

## 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 <sup>2</sup> hybridized |
| c) sp <sup>3</sup> 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) electrophilic addition<br>substitution | b) electrophilic             |
| c) nucleophilic addition                  | d) nucleophilic substitution |

**4) Cannizzaro's reaction is not given by:**

- |                 |                           |
|-----------------|---------------------------|
| a) formaldehyde | b) acetaldehyde           |
| c) benzaldehyde | d) trimethyl acetaldehyde |

**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 give iodoform test on treatment with  $I_2/NaOH$ .**
- a) Acetaldehyde                      b) Acetone                      c) Butanone                      d) 3 - pentanone
- 8) **Aldehydes and ketones are carbonyl compounds. Which of them react both with  $NaBH_4$  and with Tollen's reagent?**
- a) both aldehydes 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) trimethyl acetaldehyde
- 10) **Aldol condensation is not successful with compounds:**
- a) having no  $\alpha$ -hydrogen                      b) having  $\alpha$ -hydrogen
- c) having  $\alpha$ -methyl group                      d) none
- 11) **Phenylhydrazone on treatment with carbonyl compounds produce:**

- a) hydroxyl amines  
 b) phenylhydrazone  
 c) oximes  
 d) none of these

12) Formaldehyde react with  $\text{NH}_3$  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)  $\text{C}_n\text{H}_{2n}\text{O}$   
 b)  $\text{C}_n\text{H}_{2n+1}\text{O}$   
 c)  $\text{C}_n\text{H}_n\text{O}$   
 d)  $\text{C}_n\text{H}_{2n+2}\text{O}$

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

- a)  $\text{H}_2\text{C} = \text{CH}_2$   
 b)  $\text{HCHO}$   
 c)  $\text{CH}_3\text{OH}$   
 d)  $\text{CH}_3\text{CHO}$

15) The colour of Iodoform is:

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

Answer:

1)	b)	2)	b)	3)	c)	4)	b)	5)	a)
6)	a)	7)	d)	8)	b)	9)	b)	10)	a)

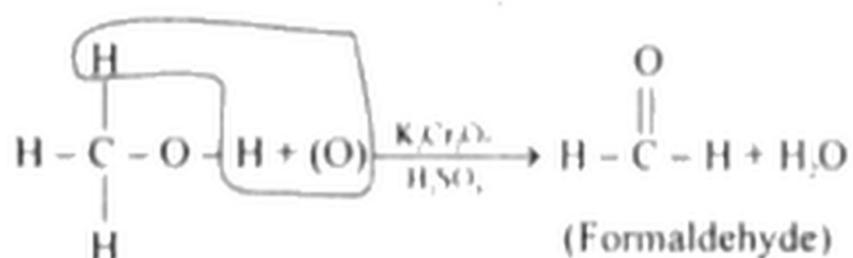
11)	b)	12)	d)	13)	a)	14)	b)	15)	c)
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**Q2. Give short answers of the following questions.**

