
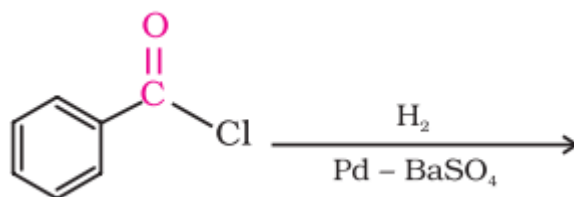
	<b>INDIAN SCHOOL AL WADI AL KABIR</b>	
<b>Class: XII</b>	<b>DEPARTMENT: SCIENCE 2022-23</b> <b>SUBJECT: CHEMISTRY</b>	<b>Date of completion:</b> <b>II week of November, 2022</b>
<b>Worksheet No:09</b> <b>with answers</b>	<b>TOPIC: ALDEHYDES, KETONES AND</b> <b>CARBOXYLIC ACIDS</b>	<b>Note:</b> <b>A4 FILE FORMAT</b>
<b>NAME OF THE STUDENT</b>	<b>CLASS &amp; SEC:</b>	<b>ROLL NO.</b>

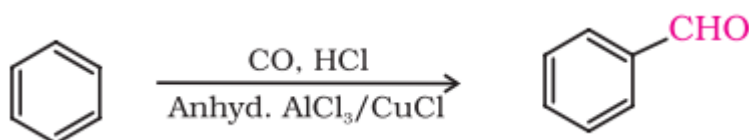
### MULTIPLE CHOICE QUESTIONS

1. What is the IUPAC name of the product obtained?



- a) Benzoic acid  
 b) Benzaldehyde  
 c) Benzene  
 d) Methylbenzene
2. Iodoform test is not answered by
- a) Propanal                      b) Ethanal  
 c) Pentan-2-one                d) Ethanol

3.



The above reaction is known as .....

- a) Etard reaction  
 b) Stephen reaction

- c) Gatterman – Koch reaction  
d) Rosenmund reduction.
4. Which of the following is Fehling solution A?  
a) alkaline sodium potassium tartarate  
b) aqueous copper sulphate  
c) ammoniacal silver nitrate solution  
d) aqueous zinc sulphate
5. Propanal when heated with Fehling's reagent, a reddish-brown precipitate is formed. The red-brown ppt formed is .....
- a) CuO            b) Propan-1-ol            c) Cu<sub>2</sub>O            d) Propanoic acid
6. Identify the compound which does not undergo aldol condensation.  
a) Methanal  
b) Ethanal  
c) Propanal  
d) Propanone
7. Which of the following compounds would answer Cannizzaro reaction?  
a) Benzaldehyde  
b) Ethanal  
c) Propanal  
d) Propanone
8. Name the organic product obtained when benzaldehyde undergoes nitration.  
a) 2-Nitrobenzaldehyde  
b) 3-Nitrobenzaldehyde  
c) 4-Nitrobenzaldehyde  
d) 2,4,6-Trinitrobenzaldehyde
9. The reagent which can be used to oxidise Butan-1-ol to Butanoic acid is .....
- a) PCC  
b) LiAlH<sub>4</sub>  
c) Jones reagent  
d) Bromine water
10. Identify the strongest acid from the following:  
a) Benzoic acid  
b) Ethanoic acid  
c) 4-Chlorobenzoic acid  
d) Trifluoroethanoic acid

**Read the given passage and answer the questions that follow:**

Aldehydes and ketones undergo nucleophilic addition reactions. A nucleophile attacks the electrophilic carbon atom of the polar carbonyl group from a direction approximately perpendicular to the plane of  $sp^2$  hybridised orbitals of carbonyl carbon. The hybridisation of carbon changes from  $sp^2$  to  $sp^3$  in this process, and a tetrahedral alkoxide intermediate is produced. This intermediate captures a proton from the reaction medium to give the electrically neutral product. The net result is addition of  $Nu^-$  and  $H^+$  across the carbon oxygen double bond.

11. Arrange the following compounds in the increasing order of their reactivity in nucleophilic addition reactions.  
Ethanal, Butanone, Butanal, Pentan-3-one
12. Ethanal is more reactive towards nucleophilic addition reactions than Propanal. Why?
13. Which is more reactive towards nucleophilic addition; Benzaldehyde or Ethanal?

