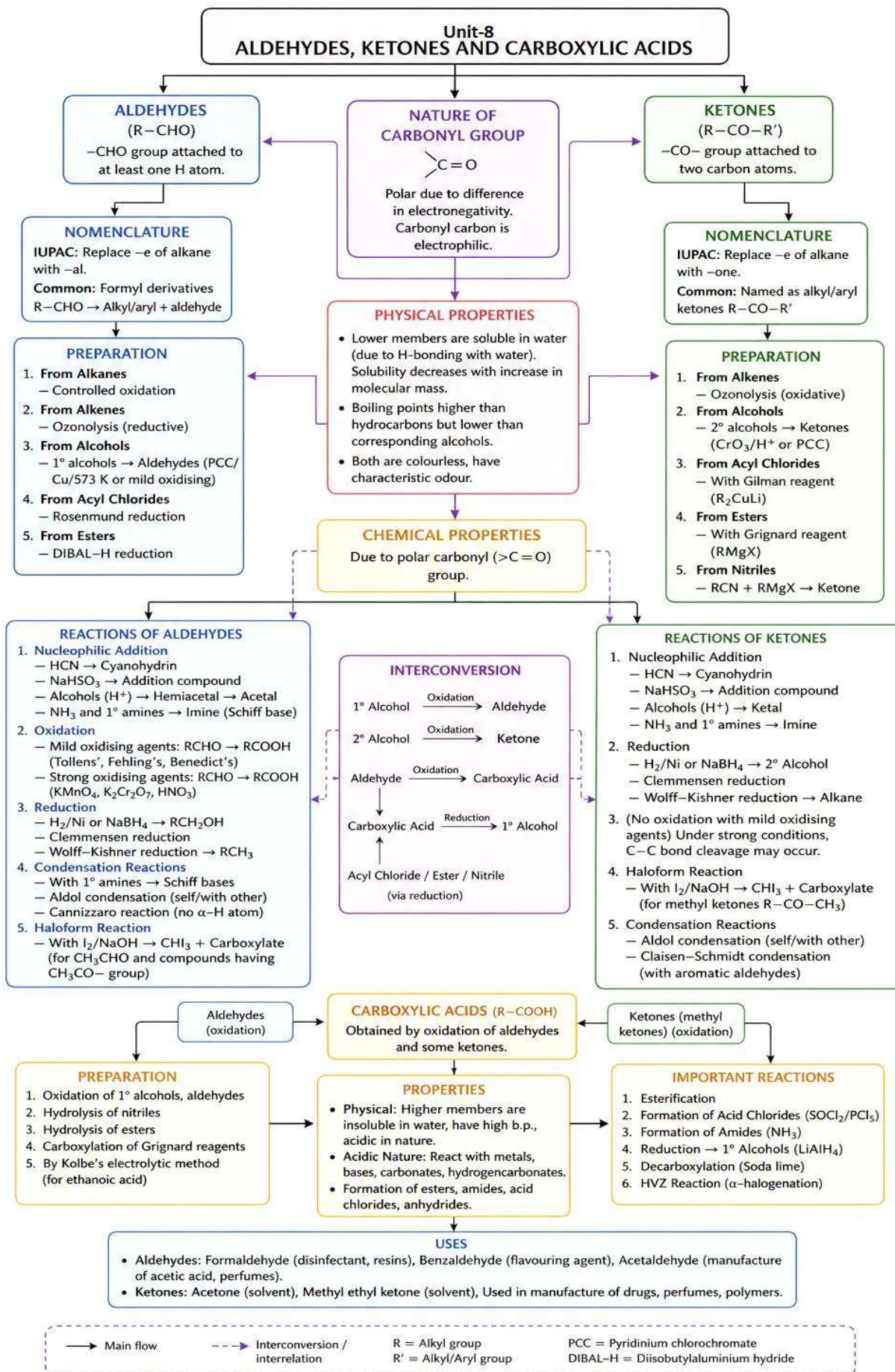




SECTION –A (1 MARK)

