueous solution of borax is acidified
 iii) Aluminium reacts with aqueous sodium hydroxide?

b) Explain the structure of diborane.

OR

- a) Account for the following:
 i) Al forms AlF_6^{3-} exists but boron does not form BF_6^{3-} .
 ii) Boron trihalides act as Lewis acids.
 iii) Conc. HNO_3 can be transported in aluminium containers.
 iv) Thallium in +1 oxidation state is more stable than in +3 oxidation state.
 v) Atomic radius of gallium is less than that of aluminium.

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