**Q1. How is formaldehyde prepared industrially?**

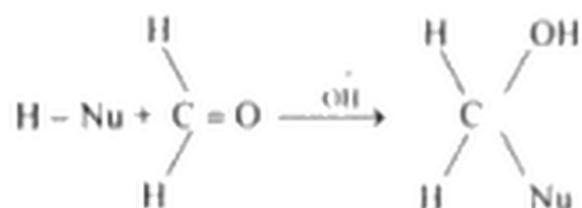
**Answer**

Industrially formaldehyde is prepared by the oxidation of methanol



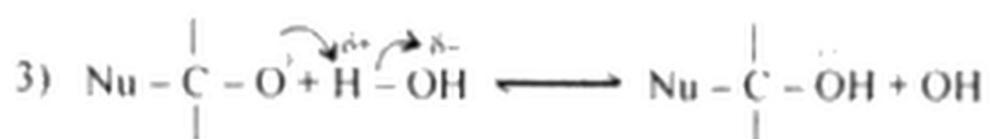
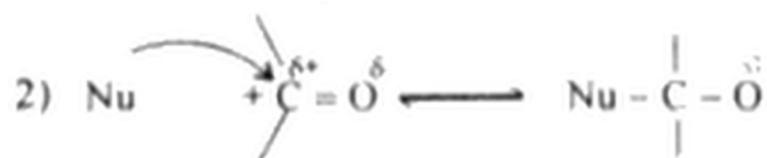
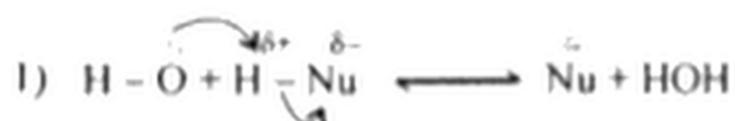
**Q2. Describe briefly the nucleophilic addition mechanism to the carbonyl compounds.**

**Answer**



Reaction

Mechanism



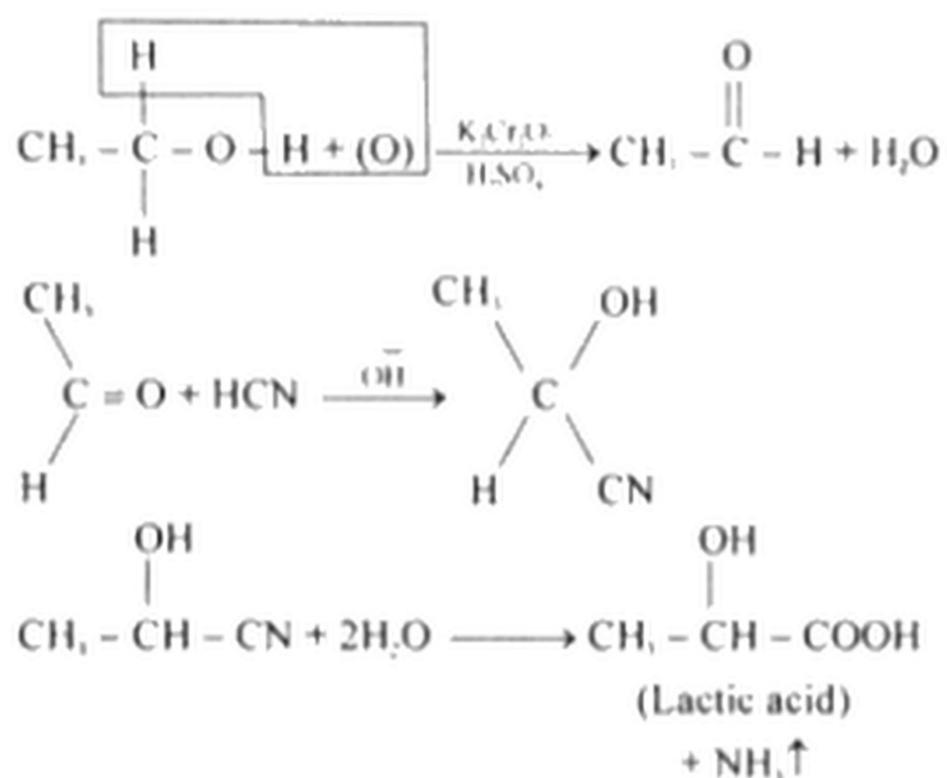
**Q3. What is mechanism of HCN addition to carbonyl compounds?**

**Answer**

Please see answer of Q 10 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?**

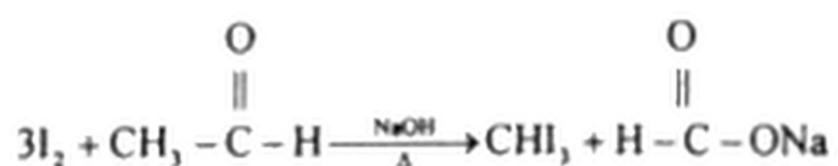
**Answer**

Please see answer of Q 14 of chapter notes.

