

## CBSE Class 12 Chemistry Chapter 12 Aldehydes, Ketones, and Carboxylic Acids Worksheet with Answers – Set 4

**Q1.** Jone's reagent is

- (a) Acidified  $\text{KMnO}_4$  solution
- (b) Acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  solution or Chromic acid and Sulphuric acid solution
- (c) Alkaline  $\text{K}_2\text{Cr}_2\text{O}_7$  solution
- (d) None of the above

**Answer:**

(b) Jone's reagent is a solution of acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  or Chromic acid and Sulphuric acid.

**Q2.** An organic compound contains hydrogen, oxygen, and a single carbon atom and responds positively to Tollen's reagent. The compound is

- (a)  $\text{HCHO}$
- (b)  $\text{CH}_3\text{OH}$
- (c)  $\text{CH}_3\text{CHO}$
- (d) None of the above

**Answer:**

(a)  $\text{HCHO}$ , formaldehyde is a compound containing hydrogen, oxygen, and a single carbon atom that responds positively to Tollen's reagent.

**Q3.** Which of the following alkene will yield acetone on ozonolysis?

- (a)  $\text{CH}_2 = \text{CH}_2$
- (b)  $\text{CH}_3\text{CH}=\text{CH}_2$
- (c)  $(\text{CH}_3)_2\text{C}=\text{C}(\text{CH}_3)_2$
- (d) None of the above

**Answer:**

(c)  $(\text{CH}_3)_2\text{C}=\text{C}(\text{CH}_3)_2$  will yield acetone on ozonolysis.

**Q4.** Which of the following combination give tertiary butyl alcohol when treated with the Grignard reagent?

- (a)  $\text{CH}_3\text{MgBr} + \text{CH}_3\text{COCH}_3$
- (b)  $\text{C}_2\text{H}_5\text{MgBr} + \text{CH}_3\text{COCH}_3$

- (c)  $\text{CH}_3\text{MgBr} + (\text{CH}_3)_3\text{COH}$   
(d) None of the above

**Answer:**

(a)  $\text{CH}_3\text{MgBr} + \text{CH}_3\text{COCH}_3$  give tertiary butyl alcohol when treated with the Grignard reagent.

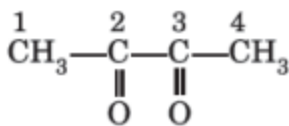
**Q5.** What happens when the water gas ( $\text{CO} + \text{H}_2$ ) is passed through an electric discharge at low pressure?

- (a) HCHO is formed  
(b) HCOOH is formed  
(c)  $\text{CH}_3\text{CHO}$  is formed  
(d)  $\text{CO}_2$  and  $\text{H}_2\text{O}$  are formed

**Answer:**

(a) HCHO is formed when the water gas ( $\text{CO} + \text{H}_2$ ) is passed through an electric discharge at the low pressure.

**Q6.** What are the IUPAC and the common name of the following compound?



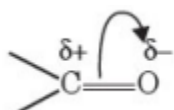
**Answer:**

The IUPAC and the common name of the above compound is Butan-2,3-dione and biacetyl, respectively.

**Q7.** Why do aldehyde and ketone have a high dipole moment?

**Answer:**

Aldehyde and ketone have a high dipole moment because the carbonyl group in the aldehydes and ketones contains a double bond between carbon and oxygen atoms. Since oxygen is more electronegative than carbon, oxygen gets a considerable negative charge while carbon acquires a positive charge. Therefore, aldehyde and ketone have a dipole moment due to the charge difference between carbon and oxygen.



**Q8.** Why is ethanol distilled out during the preparation of acetaldehyde?

**Answer:**

Ethanol is distilled out during the preparation of acetaldehyde because acetaldehyde gets oxidised to acetic acid. Therefore, ethanol is distilled out as soon as acetaldehyde is formed to prevent its oxidation.

**Q9.** What is formalin?

**Answer:**

Formalin is the 40 % aqueous solution of formaldehyde. It is primarily used as an industrial disinfectant and preservative in funeral homes and medical labs.

