



INDIAN SCHOOL SOHAR
SECOND TERM EXAM 2015-2016
CHEMISTRY

STD: XI
Date: 22-11-2015

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. The dissolution of ammonium chloride in water is endothermic process but still it dissolves readily. Why?
 2. Arrange the following in the increasing order of their reactivity towards electrophilic substitution reaction: Benzene, toluene and nitrobenzene.
 3. Which of the following is the best reducing agent?
 $E^{\circ}_{\text{Cu}^{2+}/\text{Cu}} = +0.34\text{V}$; $E^{\circ}_{\text{Zn}^{2+}/\text{Zn}} = -0.76\text{V}$; $E^{\circ}_{\text{Ni}^{2+}/\text{Ni}} = -0.25\text{V}$; $E^{\circ}_{\text{Ag}^{+}/\text{Ag}} = +0.80\text{V}$
 4. Water is amphoteric in nature. Justify.
 5. Among NaCl and MgO, which has higher lattice enthalpy and why?
 6. Define ozonolysis. An alkene on ozonolysis gave propanal and pentan-3-one as the products. Identify the alkene.

OR

State Markovnikov's rule. Explain why 2-bromopropane is the major product formed when propene reacts with HBr.

7. How will you test the presence of nitrogen in organic compounds? Explain giving equations.
8. Balance the following chemical equation by ion-electron method in acidic medium:
 $\text{MnO}_4^- + \text{SO}_3^{2-} + \text{H}^+ \longrightarrow \text{Mn}^{2+} + \text{SO}_4^{2-} + \text{H}_2\text{O}$
9. How many photons of light having a wavelength of 500 nm would provide 1.2 J of energy?
($h = 6.6 \times 10^{-34} \text{ JS}$, $C = 3 \times 10^8 \text{ ms}^{-1}$)
10. Arrange the following in the increasing order of their property mentioned:

a) $(\overset{+}{\text{C}}\text{H}_3)_3\text{C}$, $\text{CH}_3\overset{+}{\text{C}}\text{H}_2\text{CHCH}_3$, $\text{CH}_3\overset{+}{\text{C}}\text{H}_2\text{CH}_2\text{CH}_2$ (stability)

b) $-\text{I}$, $-\text{Br}$, $-\text{Cl}$, $-\text{F}$ (-I effect)

- 11.a) Derive $T\Delta S_{\text{total}} = -\Delta G$
 b) For a reaction at 298 K, $2A + B \rightarrow C$, the change in enthalpy and entropy are 400 KJ mol^{-1} and $0.2 \text{ KJ K}^{-1}\text{mol}^{-1}$ respectively. At what temperature will the reaction become spontaneous?
12. Illustrate the following with an example:
 a) Wurtz reaction b) Friedel Crafts alkylation c) Decarboxylation
- 13.a) Arrange the following in the increasing order of electron gain enthalpy: F, Cl, Br, I
 b) How does the metallic character vary on moving from left to right in a period and why?
 c) Why does the ionization enthalpy decrease on going down the group?
- 14.a) Calculate the molarity of H_2O_2 labelled as 10 volume of H_2O_2 .
 b) Give one use of H_2O_2 .

OR

- a) Write one reaction where H_2O_2 acts as i) oxidizing agent ii) reducing agent
 b) What precaution should be taken while storing H_2O_2 .
- 15.a) What is meant by auto-protolysis of water?
 b) What is water gas shift reaction?
 c) Explain with equation any one method for removing temporary hardness of water.
- 16.a) Write the IUPAC name for the following compounds:
 i) $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_2 - \text{COOC}_2\text{H}_5$ ii) $\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \text{CH}_2 - \text{OC}_2\text{H}_5$
- b) Write the structure for 2-(bromoethyl)-3-oxopentanamide.
- 17.a) Define biochemical oxygen demand.
 b) Differentiate between classical and photochemical smog.
- 18.a) What is the function of a salt bridge in electrochemical cell?
 b) A student constituted a cell using the two electrodes Al/Al^{3+} (1M) and Ni/Ni^{2+} (1M) and represented it as Ni/Ni^{2+} (1M) || Al^{3+} (1M)/Al. Is he correct?
 Given $E^\circ_{\text{Ni}^{2+}/\text{Ni}} = -0.25\text{V}$ $E^\circ_{\text{Al}^{3+}/\text{Al}} = -1.66\text{V}$
19. In three moles of ethane (C_2H_6), calculate the following:
 a) Number of moles of carbon atoms
 b) number of moles of hydrogen atoms
 c) number of molecules of ethane.
20. State Heisenberg uncertainty principle. Give its significance.
- 21.a) How can a non-polar molecule induce a dipole in a nearby non-polar molecule?
 b) O-nitrophenol has lower boiling point than p-nitrophenol. Why?
 c) Why is oxygen paramagnetic in nature.
- 22.a) Write the principle involved in i) steam distillation ii) distillation under reduced pressure
 b) Write the functional isomer of methyl ethanoate.