**Q7. Which type of alcohols undergo iodoform reaction?****Answer**

Alcohols having  $\alpha$  - hydrogen atoms

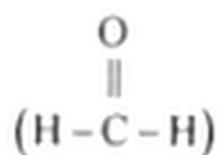
For Example

**Q8. How are methanol and ethanol polymerized?****Answer**

Please see answer of Q1 5 of chapter notes.

**Q9. Why formaldehyde do not give aldol condensation reaction?****Answer**

Aldol condensation is given by only those compounds which have  $\alpha$  - hydrogen. As formaldehyde does not given aldol condensation reaction.

**Q 10. Give the mechanism of addition of sodium bisulphate to icetones.**

**Answer**

Please see answer of Q11 of chapter notes.

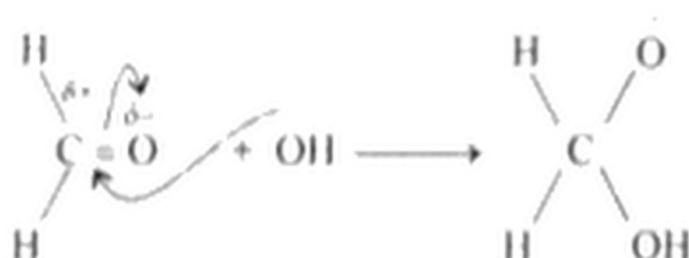
**Q3. Give detailed answers of the following questions.**

**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 C = O group which acts as electrophilic center. The between carbon and oxygen of carbonyl group acts as an electrophilic center.

For example



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

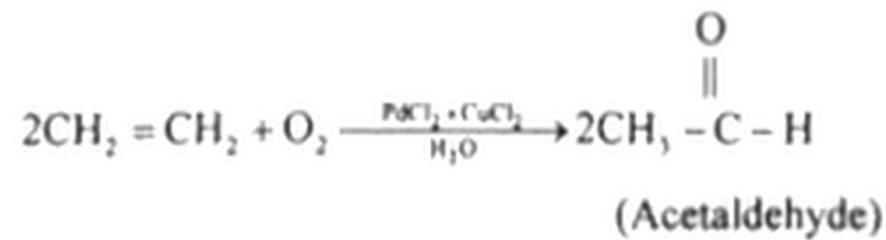
**Answer****Industrial Preparation of formaldehyde**

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



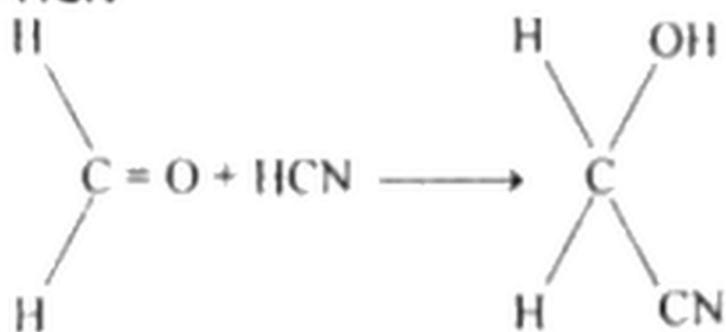
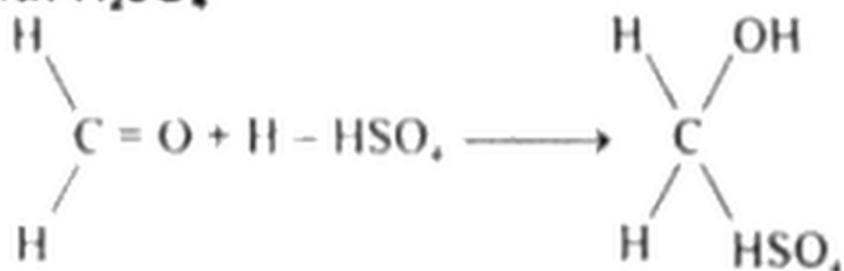
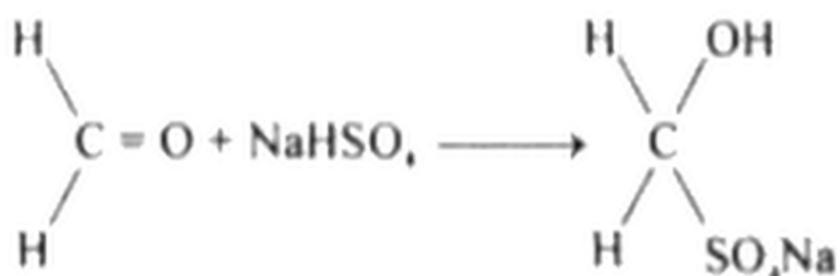
Q3. How formaldehyde reacts with following

