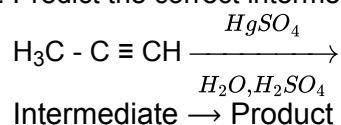


Aldehydes, Ketones and Carboxylic Acids Important Questions With Answers

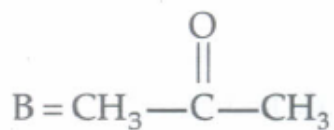
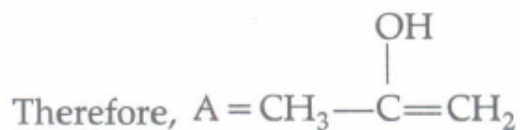
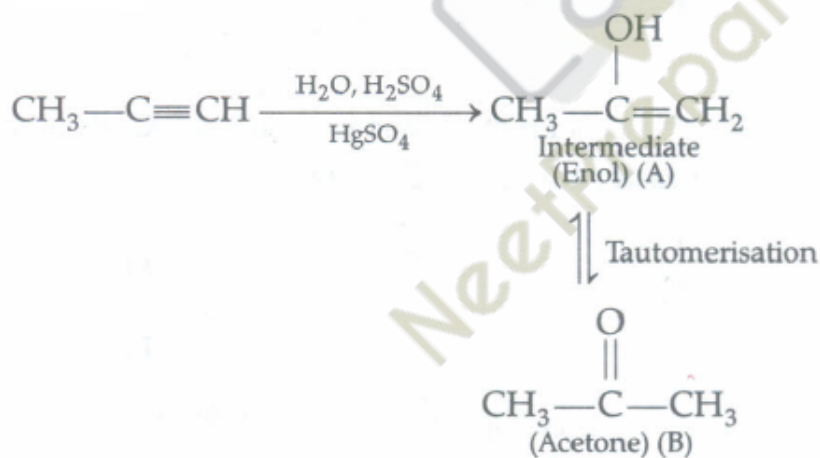
NEET Chemistry 2023

1. Predict the correct intermediate and product in the following reaction.



- a) $A = \text{H}_3\text{C} - \overset{\text{(A)}}{\underset{\text{SO}_4}{\text{C}}} = \text{CH}_2$, $B = \text{H}_3\text{C} - \overset{\text{(B)}}{\underset{\text{O}}{\text{C}}} = \text{CH}_3$
- b) $A = \text{H}_3\text{C} - \overset{\text{OH}}{\underset{\text{SO}_4}{\text{C}}} = \text{CH}_2$, $B = \text{H}_2\text{C} - \overset{\text{O}}{\underset{\text{SO}_4}{\text{C}}} = \text{CH}_2$ c) $A = \text{H}_3\text{C} - \overset{\text{O}}{\underset{\text{O}}{\text{C}}} = \text{CH}_3$, $B = \text{HC} - \text{C} \equiv \text{CH}$
- d) $A = \text{H}_3\text{C} - \overset{\text{OH}}{\underset{\text{OH}}{\text{C}}} = \text{CH}_3$, $B = \text{H}_3\text{C} - \overset{\text{O}}{\underset{\text{O}}{\text{C}}} = \text{CH}_3$

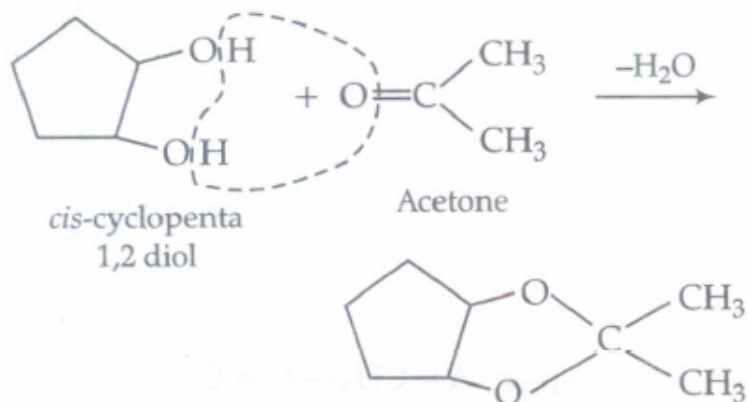
Solution : -



2. Which of the following reagents would distinguish cis-cyclopenta-1, 2-diol from the trans-isomer?

- a) MnO_2 b) Aluminium isopropoxide c) Acetone d) Ozone

Solution : -



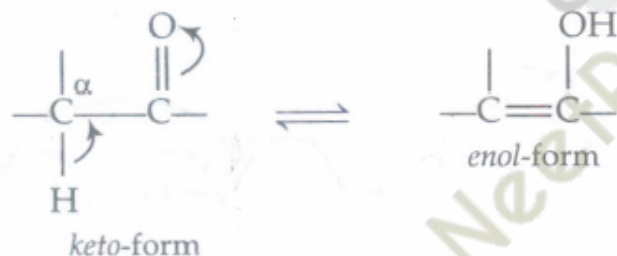
Trans isomer does not react with acetone as removal of H_2O molecule is difficult.

