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[48 / A-65]

No of Printed Pages: 02

SARDAR PATEL UNIVERSITY

M.Sc. (CHEMISTRY), Semester – I, Examination
Wednesday, 6th April 2016
PS01CCHE02 - ORGANIC CHEMISTRY – I

Time: 10:30 am - 01:30 pm **Maximum Marks – 70**

Q.1 Select the correct answer from the option given below for each of the following questions. **[08]**
Write **ONLY ANSWERS** in the provided answer book. **[e.g. Q.1 (1)-(b)]**

(1) 1-butene and 2-butene are _____.
(a) Positional isomer (b) Skeleton isomer
(c) Ring chain isomer (d) Metamers

(2) Which of these is the rate-determining step in the nitration of benzene?
(a) Protonation of nitric acid by sulfuric acid (b) Protonation of sulfuric acid by nitric acid
(c) Loss of a water molecule by the protonated species to produce the nitronium ion (d) Addition of the nitronium to benzene to produce the arenium ion

(3) Which of the following reaction does not involve nitrene as an intermediate?
(a) Schmidt rearrangement (b) Curtius rearrangement
(c) Hofmann rearrangement (d) Beckmann rearrangement

(4) How many total number of stereo isomer are possible for 2,3-dibromobutane?
(a) Two (b) Three
(c) Four (d) Six

(5) Addition reaction of alkenes are characterized by:
(i) Formation of π-bond (ii) Breaking of π-bond
(iii) addition of two groups across a double bond (iv) Elimination of two groups
Option: (a) i & iii (b) ii & iv (c) ii & iii (d) i & iv

(6) Claisen reaction involves the _____ in presence of base.
(a) reaction of two moles of same ester
(b) reaction between aromatic aldehyde and ester having α-H
(c) reaction between aromatic aldehyde and aliphatic ketone or aldehyde
(d) reaction between two moles of different eaters

(7) Aprotic bipolar solvent is favorable for _____
(a) E-2 mechanism (b) Ei mechanism
(c) E1cB mechanism (d) E-1 mechanism

(8) Benzene when treated with HCl in the presence of anhydrous $AlCl_3$ gives _____
(a) Benzyne (b) Meisenheimer complex
(c) π-complex (d) Wheland complex

Q.2 Answer **ANY SEVEN** of the following **[14]**

(a) Why "anti" conformation is favored for bimolecular elimination?
(b) In Diazo coupling reaction, the diazonium salt is taken in slightly acidic medium why?
(c) "The position of two ligands cannot be inter changed in fischer projection" Justify.
(d) Give at least one method to trap nitrene and benzyne.
(e) State and explain Bredt's rule with suitable example.
(f) Define the terms: (1) Chiral Axis (2) Homomorphic ligands
(g) Give the spectral evidences for the involvement of cyclichalonium ion in halogenations of alkene.
(h) Mention the application of Hofmann rearrangement.
(i) D-L system is inadequate in describing the configuration of compounds like meso 2,3-butanediol.

Q.3

(a)

(i) What is the minimum requirement for the following compounds to be chiral? **[03]**
1] Ansa compounds 2] Biphenyls 3] Allenes

(ii) What is prochiral center? Assign the prochirality descriptor to methylene hydrogens in 2(R)-butanol. **[03]**

(b) Explain the following:

(i) All chiral centers are always stereogenic but the reverse is not true. **[03]**

(ii) Chirality descriptor in chiral allene is independent on viewer's position. **[03]**

OR

(b) Answer the following as directed:

(i) Draw the fischer projection for 2(R)-bromo-3(R)-aminobutanoic acid. Convert it to newman projection via sawhorse formula. **[03]**

(ii) Discuss Klyne Prelog terminology by citing the example of erythro-3-bromo-2-butanol. **[03]**

Q.4

(a) Explain the following facts:

(i) Dickmann condensation is an intramolecular claisen condensation. **[03]**

(ii) The crossover experiment confirms concertedness of Bayer-villiger rearrangements. **[03]**

(b) Justify the following statements:

(i) 1,2-hydride shift in Wagner Meerwein rearrangement does not change the molecular skeleton. **[03]**

(ii) The stability of carbanion controls the pathway foe cyclopropane ring opening in Favorskii rearrangement. **[03]**

OR

(b) Explain the following:

(i) The stereochemical outcome of aldol condensation can be controlled by base strength. **[03]**

(ii) Darzen glycidic ester condensation is chain extension reaction. **[03]**

Q.5

(a) Answer the following as directed:

(i) Differentiate the Cope and Chugaev elimination reaction. **[03]**

(ii) Bromination of cis-2-butene is stereo specific as well as stereo selective reaction. **[03]**

(b)

(i) Discuss the factors favoring the hofmann elimination over saytzev's elimination. **[03]**

(ii) Ph-CH_2-CH_2-Br does not show any deuterium exchange when subjected to β-elmination in presence of EtOD/EtO^-. What information can be derived from this observation? **[03]**

OR

(b) Justify the followings:

(i) Halogenation of alkene is anti stereo selective as well as not a concerted process. **[03]**

(ii) Dehydrochlorination of neomethyl chloride; the process is governed by the thermodynamic stability of product. **[03]**

Q.6

(a) Answer the following as directed:

(i) Shows that for the alkylation of aromatic compounds, F. C. acylation is more advantageous over F. C. alkylation. **[03]**

(ii) Electrophilic attack in naphthalene is more favored on 1st position rather than 2nd position. **[03]**

(b)

(i) The product of hydroxylation from trance-2-butane using $KMnO_4$ is a dl-pair whereas use of per acid yields a meso compound. Highlight the differences in their mechanism. **[03]**

(ii) What is cyno-ethylation reaction? Describe the importance of cyno-ethylation reaction. **[03]**

OR

(b) Justify the followings:

(i) Nitration of benzene is not a concerted process. **[03]**

(ii) Electrophilic substitution on phenol is favored in ortho- and para- positions. **[03]**