- 1 In the reaction of NaOBr with amide, the carbonyl carbon is lost as :
(A) HCO_3^- (B) CO_3^{2-} (C) CO_2 (D) CO
- 2 . Predict the acid which cannot be prepared by Grignard reagent:
(a) Acetic acid (b) Succinic acid (c) Formic acid (d) All of the above
3. Which is highly soluble in water:
(a) Methanal (b) Propanal (c) Propanone (d) Butanone
4. Benzaldehyde reacts with ethanoic KCN to give product :
(a) $\text{C}_6\text{H}_5\text{CH}(\text{OH})\text{CN}$ (b) $\text{C}_6\text{H}_5\text{CH}(\text{OH})\text{COC}_6\text{H}_5$
(c) $\text{C}_6\text{H}_5\text{CH}(\text{OH})\text{COOH}$ (d) $\text{C}_6\text{H}_5\text{CH}(\text{OH})\text{CHOHC}_6\text{H}_5$
5. Name the compound not responding to the Iodoform test :
(a) 2-Pentanone (b) Ethanol (c) Ethanal (d) 3-Pentanone
6. Precipitate produced when acetaldehyde is heated with Fehling's solution :
(a) Cu (b) CuO (c) Cu_2O (d) $\text{Cu}(\text{OH})_2$
7. Test used to distinguished between Aldehydes and ketones would be :
(a) Lucas test (b) Tollen's test (c) KMnO_4 solution (Baeyer's test) (d) None of these
8. Name the compound called Imine derivatives of aldehyde and ketones :
(a) Schiff's reagent (b) Fehling's reagent (c) Schiff's base (d) Schiff's acid
9. Predict the pair of compounds will undergo Aldol and Cannizzaro reaction respectively :
(i) acetone; benzaldehyde (ii) acetaldehyde; butan-2-one
(iii) propanone; formaldehyde. (iv) cyclopentanone, benzaldehyde :
(a) (i) and (iii) (b) (ii) and (iii) (c) (i), (iii) and (iv) (d) (iii) and (iv)
10. Carboxylic acids are more acidic than phenol and alcohol due to :
(a) intermolecular hydrogen bonding (b) formation of dimers
(c) highly acidic hydrogen (d) resonance stabilization of their conjugate base

ASSERTION-REASON TYPE QUESTIONS

Directions : Each of these questions contain two statements, Assertion and Reason. Each of these questions also has four alternative choices, only one of which is the correct answer.

You have to select one of the codes (a), (b), (c) and (d) given below:

- (a) Assertion is correct, reason is correct; reason is a correct explanation for assertion.
(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion
(c) Assertion is correct, reason is incorrect
(d) Assertion is incorrect, reason is correct.
11. **Assertion:** The boiling points of aldehydes and ketones are higher than hydrocarbons and ethers of comparable molecular masses.
Reason: There is a weak molecular association in aldehydes and ketones arising out of the dipole-dipole interactions.
12. **Assertion:** Formaldehyde is a planar molecule.
Reason: It contains sp^2 hybridised carbon atom.
13. **Assertion:** Compounds containing $-\text{CHO}$ group are easily oxidised to corresponding carboxylic acids.
Reason: Carboxylic acids can be reduced to alcohols by treatment with LiAlH_4
14. **Assertion:** The molecular mass of acetic acid in benzene is 120 instead of 60.

Reason: The carboxylic acids exist as cyclic dimers in which the two molecules of the acid are held together by two strong hydrogen bonds

15. **Assertion:** The pK_a of acetic acid is lower than that of phenol.

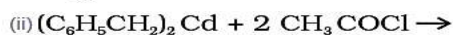
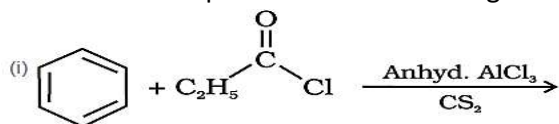
Reason: Phenoxide ion is more resonance stabilized than acetate ion.

