



INDIAN SCHOOL SOHAR
SECOND TERM EXAM - 2014
CHEMISTRY

STD: XI
Date: 1-12-14

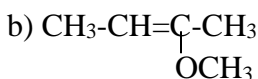
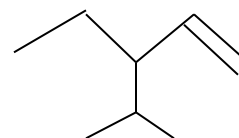
Marks: 70
Time: 3Hrs

Instructions:

1. All questions are compulsory.
 2. Question nos. 1-5 are very short answer questions and carry one mark each.
 3. Question nos. 6-10 are short answer questions and carry two marks each.
 4. Question nos. 11-22 are also short answer questions and carry three marks each.
 5. Question no. 23 is value based question and carry four marks.
 6. Question nos. 24-26 are long answer questions and carry five marks each.
 7. Use log tables if necessary. Calculators are not allowed.
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1. Write the mathematical expression for the first law of thermodynamics.
2. Identify the alkene which on ozonolysis gives a mixture of ethanal and pentane-3-one.
3. Write the bond line formula of $(\text{CH}_3)_3\text{C}(\text{CH}_2)_3\text{COOH}$.
4. Among N, O and F which element has lowest ionization enthalpy and why?
5. What are degenerate orbitals?
6. Differentiate between the two types of smog.

7. Write the IUPAC name for the following compounds: a)



8. Calcium carbonate reacts with aqueous HCl according to the reaction:
 $\text{CaCO}_3 + 2\text{HCl} \longrightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$
What mass of CaCO_3 is required to react completely with 250mL of 0.8M HCl solution?
(Atomic mass of H=1, C=12, O=16, Cl=35.5 gmol^{-1})
9. Account for the following:
 - a) Hot air balloons are used in sports and for meteorological observations.
 - b) Glycerine is more viscous than water.

OR

Write two important postulates of kinetic theory of gases.

10. If the energy of an electron in 3rd Bohr orbit is $-E$, what is the energy of the electron in
 - a) 1st Bohr orbit
 - b) 2nd Bohr orbit ?
11. a) Balance the following reaction by ion electron method in acidic medium:
 $\text{MnO}_4^- + \text{NO}_2^- + \text{H}^+ \longrightarrow \text{Mn}^{2+} + \text{NO}_3^- + \text{H}_2\text{O}$
 - b) What is the function of salt bridge?

12. The standard reduction potential of Cu^{2+}/Cu is +0.34V and Ag^+/Ag is +0.80V. Predict whether the following reaction will take place or not? Justify.
- will Cu reduce Ag^+ ions in aqueous solution?
 - will Cu dissolve in 1M HCl solution?
- 13.a) Derive the expression $\Delta G = -T\Delta S_{(\text{total})}$
 b) How does the Gibb's equation help in developing conditions under which ΔG is negative?
14. Illustrate the following with an example:
- Decarboxylation
 - Friedel-Crafts alkylation
 - Markovnikov's rule.
- OR
- How will you bring about the following conversions?
- Propene to propyne
 - phenol to nitrobenzene
 - 2-chloropropane to 1-chloropropane
15. What is meant by a) Eutrophication b) Biochemical oxygen demand c) Global warming
- 16.a) Under what conditions a compound is purified by steam distillation?
 b) How will you detect the presence of sulphur in organic compounds? Give reactions.
17. Explain the following terms: a) free radical b) carbocation c) nucleophile
18. Write the electronic configuration and determine the bond order of O_2 , F_2 and N_2 . Which one has the strongest bond on the basis of Molecular orbital theory?
19. What are quantum numbers? What information does magnetic and spin quantum number give about an electron? What permitted values can they take?
- 20.a) Differentiate between empirical and molecular formula.
 b) A substance on analysis gave the following percentage composition: Na =43.4%, C=11.3% and O = 45.3%. Determine its empirical and molecular formula if its molar mass is 106 gmol^{-1} . (Atomic mass of C=12, O=16, Na=23 gmol^{-1})
21. A, B, C are three elements with atomic number Z-1, Z and Z+1 respectively. B is an inert gas
- Predict the group of A and C.
 - Which out of the three has positive electron gain enthalpy and why?
 - Which of the three has least value of ionization enthalpy and why?
22. A discharge tube containing nitrogen gas at 25°C is evacuated till the pressure is $2 \times 10^{-2} \text{ mm}$. If the volume of the discharge tube is 2L, calculate the number of nitrogen molecules still present in the tube. ($R = 0.0821 \text{ L-atm-K}^{-1}\text{mol}^{-1}$)
23. Radha attended a seminar on conservation of ozone layer. She came to know that freons are responsible for upsetting the ozone balance. So she decided to minimize the use of air-conditioners.
- Explain how ozone layer depletion is caused by freons?
 - What values are shown by Radha?
 - Besides freons which other compounds are responsible for the depletion of ozone layer?
 - As an individual, what measures would you take to prevent ozone layer depletion
- 24.a) State Hess law of constant heat summation.
 b) The enthalpy of combustion of C, H_2 and ethylene (C_2H_4) are -94, -68.4 and $-337 \text{ Kcalmol}^{-1}$ respectively. Calculate the enthalpy of formation of ethylene.
 c) Define i) lattice enthalpy ii) standard enthalpy of formation.

OR

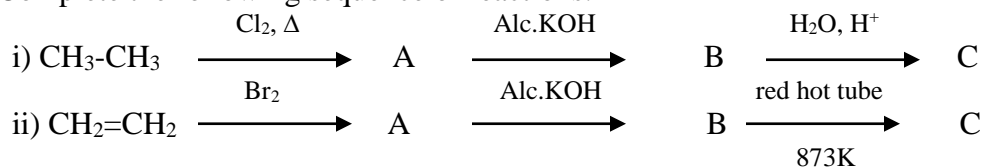
- a) Calculate the enthalpy change of the reaction: $\text{CH}_2=\text{CH}_2 + \text{H}_2 \longrightarrow \text{CH}_3-\text{CH}_3$
 given the bond enthalpies of C-H, C-C, C=C and H-H are 414, 347, 615 and 435 KJmol^{-1} .
- b) Predict whether entropy will increase or decrease in each of the following cases:
- crystallization of CuSO_4
 - dissolution of NH_4Cl in water
 - $2\text{NaHCO}_3(\text{s}) \longrightarrow \text{Na}_2\text{CO}_3(\text{s}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{g})$

25a) Account for the following:

- Acetylene is acidic in nature.
 - Cis-but-2-ene is more polar than trans-but-2-ene.
 - Benzene is extraordinarily stable.
- b) Write equations for the following reactions:
- Addition of water to ethyne in the presence of dil. H_2SO_4 and Hg^{2+} at 333K.
 - Chlorination of benzene in the presence of catalyst AlCl_3 .

OR

a) Complete the following sequence of reactions:



b) Explain the concept of delocalization with the help of orbital structure of benzene.

26. a) Explain why?

- NH_3 is more reactive than NF_3 .
 - C-C bond length in ethane is 154pm while in ethylene it is 134pm.
 - NF_3 is pyramidal while BF_3 is trigonal planar.
- b) Define hybridization. Explain sp^3d^2 hybridisation with an example.

OR

a) Draw the shapes of molecular orbitals formed by linear combination of the given orbitals:

- two 1s orbitals
- two $2p_z$ orbitals
- two $2p_x$ orbitals

b) What are the main conditions for atomic orbitals to combine to form molecular orbitals.

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