Aldehydes and Ketones

SET Self Evaluation Test - 27

1. Benzophenone can be converted into benzene using **[Tamil Nadu CET 2001]**

(a) Fused alkali

(b) Anhydrous $AlCl_3$

(c) Sodium amalgam in water

(d) Acidified dichromate

2. The reagent(s) which can be used to distinguish acetophenone from benzophenone is (are) **[CBSE PMT 1990]**

(a) 2, 4-dinitrophenyl hydrazine

(b) Aqueous solution of $NaHSO_3$

(c) Benedict reagent

(d) I_2 and Na_2CO_3

3. When acetaldehyde is heated with Fehling solution, it gives a red precipitate of **[MP PET 1989, 93; IIT 1982; MP PET/PMT 1998; RPMT 2002]**

(a) Cu (b) CuO

(c) Cu_2O (d) $Cu(OH)_2$

4. The general order of reactivity of carbonyl compounds for nucleophilic addition reactions is **[CBSE PMT 1995]**

(a) $H_2C=O > RCHO > ArCHO > R_2C=O > Ar_2C=O$

(b) $ArCHO > Ar_2C=O > RCHO > R_2C=O > H_2C=O$

(c) $Ar_2C=O > R_2C=O > ArCHO > RCHO > H_2C=O$

(d) $H_2C=O > R_2C=O > Ar_2C=O > RCHO > ArCHO$

5. Which of the following gives an alcohol and salt of carboxylic acid when reacted with conc. $NaOH$ **[MP PMT 1999]**

(a) CH_3CHO

(b) C_6H_5CHO

(c) CH_3COCH_3

(d) $C_6H_5COCH_3$

6. Which of the following compounds would undergo Cannizzaro's reaction **[CPMT 1989; AFMC 1991; MNR 1995]**

(a) Propionaldehyde

(b) Benzaldehyde

(c) Bromobenzene

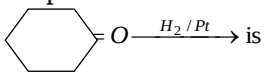
(d) Acetaldehyde

7. $NaOH / H^+$ reacts with **[BHU 2003]**

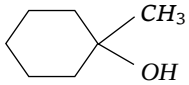
(a) $C_6H_5OCH_3$ (b) CH_3OH

(c) $CH_3-\overset{\overset{O}{\|}}{C}-CH_3$ (d) C_2H_5OH

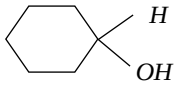
8. The product of following reaction

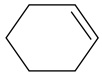


is **[Kerala CET 2000]**

(a) 

(b) 

(c) 

(d) 

9. Which of the following aldehydes is most reactive towards nucleophilic addition reactions **[Roorkee 1992; RPMT 1997]**

(a) $HCHO$ (b) CH_3CHO

(c) C_2H_5CHO (d) CH_3COCH_3

10. Which one of the following gives iodoform test **[AIIMS 1996]**

(a) Formaldehyde

(b) Ethyl alcohol

(c) Benzyl alcohol

(d) Benzaldehyde

11. The active ion in Tollen's reagent is

(a) Cu^+ (b) $Cu(NH_3)_2^+$

(c) Ag^+ (d) $Ag(NH_3)_2^+$

12. Among the following compounds, which will react with acetone to give a product containing $>C=N-$ **[IIT 1998]**

(a) $C_6H_5NH_2$

(b) $(CH_3)_3N$

(c) $C_6H_5NHC_6H_5$

(d) $C_6H_5NHNH_2$

13. Which of the following does not give yellow precipitate with I_2 and $NaOH$ **[MP PET 1996]**

(a) C_2H_5OH (b) CH_3CHO

(c) CH_3COCH_3 (d) $HCHO$

14. In this reaction

$$CH_3CHO + HCN \downarrow$$
$$CH_3CH(OH)CN \xrightarrow{H^+/OH^-} CH_3CH(OH)COOH$$

an asymmetric centre is generated. The acid obtained would be

(a) 20% *D* + 80% *L*-isomer

(b) *D*-isomer

(c) *L*-isomer

(d) 50% *D* + 50% *L*-isomer

15. Aldehydes are produced in atmosphere by **[NCERT 1982]**

(a) Oxidation of secondary alcohols

(b) Reduction of alkenes

(c) Reaction of oxygen atoms with hydrocarbons

(d) Reaction of oxygen atoms with ozone

16. Which of the following compounds will give positive test with Tollen's reagent

[CBSE PMT 1994; Kurukshetra CEE 1998; AFMC 2002]

(a) Acetamide

(b) Acetaldehyde

(c) Acetic acid

(d) Acetone

17. $ArH + R-\overset{\overset{O}{\|}}{C}-Cl \xrightarrow{\text{Lewis acid}} Ar-\overset{\overset{O}{\|}}{C}-R + HCl$ is an example of

(a) Friedel-Craft's alkylation

(b) Friedel-Craft's acylation

(c) Cannizzaro reaction

(d) Claisen condensation

[CBSE PMT 2003]