3. The correct statement regarding a carbonyl compound with a hydrogen atom on its alphacarbon, is:

- a) a carbonyl compound with a hydrogen atom on its alpha carbon rapidly equilibrates with its corresponding enol and this process is known as carbonylation
- b) a carbonyl compound with a hydrogen atom on its alpha carbon rapidly equilibrates with its corresponding enol and this process is known as keto-enol tautomerism**
- c) a carbonyl compound with a hydrogen atom on its alpha-carbon never equilibrates with its corresponding enol.
- d) a carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as aldehyde-ketone equilibration.

Solution : -

Keto-enol tautomerism is as follows:

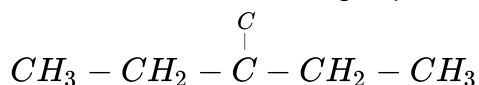


4. An organic compound X having molecular formula $\text{C}_5\text{H}_{10}\text{O}$ yields phenyl hydrazone and gives negative response to the iodoform test and Tollen's test. It produces n-pentane on reduction. X could be:

- a) pentanal** b) 2-pentanone c) 3-pentanone d) n-amyl alcohol

Solution : -

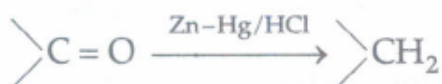
As the compound X yields phenyl hydrazone and gives negative response to the iodoform test and Tollen's test so it must contain a $\text{C}=\text{O}$ group but neither a methyl ketone nor an aldehyde. Thus, the structure of X will be



5. Clemmensen reduction of a ketone is carried out in the presence of which of the following?

- a) Zn-Hg with HCl** b) LiAlH_4 c) H_2 and Pt as catalyst d) Glycol With KOH

Solution : -



6. A strong base can abstract an α -hydrogen from:

- a) alkene b) amine c) **ketone** d) alkane

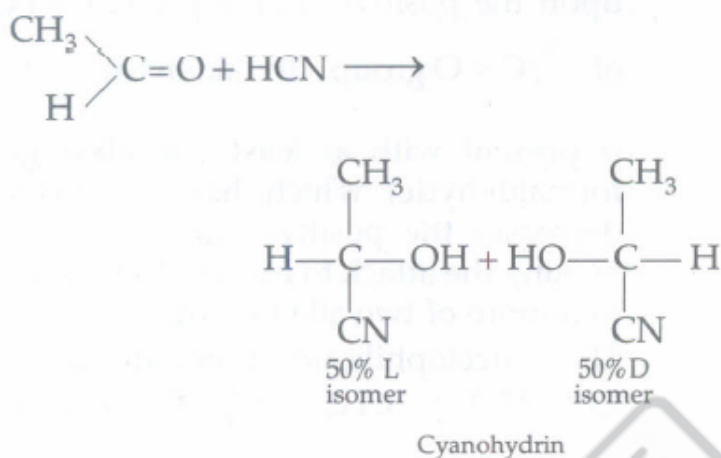
Solution : -

As the carbonyl carbon is electron deficient so most susceptible to attack by nucleophilic reagent or base. Thus α -hydrogen is the easily abstracted from ketones by a base.

7. In this reaction $\text{CH}_3\text{CHO} + \text{HCN} \rightarrow \text{CH}_3\text{CH}(\text{OH})\text{CN} \xrightarrow{\text{H.OH}} \text{CH}_3\text{CH}(\text{OH})\text{COOH}$ An asymmetric centre is generated. The acid obtained would be:

- a) **50% D + 50% L-isomer** b) 20% D + 80% L-isomer c) D-isomer d) L-isomer

Solution : -



8. During reduction of aldehydes with hydrazine and potassium hydroxide, the first is the formation of:

- a) **R - CH = NH₂** b) R - C = N c) $\text{R} - \overset{\text{O}}{\parallel}{\text{C}} - \text{NH}_2$ d) R - CH = NH

Solution : -



9. Aldol condensation will not take place in:

- a) **HCHO** b) CH₃CHO c) CH₃COCH₃ d) CH₂CH₂CHO

Solution : -

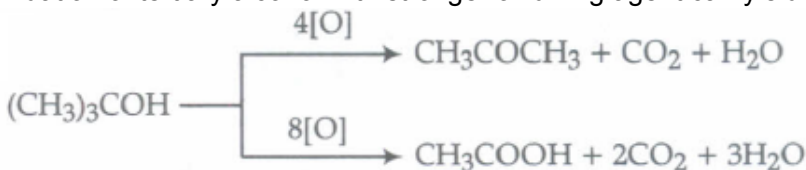
Those aldehydes which do not have α -hydrogen atom like HCHO, does not give alcohol condensation reaction.