ANSWER KEY for MCQ

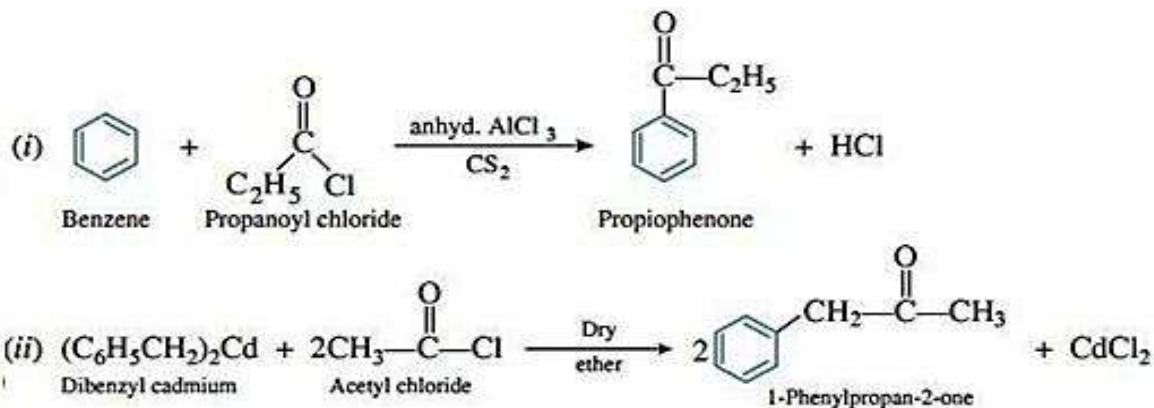
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>
<u>c</u>	<u>c</u>	<u>a</u>	<u>a</u>	<u>d</u>	<u>c</u>	<u>b</u>	<u>c</u>	<u>c</u>	<u>d</u>	<u>a</u>	<u>a</u>	<u>b</u>	<u>a</u>	<u>c</u>

SECTION – B [02 Marks Each]

- Arrange the following compounds in increasing order of their boiling points.
 CH_3CHO , CH_3CH_2OH , CH_3OCH_3 , $CH_3CH_2CH_3$
[Hint: is given by: $CH_3CH_2CH_3 < CH_3OCH_3 < CH_3CHO < CH_3CH_2OH$]
- Arrange the following compounds in increasing order of their reactivity in nucleophilic addition reactions.
 (i) Ethanal, Propanal, Propanone, Butanone.
 (ii) Benzaldehyde, p-Tolualdehyde, p-Nitrobenzaldehyde, Acetophenone.
*[Hint: Consider steric effect and Inductive effect.:
 (i) Butanone < Propanone < Propanal < Ethanal
 (ii) Acetophenone < p-Tolualdehyde < Benzaldehyde < p-Nitrobenzaldehyde]*
- Give the IUPAC names of the following compounds: (i) $PhCH_2CH_2COOH$
 (ii) $(CH_3)_2C=CHCOOH$
[Hint: (i) 3-Phenylpropanoic acid (ii) 3-Methylbut-2-enoic acid]
- Predict the product of the following reactions::



Hint:

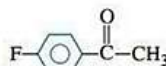
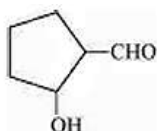


- Draw the structures of the following compounds:
 (i) 2-Hydroxycyclopentane carbaldehyde (ii) 4-Fluoroacetophenone

Hint:

SECTION –C [03 Marks Each]

- How will you convert ethanal



into the following

(i) Butane-1,3-diol (ii) But-2-enal (iii) But-2-enoic acid

[Hint: (i) On treatment with dilute alkali, ethanal produces 3-hydroxybutanal gives butane-1, 3 diol on reduction. (ii) On treatment with dilute alkali, ethanal gives 3-hydroxybutanal which on heating produces but-2-enal. (iii) When treated with Tollen's reagent, But-2-enal produced in the above reaction produces but-2-enoic acid]

Note: try to draw the structure of all the compounds involved in these reactions

2. Give simple chemical tests to distinguish between the following pairs of compounds:

(i) Methanol and Ethanol

(ii) Benzaldehyde and Formic acid

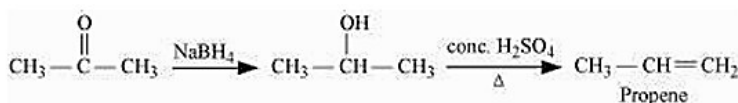
(iii) Phenol and Benzoic acid

[Hint: As per the text summary]

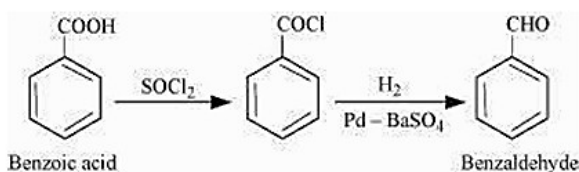
3. How will you bring about the following conversions in not more than two steps: (i) Propanone to Propene (ii) Benzoic acid to Benzaldehyde (iii) Ethanol to 3-Hydroxybutanal

[Hint:

