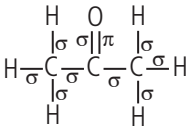
Aldehydes, Ketones and Carboxylic Acids

CHAPTER 12

TRY YOURSELF

ANSWERS

1.  Nine σ bonds and one π bond.

2. (i) But-2-en-1-al

(ii) 2-Hydroxy-2-methylhexan-4-one

(iii) 3,5-Dimethyl benzaldehyde

3. (i) $CH_3-CH_2-\underset{\underset{O}{\|}}{C}-CH_2-CH_3$

(ii) $H_3C-CH_2-\overset{O}{\overset{\|}{C}}-CH_2-CH_2-\overset{O}{\overset{\|}{C}}-H$

4. $CH_3-\underset{\text{Butan-2-ol}}{\underset{OH}{\underset{|}{CH}}}-CH_2CH_3 \xrightarrow[\Delta]{Na_2Cr_2O_7/H^+} CH_3-\underset{\text{Butan-2-one}}{\overset{O}{\overset{\|}{C}}}-CH_2CH_3$

$\xrightarrow{H_2\,|\,Cu/300°C}$ $CH_3-\underset{\underset{O}{\|}}{C}-CH_2-CH_3$ Butan-2-one

5. (i) $CH_3CH_2OH \xrightarrow[300°C]{Cu} CH_3CHO$

(ii) $HC\equiv CH + H_2O \xrightarrow[HgSO_4]{H_2SO_4} CH_3CHO$

6. Following steps are involved :

$\underset{\text{Acetaldehyde}}{CH_3-\overset{O}{\overset{\|}{C}}-H} \xrightarrow[H_2O/H^+]{CH_3MgI} \underset{\text{Isopropyl alcohol}}{CH_3-\underset{OH}{\underset{|}{CH}}-CH_3}$

$\xrightarrow[H_2SO_4]{K_2Cr_2O_7} \underset{\text{Acetone}}{CH_3-\overset{O}{\overset{\|}{C}}-CH_3}$

7. $CH_3-\overset{O}{\overset{\|}{C}}-CH_3 \xrightarrow[(ii)\ H_2O/H^+]{(i)\ CH_3MgBr} CH_3-\underset{\underset{CH_3}{|}}{\overset{OH}{\overset{|}{C}}}-CH_3$

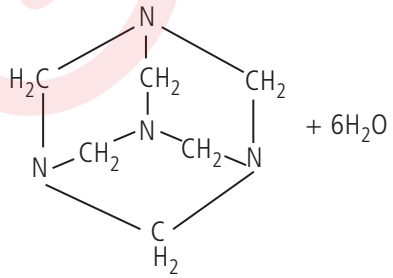
8. Wolff Kishner reduction

9. Pentan-2-one forms yellow precipitate of iodoform with alkaline solution of iodine (Iodoform test). Pentan-3-one does not give this test.

$\underset{\text{Pentan-2-one}}{CH_3CH_2CH_2-\overset{O}{\overset{\|}{C}}-CH_3} + NaOH + I_2 \longrightarrow$

$CH_3CH_2CH_2\overset{O}{\overset{\|}{C}}\overset{-}{O}\overset{+}{Na} + \underset{\text{Yellow ppt.}}{CHI_3\downarrow} + 3H_2O + 3NaI$

10. (i) $\underset{\text{Formaldehyde}}{6H-\overset{O}{\overset{\|}{C}}-H} + 4NH_3 \longrightarrow$



$+ 6H_2O$

Hexamethylene tetraamine $(CH_2)_6N_4$ (Urotropine)

(ii) $\underset{\text{Methanol}}{2CH_3OH} + O_2 \xrightarrow[450°C]{Ag} \underset{\text{Formaldehyde}}{2H-\overset{O}{\overset{\|}{C}}-H} + 2H_2O$

(iii) $\underset{\text{Acetone}}{CH_3-\overset{O}{\overset{\|}{C}}-CH_3} + 3Br_2 + 4NaOH \xrightarrow{\Delta}$

$CH_3-\overset{O}{\overset{\|}{C}}-\overset{-}{O}\overset{+}{Na} + CHBr_3\downarrow + 3H_2O + 3NaBr$

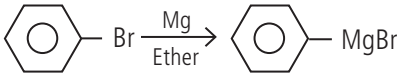
(iv) $2HCHO + \text{conc. } NaOH \xrightarrow{\Delta} CH_3OH + H-\overset{O}{\overset{\|}{C}}-\overset{-}{O}\overset{+}{Na}$

11. (a) 4-Pentylpent-2,4-dienoic acid

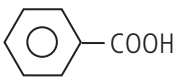
(b) 4-Ethyl-2-propylhexane-1,6-dioic acid