10. Ketones $[\text{R} - \overset{\text{O}}{\parallel}{\text{C}} - \text{R}_1]$, where R = R₁ = alkyl group, can be obtained in one step by:

- a) **hydrolysis of esters** b) oxidation of primary alcohol c) oxidation of tertiary alcohol
d) reaction of acid halide with alcohol

Solution : -

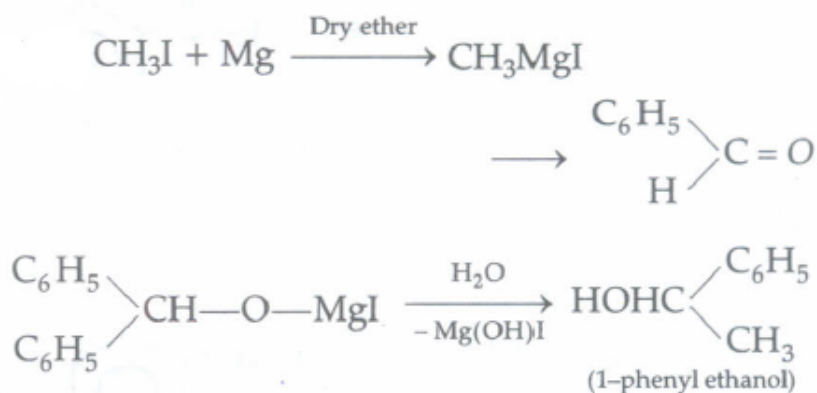
By oxidation of tertiary alcohol with stronger oxidizing agent can yield ketones along with carboxylic acid.



11. l-phenyl ethanol can be prepared by the reaction of benzaldehyde with:

- a) methyl bromide b) ethyl iodide and magnesium c) **methyl iodide and magnesium**
d) methyl bromide and aluminium bromide

Solution : -



12. $[\text{CH}_3]_3\text{C} - \text{CHO}$ does not undergo alcohol condensation due to:

- a) three electron donating methyl groups **b) cleavage taking place between - C - CHO bond**
 c) absence of alpha hydrogen atom in the molecule d) bulky $(\text{CH}_3)_3\text{C}$ - group

Solution : -

$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CHO} \\ | \\ \text{CH}_3 \end{array}$ does not undergo alcohol condensation because it does not contain α -hydrogen atom.

13. Which of the following compounds will undergo self aldol condensation in the presence of cold dilute alkali?

- a) $\text{CH}_2 = \text{CH} - \text{CHO}$ b) $\text{CH} = \text{C} - \text{CHO}$ c) $\text{C}_6\text{H}_5\text{CHO}$ **d) $\text{CH}_3 - \text{CH}_2\text{CHO}$**

Solution : -

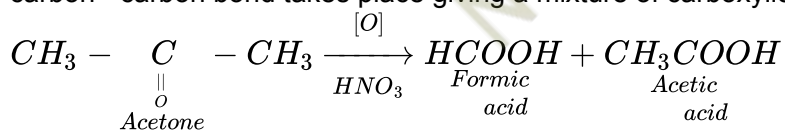
$\text{CH}_3\text{CH}_2\text{CHO}$ will undergo aldol condensation as it have α -hydrogen. Aldol condensation proceed in presence of strong base. In option (a) the loss of α -H from CH attached to double bond is difficult.

14. In which of the following the number of carbon atoms does not remain same when carboxylic acid is obtained by oxidation?

- a) CH_3COCH_3** b) $\text{CCl}_3\text{CH}_2\text{CHO}$ c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ d) $\text{CH}_3\text{CH}_2\text{CHO}$

Solution : -

Ketones with powerful oxidizing agents such as cone. HNO_3 , $\text{KMnO}_4/\text{H}_2\text{SO}_4$ or $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4$ cleavage of carbon - carbon bond takes place giving a mixture of carboxylic acid.