18. Which of the following fails to answer the iodoform test.

[CBSE PMT 1989]

(a) Pentanone–1

(b) Pentanone–2

(c) Propanone–2

(d) Ethanol

19. The reagent used for the separation of acetaldehyde from acetophenone is

(a) $NaHSO_4$

(b) $C_6H_5NHNH_2$

(c) NH_2OH

(d) $NaOH - I_2$

Answers and Solutions

(SET -27)

1. (a) $\underset{\text{Benzopheno ne}}{C_6H_5COC_6H_5} + KOH \xrightarrow{\text{Fusion}} \underset{\text{Benzene}}{C_6H_6} + \underset{\text{Pot. benzoate}}{C_6H_5COOK}$

$C_6H_5\boxed{COOK + KO}H \xrightarrow{\Delta} K_2CO_3 + \underset{\text{Benzene}}{C_6H_6}$

2. (d) Acetophenone gives iodoform reaction while benzophenone does give this.

3. (c) $CH_3CHO + \underbrace{2Cu^{+2} + 5OH^-}_{\text{Fehling solution}} \rightarrow CH_3COO^- + \underset{\text{Red ppt.}}{Cu_2O} + 3H_2O$

4. (a) The size of the alkyle group. Causes hindrance to attacking group. As the number and size of the alkyl groups incirease the hindrance to the attack of nucleophile also increases.
Thus the reactivity follows the order
$H_2C=O > RCHO > ArCHO > R_2C=O > Ar_2C=O$.

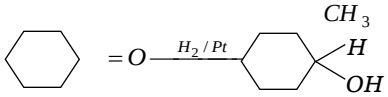
5. (b) Benzaldehyde does not have the α-hydrogen so it will undergoes cannizzaro's reaction.

$2C_6H_5CHO \xrightarrow{NaOH} C_6H_5CH_2OH + C_6H_5COONa$

6. (b) C_6H_5CHO Aldehydes – Those aldehyde in which $\alpha - H$ atom is absent can participate in Cannizzaro's reaction.

7. (c) $2CH_3 - CO - CH_3 \xrightarrow{dil\ NaOH}$

$CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle OH}{\overset{|}{C}}} - CH_2 - \overset{\displaystyle O}{\overset{||}{C}} - CH_3$ (Diacetone alcohol)

8. (c) 

9. (a) Because alkyl group is absent and they have +ve inductive effect and increases the electron density on the carbonyl group.

10. (b) The compound having α-hydrogen will give iodoform test. Ethyl alcohol and secondary alcohols also give positive iodoform test because by the action of halogens in alkaline medium, they are oxidesed to acetaldehyde and methyl ketones respectively.

$CH_3CH_2OH \xrightarrow[NaOH]{I_2} CH_3CHO \xrightarrow[NaOH]{I_2} CI_3CHO$

$CHI_3 + HCOONa \xleftarrow[NaOH]{H_2O}$

11. (d) During reaction Ag^+ gets reduced Ag metal and forms silver mirror.

12. (ad) $C_6H_5NH_2$ and $C_6H_5NH.NH_2$ will give the compounds containing $>C=N$ -group.

13. (d) $HCHO \xrightarrow{I_2/NaOH}$ No reaction

14. (d) $CH_3CHO + HCN \rightarrow CH_3CHOHCN \xrightarrow{\text{hydrolysis}}$

$\underset{\text{D+L isomer of lactic acid}}{CH_3CHOHCOOH}$

15. (c) Aldehydes are compounds containing C, H and O. So hydrocarbons react with atmospheric oxygen to give aldehydes.

16. (b) Tollen's reagent is ammonical silver nitrate solution. Its reacting species is Ag^+. It oxidises aliphatic as well as aromatic aldehydes.

$R - CHO + Ag^+ \xrightarrow[\text{reaction}]{\text{Redox}} RCOOH + Ag$

17. (b) $ArH + R - CO - Cl \xrightarrow{\text{anhyd. } AlCl_3} Ar - CO - R + HCl$

This reaction is Friedel–Craft's acylation.

18. (a) 1-pentanone is an impossible compound does not have $CH_3 - \overset{\displaystyle O}{\overset{||}{C}} -$ group.

19. (a) $NaHSO_3$ gives the addition reaction with Aldehyde and only aliphatic ketone. Acetophenone is the aromatic ketone so it does not give the addition product with $NaHSO_3$ aldehyde from the addition product with $NaHSO_3$ which on treatment with acid or base give again aldehyde.

$RCHO + HSO_3Na \longrightarrow R - \underset{\displaystyle SO_3Na}{\overset{\displaystyle OH}{\overset{|}{\underset{|}{C}}}} - H \xrightarrow[OH^{\ominus}]{H^{\oplus}\text{ or}} R - CHO$

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$C_6H_5COCH_3 + NaHSO_3 \longrightarrow$ No reaction