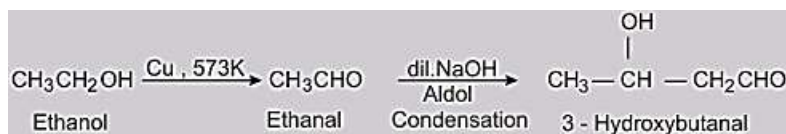
(i)



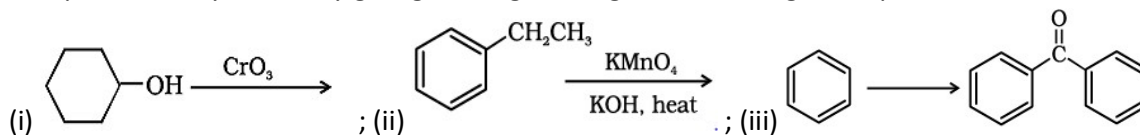
(ii)



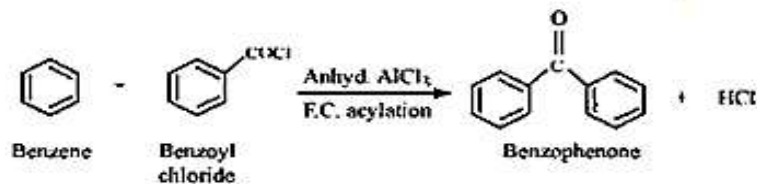
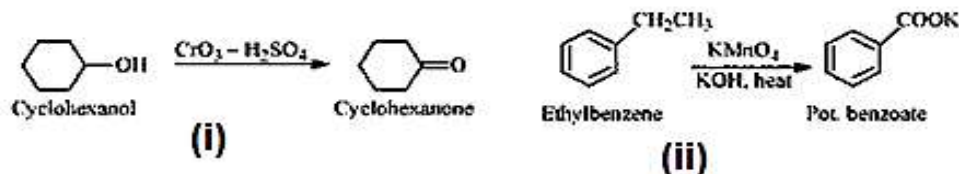
(iii)



4. Complete each synthesis by giving missing starting material, reagent or products:



Hint:



5.

for

following:

(i) Cyclohexanone forms cyanohydrin in good yield but 2, 2, 6 trimethylcyclohexanone does not.

Account
the

- (ii) There are two -NH_2 groups in semicarbazide. However, only one is involved in the formation of semicarbazones.
- (iii) During the preparation of esters from a carboxylic acid and an alcohol in the presence of an acid catalyst, the water or the ester should be removed as soon as it is formed.
- [Hint: (i) Methyl groups at α -positions offer steric hindrances and as a result, CN- cannot attack effectively in later case*
- (ii) The electron density on one of the -NH_2 group involved in the resonance decreases. As a result, it cannot act as a nucleophile.*
- (iii) Ester along with water is formed reversibly, therefore, to shift the equilibrium in the forward direction i.e., to produce more ester, either of the two should be removed.*

SECTION – D CASE BASED STUDY QUESTIONS [04 MARKS]

1. Read the passage carefully and answer the questions that follow. [1+1+2]

The following questions are case-based questions Aldehydes and ketones having at least one methyl group linked to the carbonyl carbon atom (methyl ketones) are oxidised to sodium salts of corresponding carboxylic acids having one carbon atom less than that of carbonyl compound. The methyl group is converted to haloform. This oxidation does not affect a carbon-carbon double bond, if present in the molecule. An aromatic organic compound 'A' with molecular formula $\text{C}_8\text{H}_8\text{O}$ gives positive DNP and iodoform tests. It neither reduces Tollens' reagent nor does it decolourise bromine water.

An aromatic organic compound 'A' with molecular formula $\text{C}_8\text{H}_8\text{O}$ gives positive DNP and iodoform tests. It neither reduces Tollens' reagent nor does it decolourise bromine water.

- (i) $(\text{CH}_3)_3\text{C-CHO}$ does not undergo aldol condensation.
- (ii) Benzoic acid does not give Friedel craft reaction.
- (iii) Sodium bisulphite is used for purification of ketones and aldehydes

[Hint: (i) Due to unavailability of α -hydrogen in the given compound it does not undergo aldol condensation.

(ii) Catalyst AlCl_3 is a Lewis acid that gets bonded to the carboxyl group making it less reactive.

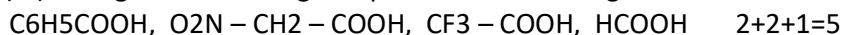
(iii) Due to formation of addition compound with NaHCO_3 whereas impurities do not.