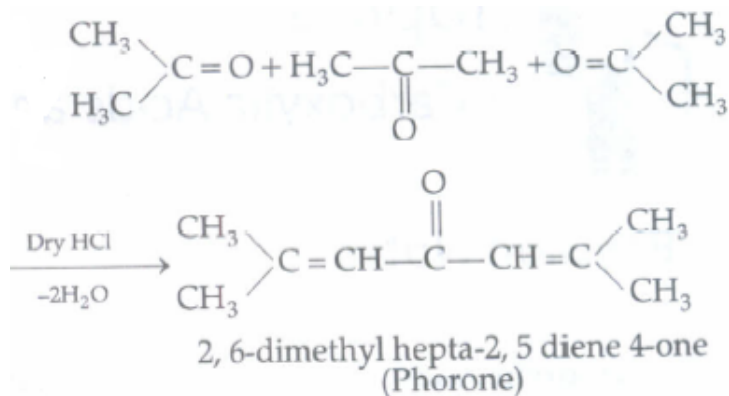


15. $3\text{CH}_3\text{COCH}_3 \xrightarrow[\text{H}_2\text{O}]{\text{HCl}} (\text{CH}_3)_2\text{C} = \text{CH} - \underset{\text{B}}{\text{CO}} - \text{CH} = \text{C}(\text{CH}_3)_2$ This polymer (B) is the obtained when acetone is

saturated with HCl gas, B can be:

- a) phorone** b) formose c) diacetone alcohol d) mesityl oxide

Solution : -



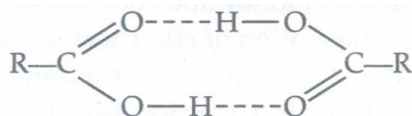
16. Carboxylic acids have higher boiling points than aldehydes, ketones and even alcohols of comparable molecular mass. It is due to their:

- a) More extensive association of carboxylic acid via van der Waals force of attraction
 b) Formation of carboxylate ion c) Formation of intramolecular H-bonding

d) Formation of intermolecular H-bonding

Solution : -

Due to formation of intermolecular H-bonding in carboxylic acid, association occurs. Hence boiling point increases and become more than the boiling point of aldehydes, ketones and alcohols of comparable molecular masses.



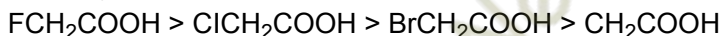
17. Which of the following represents the correct order of acidity in the given compounds?

- a) $\text{FCH}_2\text{COOH} > \text{CH}_3\text{COOH} > \text{BrCH}_2\text{COOH} > \text{ClCH}_2\text{COOH}$
 b) $\text{BrCH}_2\text{COOH} > \text{ClCH}_2\text{COOH} > \text{FCH}_2\text{COOH} > \text{CH}_3\text{COOH}$
c) $\text{FCH}_2\text{COOH} > \text{ClCH}_2\text{COOH} > \text{BrCH}_2\text{COOH} > \text{CH}_2\text{COOH}$
 d) $\text{CH}_2\text{COOH} > \text{BrCH}_2\text{COOH} > \text{ClCH}_2\text{COOH} < \text{FCH}_2\text{COOH}$

Solution : -

The acidity of halogenated acid increases with increase in electronegativity of the halogen present.

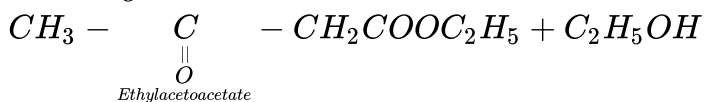
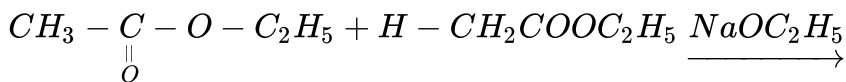
∴ Acidity order will be:



18. Self condensation of two moles of ethyl acetate in the presence of sodium ethoxide yields:

- a) ethyl butyrate **b) acetoacetic ester** c) methyl acetoacetate d) ethyl propionate

Solution : -

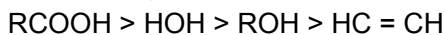


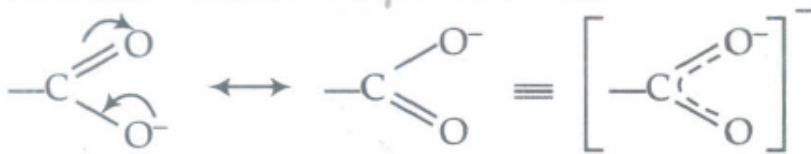
19. Which one of the following order of acidic strength is correct?

