

Class: 12
Subject: chemistry
Topic: Aldehyde ketones and carboxylic acid
No. of Questions: 25

1. Directions: The following question has four choices out of which ONLY ONE is correct.

The Cannizzaro reaction is not given by:

- a. trimethylacetaldehyde
- b. acetaldehyde
- c. benzaldehyde
- d. formaldehyde

Sol.(b) For aldehydes with a hydrogen atom alpha to the carbonyl, i.e. R_2CHCHO , the preferred reaction is an aldol condensation, originating from deprotonation of this hydrogen. This reaction restricts the scope of the Cannizzaro reaction.

2. Benzene reacts with CH_3COCl in the presence of anhydrous $AlCl_3$ to give

- a. $C_6H_5CH_3$
- b. C_6H_5Cl
- c. $C_6H_5O_2Cl$
- d. $C_6H_5COCH_3$

Sol.(d) Benzene reacts with CH_3COCl in the presence of anhydrous $AlCl_3$ to give $C_6H_5COCH_3$.

3. Benzaldehyde reacts with ammonia to form

- benzaldehyde ammonia
- hydrobenzamide
- urotropine
- ammonium chloride

Sol.(b) Benzaldehyde reacts with ammonia to form hydrobenzamide

4. Formaldehyde on reaction with ammonia forms urotropine whose formula is

- $(\text{CH}_2)_6 \text{N}_4$
- $(\text{CH}_2)_4 \text{N}_6$
- $(\text{CH}_2)_3 \text{N}_4$
- $(\text{CH}_3)_6 \text{N}_4$

Sol.(a) Formaldehyde on reaction with ammonia forms urotropine whose formula is $(\text{CH}_2)_6 \text{N}_4$.

5. What is the increasing order of the rate of HCN addition to compounds A – D?

- HCHO
- CH_3COCH_3
- PhCOCH_3
- PhCOPh

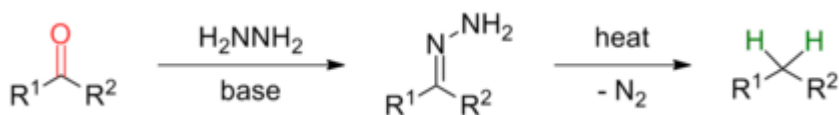
- $\text{C} < \text{D} < \text{B} < \text{A}$
- $\text{A} < \text{B} < \text{C} < \text{D}$
- $\text{D} < \text{B} < \text{C} < \text{A}$
- $\text{D} < \text{C} < \text{B} < \text{A}$

Sol.(d) Greater is the positivity of carbon in carbonyl group, higher is the reactivity towards nucleophilic addition (i.e HCN addition)

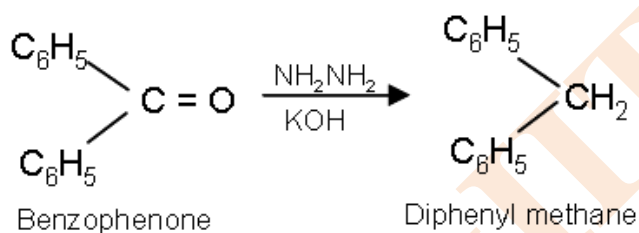
6. Under Wolf-Kishner reduction conditions, the conversion which may be brought about is

- benzaldehyde into benzyl alcohol
- cyclohexanol into cyclohexanone
- cyclohexanone into cyclohexanol
- benzophenone into diphenylmethane

Sol.(d) Wolf-Kishner reduction involves the reduction of a carbonyl compound to methylene group.



