# **QB365** Question Bank Software Study Materials

## Carbonyl Compounds and Carboxylic Acids Important 2 Marks Questions With Answers (Book Back and Creative)

12th Standard

Chemistry

Total Marks: 40

2 Marks

20 x 2 = 40

1) How is propanoic acid is prepared starting from

(a) an alcohol

(b) an alkylhalide

(c) an alkene

#### **Answer**: An alcohol:

 $\begin{array}{c} CH_{3}-CH_{2}-CH_{2}OH \xrightarrow{K_{2}Cr_{2}O_{7}/H^{+}} CH_{3}-CH_{2}-CHO \xrightarrow{K_{2}Cr_{2}O_{7}/H^{+}} CH_{3}-CH_{2}-COOH \\ \hline \\ n-Propyl alcohol \end{array} \xrightarrow{Propionaldehyde} CH_{3}-CH_{2}-CHO \xrightarrow{K_{2}Cr_{2}O_{7}/H^{+}} CH_{3}-CH_{2}-COOH \\ \hline \\ Propionaldehyde \end{array}$ 

### An alkylhalide:

Identify X and Y.

 $\begin{array}{c} CH_{3}-CH_{2}-CH_{2} \boxed{Br+Na} OH \xrightarrow{-NaBr} CH_{3}-CH_{2}-CH_{2}OH \xrightarrow{k_{2}C_{5}O_{7}/H^{*}}_{[O]} \\ n-Propyl bromide \\ CH_{3}-CH_{2}-CHO \xrightarrow{k_{3}C_{5}O_{7}/H^{*}}_{[O]} CH_{3}-CH_{2}-COOH \\ Propionaldehyde \\ Propanoic acid \end{array}$ 

#### An alkene:

2)

 $CH_{3}COCH_{2}CH_{2}COOC_{2}H_{5} \stackrel{CH_{3}MgBr}{\longrightarrow} X \stackrel{H_{3}O^{+}}{\longrightarrow} Y$ 

Answer:  $CH_{3} \cdot CO \cdot CH_{2} \cdot CH_{2} \cdot C = O + CH_{3}MgBr \longrightarrow CH_{3} - C - CH_{2} - CH_{3} - CH_{3}$ 

3) How will you convert benzaldehyde into the following compounds?

(i) benzophenone

(ii) benzoic acid

(iii) a-hydroxyphenylaceticacid.

	(i) Benzophenone C <sub>6</sub> H <sub>5</sub> CHO	$C_{5_5O_5/H^*} \rightarrow C_6H_5COOH -$	$(\Delta)$ $(\Delta)$ $C_{6}H_{5}COO$
Answer :	Benzaldehyde	Benzoicacid	C <sub>6</sub> H <sub>3</sub> COO
	$\xrightarrow{\Delta}$ Drydorikation $\rightarrow$ C <sub>6</sub> H	Calcium benzoate	
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(ii) benzoic acid

(ii) Benzoic acid



4) What is the action of HCN on

(i) propanone

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(ii) 2,4-dichlorobenzaldehyde
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iii) ethanal



(ii) 2,4-dichlorobenzaldehyde.



<sup>5)</sup> A carbonyl compound A having molecular formula  $C_5H_{10}O$  forms crystalline precipitate with sodium bisulphate and gives positive iodoform test. A does not reduce Fehling solution. Identify A.

2-pentanone (A)

 $\therefore$  (A) is 2-pentanone.

6) Does formaldehyde undergo aldol condensation? Justify your answer.

Answer: (i) Formaldehyde does not undergo aldol condensation.

(ii) Aldol condensation reaction is the characteristic of carbonyl compounds having a hydrogen atom. So this reaction does not take place in formaldehyde.

7) What is urotropine? Give its use.

Answer : Hexamethylene tetramine formed by the reaction of formaldehyde and ammonia is called urotropine.



8) Write a note on haloform reaction.

Answer : Acetaldehyde and methyl ketones, containing  $CH_3 - C - group$  , when treated with halogen and alkali give the  $\overset{|}{O}_O$ 

corresponding haloform. This is known as Haloform reaction

$$CH_3 - \mathop{C}_{ightarrow O} - CH_3 \stackrel{3Cl_2}{\underset{O}{\longrightarrow}} CCl_3 - \mathop{C}_{ightarrow O} - CH_3 \stackrel{NaOH}{\longrightarrow} CHCl_3 + CH_3 - \mathop{C}_{ightarrow O} - ONa \stackrel{NaOH}{\overset{O}{\longrightarrow}} CHCl_3 + CH_3 - \mathop{C}_{ightarrow O} - ONa$$

9) Write the structural formula of the main product formed when;

(i) The compound obtained by hydration of ethyne is treated with dilute alkali.

