

EXERCISE

Q1: Select the right answer from the choices given with each question.

- 1) The carbon atom of carbon atom of a carbonyl group is:
 - a) sp hybridized
 - b) sp^2 hybridized
 - c) sp^3 hybridized
 - d) none of these
- 2) Ketones are prepared by the oxidation of:
 - a) primary alcohol
 - b) secondary alcohol
 - c) tertiary alcohol
 - d) none of these
- 3) Acetone reacts with HCN to form a Cyanohydrin. It is an example of:
 - a) electro philic addition
 - b) electrophilic substitution
 - c) nucleophilic addition
 - d) nuelesphilic substitution
- 4) Cannizaro's reaction is not given by:
 - a) formaldehyde
 - b) acetaldehyde
 - c) benzaldehyde
 - d) trimethylacetaldehyde
- 5) Which of the following reagents will react with both aldehydes and ketones?
 - a) grignard reagent
 - b) tollen's reagent
 - c) Fehling's reagent
 - d) Benedict's reagent
- 6) Aldehydes are the oxidation product of:
 - a) p - alcohols
 - b) s - alcohols
 - c) ter - alcohols
 - d) carboxylic acids
- 7) Which of the following compounds will not given iodoform test on treatment with $I_2/NaOH$.
 - a) Acetaldehyde
 - b) Acetone
 - c) Butanone
 - d) 3 - pentahone
- 8) Aldehydes and ketones are carbonyl compounds. Which of them react both with $NaBH_4$ and with Tollen's reagent.
 - a) both addehydres and ketones
 - b) Aldehydes only
 - c) Ketones only
 - d) Neither aldehydes nor ketones
- 9) Which one of the following can undergo aldol condensation reaction?
 - (a) formaldehyde
 - (b) acetaldehyde
 - (c) benzaldehyde
 - (d) trimethylacetaldehyde
- 10) Aldol condensation is not successful with compounds:
 - a) having no α - hydrogen
 - b) having α - hydrogen
 - c) having α - methyl group
 - d) none
- 11) Phenylhydrazone on treatment with carbohyl compounds produce:
 - a) hydroxyl amines
 - b) phenlhydrazone
 - c) oximes
 - d) none of these
- 12) Formaldehyde react with NH_3 to give?
 - a) tetra ethylene nexamine
 - b) tetra ethylene tetramine

- c) hexa methlene tetramine d) cyalonite

13) General formula of aldehydes and ketone is?

- a) $C_nH_{2n}O$ b) $C_nH_{2n+1}O$ c) C_nH_nO d) $C_nH_{2n+2}O$

14) Which of the following carbe prepared in the laboratory by dry distillation of $(HCOO)_2 Ca$?

- a) $H_2C = CH_2$ b) $HCHO$
c) CH_3OH d) CH_3CHO

15) The colour of Iodoform is:

- a) white b) black c) yellow d) blue

Answers

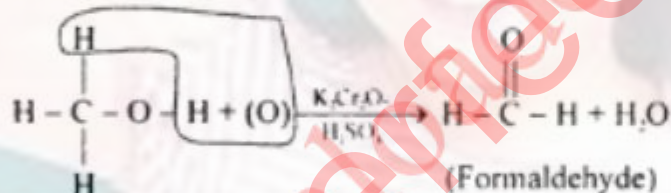
1)	b)	2)	b)	3)	c)	4)	b)	5)	a)
6)	a)	7)	d)	8)	b)	9)	b)	10)	a)
11)	b)	12)	d)	13)	a)	14)	b)	15)	c)

Q2: Give short answers of the following questions.

Q1. How is formaldehyde prepared industrially?

