2024/11

B.SC. CHEMISTRY
THIRD SEMESTER
ORGANIC CHEMISTRY II
BSC – 302 OLD COURSE [REPEAT]

[USE OMR SHEET FOR OBJECTIVE PART]

SET A

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

Objective

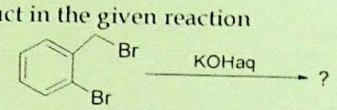
Time: 30 min. **Marks: 20**

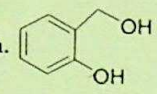
Choose the correct answer from the following: ***1X20=20***

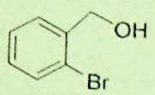
1. For preparation of any p-alcohol using Grignard reagent (GR), need
   a. GR + HCHO
   b. GR + RCHO
   c. GR + Ketone
   d. GR + H_2O

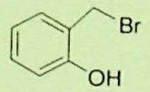
2. An organic compound A reacts with sodium metal and forms B. On heating with conc. H_2SO_4, A gives diethyl ether. A and B are respectively –
   a. C_2H_5OH and C_2H_5ONa
   b. C_2H_5OH and CH_3ONa
   c. C_3H_7OH and C_3H_7ONa
   d. CH_3OH and C_2H_5ONa

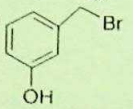
3. The major product in the given reaction



a. 

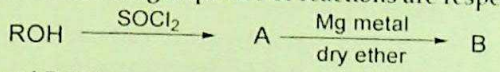
b. 

c. 

d. 

4. Which is a not a correct statement for an SN^2 reaction?
   a. Proceed with inversion of configuration
   b. strong nucleophile will favour the reaction.
   c. weak nucleophile will favour the reaction.
   d. polar aprotic solvent favour SN^2 mechanism.

5. A and B in the following sequence of reactions are respectively



   a. ROCl and ROMg
   b. RCl and RMgCl
   c. RCl and RMgOCl
   d. ROCl and RCl

6. Strength of the following nucleophile will be of the order:
   a. CH_3S^- > CH_3O^- > t-BuO$^-$
   b. CH_3O^- > CH_3S^- > t-BuO$^-$
   c. t-BuO$^-$ > CH_3S^- > CH_3O^-
   d. CH_3S^- > t-BuO$^-$ > CH_3O^-

7. The example of a trihydric alcohol is
   a. glyceraldehyde
   b. glycerol
   c. ethylene glycol
   d. ethanol

8. Acetone when reacts with methyl magnesium bromide (CH_3MgBr) produce
   a. 1° alcohol
   b. 2° alcohol
   c. 3° alcohol
   d. no reaction

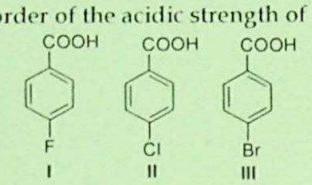
9. The main reagent for Hydroboration - Oxidation reaction of alkene is
   a. B_2H_6
   b. H_2/Pd
   c. CrO_3-H_2SO_4
   d. $Hg(OAc)_2$

10. When cyclohexene is treated with mCPBA, the product is a/an
    a. alcohol
    b. epoxide
    c. aldehyde
    d. ketone

11. Benzene diazonium chloride upon reaction with aqueous solution produce
    a. benzene
    b. Bromobenzene
    c. catechol
    d. Phenol

12. Reimer-Tieman reaction proceed via the formation of
    a. free radical
    b. carbocation
    c. carbanion
    d. carbene

13. The correct order of the acidic strength of the following:



    a. I>II>III
    b. III>I>II
    c. III>II>I
    d. I>III>II

14. Hoffmann Bromamide reaction convert
    a. primary amide to a primary amine
    b. primary amide to a primary alcohol
    c. primary amide to an aldehyde
    d. primary alcohol to a primary amine

15. The substrate which can undergo Cannizzaro reaction is
    a. Enolizable aldehyde
    b. Non-enolizable aldehyde
    c. Enolizable ketone
    d. Non-enolizable ketone

16. The intermediate compound of Aldol reaction is
    a. α -Hydroxy ester
    b. α-Hydroxy carbonyl
    c. β-Hydroxy ester
    d. β-Hydroxy carbonyl

17. The compound which can be used as Michael acceptor is
    a. α-β unsaturated carbonyl
    b. β-γ unsaturated carbonyl
    c. γ-δ unsaturated carbonyl
    d. All of these

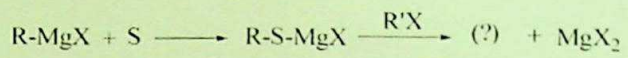
18. The alcohol which does not undergo oxidation with PDC is

a. isopropanol
b. tertiary butanol
c. benzyl alcohol
d. Ethanol

19. What is the main product obtained by the oxidation of thioethers with $KMnO_4$

a. Sulphone
b. Sulphide
c. Thioacetals
d. Sulphoxide

20. Which is the main product of the following reaction?



a. Thiols
b. Thioethers
c. alkane
d. Halo acids

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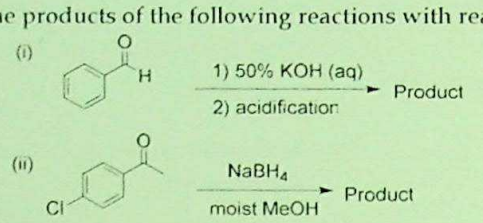
Descriptive