#### **Assertion and Reason Type**

14. Assertion: Boiling point of Ethanol is higher than that of Ethanal.  
Reason: Ethanol forms intermolecular hydrogen bonds whereas Ethanal doesn't.
  - a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
  - b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
  - c) Assertion is correct, but reason is wrong statement.
  - d) Assertion is wrong, but reason is correct statement.
15. Assertion: Propanone does not answer Tollens' test.  
Reason: Tollens' reagent is a strong oxidizing agent.
  - a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
  - b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
  - c) Assertion is correct, but reason is wrong statement.
  - d) Assertion is wrong, but reason is correct statement.

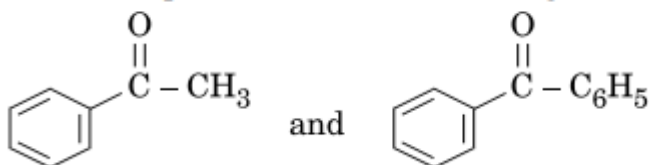
16. Assertion:  $K_a$  value of 2-Nitropropanoic acid is lower than that of Propanoic acid.

Reason: Nitro group is electron withdrawing which increases the acidity by stabilising the conjugate base.

- a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
- b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
- c) Assertion is correct, but reason is wrong statement.
- d) Assertion is wrong, but reason is correct statement.

**Question – Answer Type:**

17. Give a simple chemical test to distinguish between 1



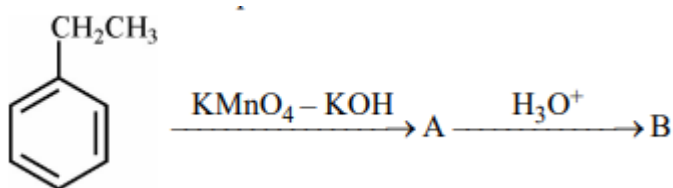
18. Aromatic carboxylic acids do not undergo Friedel-Crafts reaction. Why? 1

19. How do you convert the following? 2

(a) Ethanal to Propanone

(b) Toluene to Benzoic acid

20. Write structures of compounds A and B in each of the following reactions: 2



21. An organic compound 'A' having molecular formula  $C_5H_{10}O$  gives negative Tollens' test, forms n-pentane on Clemmensen reduction but doesn't give iodoform test. Identify 'A' and give all the reactions involved. 2

22. Write the main product formed when propanal reacts with the following reagents: 2

(i) Dilute NaOH

(ii)  $H_2N - NH_2$  followed by heating with KOH in ethylene glycol.

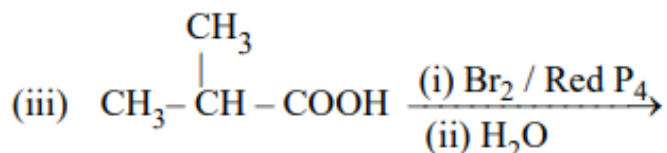
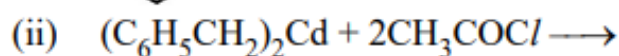
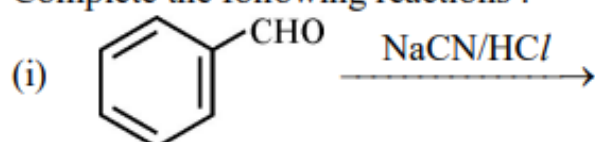
23. (A), (B) and (C) are three non-cyclic functional isomers of a carbonyl compound with molecular formula  $C_4H_8O$ . Isomers (A) and (C) give positive Tollens' test whereas isomer (B) does not give Tollens' test but gives positive Iodoform test. Isomers (A) and (B) on reduction with  $Zn(Hg)/conc. HCl$  give the same product (D). 3

- (a) Write the structures of (A), (B), (C) and (D).  
 (b) Out of (A), (B) and (C) isomers, which one is least reactive towards addition of  $HCN$  ?

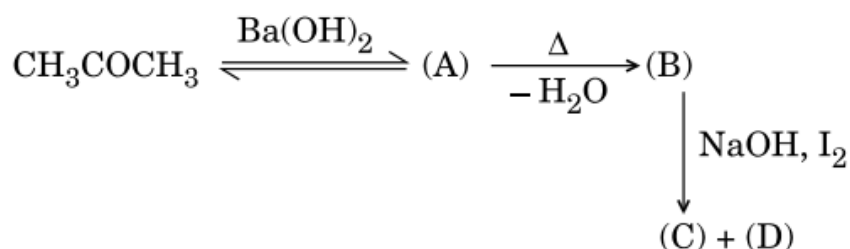
24. (a) Give reasons: 3

- (i) Benzoic acid is a stronger acid than acetic acid.  
 (ii) Methanal is more reactive towards nucleophilic addition reaction than ethanal.  
 (b) Give a simple chemical test to distinguish between propanal and propanone.

