18

M.Sc. CHEMISTRY
First Semester
ORGANIC CHEMISTRY-I
(MSC - 101)

Duration: 3Hrs. **Full Marks: 70**

Part-A (Objective) =20
Part-B (Descriptive) =50

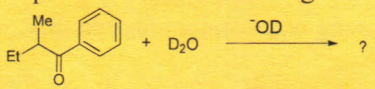
(PART-B: Descriptive)

Duration: 2 hrs. 40 mins. **Marks: 50**

Answer any *five* of the following questions:

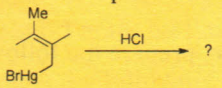
1. (a) (i) SN^1 reaction don't proceed at bridgehead carbon in [2,2,1] bicyclic compound. However, for those SE^1 is quite possible. Explain why? (2.5+2.5=5)

(ii) Write the product of the following reaction along with suitable mechanism.

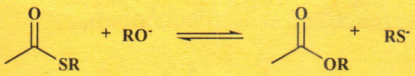


(b) (i) Explain the following observation and also mention the type of mechanism involved in the following reaction. (3+2=5)

(ii) Write the product of the following reaction with mechanism-



2. (a) (i) Predict the direction of the following reaction using HSAB principle- (2)



(ii) The ratio of K_H/ K_D for the following reaction is 7. On the basis of this propose a mechanism for the reaction. (3)

$CH_3COCH_3 + Br_2 \longrightarrow CH_2(Br)COCH_3 + HBr$

$CH_3COCD_3 + Br_2 \longrightarrow CD_2(Br)COCD_3 + DBr$

(b) Write down Hammett equation and explain each term used in the equation. Why Hammett equation is called as linear free energy relationship? (3+2=5)

3. (a) Why Hammett plots gives almost straight line for para, meta and unsubstituted benzene derivatives? However, for aliphatic and o-substituted compounds deviation from linearity is observed? (5)

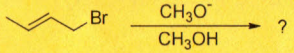
(b) (i) Arrange the following acid in order of their increasing strength- (2+3=5)

CH_3COOH, $ClCH_2COOH$, FCH_2COOH, ICH_2COOH

(ii) Basicity for methyl amine is more than that of ammonia while basicity of aniline is less than that of methyl amine. Explain why?

4. (a) Explain with example, what do you mean by an ambident nucleophile? (2)

(b) Give the products of the following reaction that favours SN^2 and that favours SN^1 mechanism. (3)



(c) Discuss in details how the following factors affect an SN^1 reaction? (5)

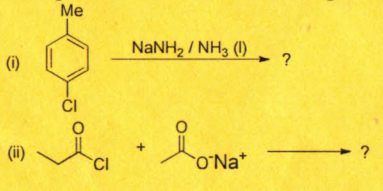
(i) Structure of the substrate. (ii) Nature of nucleophile

(iii) Nature of solvent

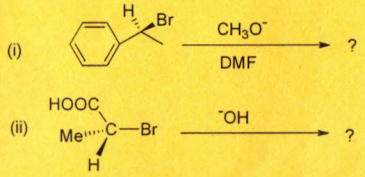
5. (a) Using the required substrate and the nucleophile, prepare the following compounds. (2)

(i) CH_3-CH_2-CH_2-OCH_3 (ii) CH_3-CH_2-CH_2-CH_2-SCH_3

(b) Give the product of the following reactions with mechanism. (3)



(c) Write down the product with stereo-chemistry of the following reactions with mechanism. (2+3=5)



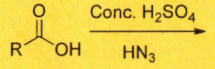
6. (a) Why aniline doesn't undergo Friedel Craft alkylation? (2)

(b) What is o/p ratio? How steric factors affect the o/p ratio? (3)

(c) Write about arenium ion mechanism giving energy profile diagram. (5)

7. (a) Write about Wittig Rearrangement. (2)

(b) Complete the following reaction with mechanism. (3)

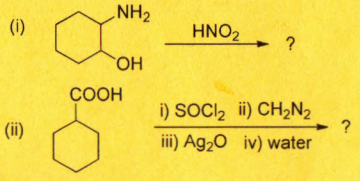


(c) Write short notes on following: (2.5×2=5)

(i) Sommelet Hauser Rearrangement

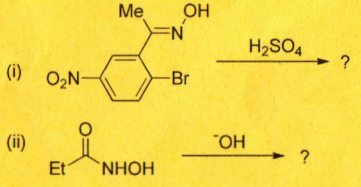
(ii) Favorskii Rearrangement

8. (a) Write the product of the following: (1×2=2)



(b) Write short notes on Pinacol Pinacolone Rearrangement. (3)

(c) Complete the following with mechanism: (2.5×2=5)



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REV-00
MSC/94/104 2015/12

M.Sc. CHEMISTRY
First Semester
ORGANIC CHEMISTRY-I
(MSC - 101)

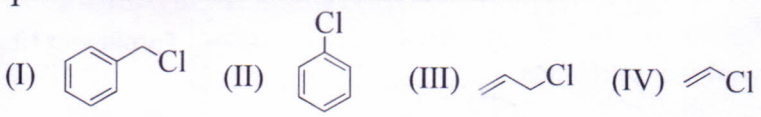
Duration: 20 minutes **Marks – 20**

PART-A (Objective)

