RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. FIFTH SEMESTER EXAMINATION, DECEMBER 2013

THIRD YEAR

Date : 19/12/2013 **INDUSTRIAL CHEMISTRY (Honours)**

Time : 11 am – 1 pm Paper : V Full Marks : 50

[Use a separate answer book for each Unit]

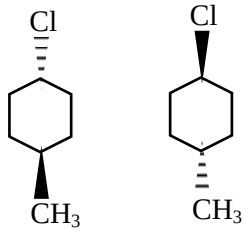
Group – B

Unit - I

1. Write notes on (**any four**) : [4×5]
   a) ESP
   b) QRA
   c) Hydrosphere
   d) Catalytic convertor
   e) BOD or COD
   e) Sustainable development

Unit - II

2. Answer **any five** of the following : [5×1]
   a) Write down the decreasing order of stability of the different conformations of cyclohexane among chair, boat and twist boat form.
   b) The favoured conformation for the molecules 1,2-dichloroethane; 1,2-ethanediol and propanaldehyde will be respectively—
      i) gauche, anti, eclipsed ii) eclipsed, gauche, anti
      iii) anti, gauche, eclipsed iv) anti, eclipsed, gauche
   c) Suggest the type of product of the reaction of trans-2-pentene with bromine—
      i) meso ii) optically active iii) anti iv) racemic
   d) The Bayer angle strain in cycloheptane is nearly _____.
   e) The compounds given below are—



      i) identical ii) enantiomers iii) regioisomers iv) diastereomers
   f) What are the reagent used in Bardhan-Sengupta synthesis of phenanthrene.
   g) Write down the prefered conformation for 1-tertiary butyl-4-methyl cyclohexane.
   h) What reagent will you prefer for synthesis of primary amine?

3. Answer **any five** of the following : [5×2]
   a) For 1,2-dichloro-1, 2-diphenyl ethane, the meso-isomer has a dipole moment of 1·27D, whereas that of optically active form is 2·77 D. Explain.
   b) What is the C_2-pathway for the flipping of cyclohexane. Draw the energy profile of it.
   c) Draw the preferred orientation of cyclohexane-1, 2-diol, 1-methyl-1-cyano cyclohexane, 2-aminoethanol, biphenyl.

d) Identify A-D :

$$CH_3CH_2Br \xrightarrow{PPh_3} A \xrightarrow{B} CH_3\overset{(-)}{C}H\overset{\oplus}{P}Ph_3 \xrightarrow{PhCHO\ in\ toluene} C\,(with\ proper\ stereochemistry) \xrightarrow{m-CPBA} D$$

e) Discuss about angle strain with the basis of structure of cyclo propane.

f) What are the products when nitrobenzene is reduced in acid, alkali and neutral medium? Also write the proper reagents.

g) How can you convert the following :

i) Aniline to phenol

ii) p-anisidine to 4-bromoanisole

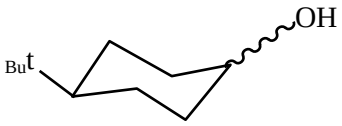
h) What are the products formed during sulphonation of naphthalene at 40°C and 160°C. Draw the energy diagram of reactant and products in this reaction.

3. Answer **any five** of the following : [5×3]

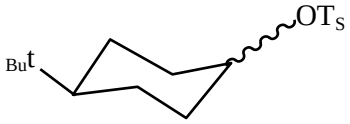
a) What is the utility of Hinsberg method? Discuss.

b) What is levelling effect? Draw and discuss the preferred conformation of 1-methyl-1-phenyl cyclohexane.

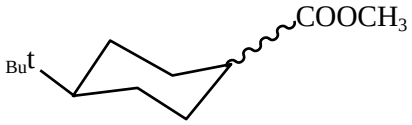
c) Account for the following (**any two**) :

i) 

Relative oxidation rate of chromic acid $k_{cis}/k_{trans} = 3{\cdot}23$

ii) 

Substitution reaction with thiophenolate $k_{cis}/k_{trans} = 31$

iii) 

Rate of saponification $k_{trans}/k_{cis} = 20$

d) For 2,3-dibromobutane, discuss the population of different conformers in meso and active form. Dipole moment of 1,2-dichloro ethane in solid state is 0D, however, in gaseous state it is 1·27 D. Explain.

e) Write short note on Sandmayer reaction.

f) Write down the steps for Haworth synthesis of anthracene.

g) define dihedral angle and torsion angle. Give also examples.

h) What will be the preferred conformation of the following compounds. Give reasons also.
cyclohexane-1, 3-diol, 1-chloro-4-methyl chlohexane.