25. Complete the following reactions : 3

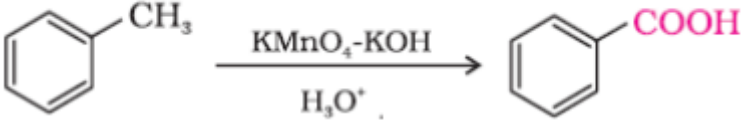


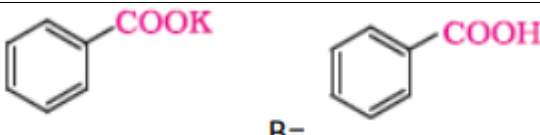
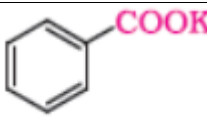
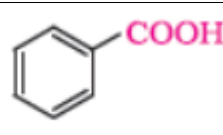
26. Complete the following sequence of reactions :



- (i) Identify (A) to (D).  
 (ii) Give the IUPAC name of (A).

## ANSWERS

1.	b
2.	a
3.	c
4.	b
5.	c
6.	a
7.	a
8.	b
9.	c
10.	d
11.	Pentan-3-one < Butanone < Butanal < Ethanal
12.	Presence of relatively larger alkyl group in Propanal hinders the approach of nucleophile.
13.	Ethanal is more reactive. The polarity of the carbonyl group is reduced in benzaldehyde due to resonance. Thus, the carbon atom of the carbonyl group of benzaldehyde is less electrophilic.
14.	a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
15.	c) Assertion is correct, but reason is wrong statement.
16.	d) Assertion is wrong, but reason is correct statement
17.	On adding NaOH / I <sub>2</sub> and heat, acetophenone forms yellow ppt. of iodoform (CHI <sub>3</sub> ) whereas benzophenone does not.
18.	Carboxyl group is deactivating and the catalyst aluminium chloride (Lewis acid) gets bonded to the carboxyl group.
19.	<p>(a) <math>\text{CH}_3\text{CHO} \xrightarrow{\text{(i)CH}_3\text{MgBr, Dry ether(ii)H}_2\text{O/H}^+} \text{CH}_3\text{CH(OH)CH}_3 \xrightarrow{\text{CrO}_3} \text{CH}_3\text{COCH}_3</math></p> <p>(b)</p> 

20.	 <p>A=  B= </p>
21.	<p>A = <math>\text{CH}_3\text{CH}_2\text{COCH}_2\text{CH}_3</math> / pentan-3-one</p> $\text{CH}_3\text{CH}_2\text{COCH}_2\text{CH}_3 \xrightarrow{\text{Zn-Hg, HCl(conc.)}} \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
22.	<p>i) <math>\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}(\text{CH}_3)\text{CHO}</math>  ii) <math>\text{CH}_3\text{CH}_2\text{CH}_3</math></p>
23.	<p>(a)  A = <math>\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}</math>  B = <math>\text{CH}_3\text{COCH}_2\text{CH}_3</math>  C = <math>(\text{CH}_3)_2\text{CHCHO}</math>  D = <math>\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3</math></p> <p>(b) B</p>
24.	<p>a) i) Due to greater electronegativity of <math>\text{sp}^2</math> hybridised carbon to which carboxyl carbon is attached / Due to greater resonance stabilization of carboxylate ion with the benzene ring.  ii) Because carbonyl carbon of methanal is more electrophilic than that of ethanal / due to +I effect of methyl group in ethanal, reactivity decreases.</p> <p>b) On heating with Tollens' reagent, propanal forms silver mirror whereas propanone does not. (or any other suitable chemical test)</p>
25.	<p>i) <math>\text{C}_6\text{H}_5\text{-CH}(\text{OH})\text{-CN}</math>  ii) <math>2 \text{CH}_3\text{COCH}_2\text{C}_6\text{H}_5 + \text{CdCl}_2</math>  iii) <math>(\text{CH}_3)_2\text{-C}(\text{Br})\text{COOH}</math></p>
26.	<p>i) A = <math>(\text{CH}_3)_2\text{CH}(\text{OH})\text{CH}_2\text{COCH}_3</math>, B = <math>(\text{CH}_3)_2\text{CH}=\text{CHCOCH}_3</math>,  C and D = <math>\text{CHI}_3</math> and <math>(\text{CH}_3)_2\text{CH}=\text{CHCOONa}</math></p> <p>ii) 4-Hydroxy-4-methylpentan-2-one</p>

Prepared by Mr. Anoop Stephen	Checked by: HOD -SCIENCE
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