



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

PAPER ID : 9603

Roll No.

--	--	--	--	--	--	--	--	--	--

B. Tech.

(Only for the candidates admitted/Readmitted in the session 2008-09)

(SEM. I) EXAMINATION, 2008-09**ENGG. CHEMISTRY - I**

Time : 3 Hours]

[Total Marks : 100

SECTION - A1 Choose / Fill correct answer : 20×1=20(i) The bond energy of N_2 is _____ than that of O_2 .

(ii) Which of the following possesses lowest energy ?

(i) NO (ii) O_2 (iii) N_2 (iv) CO

(iii) Which of the following results in strongest bonding ?

(i) Electrovalent (ii) Co-ordinate

(iii) Covalent (iv) H-bond.

(iv) Which of the following molecules possesses the smallest bond length ?

(i) F_2 (ii) Cl_2 (iii) Br_2 (iv) I_2

(v) Rate of reaction is directly proportional to the _____.

(vi) The reaction : $N_2O_5(g) \rightarrow N_2O_4(g) + \frac{1}{2}O_2(g)$ is :

(i) Zero order (ii) First order

(iii) Second order (iv) Fractional order.



(vii) Threshold energy = Activation energy + _____.

(viii) Bragg's equation is _____.

(ix) Chlorination of benzene is carried out in the presence of

(i) $AgNO_3$ (ii) $TiCl_4$

(iii) $FeCl_3$ (iv) $NiCl_2$

(x) Ketoxime $\xrightarrow{H_2SO_4}$ N-substituted amide. This reaction is known as

- (i) Aldol condensation
- (ii) Beckmann rearrangement
- (iii) Hoffmann rearrangement
- (iv) Diels - Alder reaction.

(xi) Cyclohexanone oxime $\xrightarrow{H_2SO_4}$ _____.

(xii) Which of the following compounds shows optical isomerism ?

(i) $CH_3 - CH(OH) - COOH$

(ii) $CH_3 - CHBr - CH_3$

(iii) $CH_3 - CH(CH_3) - CH_2CH_3$

(iv) $CH_3 - CH(OH) - CH_3$.

(xiii) The degree of polymerization represents the _____.

(xiv) The polymerization which is accompanied by elimination of small molecules is called :

- (i) Addition
- (ii) Copolymerization
- (iii) Condensation
- (iv) Crosslinking polymerization.



- (xv) Polystyrene is prepared from styrene in presence of _____.
- (xvi) $[Pt Cl_3 (C_2H_4)]^- K^+$ is known as _____.
- (xvii) In neutralization titration of Na_2CO_3 Vs HCl , the indicator used is :
- (i) Methyl yellow
 - (ii) Methyl red
 - (iii) Methyl orange
 - (iv) Erio-Chrome black T
- (xviii) The absorbance is directly proportional to :
- (i) Wavelength
 - (ii) Path length
 - (iii) Concentration
 - (iv) Concentration and path length both.
- (xix) IR active molecules are those which undergo a net change in _____.
- (xx) Number of NMR signals obtained in CH_3COCH_3 will be
- (i) 2
 - (ii) 6
 - (iii) 1
 - (iv) 3.



SECTION - B

2 Attempt any **three** of the following : **10×3=30**

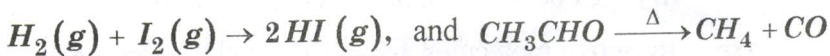
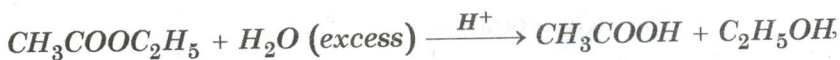
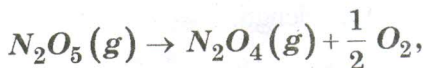
- (i) (a) What is molecular orbital theory ? With the help of molecular orbital diagram, calculate the bond order of the following :



- (b) An edge of cubic cell of NaCl crystal is 6.5×10^{-8} cm. Assuming that four molecules of NaCl are associated per unit cell, calculate its density.