i) HCN

ii) H<sub>2</sub>SO<sub>4</sub>

iii) NaHSO<sub>4</sub>

**Answer**

**i) Formaldehyde with HCN****ii) Formaldehyde with H<sub>2</sub>SO<sub>4</sub>****iii) Formaldehyde with NaHSO<sub>4</sub>**

**Q4. Define and explain aldol 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 Q1 4 of chapter notes.

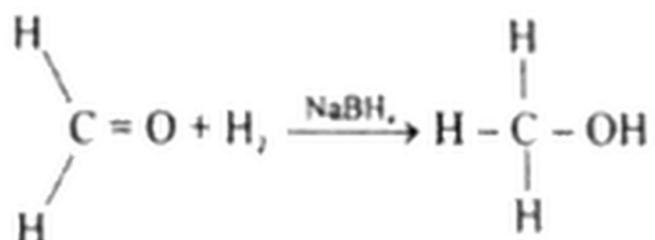
**Q6. Give the following reductions of aldehydes and ketones along with mechanism.**

i)  $\text{NaBH}_4$             ii) Catalytic reduction

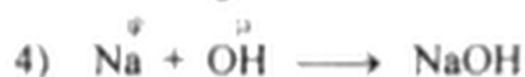
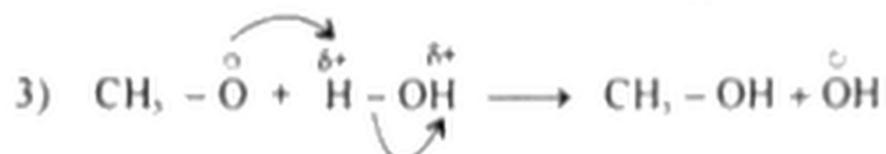
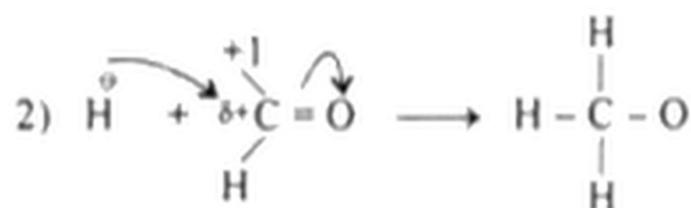
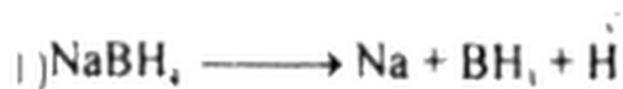
**Answer**