Time: 20 mins **Total Marks: 20**

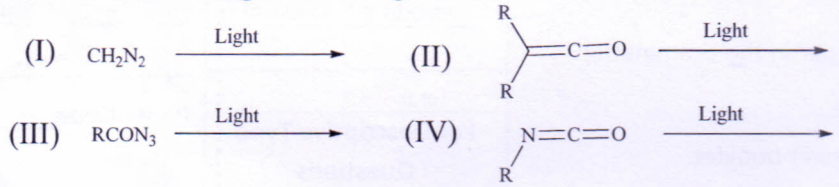
I. Choose the correct option: **1×20=20**

1. Which pair will not form a stable carbocation?



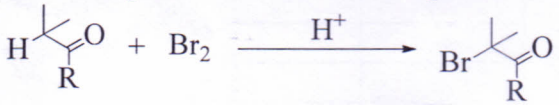
(a) I and II (b) II and III (c) II and IV (d) III and IV

2. Which of the following reaction gives carbene as intermediate?



(a) I and II (b) I , II and III (c) III and IV (d) I and III

3. The following reaction is an example of -



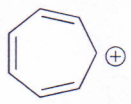
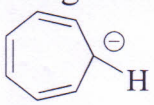
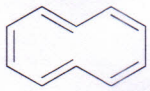
(a) Nucleophilic substitution (b) Addition reaction
(c) Eletcrophilic substitution (d) None

4. Which of the following reaction don't involve carbocation?
   (a) $(CH_3)_3CCl + AgNO_3 \longrightarrow$
   (b) $(CH_3)_3COH + HCl \longrightarrow$
   (c) $(CH_3)_3CH + Cl_2 + Light \longrightarrow$
   (d) $CH_3CH{=}CHCH_2OH + H_3O^+ \longrightarrow$

5. Which of the following structure is not aromatic?

(a)  (b)  (c)  (d) 

6. Which of the following structures are aromatic?

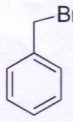
(a)  (b)  (c)  (d) None of these

7. In which of the following mechanism carbanion is involved?
(a) SN^2 (b) SN^1 (c) SE^2 (d) SE^1

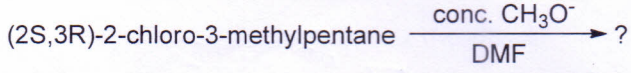
8. Which is a correct statement for an SN^2 reaction?
(a) Follow 2nd order kinetics.
(b) Weak nucleophile will favour the reaction.
(c) Carbocation is formed as an intermediate.
(d) All these statements are correct.

9. Decreasing order of nuceophilicity of (1) CH_3S^-, (2) CH_3COO^-, (3) CH_3OH, is
(a) 1 > 2 > 3 (b) 2 > 3 > 1 (c) 3 > 2 >1 (d) 1 > 3 > 2

10. Which of the following substrate will produce rearranged product under SN^1 condition?

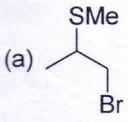
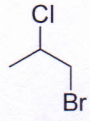
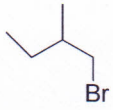
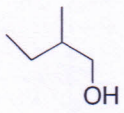
(a)  (b)  (c)  (d) 

11. The following substitution reaction

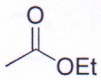
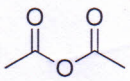


, will produce
(a) (2R,3R)-2-methoxy-3-methylpentane (b) (2R,3S)-2-methoxy-3-methylpentane
(c) (2S,3S)-2-methoxy-3-methylpentane (d) (2S,3R)-2-methoxy-3-methylpentane

12. Which of the following substrate will exhibit neighboring group participation?

(a)  (b)  (c)  (d) 

13. List the following in order of decreasing reactivity towards hydrolysis:

1)  2)  3) 

(a) 1 > 2 > 3 (b) 2 > 3 > 1 (c) 3 > 2 >1 (d) 1 > 3 > 2

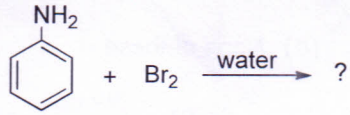
14. The electrophile involved in sulphonation of aromatic system is
(a) SO_3 (b) SO_3H (c) H_2SO_4 (d) None of the above

15. Which of the following rearrangement reaction involves electron rich carbon?
(a) Favorskii Rearrangement (b) Pinacol Pinacolone Rearrangement
(c) Curtius Rearrangement (d) None of the above

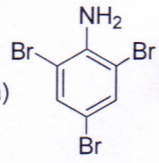
16. In Losssen Rearrangement, the eliminating group is
(a) –OCOR (b) N_2 (c) HCl (d) None of the above

17. In Neber Rearrangement, the intermediate is
(a) Carbene (b) Carbocation
(c) Azirene (d) None of the above

18. The product of the reaction:



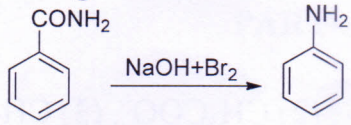
, is

(a) 

(b) 

(c) Both i & ii (d) None of these

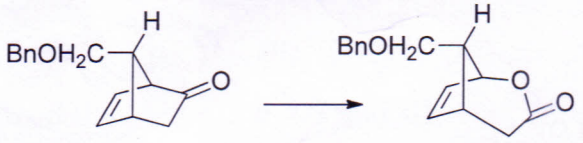
19. The name of the following reaction is



(a) Hoffmann Rearrangement (b) Curtius rearrangement

(c) Lossen Rearrangement (d) None of the above

20. Which of the following reagent convert the following?



Bn= $C_6H_5CH_2$-

(a) Perbenzoic acid (b) HN_3

(c) Sulphuric acid (d) None of the above

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