TDC (CBCS) Odd Semester Exam., 2019

CHEMISTRY

(3rd Semester)

Course No. : CHMHCC–302 T

(Organic Chemistry)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

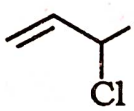
GROUP—A

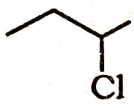
Answer **two** questions from each Unit in this Group

UNIT—I

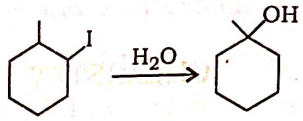
1. *(a)* Arrange the following three chlorides in decreasing order towards S_N1 reactivity : 1

(i) 

(ii) 

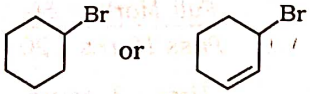
(iii) 

(b) For the reaction

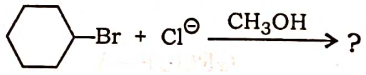


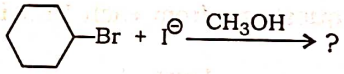
show the mechanism of formation of intermediate carbocation. 1

2. (a) Which of the following reacts faster in S_N1 reaction and why? 1

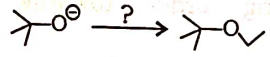


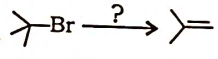
(b) Which of the following will exhibit higher S_N2 reaction rate and why? 1

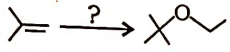
(i) 

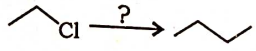
(ii) 

3. Provide the appropriate reagent for each of the following conversions : ½×4=2

(i) 

(ii) 

(iii) 

(iv) 

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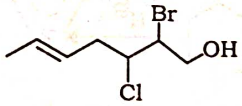
UNIT—II

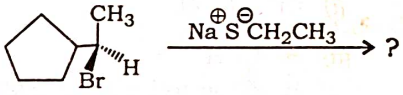
4. (a) Write the IUPAC name of the following compound : ½



(b) (i) Predict the following product : ½

$$CH_3Br + CH_3CH_2O^{\ominus}Na^{\oplus} \rightarrow ?$$

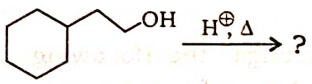
(ii) Identify the following product with stereochemistry : 1



5. (a) What is Lucas reagent? Arrange the following compounds in increasing order of reactivity towards Lucas reagent : ½+1=1½

CH_3CH_2OH, $CH_3CH(OH)CH_3$, $(CH_3)_3COH$

(b) Predict the following product : ½



6. (a) Phenols generally do not undergo substitution of OH group like alcohol. Why? 1

(Turn Over)

(b) Identify the following products : ½×2=1

(i) $CH_3CH=CH_2 \xrightarrow{H^{\oplus}/H_2O} ?$

(ii)  $\xrightarrow{H^{\oplus}, \Delta} ?$

UNIT—III

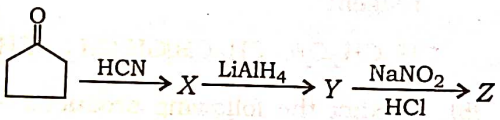
7. (a) Arrange the following compounds in decreasing order of reactivity with Grignard reagent : ½

(i) $CH_3-\overset{O}{\overset{\|}{C}}-H$

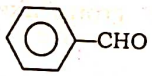
(ii) $H-\overset{O}{\overset{\|}{C}}-H$

(iii) $CH_3-\overset{O}{\overset{\|}{C}}-Ph$

(b) Identify *X*, *Y* and *Z* in the following reaction : 1½



8. (a) Arrange the following in increasing order of reaction rate towards nucleophilic addition reaction : 1

(i) 

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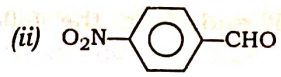
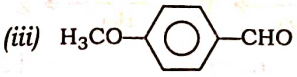
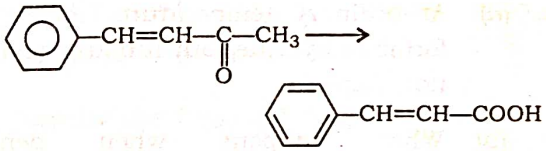
(ii) 

(iii) 

(b) Choose the correct answer : 1

Which of the following reagents is appropriate for the reaction?