(c) Heptane-1,7-dioic acid

(d) 2,5-Diphenylheptane-1,7-dioic acid

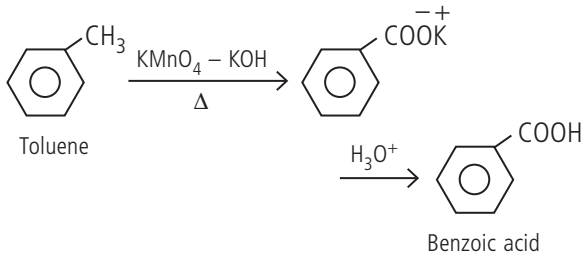
12. 

Bromobenzene

$\xrightarrow[(ii)\ H_2O/H^+]{(i)\ CO_2}$ 

Benzoic acid

13.



14. $CH_2 = CH_2 \xrightarrow{HBr} CH_3CH_2Br \xrightarrow{NaCN} CH_3CH_2CN \xrightarrow{H_2O/H^+} CH_3CH_2COOH$

Ethylene — Propionic acid

15. Only $LiAlH_4$ and B_2H_6/H_3O^+ can reduce carboxylic acids to alcohols.

16. $CH_3-\underset{F}{CH}-COOH > CH_3-\underset{Br}{CH}-COOH > BrCH_2CH_2COOH$

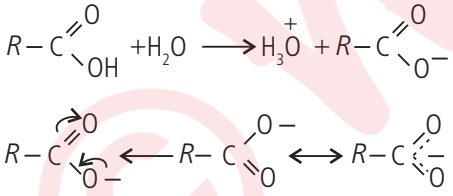
17. $O_2NCH_2COOH > FCH_2COOH > C_6H_5COOH$

An electron withdrawing group increases the acidic strength of acid by withdrawing electrons and making the release of proton easier.

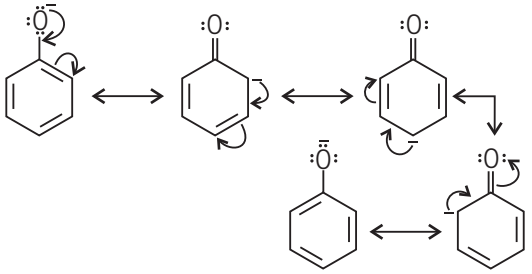
$-I$ effect of $-NO_2$ is greater than $-F$ and C_6H_5- group has weak $-I$-effect

18. (i) Carboxylate ion is stabilised by two equivalent resonance structures.

(ii) Negative charge in these structures is delocalised at more electronegative oxygen atoms.

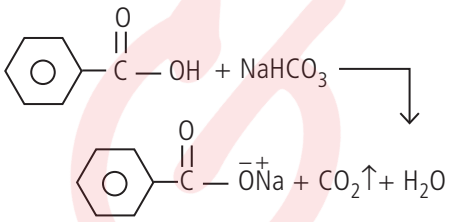


In alcohols, the alkoxide ion is not stabilised by resonance. In phenoxide ion, the resonance structures are non-equivalant and the structures have negative charge on less electronegative carbon atom in all structures except two.

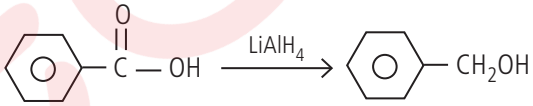


Therefore carboxylate ion is more stable than phenoxide ion.

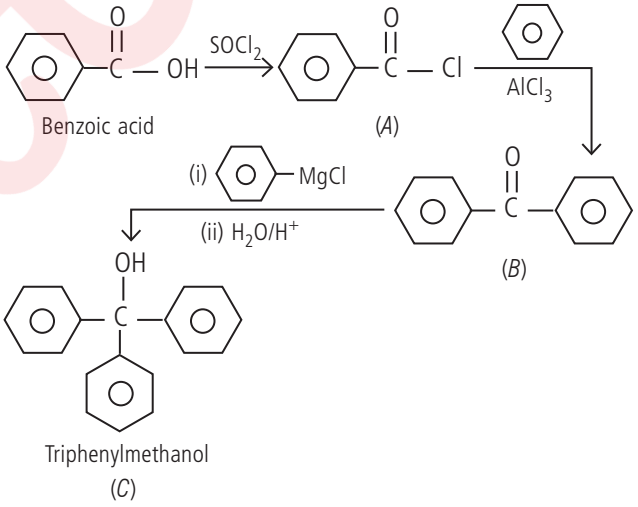
19. (a)



(b)



20.



BEST SELLING BOOKS FOR CLASS 12

Visit www.mtg.in for complete information