Answer

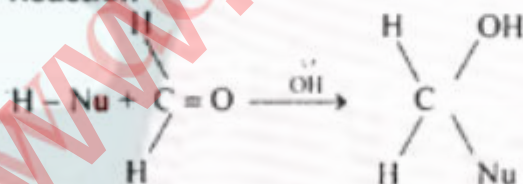
Industrially formaldehyde is prepared by the oxidation of methanol



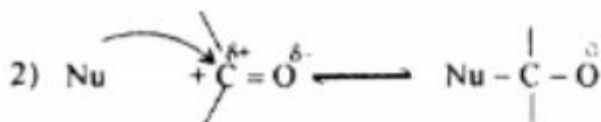
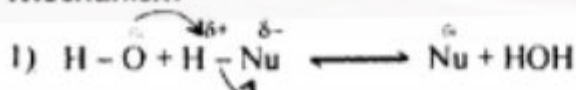
Q2. Describe briefly the nucleophilic addition mechanism to the carbonyl compounds.

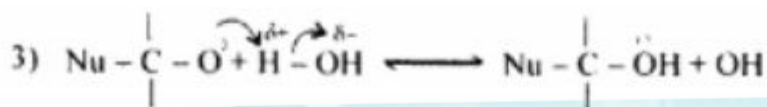
Answer

Reaction



Mechanism





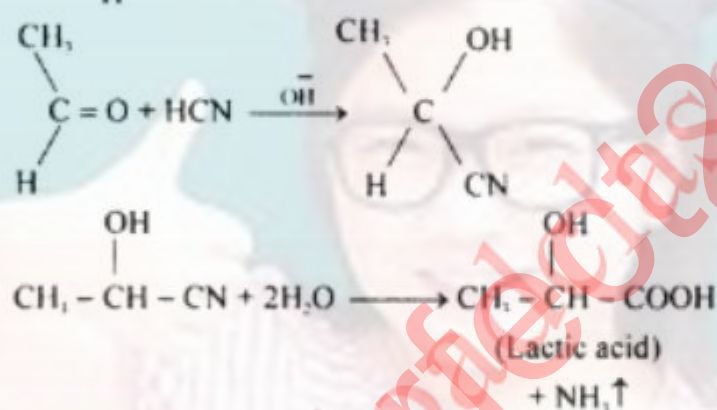
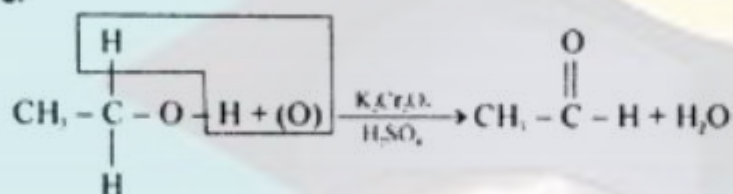
Q3. What is mechanism of HCN addition to carbonyl compounds?

Answer

Please see answer of Q10 of chapter.

Q4. How is ethanol converted to lactic acid?

Answer



Q5. What is the addition product of Grignard reagent to formaldehyde, acetaldehyde and ketones?

Answer

Please see answer of Q3 of chapter notes.

Q6. What is haloform reaction?

Answer

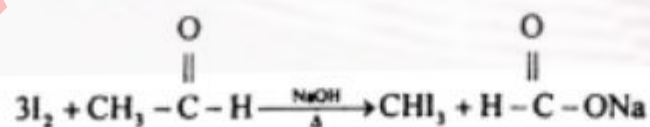
Please see answer of Q14 of chapter notes.

Q7. Which type of alcohols undergo iodoform reaction?

Answer

Alcohols having α - hydrogen atoms

For Example



Q8. How are methanol and ethanol polymerized?

Answer

Please see answer of Q15 of chapter notes.

Q9. Why formaldehyde do not give aldol condensation reaction?

Answer

Aldol condensation is given by only those compounds which have α - hydrogen. As

formaldehyde $\begin{array}{c} \text{O} \\ || \\ (\text{H}-\text{C}-\text{H}) \end{array}$ does not give aldol condensation reaction.

Q10. Give the mechanism of addition of sodium bisulphate to ketones.

Answer

Please see answer of Q11 of chapter notes.

