

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 9928

Roll No.

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B.Tech.

(SEM II) EVEN SEMESTER THEORY EXAMINATION,
2009-2010

CHEMISTRY

Time : 3 Hours

Total Marks : 100

Note : (i) Attempt **ALL** the questions.

(ii) All questions carry **equal** marks.

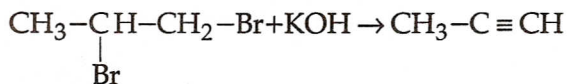
1. Attempt any four parts of the following :
- Write down the molecular orbital diagram of carbon mono - oxide molecule and calculate its bond order.
 - With the help of metallic bond (band theory) show the difference between conductor and insulator.
 - Describe applications and formation of fullerenes.
 - With suitable examples differentiate intra - and inter molecular hydrogen bonds.
 - A crystalline compound is formed by two elements X and Y. It crystallises to give a body centred cubic crystal such that X is situated at the centre of the cube and Y atoms are at the eight corners of the cube. What will be simplest formula of the compound ?

2. Attempt any four parts of the following :

- (a) For a non-linear molecule AX_2 , show different types of stretching and bending modes of vibrations in IR.
- (b) Two organic compounds have same molecular formula C_2H_6O . In NMR spectra one shows only one signal while the other has three signals. Identify them with proper explanation.
- (c) With suitable examples classify polymers based on :
- structure and shape and
 - behaviour towards heat
- (d) Discuss the applications along with the structures of Nylon-6 and polyacrylonitrile.
- (e) Write short note on synthetic rubbers.

3. Attempt any three parts of the following :

- (a) (i) Classify the following reactions as to whether they are of the substitution, addition or elimination type :



- (ii) Discuss the stability of carbocations
- (b) Discuss the mechanism and one application of Beckmann rearrangement.

- (c) Explain :
- (i) Optical activity
 - (ii) Enantiomers
 - (iii) Racemization
 - (iv) Resolution
- (d) (i) Explain the term conformation.
- (ii) Write down different conformations of n- butane
- (iii) Sketch the energy profile of rotation along C(2) - C(3) bond in n - butane. With the help of this diagram show the stability of different conformations of n - butane.

4. Attempt any **three** parts of the following :

- (a) Derive formula for the rate constant of a second order reaction when the initial concentrations of both the reactants are different. Under what condition a second order reaction behaves like a first order one ?
- (b) (i) Define the terms - phase, component and degree of freedom with examples.
- (ii) With a neat phase diagram of one component water system explain triple point.
- (c) (i) Define standard electrode potential.
- (ii) Calculate the potential of a zinc electrode at 25°C when it is dipped in 0.096 M solution of ZnSO_4 (assuming the dissociation of ZnSO_4 as 100%). ($E^0_{\text{Zn}^{++}/\text{zn}} = 0.76 \text{ V}$.)
- (d) What is activation energy ? Describe the effect of catalyst on activation energy.

5. Attempt any three parts of the following :

- (a) (i) Define the terms, scale and sludge.
(ii) A water sample is analysed and found to contain the following in ppm :

$\text{Ca}(\text{HCO}_3)_2 = 11$, $\text{Mg}(\text{HCO}_3)_2 = 12$,
 $\text{CaCl}_2 = 8.2$ and $\text{Mg SO}_4 = 2.6$. Calculate total hardness.

[Given : Ca = 40, C = 12, H = 1, Mg = 24, Cl = 35.5, S = 32 and O = 16]

- (b) What is reverse osmosis ? Describe its application for getting pure water.
- (c) (i) Differentiate between 'gross' and 'net' calorific value of a fuel.
(ii) Describe in brief the method of preparation of Biogas. Discuss the advantages of Biogas.
- (d) (i) Name three pollutants of air and describe the effect of any one of them. What are the methods to reduce air pollution ?
(ii) Define chemical shift in Nuclear Magnetic Resonance (NMR) spectroscopy.

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