UG (CBCS) Ist Year Annual Examination

2706

B.Sc. CHEMISTRY

(States of Matter, Chemical Kinetics and Functional Organic Chemistry)

(Core)

Paper : CHEM 102

Time : 3 Hours]   [Maximum Marks : 50

Note :– Attempt *five* questions in all, selecting *one* question from each Section. Question No. **9** is compulsory. Attempt all parts of a question together.

Section–A

1. (a) Explain the term 'Collision Number' and 'Collision Frequency'. Discuss the effect of temperature and pressure on collision frequency.

(b) Define :

    (i)   Most Probable velocity

    (ii) Average velocity

    (iii) Root mean square velocity

(c) Show that for 1 mole of a gas, critical

temperature $(T_c) = \dfrac{8a}{27Rb}$.   4,3,3

2. (a) What is meant by coefficient of viscosity of a

liquid. Describe Ostwald method for determining

the viscosity of liquid.

(b) What is Surface Tension. Explain the effect of

temperature on surface tension.

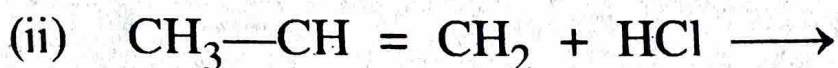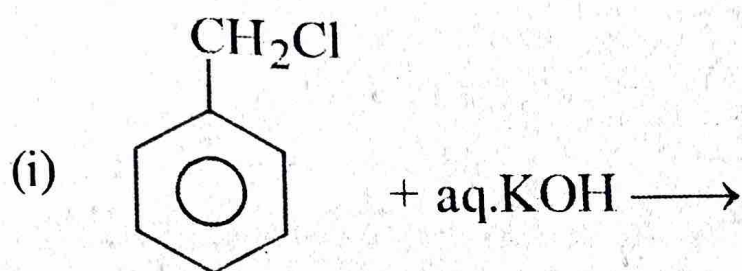(c) Describe the Maxwell distribution of molecular

speeds.   4,3,3

CH–6

(2)

Section-B

3. (a) How many types of Bravis Lattices does the crystals exhibit depending upon the shape of unit cell ? Name them and explain them.

(b) Define Symmetry Elements. What do you mean by Plane of symmetry centre of symmetry and rotation-reflection axis of symmetry ?

(c) What type of crystal lattice CsCl has ? Draw and explain. 4,3,3

4. (a) Give various methods for determination of order of reaction. Briefly describe half life period method for determination of order of reaction.

(b) Differentiate between molecularity and order of a reaction.

(c) Describe Collision theory and give its limitations. 4,3,3

CH-6 (3) Turn Over

Section–C

5. (a) How will you convert benzene into acetophenone ? Give mechanism.

(b) Describe the mechanism of nitration of benzene.

(c) What happens when :

(i) Phenol is heated with Zinc ?

(ii) 1-Propene reacts with HBr in the presence of peroxide ?

(iii) Ethyliodide reacts with sodium nitrite ?

(iv) Methyliodide reacts with silver cyanide ?   3,3,4

6. (a) Discuss the mechanism of SN^1 and SN^2 reactions.

(b) Give the reactions of the following :

(i) Sandmeyer's reaction

(ii) Gatterman reaction

CH–6

(4)

(c) Complete the reaction :

(i) $C_6H_5CH_2Cl$ (benzyl chloride) + aq.KOH $\longrightarrow$

(ii) $CH_3\text{—}CH = CH_2 + HCl \longrightarrow$

(iii) $C_2H_5Br + C_2H_5 \overset{\oplus}{O} \overset{\ominus}{N}a \rightarrow$ 4,3,3

Section–D

7. (a) How will you get the formation of 1°, 2° and 3° alcohols from Grignard Reagent ?
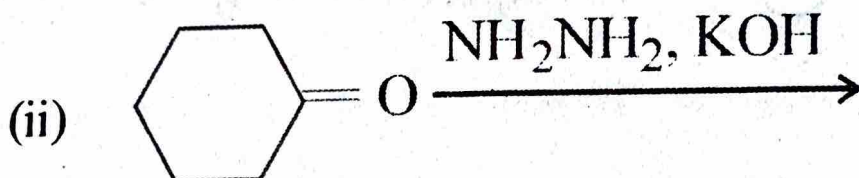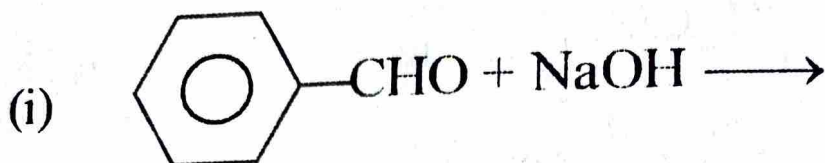
(b) Discuss Gattermann Koch reaction with mechanism.

(c) Write the mechanism of dehydration of ethyl alcohol with conc. H_2SO_4.   4,3,3

8. (a) What is Aldol condensation ? Give its mechanism and limitations.

(b) Discuss the Wittig reaction with mechanism.

(c) Complete the reaction :

(i) $C_6H_5-CHO + NaOH \longrightarrow$

(ii) (cyclohexanone) $=O \xrightarrow{\quad NH_2NH_2, \ KOH \quad}$

(iii) $CH_3COCl + H_2 \xrightarrow{\quad Pd\text{-}BaSO_4 \quad}$ 4,3,3

Section–E

(Compulsory Question)

9. (A) Fill in the blanks :

(i) With increase in temperature, the viscosity of a liquid ....

(ii) Saponification of Ester is a .... order reaction.

(iii) The rise of liquid in a capillary tube is due to ....

(iv) Oxidation of toluene with alk. $kMnO_4$ gives mainly ....

(v) Electrophile in Reimer-Tiemann reaction is ....   1×5=5

(B) Mark the following statements as True or False :

(i) Cannizaro reaction is undergone by aldehyde having no α-hydrogens.

(ii) Benzoin condensation is catalysed by OH^-.

(iii) Activation energy (E_a) can be calculated using Arrhenius equation.

(iv) Benzene reacts with chlorine in the presence of $FeCL_3$ catalyst to form hexachlorobenzene.

(v) The half life period of any first order reaction is independent of the initial concentration.

$1\times5=5$