SC

SEAT No._____ No. of printed pages: 04

[26]

SARDAR PATEL UNIVERSITY

M.Sc. (Chemistry), Semester – I

April 11, 2018 :: Wednesday

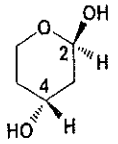
Time: 10:00 A.M. – 1:00 P.M.

ORGANIC CHEMISTRY-I [PS01CCHE22]

Note: Figures to the right indicate full marks. **Total marks: 70**

Q-1 **Select the correct answer and mention only the code of correct answer against their question numbers.** **[08]**

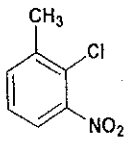
a. Which is the correct assignment of chirality at C2 and C4 of the following molecule?

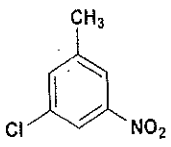


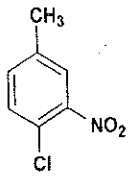
(i) 2*S*,4*S*
(ii) 2*R*,4*R*
(iii) 2*S*,4*R*
(iv) 2*R*,4*S*

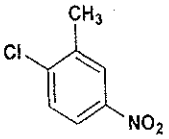
b. Which of the following is *wrong* statement regarding elimination reaction?
(i) The E2 mechanism generally occurs under highly basic condition.
(ii) The E2 mechanism is stereospecific.
(iii) The E1 mechanism does not require a base.
(iv) The E1cB mechanism is usually unimolecular in the rate determining step.

c. Suggest the major product upon chlorination of m-nitrotoluene with Cl_2 / $AlCl_3$

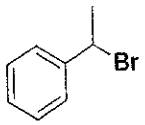
(i) 

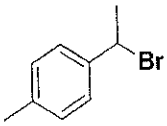
(ii) 

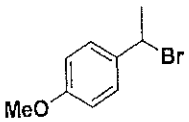
(iii) 

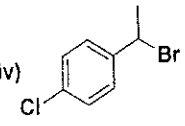
(iv) 

d. Which is the most reactive compound for the E1 elimination?

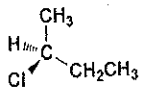
(i) 

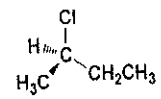
(ii) 

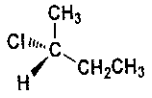
(iii) 

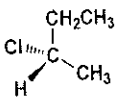
(iv) 

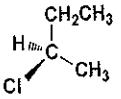
e. Which of (i)-(iv) shows the same compound as the following?



(i) 

(ii) 

(iii) 

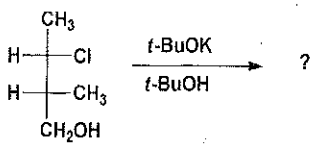
(iv) 

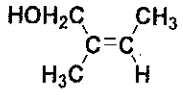
C.P.T.O.)

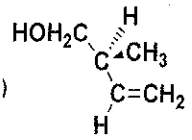
f. Which combination of carbonyl compounds gives phenyl vinyl ketone by an aldol condensation?

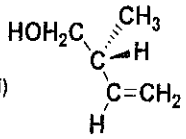
(i) acetophenone + formaldehyde
(ii) acetophenone + acetaldehyde
(iii) benzaldehyde + acetaldehyde
(iv) benzaldehyde + formaldehyde

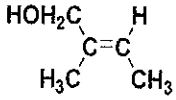
g. Suggest the main product of the following reaction?



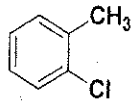
(i) 

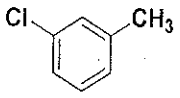
(ii) 

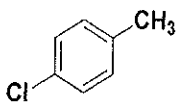
(iii) 

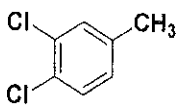
(iv) 

h. Which gives about 1:1 *p*- and *m*- methyl aniline as the main products when treated with sodium amide in liquid ammonia?