(i) $KMnO_4$, Δ followed by $H^{\oplus}$

(ii) I_2/NaOH followed by $H^{\oplus}$

(iii) H_2/Pt

(iv) $LiAlH_4$

9. (a) Choose the correct answer : ½

Cannizzaro reaction is

(i) oxidation reaction

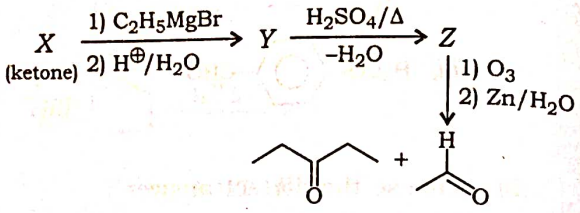
(ii) reduction reaction

(iii) ion exchange reaction

(iv) disproportionation reaction

(Turn Over)

(b) Identify X, Y and Z in the following reaction : 1½



UNIT—IV

10. (a) At ordinary temperature, maleic acid forms anhydride, but fumaric acid does not. Explain. 1

(b) What happens when benzene-1,2-dicarboxylic acid is heated with P_2O_5? 1

11. (a) Name the reaction and the reagents used for the conversion of acid chloride to the corresponding aldehyde. 1

(b) What happens when lactic acid is treated with Fenton's reagent? 1

12. (a) Which of the following is more reactive towards nucleophilic substitution? Give reason : 1

(i) Acid chloride

(ii) Acid amide

(b) Convert phthalic acid into phthalimide. (Give equation only) 1

UNIT—V

13. (a) Why is the Grignard reagent prepared in anhydrous condition? 1

(b) A Grignard reagent reacts with methanal to form $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2OH$. Identify the Grignard reagent. 1

14. (a) Write various tautomeric forms of $CH_3COCH_2COOCH_2CH_3$. 1

(b) Explain why methylenic hydrogen in ethylacetoacetate is acidic in nature. 1

15. (a) What is oleum? 1

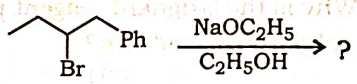
(b) Why SO_3 acts as an electrophile, though it is a natural molecule? 1

GROUP—B

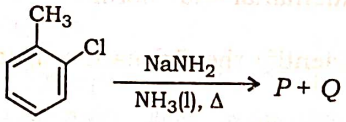
Answer **one** question from each Unit in this Group

UNIT—I

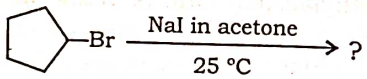
16. *(a)* Predict the major product and provide the mechanism : 2

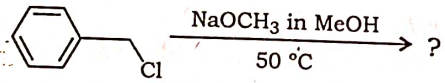


(b) Identify *P* and *Q*, and propose plausible mechanism : 2



(c) Select, with reasons, whether the following combination of reactants will react following S_N1 or S_N2 pathway. Write the corresponding products of the reactions : 1+1=2

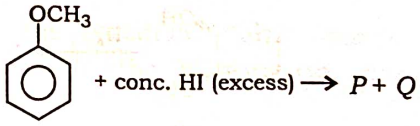
(i) 

(ii) 

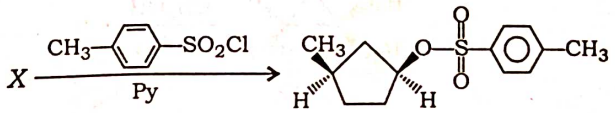
17. *(a)* Haloarenes undergo nucleophilic substitutions less readily than haloalkanes. Explain. 1½

(Continued)

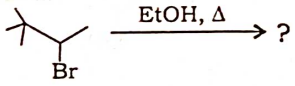
(b) Identify *P* and *Q* from the following reaction : 1



(c) Identify *X*, and propose a mechanism for the following reaction : 1½

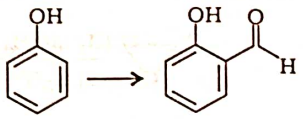


(d) Complete the following elimination reaction and provide mechanism : 2



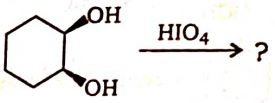
UNIT—II

18. *(a)* What is the electrophile in Reimer-Tiemann reaction? How is it generated and how can this be useful in bringing the following conversion? Explain with mechanism taking appropriate reagent(s) : ½+½+2=3

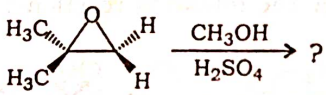


(Turn Over)

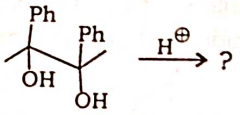
(b) Predict the following product (with mechanism) : 1½