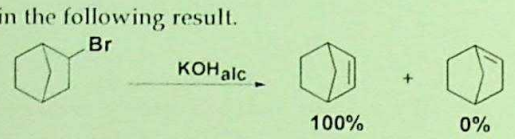
Time : 2 hrs. 30 min. Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. a. Write the products of the following reactions with reaction mechanism 3

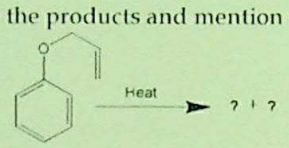


b. Explain the following result. 2



c. a. How will you prepare salicylaldehyde starting from phenol via Riemer-Tiemann reaction? Show the detailed mechanism. 3

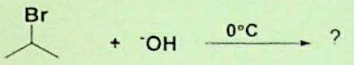
b. Write down the products and mention which one is the major product 2

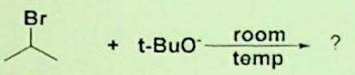


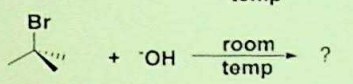
2. a. Discuss the stereochemical changes that may be observed when an optically active substrate undergo nucleophilic substitution following SN^1 mechanism. 3

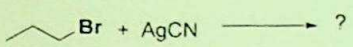
b. "A strong nucleophile favour SN^2 mechanism and weak nucleophile favours an SN^1 mechanism." Justify the statement. 3

c. Predict the products in the following reactions: 4

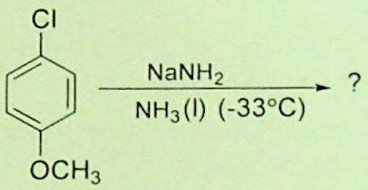
(i) 

(ii) 

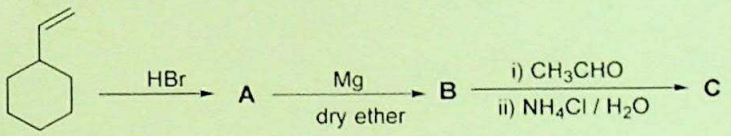
(iii) 

(iv) 

3. a. Write down the product / products formed in the following reaction with mechanism. 3



b. Write down the products **A**, **B** and **C** in the following sequence of reactions 3



c. Sketch out a strategy for synthesis of the following compounds using CH_3CH_2Br 4

(i)

(ii)

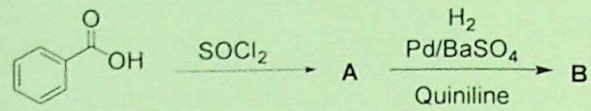
4. a. How will you prepare ethanol from acetaldehyde. Why is the boiling point of ethanol greater than acetaldehyde-explain schematically? 1+2=3

b. Write down the structure of picric acid, 2-nitrophenol and 2-ethylphenol and comment which one is more acidic in nature. 2

c. Describe Pinacol-pinacolone rearrangement. 3

d. How can you prepare epoxide from halohydrins? Explain with a suitable example. 2

5. a. Write the reagents (A & B) of the following reactions. 2



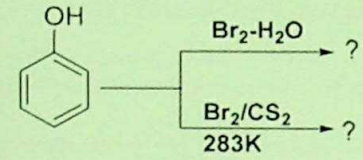
b. Write a short note on Cannizzaro reaction. 5

c. What product will be formed if CO_2 is treated with 2 equivalents of PhLi in anhydrous THF followed by acidic treatment? 3

6. a. Why 4-nitrophenol has greater boiling point than 2-nitrophenol - draw the structures in support of your answer? 2

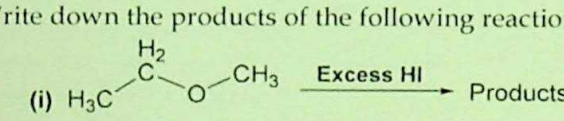
b. Describe Kolbe-Schmitt reaction and show the mechanism for the formation of salicyclic acid from phenol. 3

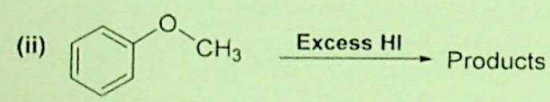
c. Write down the products 2



d. Write down the short note on Fries Rearrangement with detailed mechanism? What is the role of $AlCl_3$ in the reaction? 3

7. a. Write down the products of the following reactions 2





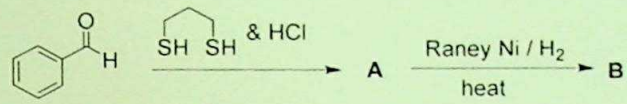
b. Show the mechanistic pathway of Curtius Rearrangement. 3

c. Write down the structure of Maleic acid and Fumaric acid. Which one can form corresponding anhydride easily upon heating via intramolecular dehydration? Draw the structure of that anhydride. 3

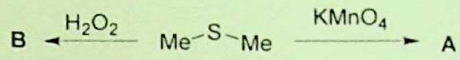
d. How will you prepare Phthalic anhydride from Phthalic acid? 2

8. a. Identify 'A' & 'B' of the following reactions. 3+2 = 5

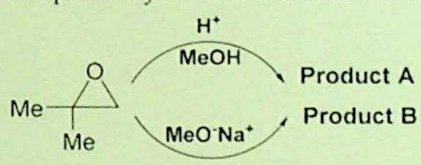
(i)



(ii)



b. Write down the product A and B? Show most appropriate mechanistic pathway for the formation of A and B 3



c. What will be the product of the following reaction 2

(i)

(ii)

= = *** = =