CHE-5

BACHELOR OF SCIENCE (B.Sc.)

Term-End Examination

June, 2005

CHEMISTRY

CHE-5 : ORGANIC CHEMISTRY

Time : 2 hours *Maximum Marks : 50*

Note : *Attempt **all** the four questions.*

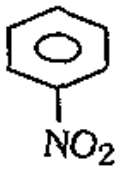
1. (a) Give the IUPAC names of the following compounds : *1+1*

(i) $CH_3CH_2OCH_2CH(CH_3)_2$

(ii) $CH_2 = CHCOOH$

(b) Complete any ***three*** of the following reactions : *1×3*

(i)  + KOH ⟶ .....

(ii)  $\xrightarrow[HCl]{Fe}$ .....

(iii) $RC \equiv CR' \xrightarrow[BaSO_4, H_2]{Pd - C,} .....$

(iv) $CH_3 - CH = CH_2 \xrightarrow[H_2O_2, {}^-OH]{(BH_3)_2} .....$

(v) $CH_3COOH + NaOH \xrightarrow{\Delta} .....$

2. (a) Attempt any ***two*** of the following : *2+2*

(i) Which one — out of 1,3-pentadiene or 1,4-pentadiene — will have absorption maximum on longer wavelength and why ?

(ii) How will you prepare 4-nitrobenzenamine from benzenamine (aniline) ?

(iii) Write the structure of heterocyclic nucleus present in indole alkaloids and quinoline alkaloids.

(b) Attempt any ***three*** of the following : *2×3*

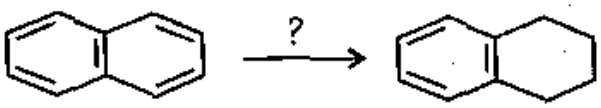
How will you convert ?

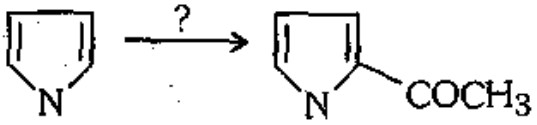
(i) $CH_2 = CH - CH_2Cl \xrightarrow{?} CH_2 = CH - CH_3$

(ii) $\Delta \xrightarrow{?} CH_3CH_2CH_2OH$

(iii) $CH_3 - CH = CH_2 \xrightarrow{?} CH_3 - \underset{\displaystyle OH}{\underset{|}{CH}} - CH_3$

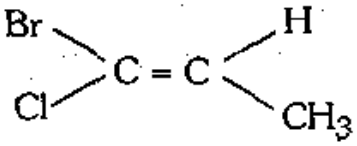
(iv) $CH_3C \equiv CCH_3 \xrightarrow{?} 2\,CH_3COOH$

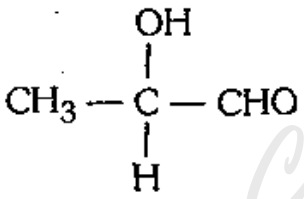
(v) 

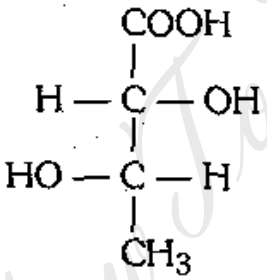
(vi) 

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

(a) Arrive at the configuration of any ***two*** of the following molecules using CIP rules :

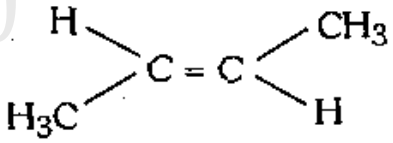
(i) 

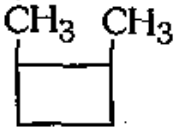
(ii) 

(iii) 

(b) Name the symmetry elements present in any ***two*** of the following molecules :

(i) $HC \equiv CH$

(ii) 

(iii) 

(c) What do you understand by ring chain and valence tautomerism ? Cite one example of each.

(d) Give the reaction of methyl magnesium bromide with

(i) carbon dioxide

(ii) methyl cyanide

(e) Write the products of the following reactions :

(i) 1-propanol $\xrightarrow[\Delta]{573\,K,\ Cu}$?

(ii) 2-methylbutanol $\xrightarrow[\Delta]{573\,K,\ Cu}$?

What is the importance of the above reactions ?

(f) Give the products obtained when the following acids are heated with a mineral acid :

(i) 2-hydroxybutanoic acid

(ii) 3-hydroxybutanoic acid

(iii) 4-hydroxybutanoic acid

(g) Give the expected products of the reaction between ethyl benzoate and the following reagents :

(i) aqueous NH_3, heat

(ii) $LiAlH_4$ followed by H_3O^+

(iii) excess of CH_3MgBr followed by H_3O^+

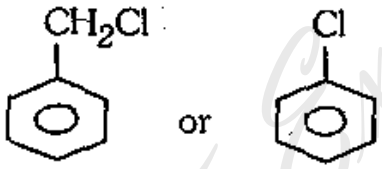
(h) How can ethylene oxide be converted into (i) ethanal and (ii) ethane-1,2-diol ?

4. Answer any ***five*** of the following : 4×5

(a) What is the fingerprint region in IR spectroscopy ? Give its utility. What are various mediums used in recording IR spectrum ?

(b) Give the main uses of studying mass spectrum of an organic compound. What are the expected peaks in the mass spectrum of 2,2-dimethylbutane ?

(c) Which member of each of the following pairs would undergo S_N2 reaction faster ? Explain.
(Attempt any ***two***) :

(i)  or

(ii) $CH_2 = CHCH_2Cl$ or $CH_3CH_2CH_2Cl$

(iii) $(CH_3)_2CHCH_2Cl$ or $(CH_3)_3CCl$

(d) Write short notes on any ***two*** of the following :

(i) Gattermann synthesis

(ii) Wittig reaction

(iii) Cannizzaro reaction

(e) Give *two different methods* of converting 2-methylpropanoic acid into its methyl ester.

(f) What is saccharin ? How is it manufactured ? Why has its use been discontinued as a sweetening agent ?

(g) What is Hofmann rearrangement ? Explain with suitable example.

(h) What is Reformatsky reaction ? How can 3-methyl-3-hydroxybutanoic acid be prepared from 2-bromoacetic acid using this reaction ?