- a) $\text{RCOOH} > \text{HOH} > \text{HC} = \text{CH} > \text{ROH}$ b) $\text{RCOOH} > \text{HC} = \text{CH} > \text{HOH} > \text{ROH}$
 c) $\text{RCOOH} > \text{ROH} > \text{HOH} > \text{HC} = \text{CH}$ **d) $\text{RCOOH} > \text{HOH} > \text{ROH} > \text{HC} = \text{CH}$**

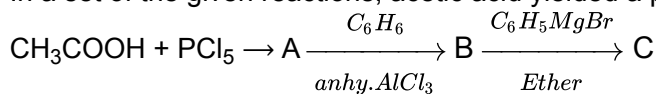
Solution : -

Carboxylic acid is stronger acid than alcohol and water because after removal of proton carboxylate ion is stabilized by resonance.





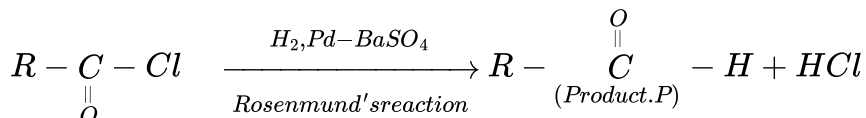
20. In a set of the given reactions, acetic acid yielded a product C.



Product C would be :

- a) $\text{CH}_3\text{CH}(\text{OH})\text{C}_6\text{H}_5$ b) $\text{CH}_3 - \overset{\text{C}_2\text{H}_5}{\text{C}}(\text{OH})\text{C}_6\text{H}_5$ c) $\text{CH}_3\text{CH}(\text{OH})\text{C}_2\text{H}_5$ d) $\text{CH}_3\text{COC}_6\text{H}_5$

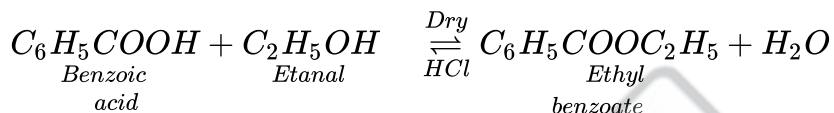
Solution : -



21. Benzoic acid may be converted into ethyl benzoate by reaction with:

- a) sodium ethoxide b) ethyl chloride c) **dry HCl, C₂H₅OH** d) ethanol

Solution : -

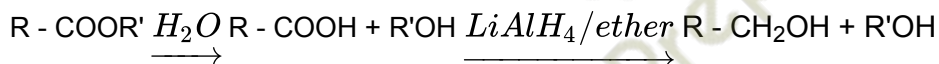


Here H₂O is continuously removed from reaction so that reaction always proceeds to product formation i.e., Ethyl benzoate.

22. Reduction by LiAlH₄ of hydrolysed product of an ester gives:

- a) two acids b) two aldehydes c) one molecule of alcohol and another of carboxylic acid d) **two alcohols**

Solution : -



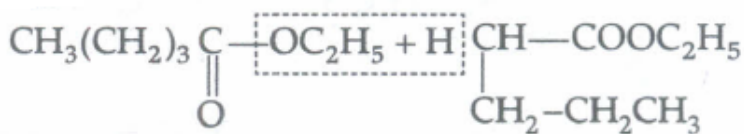
Thus, two molecules of R'OH is produced on reduction of hydrolysed product of ester.

23. Which one of the following esters cannot undergo Claisen self-condensation?

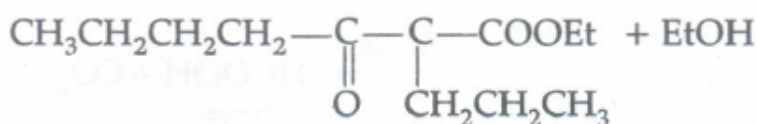
- a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COOC}_2\text{H}_5$ b) **$\text{C}_6\text{H}_5\text{COOC}_2\text{H}_5$** c) $\text{C}_6\text{H}_5\text{CH}_2\text{COOC}_2\text{H}_5$ d) $\text{C}_6\text{H}_{11}\text{CH}_2\text{COOC}_2\text{H}_5$

Solution : -

The ester which contain α-hydrogen atom undergoes Claisen self-condensation.



Claisen
Condensation



(Here Et = C₂H₅)

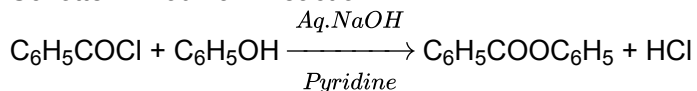
But in case of $\text{C}_6\text{H}_5\text{COOC}_2\text{H}_5$, it does not contain α-hydrogen thus it does not undergo Claisen condensation.