i) Reduction of aldehydes and ketones with  $\text{NaBH}_4$

**General Reaction**

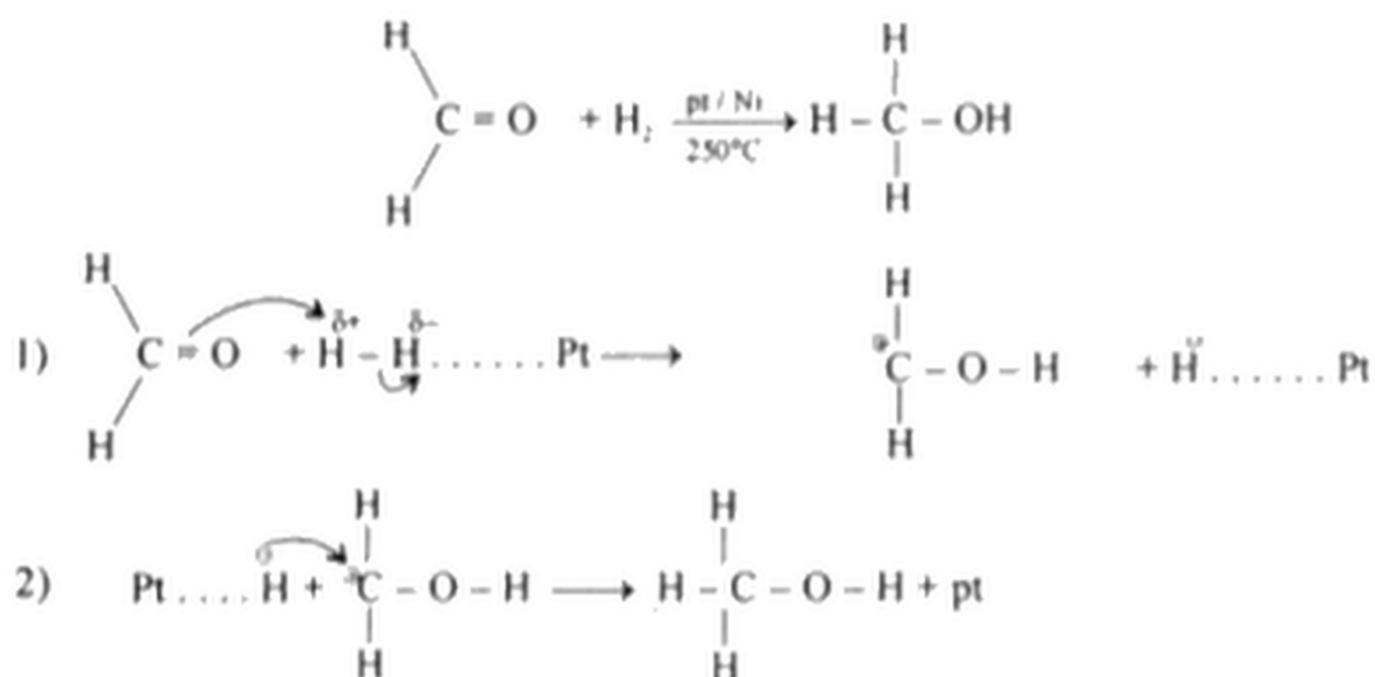


**Mechanism of Reaction**



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 Q 16, Q17, Q18, Q19 and Q20 of chapter.