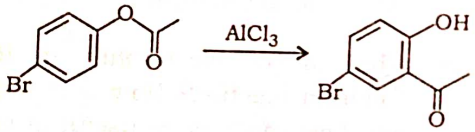
(c) What is the predominant product of the following reaction? Provide mechanism : 1½



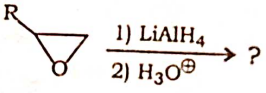
19. (a) Complete the following reaction and provide plausible mechanism : 2



(b) Provide mechanism from the following reaction : 2



(c) Predict the product and depict reasonable mechanism for the following reaction : 2



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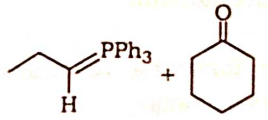
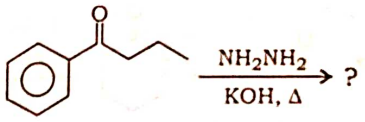
UNIT—III

20. Predict the products and depict the mechanisms for the following reactions : 2×3=6

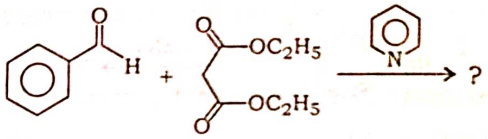
(i)



(ii)

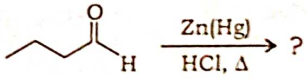


(iii)

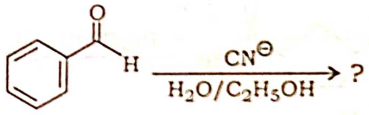


21. Complete the following reactions and provide plausible mechanisms : 2×3=6

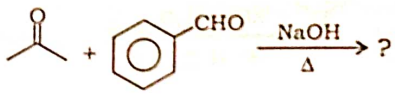
(i)



(ii)



(iii)

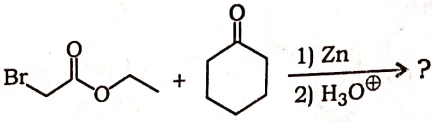


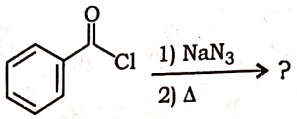
(Turn Over)

UNIT—IV

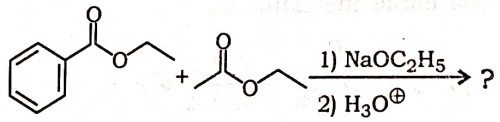
22. *(a)* Provide the equation for acidic hydrolysis of ethylbutanoate and provide the mechanism. 2

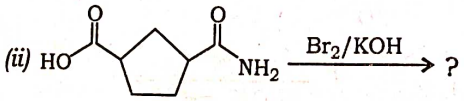
(b) Complete the following reactions and show the mechanisms : 2×2=4

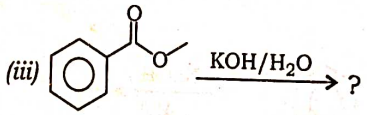
(i) 

(ii) 

23. Predict the products from the following reactions (with mechanisms) : 2×3=6

(i) 

(ii) 

(iii) 

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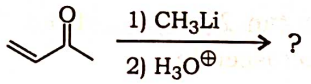
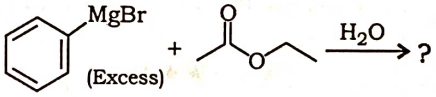
UNIT—V

24. *(a)* Complete the following reactions and propose suitable mechanisms : 1½×2=3

(i) 

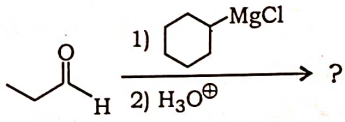
(ii) 

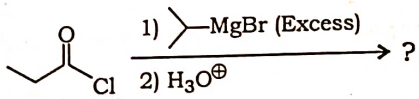
(b) Carry out the following syntheses : 1½×2=3

(i) Succinic acid from diethylmalonate

(ii) 3-phenyl propenoic acid from ethyl-acetoacetate

25. *(a)* Predict the products and propose reasonable mechanisms for the following reactions : 1½×2=3

(i) 

(ii) 

(Turn Over)

(b) Carry out the following syntheses : $1\frac{1}{2} \times 2 = 3$

(i) But-2-enoic acid from diethyl-malonate

(ii) Pentan-2-one from ethyl-acetoacetate

★ ★ ★