24. Schotten Baumann reaction is a reaction of phenols with:

- a) benzoyl chloride and NaOH b) acetyl chloride and NaOH c) salicylic acid and cone. H₂SO₄
 d) acetyl chloride and cone. H₂SO₄

Solution : -

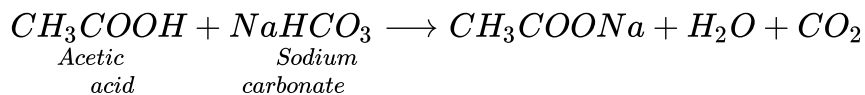
Schotten - Boumann reaction



25. Among acetic acid, phenol and *n*-hexanol which one of the following compounds will react with NaHCO₃ solution to give sodium salt and CO₂?

- a) Acetic acid b) *n*-hexanol c) Acetic acid and phenol d) Phenol

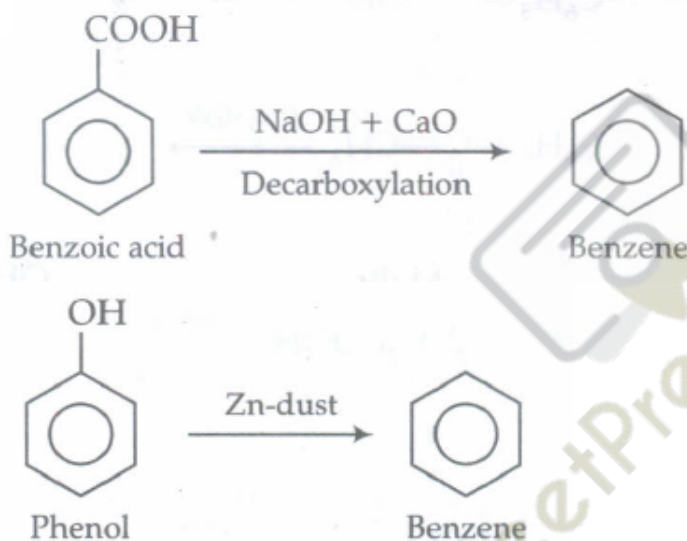
Solution : -



26. Benzoic acid gives benzene on being heated with X and phenol gives benzene on being heated with Y. Therefore, X and Y are respectively.

- a) soda lime and copper b) Zn dust and NaOH c) Zn dust and soda lime d) soda lime and zinc dust

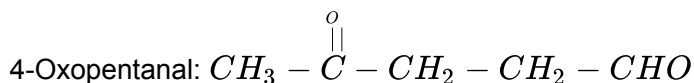
Solution : -



27. Which of the following structures is not correctly matched?

- a) α - Menthoxypionaldehyde - $H_3C - \overset{H_3CO}{\underset{|}{CH}} - \overset{O}{\parallel}C - H$
 b) 3 - Hydroxybutanal - $CH_3 - \overset{OH}{\underset{|}{CH}} - CH_2CHO$
 c) 4 - Oxopentanal - $CH_3CH_2CH_2 - \overset{O}{\parallel}C - CHO$
 d) Di - sec. butylketone - $CH_3CH_2 - \overset{CH_3}{\underset{|}{CH}} - \overset{O}{\parallel}C - \overset{CH_3}{\underset{|}{CH}} - CH_2CH_3$

Solution : -



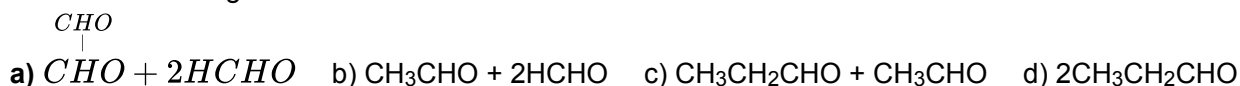
28. Which of the following carbonyl compounds is most polar?

- a) $C_2H_5 - \overset{O}{\parallel}C - C_2H_5$ b) $CH_3 - \overset{O}{\parallel}C - CH_3$ c) $CH_3 - \overset{O}{\parallel}C - H$ d) $H - \overset{O}{\parallel}C - H$

Solution : -

HCHO will be most polar due to lowest electron density on carbon of carbonyl group.

29. Ozonolysis of an organic compound gives formaldehyde as one of the products. This confirms the presence of
 a) two ethylenic double bonds **b) a vinyl group** c) an isopropyl group d) an acetylenic triple bond.
30. A diene, buta-1, 3-diene was subjected to ozonolysis to prepare aldehydes. Which of the following aldehydes will be obtained during the reaction?