**Q8. Which type of aldehydes give Cannizzaro'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**

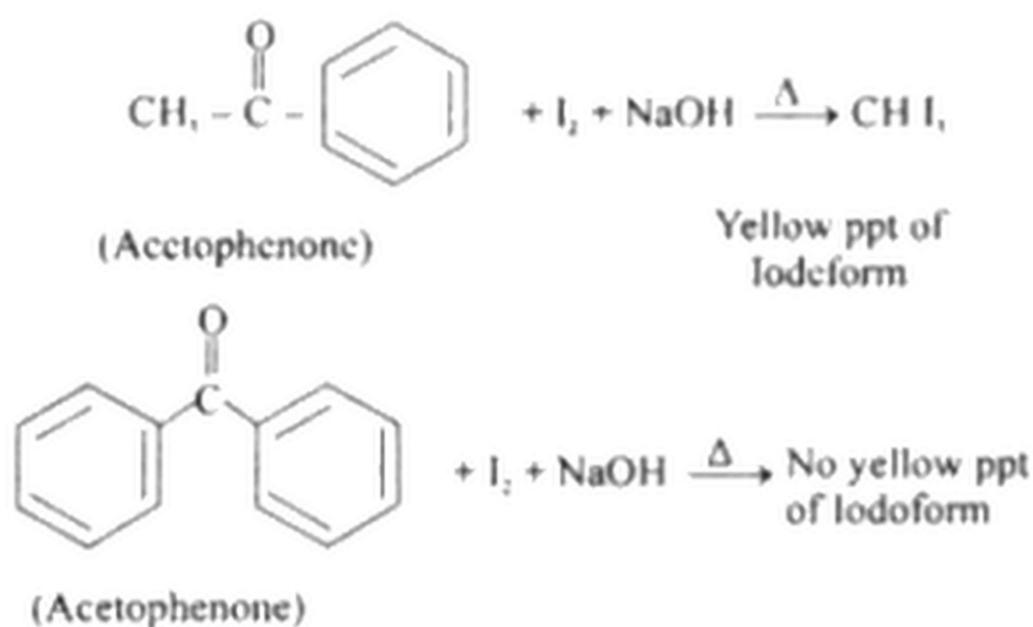
Aldehydes gives the silver mirror test with tollen's reagent and also gives the Fehling's solution test while ketones do not give Tollen's test as well as Fehling solution test.