(ii) Methanal reacts with ammonia

Answer: (i) 
$$\underset{Ethyne}{HC} \equiv CH + H_2O \xrightarrow{Hg^{2+}} CH_3CHO \xrightarrow{OH^-} CH_3 - CH - CH_2 - CHO$$

(ii)  $6CH_2O + 4NH_3 \longrightarrow (CH_2)_6N_4 + 6H_2O$ hexa methylane tetramine(urotropine)

10) Write the structural formula of 1,1 - dimethoxy ethane. How is it prepared from ethanal?

Answer :  $CH_3 - CH OCH_3$ 1, 1 - dimethoxy ethane

Preparation :

When acetaldehyde is treated with 2 equivalent of methanol in presence of HCI, 1,1, - dimethoxy ethane is obtained.



11) How is acetic acid prepared from amides and esters?

Answer:  
(i) 
$$CH_3 - \overset{O}{C} - NH_2 \xrightarrow{H_2O} CH_3 - \overset{O}{C} - OH + NH_3$$
  
(ii)  $CH_3 - \overset{H}{C} - OCH_3 \xrightarrow{HOH}_{H^+orOH^-} CH_3 - \overset{O}{C} - OH + CH_3OH$   
methyl acetate

12) What happens when soda lime is treated with

(i) CH<sub>3</sub>COONa

(ii)  $C_6H_5COOH$ ?

**Answer :** (i) Decarboxylation: When anhydrous: sodium salt of carboxylic acids are heated with soda lime, carboxyl group is removed with the formation of hydrocarbon containing one carbon atom less.

 $CH_3COONa \xrightarrow{NaOH/CaO} CH_4 + Na_2CO_3$ Sodium acetate

(ii) Heating benzoic acid with soda lime gives benzene.

13) Explain HVZ reaction.

**Answer :** (i) Carboxylic acids having an a -hydrogen are halogenated at the a -position on treatment with chlorine or bromine in the presence of small amount of red physophorus to form a halo carboxylic acids. This reaction is known as Hell - Volhard - Zelinsky reaction (HVZ reaction)

(Ii) The  $\alpha$  - Halogenated acids are convenient starting materials for preparing  $\alpha$  - substituted acids.

<sup>14)</sup> Compare the strength of mono, di, trichloro acetic acid.

**Answer**: CCl<sub>3</sub>COOH > CHCl<sub>2</sub>COOH > CH<sub>2</sub>Cl COOH > CH<sub>3</sub>COOH

Chlorine is the electron withdrawing group, it increases the acidic strength by -I effect.

15) What is Rosenmund reduction?

Answer : Aldehydes can be prepared by the hydrogenation of acid chloride, in the presence of Pd supported by barium

sulphate

 $CH_{3} - C - Cl + H_{2} \xrightarrow{Pd/BaSO_{4}} CH_{3} - C - H + HCl$  Acetaldehyde

16) What is Benzoin Condensation?

Answer : The benzoin condensation involves the treatment of an aromatic aldehyde with aqueous alcoholic KCN, The products

are a-hydroxy ketone.

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$C_{c}H_{5} - C - H + H - C - C_{c}H_{-} - $	alc.KCN	$\rightarrow C.H CH-C C.H.$
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		Benzoin

17) Discuss the uses of acetaldehyde.

Answer: i) Acetaldehyde is used for silvering of mirrors.

ii) Paraldehyde is used in medicine as a hypnotic.

iii) Acetaldehyde is used in the commercial preparation of number of organic compounds like acetic acid, ethyl acetate etc.,

18) How is benzoic acid prepared from  $CO_2$ ?



19) What is decarboxylation?

Answer : Removal of  $CO_2$  from carboxyl group is called as decarboxylation. Sodalime is used as decarboxylating agent. $CH_3COONa + NaOH \xrightarrow{CaO} CH_4 + Na_2CO_3$ Sodium acetateMethane

20) How will you convert benzaldehyde into the following compounds?(ii) benzoic acid

(ii) Benzoic acid  $C_6H_5CHO \xrightarrow{Na_5C_5O_5/H'} C_6H_5COOH$ 

**Answer:**