31. Alkene (X) (C_5H_{10}) on ozonolysis gives a mixture of two compounds (Y) and (Z). Compound (Y) gives positive Fehling's test and iodoform test. Compound (Z) does not give Fehling's test but give iodoform test. Compounds (X), (Y) and (Z) are

a)

X	Y	Z
$C_6H_5COCH_3$	CH_3CHO	CH_3COCH_3

b)

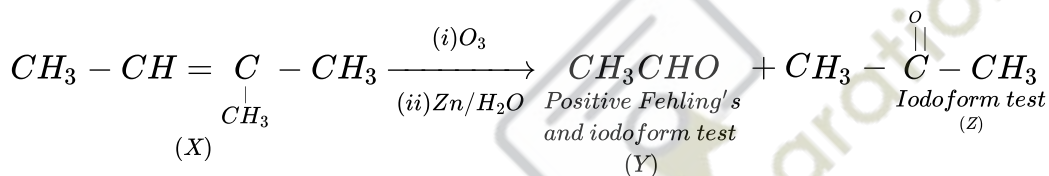
X	Y	Z
$CH_3 - CH = \underset{\underset{CH_3}{ }}{C} - CH_3$	CH_3CHO	CH_3COCH_3

c)

X	Y	Z
$CH_3CH_2CH=CH_2$	CH_3CH_2CHO	$HCHO$

d)

X	Y	Z
$CH_3-CH=CH-CH_3$	CH_3CHO	CH_3CHO

Solution : -

32. Propanone can be prepared from ethyne by
 a) **passing a mixture of ethyne and steam over a catalyst, magnesium at 420°C**
 b) passing a mixture of ethyne and ethanol over a catalyst zinc chromite
 c) **boiling ethyne with water and H_2SO_4** d) treating ethyne with iodine and NaOH
33. In the following reaction, product (P) is
- $$R - \overset{O}{\parallel} C - Cl \xrightarrow[Pd/BaSO_4]{H_2} P$$
- a) **RCHO** b) RCH_3 c) $RCOOH$ d) RCH_2OH
34. Benzoyl chloride on reduction with $H_2/Pd-BaSO_4$ produces
 a) benzoic acid b) benzyl alcohol c) benzoyl sulphate **d) benzaldehyde**
35. The oxidation of toluene to benzaldehyde by chromyl chloride is called
 a) **Etard reaction** b) Riemer-Tiemann reaction c) Wurtz reaction d) Cannizzaro's reaction
36. Choose the correct statement regarding the physical properties of carbonyl compound.
 a) All aldehydes are insoluble in benzene **b) Higher aldehydes are more fragrant**
 c) n-Butane has more boiling point than acetone
 d) Methanal and propanone are immiscible with water in all proportions
37. Arrange the following compounds in increasing order of their reactivity in nucleophilic addition reactions.
 Ethanal, Propanal, Propanone, Butanone

- a) **Butanone < Propanone < Propanal < Ethanal** b) Propanone < Butanone < Ethanal > Prop anal
 c) Propanal < Ethanal < Propanone < Butanone d) Ethanal < Prop anal < Propanone < Butanone

Solution : -

Ketones are less reactive than aldehydes.

38. Which among the following is most reactive to give nucleophilic addition?

- a) **FCH₂CHO** b) ClCH₂CHO c) BrCH₂CHO d) ICH₂CHO

Solution : -

FCH₂CHO is most active towards nucleophilic addition since presence of most electronegative F withdraws electrons from carbon of carbonyl group making it more polar.

39. Which of the following compounds does not react with NaHSO₃?

- a) HCHO **b) C₆H₅COCH₃** c) CH₃COCH₃ d) CH₃CHO

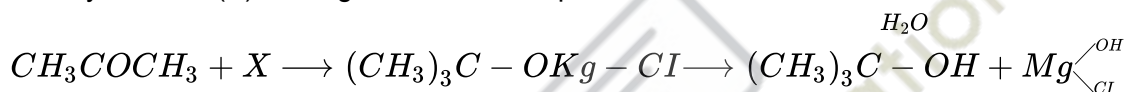
40. Aldehydes other than formaldehyde react with Grignard reagent to give addition products which on hydrolysis give

- a) tertiary alcohols **b) secondary alcohols** c) primary alcohols d) carboxylic acids.

Solution : -

Formaldehyde forms primary alcohol while all other aldehydes form secondary alcohols on reaction with Grignard's reagent followed by hydrolysis.

41. Identify reactant (X) in the given reaction sequence.



- a) **CH₃MgCl** b) CH₃COCl + Mg c) MgCl₂ d) CH₃CH₂MgCl

42. Hydrocarbons are formed when aldehydes and ketones are reacted with amalgamated zinc and cone. HCl. The reaction is called

- a) Cannizzaro reaction **b) Clemmensen reduction** c) Rosenmund reduction
 d) Wolff-Kishner reduction.