Q10. How will you differentiate between acetophenone and benzophenone?

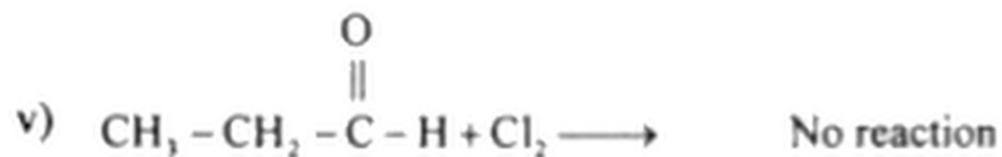
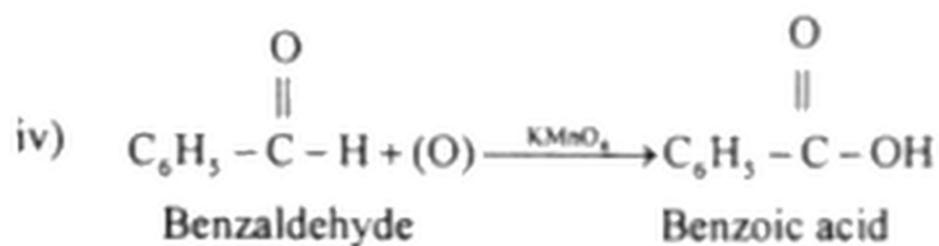
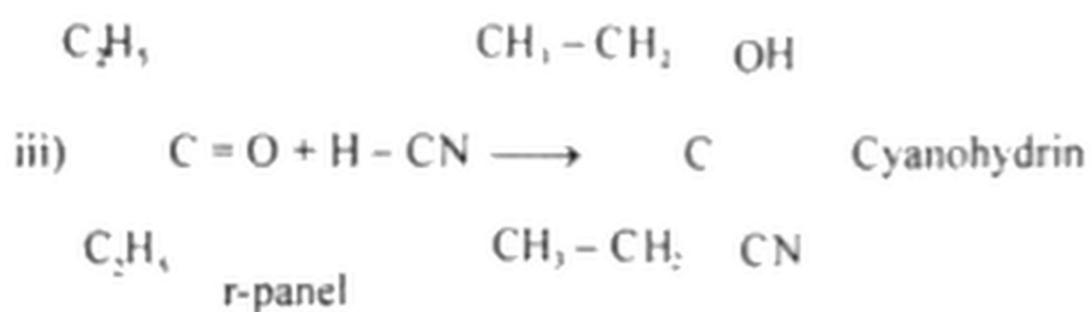
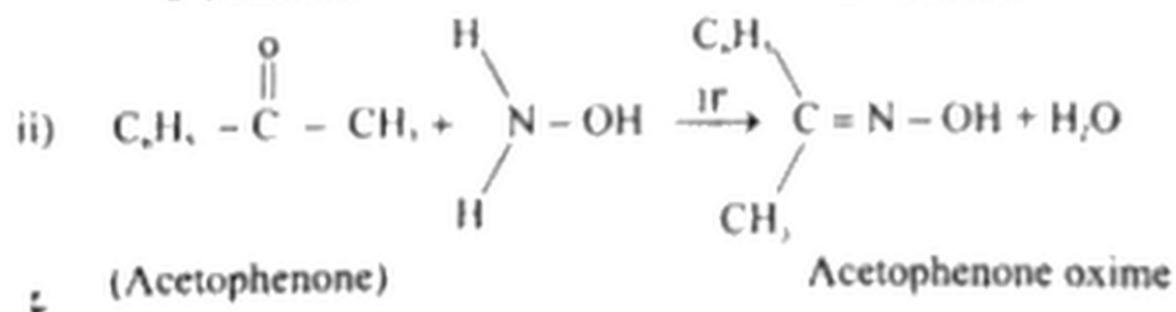
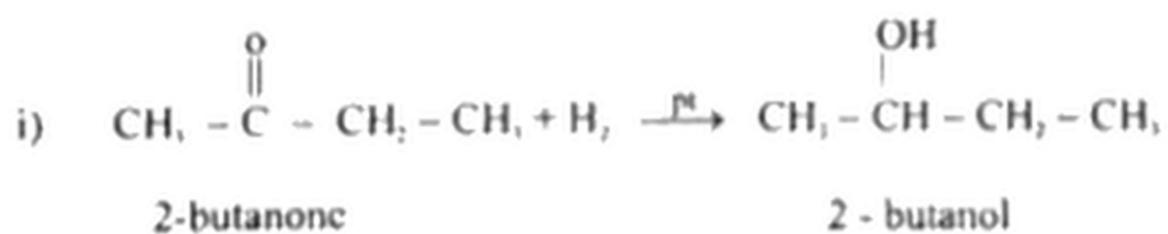
**Answer**

