Printed Pages : 8 EAS – 102 / EAS – 202

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

PAPER ID : 9612 Roll No.

B. Tech.

(SEM. II) EXAMINATION, 2008-09

ENGG. CHEMISTRY

Time : 3 Hours] *[Total Marks : 100*

SECTION–A

1 Choose/Fill correct answers : **20×1=20**

(i) Conversion of an amide to a primary amine with one less carbon atom in presence of $NaOH/Br_2$ is known as :

(a) Beckmann rearrangement
(b) Cannizaro reaction
(c) Diels-Alder reaction
(d) Hoffmann rearrangement

(ii) According to the phase rule degree of freedom (F) = _____.

(iii) Number of signals obtained in the ^1H NMR of $CH_3CH_2OCH_2CH_3$ shall be :

(a) 10
(b) 1
(c) 2
(d) 4

(iv) The monomer in natural rubber is _____.

(v) The half life period of a first order reaction is _____.

(vi) S_N2 reaction is accompanied by _____ of configuration.

(vii) For a strong acid-weak base neutralization titration the pH at the end point must be

(a) >7
(b) 7
(c) <7
(d) 10

(viii) The order of the bond length of O_2, O_2^-, O_2^+ is _____.

(ix) _____ conformer of n - butane has the highest potential energy.

(x) The finger print region in IR spectroscopy is in _____ range.

(xi) The reaction :

$$\underset{\text{Surcose}}{C_{12}H_{22}O_{11}(liq)} + H_2O\,(liq) \xrightarrow{H^+} C_6H_{12}O_6\,(liq) + C_6H_{12}O_6\,(liq)$$

is :

(a) zero order
(b) first order
(c) second order
(d) fractional order

(xii) Optical isomerism in compounds due to restricted rotation around a single bond is called _____.

(xiii) Coating of Sn over iron is an example of _____ coating.

(xiv) The temporary hardness in water is due to the presence of _____.

(xv) An example of electrically conducting polymer is

(a) Poly vinylchloride
(b) Poly styrene
(c) Poly acetylene
(d) Poly ethene

(xvi) Net calorific value is_____ than gross calorific value.

(xvii) Corrosion is a process of _____ of a metal.

(xviii) o-nitrophenol has a _____ melting point than p-nitrophenol.

(xix) Diamond, graphite and _____ are the allotropic forms of carbon.

(xx) Wilkinson's catalyst is :

(a) CH_3MgCl

(b) $(PhP)_3RhCl$

(c) $Et_3Al/TiCl_4$

(d) n-BuLi

SECTION–B

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

(i) (a) Distinguish between thermoplastic and thermosetting polymers.

(b) What are elastomers? Give the preparation, structures and uses of Buna- S and Butyl rubber.

(ii) (a) On the basis of molecular orbital theory explain why F_2 is diamagnetic while O_2 is paramagnetic? Calculate their bond orders.

(b) Calculate the number of atoms per unit cell in SC, BCC and FCC.

(iii) (a) Write a short note on biogas as a source of energy.

(b) Show that in case of a first order reaction, the time required for completion of 99.9% of the reaction is about ten times of that required for half the reaction.

(iv) Asymmetrically substituted compounds having even number of cumulative double bonds exhibit optical isomerism whereas those having odd number of cumulative double bonds show geometrical isomerism. Explain giving reasons.

(v) Define and explain the terms involved in phase rule. Draw a neat labelled phase diagram of water system and explain the areas and curves in it. What is the significance of the triple point and metastable curve in this system?

SECTION–C 10×5=50

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

(a) What is electrochemical theory of corrosion? Discuss the mechanism of electrochemical corrosion of iron with

(i) absorption of oxygen

(ii) evolution of hydrogen

(b) Starting from cyclohexanone oxime, how can Nylon-6 be prepared? Name the reaction and discuss its mechanism.

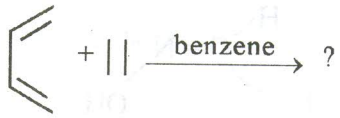
What are the important properties and uses of Nylon-6?