43. Which of the following statements is incorrect?

- a) FeCl₃ is used in the detection of phenols b) Fehling solution is used in the detection of glucose
c) Tollens' reagent is used in the detection of unsaturation.
 d) NaHSO₃ is used in the detection of carbonyl compounds.

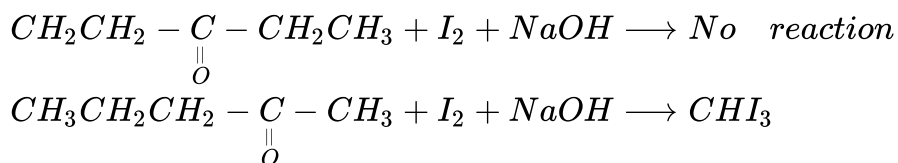
Solution : -

Tollens' reagent is used to detect aldehyde group.

44. What is the test to differentiate between pentan-2-one and pentan-3-one?

- a) **Iodoform test** b) Benedict's test c) Fehling's test d) Aldol condensation

Solution : -



45. The best oxidising agent for oxidation of CH₃.CH=CH-CHO to CH₃.CH=CH-COOH is

- a) Baeyer's reagent **b) Tollens'reagent** c) Schiff's reagent d) acidified dichromate.

Solution : -

Tollens' reagent oxidises only -CHO to -COOH group.

46. Which of the following statements is not correct?
- Aldehydes and ketones are functional isomers.
 - Formaldehyde reacts with ammonia to form hexamethylenetetramine.
 - LiAlH_4 converts ketones into secondary alcohols.
 - Ethanal and propanal give positive iodoform test.**

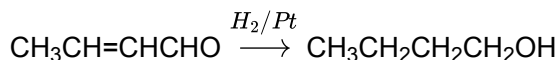
Solution : -

Ethanal gives iodoform test while propanal does not give iodoform test.

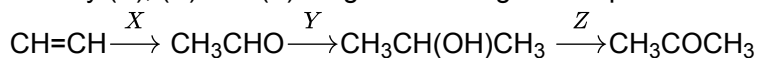
47. Which of the following reagents are not correctly matched with the reaction?

- $\text{CH}_3\text{CH}=\text{CHCHO} \longrightarrow \text{CH}_3\text{CH}=\text{CHCOOH}$: Ammoniacal AgNO_3
- $\text{CH}_3\text{CH}=\text{CHCHO} \longrightarrow \text{CH}_3\text{CH}=\text{CHCH}_2\text{OH}$: H_2/Pt**
- $\text{R-COOH} \longrightarrow \text{R-CH}_2\text{OH}$: NaBH_4
- $\text{CH}_3\text{CH}_2\text{COCl} \longrightarrow \text{CH}_3\text{CH}_2\text{CHO}$: $\text{H}_2, \text{Pd}/\text{BaSO}_4$

Solution : -



48. Identify (X), (Y) and (Z) reagents in the given sequence of reaction



- $\text{X} = \text{H}_2\text{SO}_4$, $\text{Y} = \text{H}_2\text{O}/\text{OH}^-$, $\text{Z} = \text{PCl}_5$, heat
 - $\text{X} = \text{HNO}_3$, $\text{Y} = \text{Na}_2\text{CO}_3$, $\text{Z} = \text{H}_2\text{SO}_4$, heat
 - $\text{X} = \text{H}_2\text{SO}_4/\text{H}^+$, $\text{Y} = \text{PCl}_5/\text{H}_2\text{O}$, $\text{Z} = \text{K}_2\text{Cr}_2\text{O}_7/\text{OH}^-$
 - $\text{X} = \text{H}_2\text{SO}_4/\text{Hg}^{2+}$, $\text{Y} = \text{CH}_3\text{MgBr}/\text{H}_2\text{O}$, $\text{Z} = \text{K}_2\text{Cr}_2\text{O}_7/\text{H}^+$**
49. To differentiate between pentan-2-one and pentan-3-one a test is carried out. Which of the following is the correct answer?
- Pentan-2-one will give silver mirror test
 - Pentan-2-one will give iodoform test**
 - Pentan-3-one will give iodoform test.
 - None of these

50. **Assertion :** Aromatic aldehydes and ketones undergo electrophilic substitution reaction at meta position.

Reason: Carbonyl group activates the ring towards electrophilic substitution reactions.

- If both assertion and reason are true and reason is the correct explanation of assertion
- If both assertion and reason are true but reason is not the correct explanation of assertion.
- If assertion is true but reason is false**
- If both assertion and reason are false.