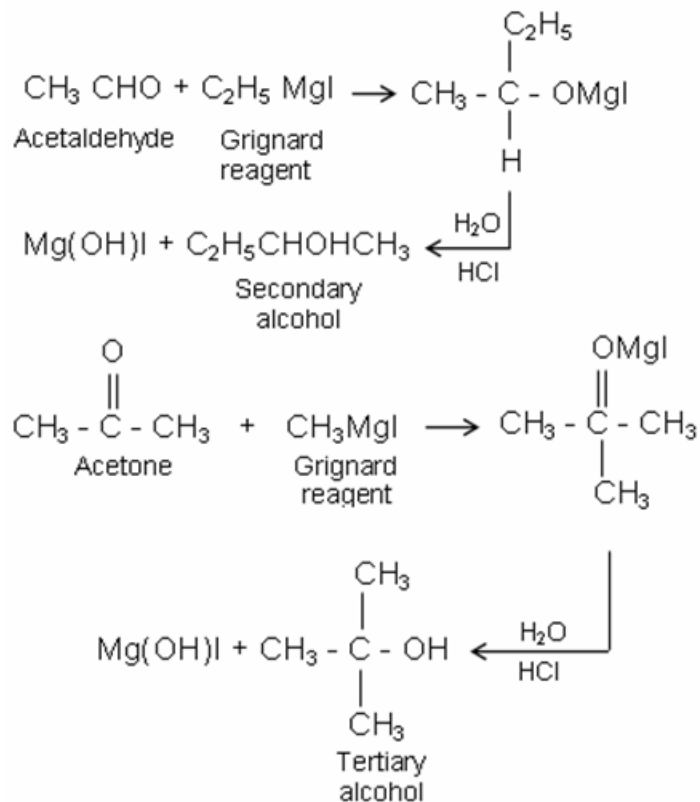
For example,



7. The reagent with which both acetaldehyde and acetone react easily is

- Tollen's reagent
- Schiff's reagent
- Grignard's reagent
- Fehling's reagent

Sol. (c)



8. Benzyl alcohol is obtained from benzaldehyde by which of the following reactions?

- Wurtz reaction
- Cannizzaro reaction
- Claisen reaction
- Perkin reaction

Sol.(b) Aldehydes that do not have alpha hydrogen undergo Cannizzaro reaction. So benzaldehyde which does not have alpha hydrogen undergoes this reaction to form benzyl alcohol.

9. Formaldehyde when treated with KOH gives methanol and potassium formate. The reaction is known as

- a. Perkin reaction
- b. Claisen reaction
- c. Cannizzaro reaction
- d. Wurtz reaction

Sol.(c) The Cannizzaro reaction, named after its discoverer Stanislao Cannizzaro, is a chemical reaction that involves the base-induced disproportionation of an aldehyde. Cannizzaro first accomplished this transformation in 1853, when he obtained benzyl alcohol and potassium benzoate from the treatment of benzaldehyde with potash (potassium carbonate). More typically, the reaction would be conducted with sodium or potassium hydroxide:



The oxidation product is a salt of a carboxylic acid and the reduction product is an alcohol.^[3] For aldehydes with a hydrogen atom alpha to the carbonyl, i.e. R_2CHCHO , the preferred reaction is an aldol condensation, originating from deprotonation of this hydrogen. This reaction restricts the scope of the Cannizzaro reaction.

10. Which of the following aldehydes is the most reactive towards nucleophilic addition reactions?

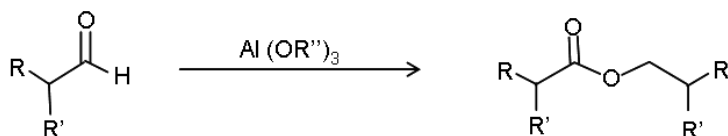
- a. HCHO
- b. CH_3CHO
- c. $\text{C}_2\text{H}_5\text{CHO}$
- d. None of these

Sol.(a) Aldehydes containing no alpha hydrogen are the most reactive towards nucleophilic addition reactions.

11. Conversion of acetaldehyde into ethyl acetate in the presence of aluminium ethoxide is called

- a. Aldol condensation
- b. Cope reaction
- c. Tishchenko reaction
- d. Benzoin Condensation

Sol.(c)



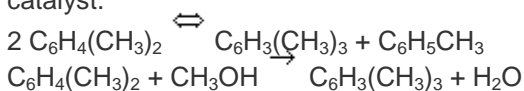
The Tishchenko Reaction is a disproportionation reaction that allows the preparation of esters from two equivalents of an aldehyde.

12. Directions: The following question has four choices out of which ONLY ONE is correct.

Which of the following compounds is prepared from the distillation of acetone with sulfuric acid?

- a. Mesityl oxide
- b. Phorone
- c. Mesitylene
- d. Chloreton

Sol.(c) Mesitylene is prepared by alkylation or equilibration or methylation of xylene over solid acid catalyst.



In the laboratory, it can be prepared by distillation of acetone with sulfuric acid catalyst. Trimerization of propyne, also requiring a catalyst, affords a mixture of mesitylene and pseudocumene.

13. Directions: The following question has four choices out of which ONLY ONE is correct.

On passing vapours of isopropyl alcohol over heated Cu at 573K _____ takes place.

- a. dehydration
- b. dehydrogenation
- c. hydration
- d. hydrogenation

Sol.(b) On passing vapours of isopropyl alcohol over heated Cu at 573K dehydrogenation takes place.

14. Directions: The following question has four choices out of which ONLY ONE is correct.

Which of the following does not give the iodoform test?