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



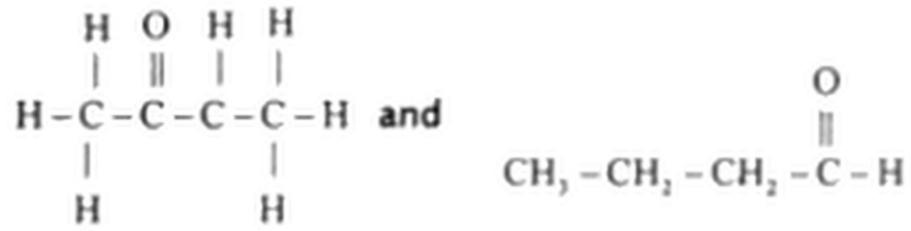
Q11 Predict the formulas of the products of the following reactions.



**Answer**

**Q12. Write structural formulas for all compounds of molecular formula C<sub>4</sub>H<sub>8</sub>O containing a carbonyl group.**

**Answer**

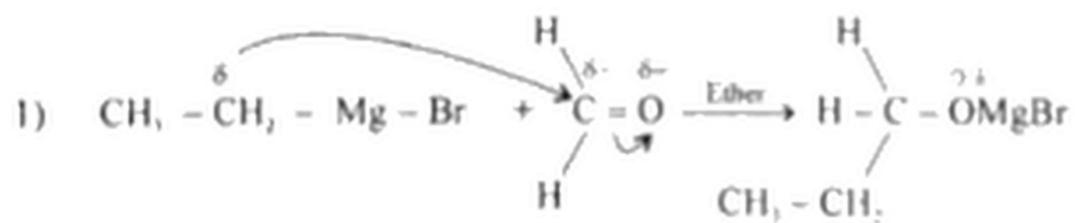


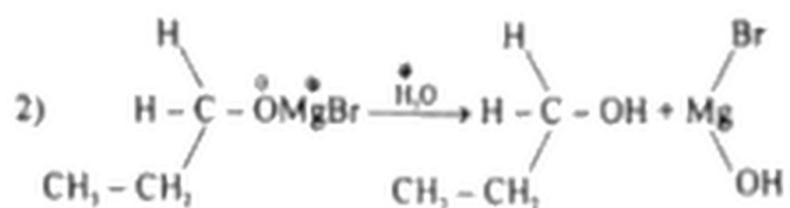
Q13. Predict the formulas of the compounds formed when the following are treated with the Grignard's reagent methyl magnesium bromide.

- i) Methanol      ii) Ethanol      iii) Propanone      iv) Carbon dioxide

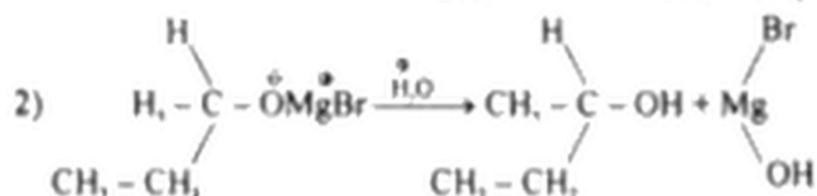
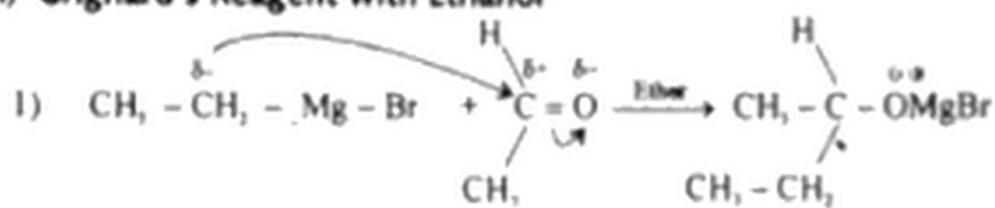
Answer

i) Grignard's reagent with Methanol

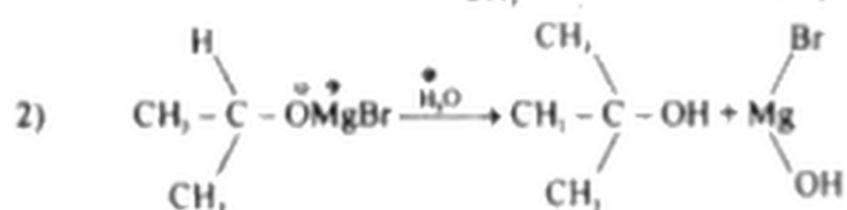
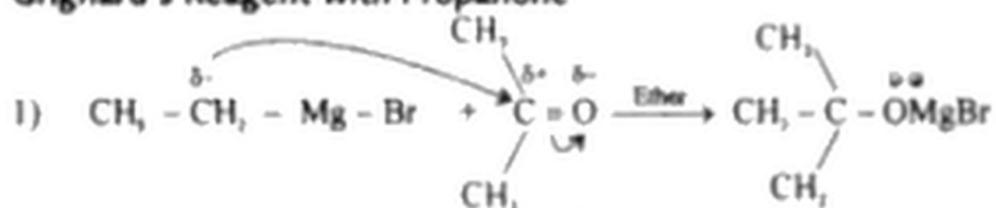




### ii) Grignard's Reagent with Ethanol



### iii) Grignard's Reagent with Propanone



### iv) Grignard's Reagent with Carbon Dioxide