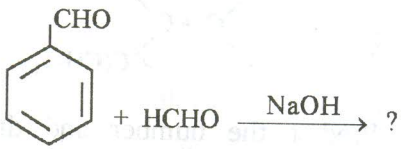
4 Attempt any **one** of the following :

(a) Explain the method of proximate analysis of coal.

3.25 grams of coal was Kjeldahlized and NH_3 gas thus evolved was absorbed in 45 mL of 0.1 N H_2SO_4. To neutralize excess acid, 11.5 mL of 0.1 N NaOH was required. Determine the percentage of Nitrogen in the coal sample.

(b) Complete the following reactions and write their mechanism :

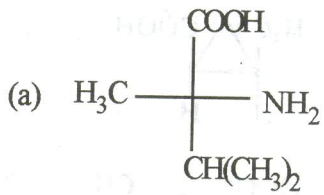
(i) 

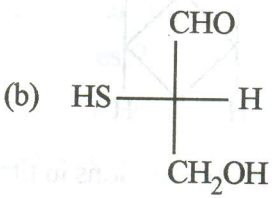
(ii) 

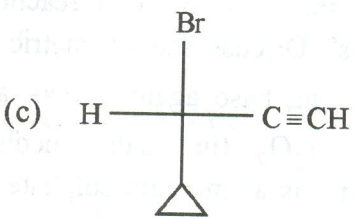
Write **one** application each of the above named reactions.

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

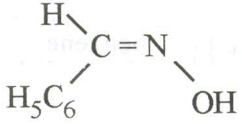
(a) (i) Assign R or S configuration to the following :

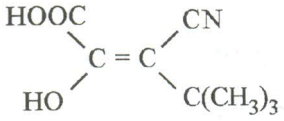






(ii) Assign E or Z configuration to the following:

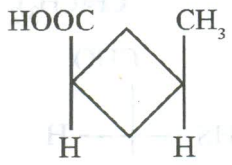
(a) 

(b) 

(iii) Predict the number and draw all the possible stereoisomers for the following :

(a) 

(b) 

(c) 

(b) Classify the types of reactions in titrimetric analysis. How is the completion of reaction indicated in titrations? Discuss the titrimetric analysis of :

(i) Strong base against weak acid

(ii) $K_2Cr_2O_7$ (in acidic medium) against ferrous ammonium sulphate.

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

(a) (1) What is an electrochemical series? Give its applications with suitable examples.

(2) Discuss the applications of Liquid crystal.

OR

(1) Explain giving reasons, what will happen if :

(i) an underground iron pipe is connected through an insulated wire to a block of zinc metal?

(ii) a metallic rod is vertically half submerged under water.

(2) (i) Giving appropriate examples distinguish between order and molecularity of reaction.

(ii) Describe the structure of Graphite. How it acts as conductor of electricity?

(b) Explain the zeolite process for water softening and the regeneration of zeolite. What are the limitations of this process?

The hardness of 1000 liters of a water sample was completely removed by passing it through a zeolite softener. The softener then required 30 litres of NaCl solution containing 1.5 g/L of NaCl for regeneration. Calculate the hardness of the sample of water.

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

(a) (I) Describe the different molecular vibrations encountered in IR Spectroscopy. How would you distinguish between the compounds in each of the following pair by IR spectral studies :

(i) Phenol and cyclohexanol

(ii) cis- and trans- 2- butene

(iii) acetaldehyde and acetone

(II) Explain shielding and deshielding of a nucleus in NMR spectroscopy. A compound having the molecular formula $C_{10}H_{14}$ gave the following ^1H NMR data :

δ 0.88 (6H, doublet)

δ 1.86 (1H, multiplet)

δ 2.45 (2H, doublet)

δ 7.12 (5H singlet)

Identify the compound based on proper explanation.

(b) What are organo-metallic compounds? Discuss the mechanism of the reaction for the preparation of polypropylene using Ziegler-Natta catalyst. Give the structures of stereo regular polypropylene thus obtained.