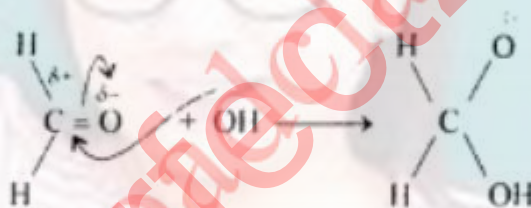
Q3: Give detailed answers of the following questions.

Q1. What is reactivity of the carbonyl group?

Answer

Carbonyl group is a highly polar group. There is partial positive charge of carbon atom of $\text{C}=\text{O}$ group which acts as electrophilic center. The bond between carbon and oxygen of carbonyl group ($\text{C}=\text{O}$) acts as an electrophilic center.

For example

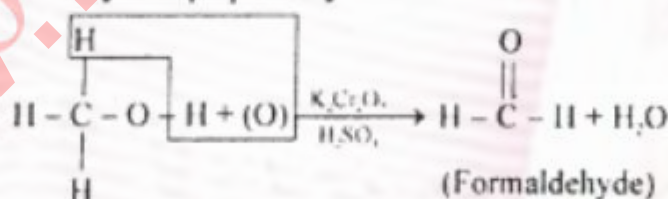


Q2. How will you prepare formaldehyde and acetaldehyde on industrial scale?

Answer

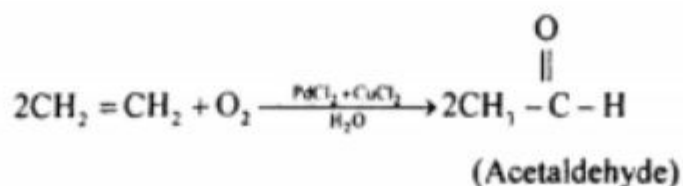
Industrial Preparation of formaldehyde

Industrially formaldehyde is prepared by the oxidation of m-ethanol.



Industrial preparation of acetaldehyde

Acetaldehyde is prepared industrially by air oxidation of ethylene using palladium chloride catalyst with a cupric chloride promoter

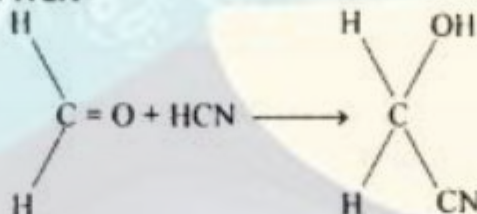


Q3. How formaldehyde reacts with following

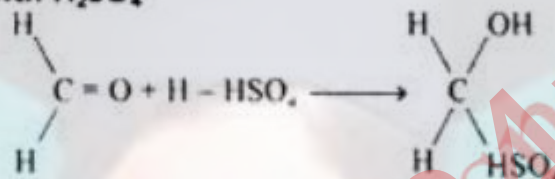
- i) HCN ii) H_2SO_4 iii) NaHSO_4

Answer

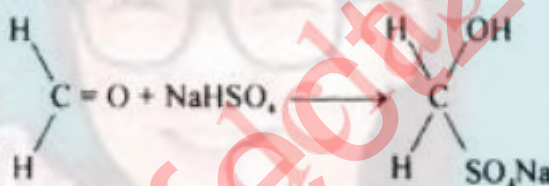
i) Formaldehyde with HCN



ii) Formaldehyde with H_2SO_4



iii) Formaldehyde with NaHSO_4



Q4. Define and explain adol condensation along with mechanism.

Answer

Please see answer of Q12 of chapter notes.

Q5. Give detail of haloform reaction why it is called so?

Answer

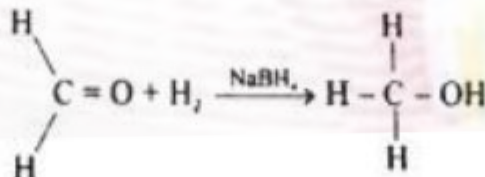
Please see answer of Q14 of chapter notes.