Given : Avogadro's number = 6.023×10^{23} .

- (ii) (a) Distinguish between order and molecularity of a reaction, calculate order and molecularity of the following reactions :



- (b) What is activation energy ? Discuss its relationship with rate constant of a reaction.
- (iii) What are the properties of a good fuel ? Define, High and Low Calorific Values. A 0.80 g sample of a solid fuel was completely combusted in the excess of oxygen using bomb calorimeter. The rise in temperature of water in calorimeter was $2.5^\circ C$. Calculate the High Calorific Value of the fuel, if water taken in calorimeter is 2000 g and water equivalent of calorimeter is 2200 g. Also calculate Low Calorific Value.

(Given : % H in fuel = 2.2).



- (iv) Give the mechanism of the following reactions :
- (a) Beckmann rearrangement
 - (b) Diels-Alder reaction.
- (v) Distinguish between homopolymers and copolymers. Why do polymers have an average molecular weight ?

SECTION - C

10×5=50

3. Attempt any **one** part of the following :

- (a) What do you understand by liquid crystalline state ? Discuss the classification of liquid crystals and write their applications.
- (b) Discuss properties and applications of fullerene.

4. Attempt any **one** part of the following :

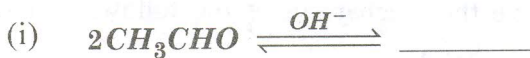
- (a) What do you mean by EMF ? Discuss chemical and concentration cells.
- (b) Derive an equation for half life period of a first order reaction.

A compound decomposes according to the first order rate law with a half life period of 30 min. Calculate the fraction of remaining compound after 120 min.

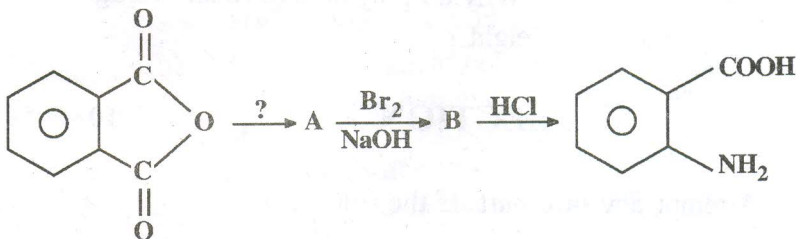
5. Attempt any **one** part of the following :

- (a) Complete the following reactions and write their mechanism :

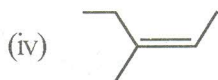
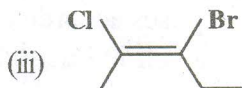
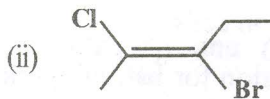




(iii)



(b) (i) What do you understand by E-Z notations ? Assign E and Z configuration to the following compounds :



(ii) Discuss the conformations of n-butane with the help of its potential energy diagram.



6 Attempt any **one** part of the following :

- (a) (i) An organic compound having molecular formula C_7H_6O shows absorption peaks at 3010, 2700, 1600, 1580, 1520, 1480 and 1720 cm^{-1} in its IR spectrum. Suggest its structure.
- (ii) Define chemical shift. Show the expected NMR signals and their splitting in the following compounds :



OR

- (a) What is Beer-Lambert law in UV-VIS absorption spectroscopy ? A compound having concentration 10^{-3} g/l resulted absorbance value **0.20** at λ_{max} **510 nm** using **1.0 cm** cell. Calculate its absorptivity and molar absorptivity values. Molecular weight of compound is 400.
- (b) Discuss the ion exchange method for water softening. Compare its merits with Zeolite method.

7 Attempt any **one** part of the following :

- (a) Discuss the thermoplastic resins. Write the synthesis and applications of polystyrene and polyvinyl chloride.
- (b) What are the organometallic compounds ? Give the preparation and properties of organometallic compounds of lithium.