(i) 

(ii) 

(iii) 

(iv) 

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

a. *cis*-1,2-Dimethylcyclohexane is optically inactive even though it has two chiral centers. Explain.
b. Which factors favour ipso substitution?
c. Acetophenone on Beckmann rearrangement do not give N-methyl benzamide.
d. Addition of HBr to 1-phenylpropene yields only (1-bromopropyl)benzene. Propose a mechanism for the reaction, and explain why none of the other regioisomer is produced.
e. Why does menthyl chloride give a single product in elimination reaction?
f. Define (i) chiral axis and (ii) homomorphic ligand.
g. Friedel–Crafts reaction of benzene with (R)-2-chlorobutane produces optically active or racemic product. Explain.
h. Justify that chirality is neither necessary nor the sufficient condition for the occurrence of diastereotopic ligands in molecule.
i. How topicity can be decided by symmetry operation?

Q-3 [A] Explain the following statements. **[06]**

(i) 1,2-Dichlorocyclopropane has two stereogenic carbon atoms, comment on its stereoisomerism.
(ii) Define prochiral centre. Assign prochiral descriptors to methylene hydrogens in 2*S*-chloro butane

Q-3 [B] Discuss in detail. **[06]**

(i) Show that carbon-3 is pseudochiral in 2,3,4-trihydroxypentane
(ii) How many stereoisomers are possible for 2,3-dibromopentane? Draw their structure and give R/S notation to them.

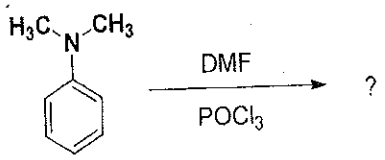
OR

Q-3 [B] Do as directed. [06]

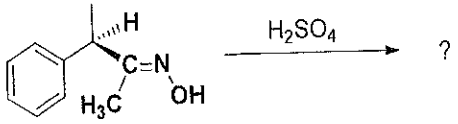
(i) Show that rotation of 90° is not allowed to Fischer projection formula.
(ii) Discuss Klyne-Prelog terminology by citing suitable example.

Q-4 [A] Complete the following transformation with detail mechanism [06]

(i)



(ii)



Q-4 [B] Answer the following [06]

(i) Sommelet Hauser rearrangement involves 2,3-sigmatropic shift.
(ii) Dieckmann condensation is an intramolecular Claisen condensation

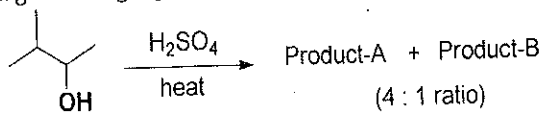
OR

Q-4 [B] Explain in detail. [06]

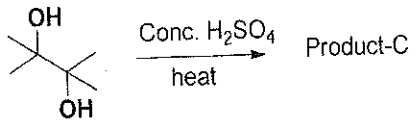
(i) 1, 2-hydride shift in Wagner Meerwein rearrangement does not change molecular skeleton.
(ii) Schmidt reaction is more advantageous over Curtius reaction

Q-5 [A] Suggest mechanisms for these eliminations. Why does the first give a mixture and the second give a single product? [06]

(i)



(ii)



Q-5 [B] Answer the following. [06]

(i) Explain the factors favouring E1 elimination.
(ii) Show that hydroxylation of alkene by using peracid is stereospecific.

OR

Q-5 [B] Do as directed. [06]

(i) Give the difference between Cope and Chugaev elimination
(ii) Explain Markonikoff's rule by taking example of reaction between HBr and 1-methylcyclohexene

Q-6 [A] Explain in detail. [06]

(i) Primary kinetic isotope effect is not observed for nitration of benzene.
(ii) Benzene does not give the product of hydrochlorination with HCl in presence of $AlCl_3$ but it undergoes substitution reaction.

C.P.T.O.)

Q-6 [B] Describe in brief. **[06]**

(i) Electrophilic substitution of Naphthalene is more favoured at position – 1 rather than position – 2.

(ii) Nitration of aniline gives meta derivative as a major product.

OR

Q-6 [B] Answer the following. **[06]**

(i) Discuss the sulphonation of Naphthalene.

(ii) Electrophilic substitution reaction of pyridine occurs at position-3. Explain.