Q6. Give the following reductions of aldehydes and ketones along with mechanism. i) NaBH_4 ii) Catalytic reduction

Answer

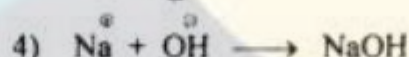
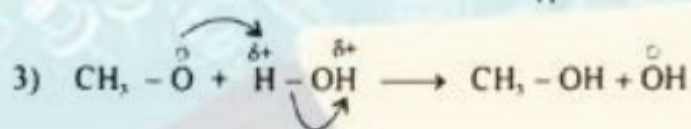
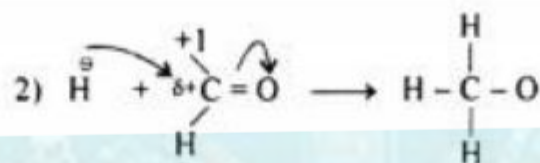
i) Reduction of aldehydes and ketones with NaBH_4

General Reaction



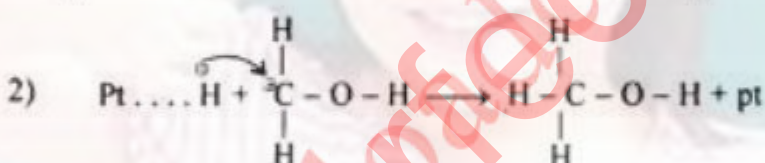
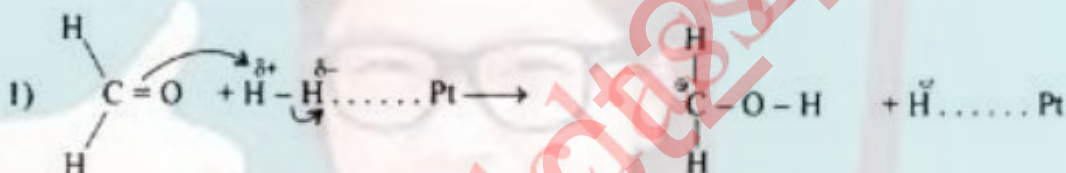
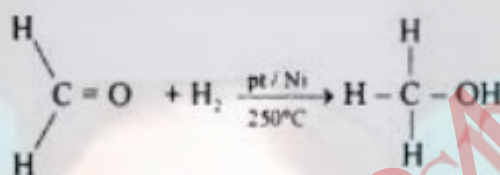
Mechanism of Reaction





II) Reduction of aldehydes and ketones through catalytic reduction

General Reaction



Q7. What is the mechanism for addition of ammonia derivative to carbonyl group?

Answer

Please see answer of Q16, Q17, Q18, Q19 and Q20 of chapter.

Q8. Which type of aldehydes give cannizaro's reaction? Explain with mechanism.

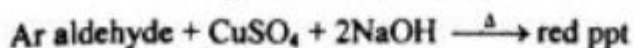
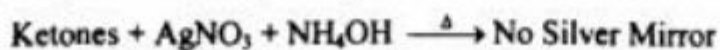
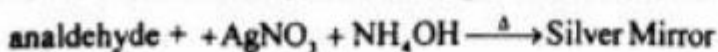
Answer

Please see answer of Q13 of chapter notes.

Q9. How do you distinguish a ketone and an aldehyde by chemical method?

Answer

Aldehydes give the silver mirror test with Tollen's reagent and also give the Fehling's solution test while ketones do not give Tollen's test as well as Fehling's solution test.

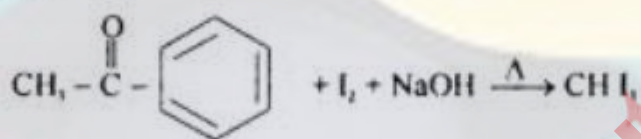




Q10. How will you differentiate between acetophenone and benzophenone?