23. During an educational trip, a student of botany saw a beautiful lake in a village. She collected many plants from that area. She noticed that villagers were washing clothes around the lake and at some places waste materials from houses was destroying its beauty. After few years, she visited the same lake again. She was surprised to find that the lake was covered with algae, stinking smell was coming out and its water had become unusable.

- Suggest reason for this condition of the lake.
- Explain eutrophication.
- As a student, what measures would you take to prevent water pollution?

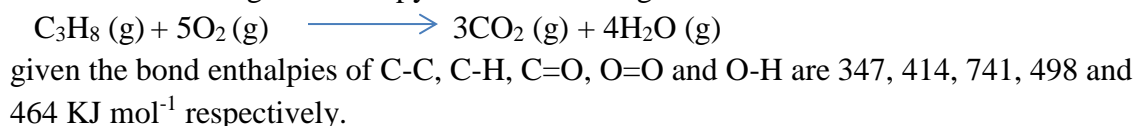
24.a) State Hess law of constant heat summation.

- Calculate the enthalpy of formation of acetic acid (CH_3COOH) if enthalpy of combustion of carbon, hydrogen and acetic acid are -393.5 , -285.9 and -867 KJ mol^{-1} respectively.
- What do you understand by the term internal energy and enthalpy. How are the two related to each other?

OR

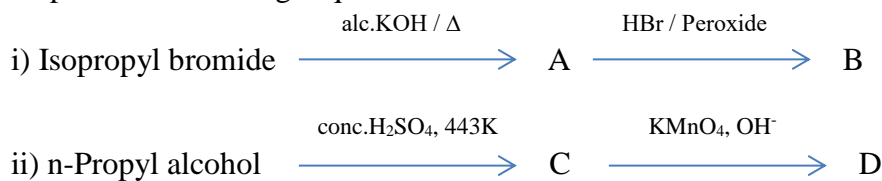
- What is the effect of temperature on entropy?
- Predict the sign of ΔS for the following process:
 - Crystallisation of sugar
 - $\text{CaCO}_3 (\text{s}) \rightarrow \text{CaO} (\text{s}) + \text{CO}_2 (\text{g})$

- Calculate the change in enthalpy for the following reaction:



25.a) Write the mechanism for the nitration of benzene.

- How will you bring about the following conversions?
 - Ethyne to chlorobenzene
 - Ethyl bromide to ethyne.
- Complete the following sequence of reactions:



OR

- Explain why acetylene is acidic in nature?
- Draw conformations of butane taking C2-C3 as reference axis in sawhorse projections. Which one is more stable and why?
- Account for the following:
 - Cis-but-2-ene is more polar than trans-but-2-ene.
 - $\overset{(+)}{\text{CH}_2}=\overset{(+)}{\text{CH}}-\text{CH}_2$ is more stable than $\text{CH}_3\text{CH}_2\text{CH}_2$.

26.a) State Dalton's law of partial pressure.

- b) A mixture of dihydrogen and dioxygen at one bar pressure contains 20% by weight of dihydrogen. Calculate the partial pressure of each gas. (Atomic weight of H=1, O=16)
- c) Boiling point of HF, HCl, HBr and HI are 293K, 189K, 206K and 238K respectively. Account for this observation based on various types of intermolecular forces.

OR

a) Explain the various postulates of kinetic theory of gases and account for the following properties of gases:

- i) High compressibility ii) Boyle's law iii) Charles' law.

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