SECTION –E [05 MARKS EACH]

1.(a) How will you bring about the following conversions : 2026

- (I) Bromobenzene to 1-phenylethanol
- (II) Benzene to m-nitroacetophenone
- (III) An organic compound with the molecular formula $\text{C}_8\text{H}_8\text{O}$ forms 2,4-DNP derivative, reduces Tollens' reagent and undergoes Cannizzaro reaction. On vigorous oxidation with acidic or alkaline KMnO_4 it gives Benzene-1,2-dicarboxylic acid. Identify the compound and write the products when it undergoes Cannizzaro reaction.

(IV) Arrange the following compounds in increasing order of their acid strength :

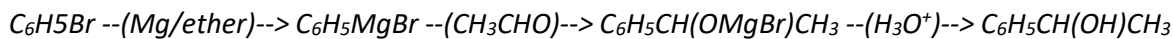


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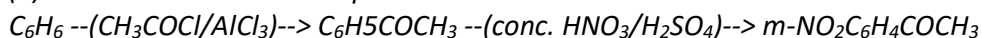
- (b) (i) Write the products formed when benzaldehyde reacts with the following reagents :
- (I) 2,4-Dinitrophenylhydrazine
- (II) Acetophenone in the presence of dilute NaOH followed by heating
- (ii) Give reasons for the following :
- (I) Benzoic acid does not undergo Friedel-Crafts reaction.
- (II) Carboxylic acids have higher boiling point than alcohols of comparable molecular mass.
- (iii) Write simple chemical test to distinguish between propanal and propanone. 2+2+1=5

ANS. (a) Conversions

(I) Bromobenzene to 1-Phenylethanol



(II) Benzene to m-Nitroacetophenone



(III) Identification of compound

Given:

- Molecular formula = C_8H_8O , Gives 2,4-DNP test, Reduces Tollens' reagent, Undergoes Cannizzaro reaction, Oxidation gives benzene-1,2-dicarboxylic acid

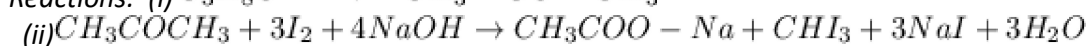
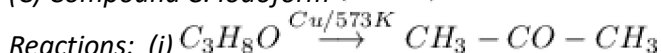
Compound: o-Methyl benzaldehyde (2-methylbenzaldehyde)

2. An organic compound A, having the formula C_3H_8O , on treatment with copper at 573 K gives B. B does not reduce Fehling's solution but gives a yellow precipitate of the compound C with $I_2 / NaOH$. Deduce the structures of A, B, and C. Also write the respective chemical reactions.

Hint: (A) Compound A: Propan-2-ol (C_3H_8O)

(B) Compound B: Propanone (CH_3COCH_3)

(C) Compound C: Iodoform (CHI_3)



2022 TERM I (ONLY DESCRIPTIVE TYPE QUESTIONS DUE TO COVID -19)

Q1. Predict the reagent for carrying out the following transformations (Any Two)

(i) Benzoyl chloride to Benzaldehyde

Reagent: $H_2 / Pd-BaSO_4$ (Rosenmund Reduction)

(ii) Ethanal to 3-hydroxybutanal

Reagent: Dilute NaOH (Aldol condensation)

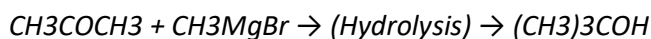
(iii) Ethanoic acid to 2-chloroethanoic acid

Reagent: $Cl_2 / Red\ phosphorus$ (HVZ Reaction)

(a) What happens when:

(i) Propanone is treated with CH_3MgBr and then hydrolysed?

Reaction:



Product formed: tert-Butyl alcohol (2-methylpropan-2-ol)

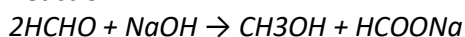
(ii) Ethanal is treated with excess ethanol and acid?



Product formed: Acetal (1,1-diethoxyethane)

(iii) Methanal undergoes Cannizzaro reaction?

Reaction:

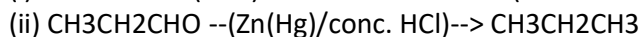


Products formed:

- Methanol
- Sodium formate

OR

(b) Write the main product in the following reactions:



Product: Propane