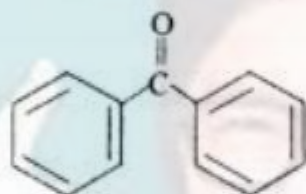
Answer

Acetophenone and benzophenone can be differentiated through iodoform test. Acetophenone gives yellow precipitates of iodoform while benzophenone does not give iodoform test.



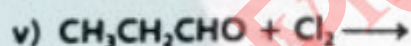
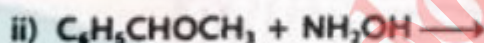
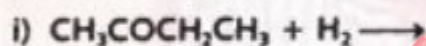
(Acetophenone)

Yellow ppt of
Iodoform

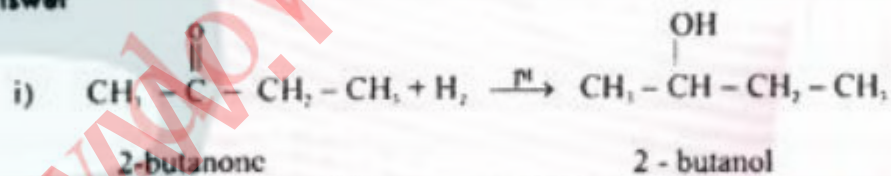


(Benzophenone)

Q11. Predict the formulas of the products of the following reactions.

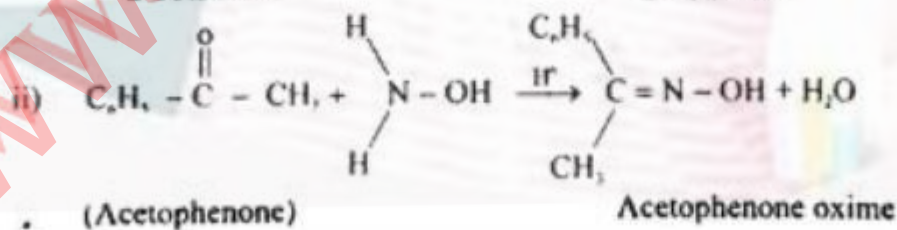


Answer



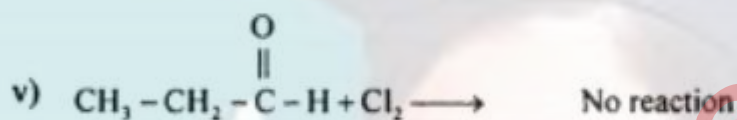
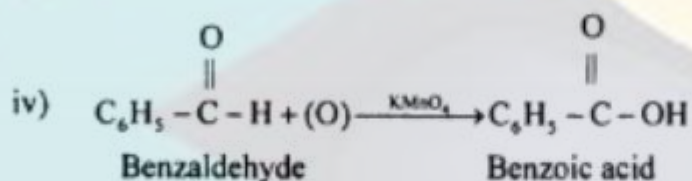
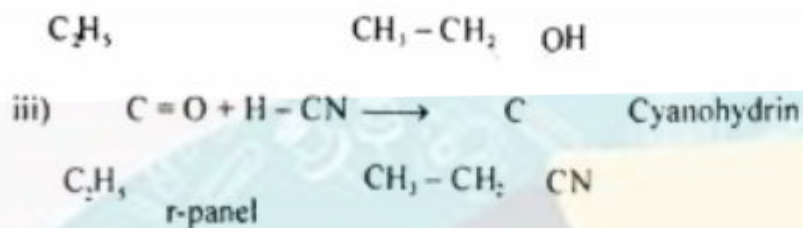
2-butanone

2-butanol



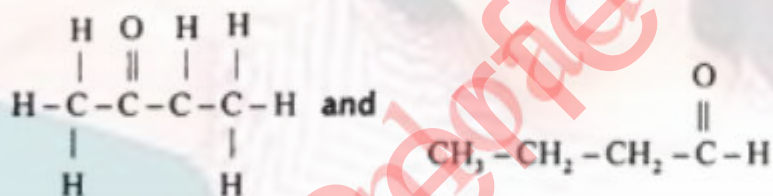
(Acetophenone)

Acetophenone oxime



Q12. Write structural formulas for all compounds of molecular formula $\text{C}_4\text{H}_8\text{O}$ containing a carbonyl group.