**Q10.** Name the reagents that can be used to bring about the following conversion.

- (a) Ethane nitrile to Ethanal
- (b) Allyl alcohol to Propenal
- (c) But-2-ene to Ethanal

**Answer:**

The reagent that can be used to bring about the following conversion are mentioned below.

- (a) **Ethane nitrile to Ethanal:** Di BALH
- (b) **Allyl alcohol to Propenal:** PCC in Di chloro methane
- (c) **But-2-ene to Ethanal:**  $O_3 / H_2O$  in An dust

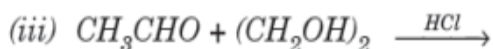
**Q11.** Arrange the following carbonyl compounds in order of reactivities in the nucleophilic addition reaction.

Benzaldehyde, p-tolualdehyde, p-nitro benzaldehyde, and acetophenone.

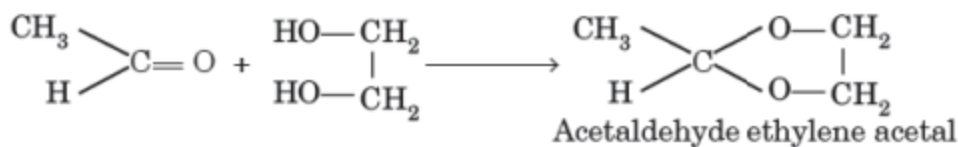
**Answer:**

We can arrange the above carbonyl compounds in order of reactivities in the nucleophilic addition reaction as Acetophenone < p-tolualdehyde < benzaldehyde < p-nitro benzaldehyde.

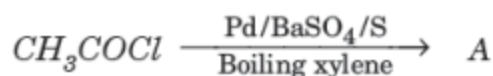
**Q12.** Complete the reaction.



**Answer:**

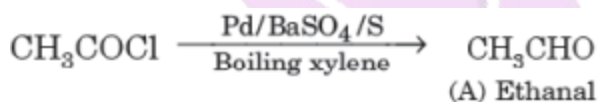


**Q13.** Identify A in the following reaction.



**Answer:**

Here, A is ethanol.



**Q14.** Why do aldehyde and ketones have lower boiling points than alcohol and carboxylic acid?

**Answer:**

Aldehyde and ketones have lower boiling points than alcohol and carboxylic acid because the dipole-dipole interaction in aldehyde and ketone is less than the intermolecular hydrogen bonds in alcohols and carboxylic acid. Therefore, the aldehyde and ketone boiling points are less than the boiling point of alcohol and carboxylic acid.

**Q15.** Which bond, C-OH or CO-H of the carboxylic acid, is broken when

- (a) Acid chloride is formed
- (b) Acid reacts with zinc

(c) Acid reacts with ammonia to form amide

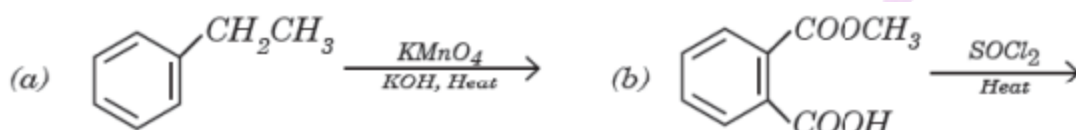
**Answer:**

(a) During the formation of acid chloride, the C-OH bond of the carboxylic acid is broken.

(b) When acid reacts with zinc, the CO-H bond of the carboxylic acid is broken.

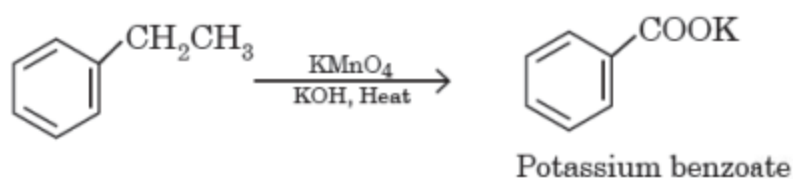
(c) When acid reacts with ammonia to form amide, the CO-H bond of the carboxylic acid is broken.

