[26] No. of printed pages :4

SARDAR PATEL UNIVERSITY
B.Sc. (III SEM.) EXAMINATION
Wednesday, 26th December, 2012
2.30 pm to 5.30 pm
US03CCHE01 : ORGANIC CHEMISTRY

Total Marks: 70

Note: Figures to the right indicate full marks of the questions.

Q.1 Choose the correct option from the following: [10]

(i) Compound whose molecules are superimposable on their mirror image even though they contain asymmetric carbon atom is called
(a) Diastereomer (b) Meso compound
(c) Conformer (d) Conformation

(ii) 10 cm = _____dm
(a) 1 (b) 0.1 (c) 100 (d) 1000

(iii) The oxidation of which of the following alchols is easy?
(a) 2-methyl-2-butanol (b) 2-butanol
(c) 2-2methyl-2-propanol (d) ethanol

(iv) Which of the following compound gives iodoform test?
(a) Benzaldehyde (b) Isopropyl alcohol
(c) Benzophenone (d) Tert-butyl alcohol

(v) Amide compounds react with Br_2/NaOH to give
(a) 1^0 amines (b) Anilides
(c) Alkane (d) Carboxylic acids

(vi) Hinsberg's reagent is
(a) NH_2NH_2/KOH (b) $Pd/BaSO_4$
(c) Benzene sulphonyl chloride (d) $ZnCl_2$/HCl

(vii) Which of the following is the strongest acid?
(a) Butanoic acid (b) 2-chlorobutanoic acid
(c) 3-chlorobutanoic acid (d) 4-chlorobutanoic

(viii) Phenol is acidic because of
(a) Chelation (b) Inductive effect
(c) Resonance (d) Hydrogen bonding

(ix) Which of the following compound for possesses analgesic and antipyretic properties?
(a) Piperine (b) Thymol
(c) Hexestrol (d) Phenacetin

(x) The carbon atom of a carbonyl group is
(a) sp-hybridized (b) sp^2- hybridized
(c) sp^3- hybridized (d) sp^3d- hybridized

Q.2 Answer the following. (Any six) [12]

(i) Eclipsed conformation of ethane is less stable than staggered conformation.

(ii) Just sketch various conformations of cyclohexane and arrange their stability in increasing order with potential energy diagram.

(iii) State the limitations of Grignard synthesis.
(iv) Aldehydes generally undergo nucleophilic addition more readily than ketones, explain.
(v) Give mechanism for base-catalyzed halogenation of ketones.
(vi) Give the synthesis of m-bromophenol from nitrobenzene.
(vii) Give the synthesis of mesitoic acid from mesitylene by Grignard synthetic route.
(viii) Give the synthesis of salicylic acid from chlorobenzene.

Q.3 Answer the following:

(i) What is 1,3-diaxial interaction? Why equatorial methyl cyclohexane is more stable than axial methyl cyclohexane? [04]

(ii) What is conformation? Draw all Newman formulae resulting from rotation along C_2-C_3 bond of n-butane through 60^0. Name all the conformations and arrange them in increasing order of stability with potential energy diagram. [04]

OR

Q.3 Answer the following:

(i) State and explain sequence rules with suitable examples. [04]

(ii) Define the term configuration with suitable illustration. Give detail account of all different kinds of representation used to represent configuration about a chiral carbon. [04]

Q.4 Answer the following

(i) Arrange the acidity order of following molecules and give detail explanation for your answer. [04]
(a) Alcohol (b) Water (c) Ammonia (d) Alkane

(ii) Give the synthesis of 3-methyl-2-pentanol from ethyl alcohol by Grignard synthetic route. [04]

OR

Q.4 Answer the following

(i) Describe in detail about the reaction of glycerol with [04]
(a) HNO_3 (b) HI (c) oxalic acid.

(ii) Arrange the boiling point order of following molecules and give detail explanation for your answer. [04]
(a) Ether (b) Alkane (c) Water (d) Alcohol

Q.5

(i) Give detail stepwise mechanism for Wittig reaction. [03]

(ii) Give detail stepwise mechanism for Claisen condensation and also justify that acetoacetic ester is a stronger acid than ordinary ester. [05]

OR

Q.5

(i) Give all the steps involved in synthesis of 2-ethyl-1-hexanol from acetaldehyde using aldol condensation synthetic route. [04]

(ii) What is hemiacetal? Give detail stepwise mechanism for the acetal formation. [04]

Q.6 Answer the following

(i) Arrange the basicity order of the following molecules and give detail explanation for your answer. [04]

(a) Ammonia (b) Methyl amine (c) Aniline

(ii) Give all the steps involved in synthesis of m-bromotoluene from toluene. [04]

OR

Q.6 Answer the following

(i) Describe the action of nitrous acid on 1^0, 2^0 and 3^0 aliphatic as well as aromatic amines. [03]

(ii) Draw FIVE structures of isomeric amines having molecular formula $C_4H_{11}N$. Classify them as 1^0, 2^0 and 3^0 amines. How can they be distinguished by a chemical test? [05]

Q.7 Answer the following

(i) Give all the steps involved in synthesis of leucine (α-aminoisocaproic acid) from malonic ester and alcohol of four carbons. [04]

(ii) Arrange the acidity order of following molecules and give detail explanation for your answer. [04]

(a) Acetic acid (b) formic acid (c) Chloroacetic acid

OR

Q.7 Answer the following

(i) Myron Bender alkaline hydrolysis of carbonyl-labeled ethyl benzoate undergo not only hydrolysis but also exchange of its ^{18}O with ordinary oxygen from the solvent, explain. [03]

(ii) Give the synthesis of citric acid and tartaric acid from glycerol and ethylene respectively. [05]

Q.8

(i) Complete the following reaction and give detail stepwise mechanism. [04]

Isopropyl benzene $\frac{(i)O_2}{(ii)H_2O/H^+}$? + ?

(ii) Complete and rewrite the following synthesis. [04]

(1) p-toluic acid + Fuming H_2SO_4 → A ($C_8H_8O_5S$).

(2) A + KOH $\xrightarrow{Fusion}$ B ($C_8H_8O_3$).

(3) B + Na, alcohol → C ($C_8H_{14}O_3$).

(4) C + HBr → D ($C_8H_{13}O_2Br$).

(5) D + base, heat → E ($C_8H_{12}O_2$).

(6) E + C_2H_5OH, HCl → F ($C_{10}H_{16}O_2$).

(7) F + CH_3MgI, then H_2O → α-terpineol ($C_{10}H_{18}O$).

OR

Q.8 Answer the following

(i) Arrange the acidity order of following molecules and give detail explanation for your answer considering <u>resonance</u> concept. [04]

(a) Phenol (b) Water (c) Alcohol

(ii) Complete the following reaction and give detail <u>stepwise</u> mechanism. [04]

Phenol $\frac{\mathbf{HCN/HCl}}{\boldsymbol{AlCl_3, 40^0 C}}$?