Answer

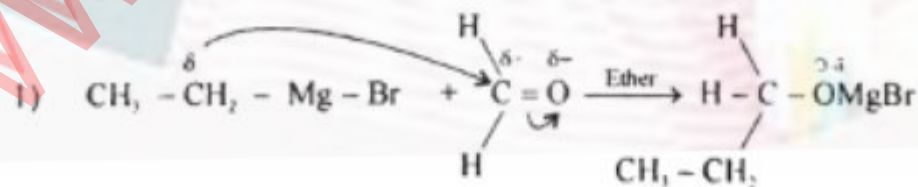


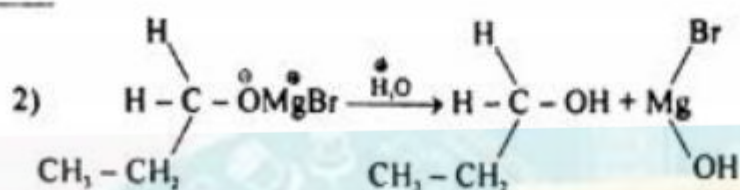
Q13. Predict the formulas of the compounds formed when the following are treated with the Grignard's reagent methyl magnesium bromide.

- i) Methanol ii) Ethanol iii) Propanone iv) Carbondioxide

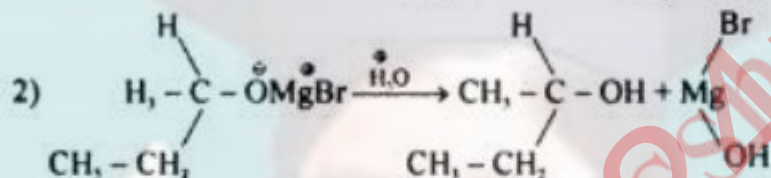
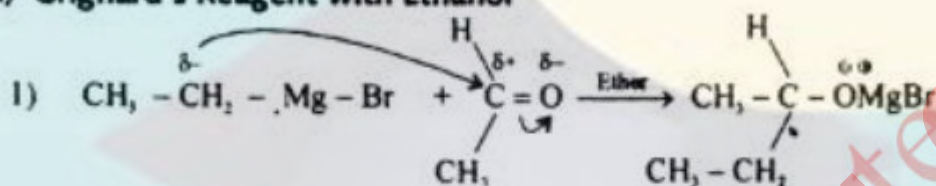
Answer

i) Grignard's reagent with Methanol

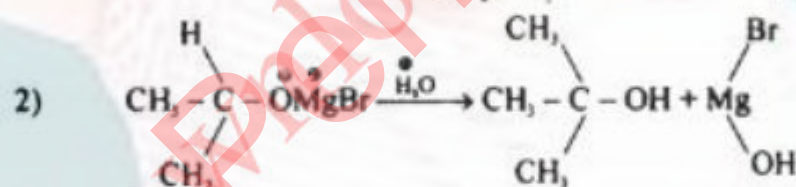
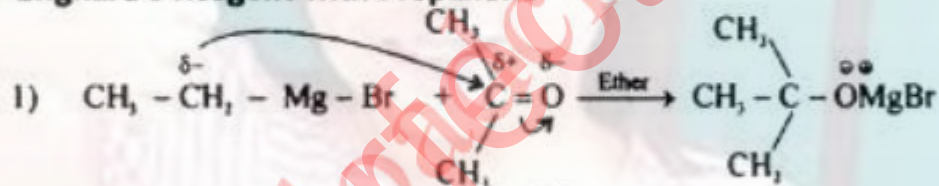




ii) Grignard's Reagent with Ethanol



iii) Grignard's Reagent with Propanone



iv) Grignard's Reagent with Carbon Dioxide

