

2012

CHEMISTRY

(Major)

Paper : 2.2

(Organic Chemistry)

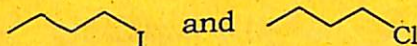
Full Marks : 60

Time : 2½ hours

*The figures in the margin indicate full marks
for the questions*

1. Answer the following questions : 1×7=7

- (a) In the following pair of halogen compounds, which one would undergo S_N2 reaction faster?



- (b) Find out a reagent for the conversion of $RCOCl$ into $RCHO$.
- (c) What is Hinsberg's reagent?
- (d) Why are the boiling points of isopentane and neopentane less than that of n -pentane?

- (e) What is formed when glycerol is heated with KHSO_4 ?
- (f) Draw the chair form of cyclohexane and label the axial and equatorial H-atoms.
- (g) What does the term 'topocity' signify?

2. Answer the following questions : 2×4=8

- (a) Explain why the boat form of cyclohexane is less stable compared to the chair form.
- (b) What are homotopic and heterotopic ligands? Give suitable examples.
- (c) How are the H-atoms at a pro-chiral centre distinguished from one another?
- (d) What are diastereotopic ligands? Give example of molecules with diastereotopic H-atoms and explain why they are so.

3. Answer any *three* questions : 5×3=15

- (a) The bromination of toluene using bromine in aqueous acetic acid takes place 605 times faster than does the same reaction of benzene. The product ratio is 32.9% *ortho*-, 0.3% *meta*- and 66.8% *para*-bromotoluene. Calculate the partial rate factors for the reaction.

- (b) Explain the formation of aniline from chlorobenzene through benzyne intermediate formation. What are the evidences in support of this mechanism? 3+2=5
- (c) Discuss the mechanism of Friedel-Crafts acylation. What is the role of AlCl_3 in this reaction? 3+2=5
- (d) Give an example of $\text{Ar S}_{\text{N}}1$ reaction. What is the mechanism involved? What are the evidences in support of this mechanism? 1+2+2=5
4. Answer any *three* questions : 10×3=30
- (a) (i) Describe Corey-House method for the preparation of unsymmetrical alkane. 3
- (ii) Why is peroxide effect not valid with HCl and HI? 2
- (iii) Distinguish between but-1-yne and but-2-yne. 2
- (iv) How is 1°-, 2°- and 3°-alcohol detected by Lucas test? 3
- (b) (i) Discuss the mechanism of acid-catalysed aldol condensation. 3
- (ii) Convert ethyne into propanone. 2

- (iii) What products are obtained when nitrobenzene is reduced under acidic, neutral and alkaline conditions? 3
- (iv) Using Gabriel's phthalimide method, how can you prepare a 1°-amine exclusively? 2
- (c) (i) What is Wurtz-Fittig reaction? 2
- (ii) Convert aniline into 4-nitroaniline. 2
- (iii) Explain the mechanism involved in Reimer-Tiemann reaction. 3
- (iv) How is cinnamic acid prepared from benzaldehyde? What is the name of the involved reaction? 2+1=3
- (d) (i) Why does HCN not add to the >C=O part of an ester? 2
- (ii) Arrange the compounds in order of increasing reactivity towards nucleophilic reagents : 2
- CH_3CHO , CH_3COCH_3 , CF_3CHO and
 $\text{CH}_3\text{CH}=\text{CH}-\text{CHO}$
- (iii) *p*-Animobenzaldehyde does not undergo the benzoin condensation. Why? 3
- (iv) Convert benzene into benzaldehyde by Gattermann-Koch synthesis. 3

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