- a. CH_3CHO
- b. $\text{CH}_3\text{CH}_2\text{COCH}_3$
- c. $\text{CH}_3\text{COC}_2\text{H}_5$
- d. $\text{CH}_3\text{CH}_2\text{CH}_3$

Sol.(d) The iodoform test is used to detect the presence of a keto group.

15. Directions: The following question has four choices out of which ONLY ONE is correct.

The presence of alkyl group increases the electron density at the carbonyl carbon by

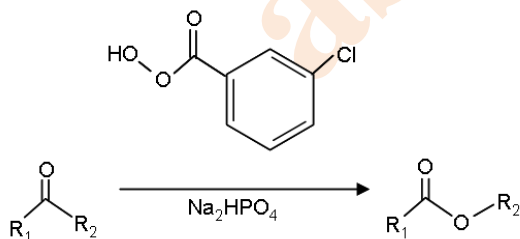
- a. + inductive effect
- b. -inductive effect
- c. mesomeric effect
- d. optical activity

Sol.(a)fact

16. A ketone on Baeyer-Villiger oxidation produces

- a. a carboxylic acid with the loss of carbon atom(s)
- b. a carboxylic acid with the same number of carbon atoms
- c. an ester with the loss of carbon atom(s)
- d. an ester with the same number of carbon atoms

Sol.(d)The Baeyer–Villiger oxidation is an organic reaction in which a ketone is oxidised to an ester by treatment with peroxy acids or hydrogen peroxide. Key features of the Baeyer–Villiger oxidation are its stereospecificity and predictable regiochemistry.



17. Directions: The following question has four choices out of which ONLY ONE is correct.

_____ undergoes oxidation with acidified $K_2Cr_2O_7$ to give acetone

- a. Ethanol
- b. 1-propanol
- c. 2-propanol
- d. 1-butanol

Sol.(c)2-propanol undergoes oxidation with acidified $K_2Cr_2O_7$ to give acetone.

18. Directions: The following question has four choices out of which ONLY ONE is correct.

Hydroformylation means the introduction of

- a. H_2 in the compound
- b. -CHO group in the compound
- c. $>C=O$ group in the compound
- d. None of these

Sol.(b)Hydroformylation means the introduction of -CHO group in the compound.

19. Directions: The following question has four choices out of which ONLY ONE is correct.

Acetone reacts with ethyl magnesium iodide to form

- a. phenyl hydrozone.
- b. isopropyl alcohol.
- c. 2-methyl -2-butanol.
- d. 1-butanol.

Sol.(c) Acetone reacts with ethyl magnesium iodide to form 2-methyl -2-butanol.

20. Directions: The following question has four choices out of which ONLY ONE is correct.

The nucleophile in the reaction of chloroform with acetone is

- a. Cl^-
- b. Cl_3^-
- c. CCl_3^-
- d. CHCl_2^-

Sol.(c) The nucleophile in the reaction of chloroform with acetone is CCl_3^- .

21. Arrange the following compounds in increasing order of their reactivity in nucleophilic addition reaction:

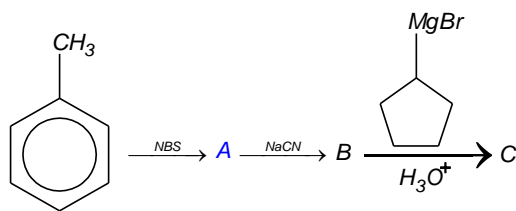
Benzaldehyde, p – tolualdehyde, p – nitrobenzaldehyde, acetophenone.

Sol. Acetophenone is ketone, all other are aldehydes, \therefore it is less reactive. +M group increases electron density and so makes the compound unfit for nucleophilic addition & vice versa is true for —M group.

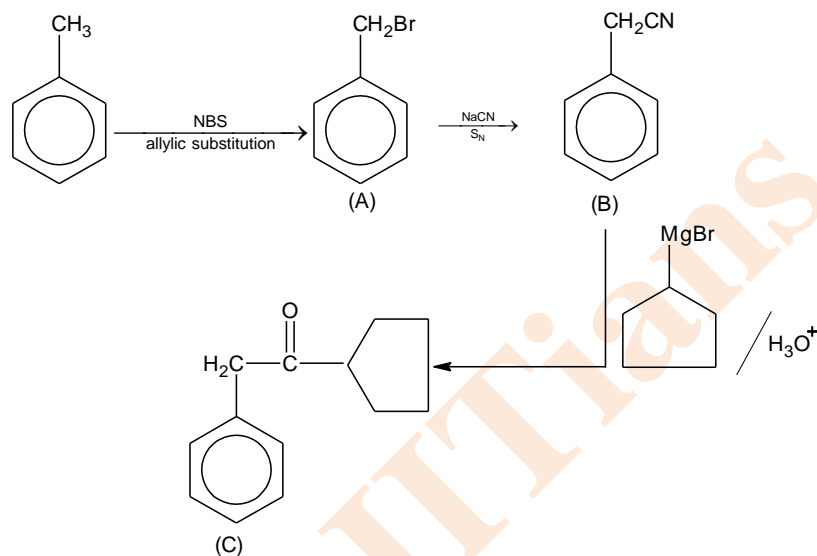
Order is:

Acetophenone < p – tolualdehyde < benzaldehyde < p – nitrobenzaldehyde

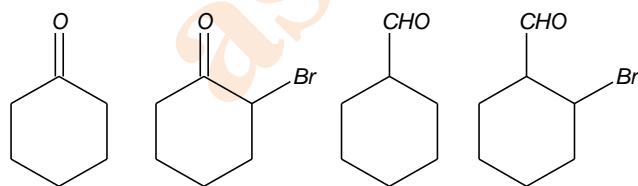
22. Identify A, B & C in the following



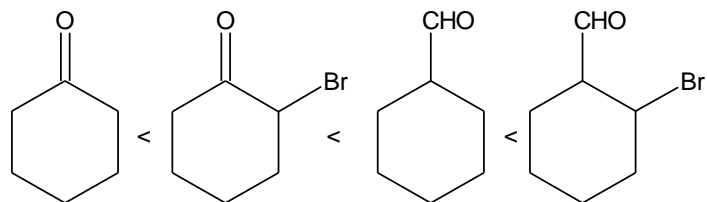
Sol.



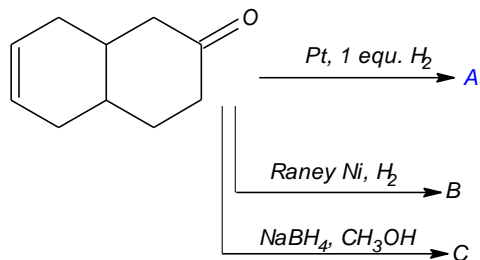
23. Arrange the following in increasing extent of hydration:



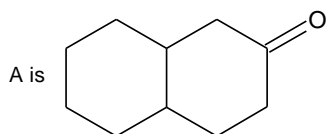
Sol. The extent of hydration increases as groups tendency to form H – bonding increases. In general hydration of an aldehyde is greater than that of a ketone.



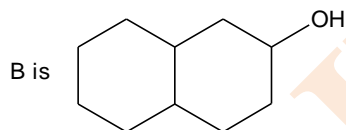
24. Identify A, B & C in the following



Sol. With Pt, only double bond is affected



With Raney Ni, $-\text{C}=\text{O}$ groups as well as double bond is reduced.

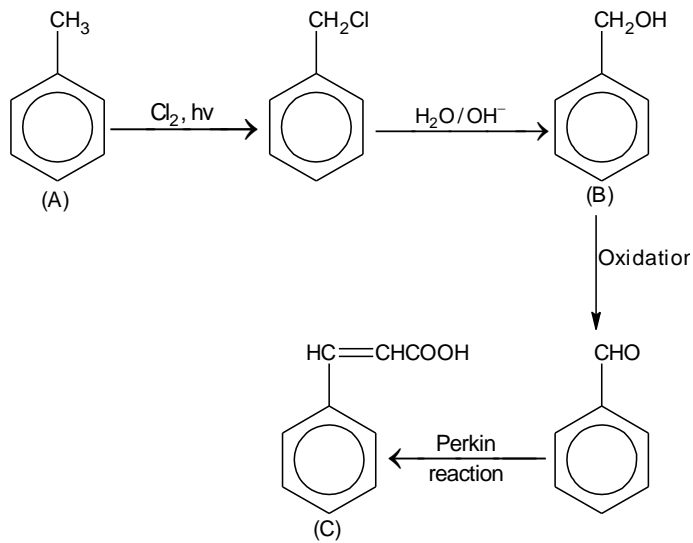


$\text{NaBH}_4, \text{CH}_3\text{OH}$ does not reduce double bond.



25. Compound A, having the empirical formula C_7H_8 is chlorinated in sunlight to give a product which is hydrolysed to produce B. B after oxidation reacts with acetic anhydride in the Perkin reaction to produce an acid C, which has an equivalent weight of 148. Give the name & structure of A, B & C.

Sol. Since B on oxidation undergoes Perkin reaction, \therefore the oxidised compound is benzaldehyde & A is toluene.



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