

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

PAPER ID : 9603

Roll No.

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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) $[PtCl_3(C_2H_4)]^- K^+$ 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**

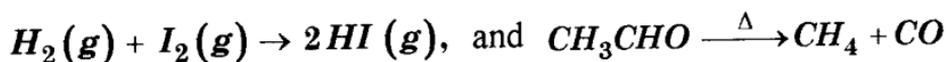
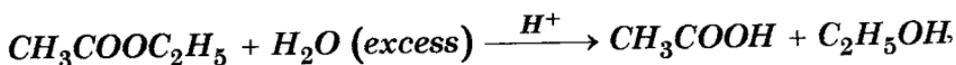
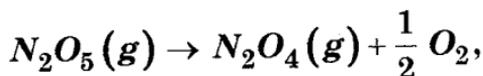
- (i) (a) What is molecular orbital theory ? With the help of molecular orbital diagram, calculate the bond order of the following :



- (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°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 :
- Beckmann rearrangement
 - 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 :

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

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

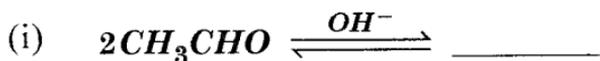
- What do you mean by EMF ? Discuss chemical and concentration cells.
- Derive an equation for half life period of a first order reaction.

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.

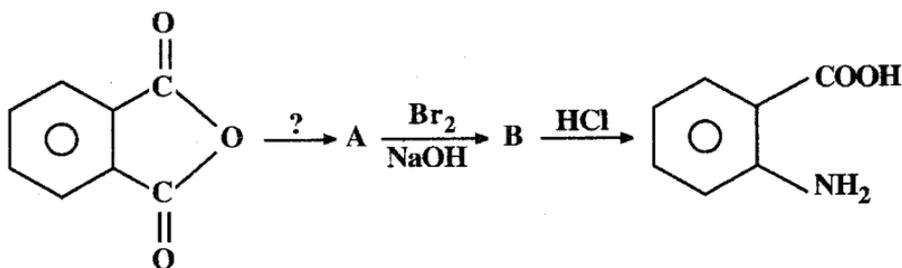
5 Attempt any **one** part of the following :

- Complete the following reactions and write their mechanism :

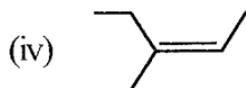
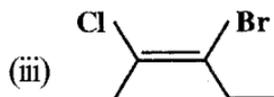
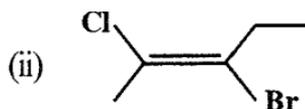
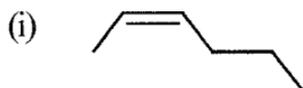




(iii)



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

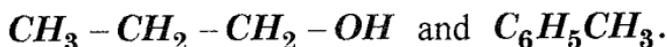


(ii) Discuss the conformations of n-butane with the help of its potential energy diagram.



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.