**Q16.** Predict the product of the following reaction.

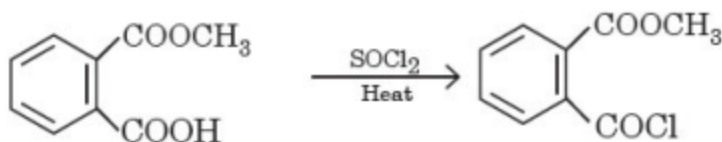


**Answer:**

(a) When ethyl benzene is oxidised with potassium permanganate in the presence of potassium hydroxide, potassium benzoate is formed.



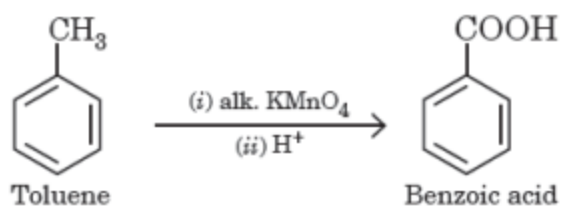
(b) When thionyl chloride reacts with acetylsalicylic acid, a nucleophilic substitution reaction takes place.



**Q17.** Discuss the reaction for the preparation of the benzoic acid from toluene?

**Answer:**

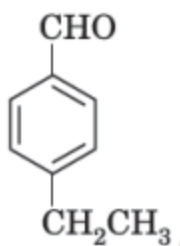
We can prepare benzoic acid from toluene by oxidising it with alkaline potassium permanganate.



**Q18.** An organic compound with molecular formula  $\text{C}_9\text{H}_{10}\text{O}$  forms 2, 4-DNP derivative, reduces Tollen's reagent and undergoes Cannizzaro reaction. On vigorous oxidation, it gives 1, 4-benzene dicarboxylic acid. Identify the compound.

**Answer:**

The given compound forms 2, 4-DNP derivative. Therefore, it is an aldehyde or ketone. Since it reduces Tollen's reagent, it must be an aldehyde. The compound undergoes Cannizzaro's reaction, so it does not contain alpha hydrogen. On vigorous oxidation, it gives 1, 4-benzene dicarboxylic acid, which means it must have an alkyl group at 4-position concerning -CHO group on the benzene ring. The molecular formula suggests it should be 4-Ethyl benzaldehyde.

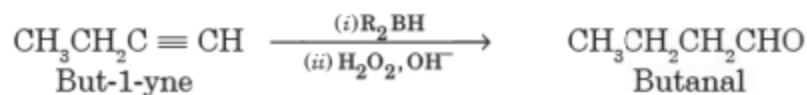


**Q19.** Give the different products formed when butyne undergoes  
 (a) A hydroboration oxidation reaction and  
 (b) Hydration in the presence of acidic amalgamation

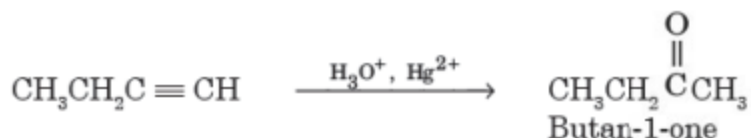
**Answer:**

The different products formed when butyne undergoes

(a) A hydroboration oxidation reaction and



(b) Hydration in the presence of acidic amalgamation



**Q20.** An organic compound (A) has the molecular formula ( $C_5H_{10}O$ ). It does not reduce Tollen's reagent but forms an orange precipitate with a 2, 4-DNP reagent. It does not give a yellow deposit on treatment with NaOH and  $I_2$ . Under vigorous conditions on oxidation, it provides ethanoic acid and carboxylic acid (B). The sodium salt of (B) gives a hydrocarbon (C) in Kolbe's electrolytic reduction. Identify (A), (B), and (C) and write the reactions involved.

**Answer:**

The compound (A) does not reduce Tollen's reagent but forms an orange precipitate with 2, 4-DNP reagent, so it must be ketone. Since it does not give an iodoform test, it is not a methyl ketone. Therefore (A) is  $CH_3CH_2COCH_2CH_3$  ( $C_5H_{10}O$ )

