Ordinary Thinking

Objective Questions

Introduction

1. Reaction of acetaldehyde with *HCN* followed by hydrolysis gives a compound which shows [MP PET 1997]
   (a) Optical isomerism (b) Geometrical isomerism
   (c) Metamerism (d) Tautomerism

2. In aldehydes and ketones, carbon of carbonyl group is [MP PMT 1995; RPET 1999, 2000]
   (a) sp^3 hybridised (b) sp^2 hybridised
   (c) *sp* hybridised (d) Unhybridised

3. The IUPAC name of the following structure is
   $$CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-\overset{\displaystyle O}{\overset{\|}{C}}-CH_2-CH_2OH$$ [MP PMT 1995]
   (a) 1-hydroxy 4-methyl 3-pentanone
   (b) 2-methyl 5-hydroxy 3-pentanone
   (c) 4-methyl 3-*oxo* 1-pentanol
   (d) Hexanol-1, one-3

4. **Glyoxal** is [BVP 2003]
   (a) CH_2O-CH_2O (b) $\begin{matrix}CH_2OH\\|\\CH_2OH\end{matrix}$
   (c) $\begin{matrix}CHO\\|\\CHO\end{matrix}$ (d) $\begin{matrix}CH_2OH\\|\\CHO\end{matrix}$

5. Aldehydes are isomeric with
   (a) Ketones (b) Ethers
   (c) Alcohols (d) Fatty acids

6. Which of the following compounds does not contain an $-OH$ group [CPMT 1982]
   (a) Phenol (b) Carboxylic acid
   (c) Aldehydes (d) Alcohols

7. IUPAC name of CH_3COCH_3 is [MP PET 1991]
   (a) Acetone (b) 2-propanone
   (c) Dimethyl ketone (d) Propanal

8. What is the compound called if remaining two valencies of a carbonyl group are satisfied by two alkyl groups [CPMT 1990]
   (a) Aldehyde (b) Ketone
   (c) Acid (d) Acid chloride

9. $CH_3-\underset{\displaystyle H}{\underset{|}{\overset{\displaystyle OH}{\overset{|}{C}}}}-CN$ is
   (a) Acetaldehyde cyanohydrin
   (b) Acetone cyanohydrin
   (c) Cyanoethanol
   (d) Ethanol nitrile

10. Ethanedial has which functional group(s)
    (a) One ketonic (b) Two aldehydic
    (c) One double bond (d) Two double bond

11. In the group $\begin{matrix}R'\\R\end{matrix}\!\!>\!C=O$ the carbonyl carbon is joined to other atoms by
    (a) Two sigma and one pi bonds
    (b) Three sigma and one pi bonds
    (c) One sigma and two pi bonds
    (d) Two sigma and two pi bonds

12. Which of the following types of isomerism is shown by pentanone
    (a) Chain isomerism (b) Position isomerism
    (c) Functional isomerism (d) All of these

13. IUPAC name of CCl_3CHO is [MP PMT/PET 1988]
    (a) Chloral (b) Trichloro acetaldehyde
    (c) 1, 1, 1-trichloroethanal (d) 2, 2, 2-trichloroethanal

14. Which of the following is a mixed ketone [AFMC 1997]
    (a) Pentanone (b) Acetophenone
    (c) Benzophenone (d) Butanone

15. Chloral is [CPMT 1976, 84]
    (a) CCl_3CHO (b) CCl_3COCH_3
    (c) CCl_3COCCl_3 (d) CCl_3CH_2OH

16. Carbonyl compounds are usually
    (a) Ethers, aldehydes, ketones and carboxylic acids
    (b) Aldehydes, ketones and carboxylic acids
    (c) Aldehydes and ketones
    (d) Carboxylic acids

17. Acetone and acetaldehyde are [KCET 1998]
    (a) Position isomers (b) Functional isomers
    (c) Not isomers (d) Chain isomers

18. Which of the aldehyde is most reactive ? [DCE 2004]
    (a) C_6H_5-CHO (b) CH_3CHO
    (c) $HCHO$ (d) All the equally reactive

Preparation

1. The end product in the following sequence of reaction is
   $$HC\equiv CH \xrightarrow[20\%H_2SO_4]{1\%HgSO_4} A \xrightarrow{CH_3MgX} B \xrightarrow{[O]}$$ [Bihar CEE 2002]
   (a) Acetic acid (b) Isopropyl alcohol
   (c) Acetone (d) Ethanol

2. In the following reaction, product *P* is $R-\overset{\displaystyle O}{\overset{\|}{C}}-Cl \xrightarrow[Pd-BaSO_4]{H_2} P$ [CBSE PMT 19
   IIT 1992; AIIMS 1997; AFMC 1998]
   (a) RCH_2OH (b) $RCOOH$
   (c) $RCHO$ (d) RCH_3

3. Acetophenone is prepared from [CPMT 2003]
   (a) Rosenmund reaction
   (b) Sandmayer reaction
   (c) Wurtz reaction
   (d) Friedel craft reaction

4. Compound which gives acetone on ozonolysis [UPSEAT 2003]
   (a) $CH_3-CH=CH-CH_3$ (b) $(CH_3)_2C=C(CH_3)_2$
   (c) $C_6H_5CH=CH_2$ (d) $CH_3CH=CH_2$

5. $CH_3-\underset{\displaystyle O}{\underset{\|}{C}}-CH_2-COOC_2H_5 \xrightarrow[H_2O]{NaOH} A,$
   product '*A*' in the reaction is [RPMT 2003]
   (a) CH_3COOH (b) C_2H_5OH
   (c) CH_3COCH_3 (d) C_2H_5CHO

6. Which one of the following compounds is prepared in the laboratory from benzene by a substitution reaction **[EAMCET 2003]**

(a) Glyoxal (b) Cyclohexane
(c) Acetophenone (d) Hexabromo cyclohexane

7. Ketones $(R-\overset{\overset{O}{\|}}{C}-R_1)$ where $R = R_1 =$ alkyl group. It can be obtained in one step by **[CBSE PMT 1997]**

(a) Hydrolysis of esters
(b) Oxidation of primary alcohol
(c) Oxidation of secondary alcohol
(d) Reaction of acid halide with alcohols

8. Predict the product 'B' in the sequence of reaction $HC \equiv CH \xrightarrow[HgSO_4]{30\%H_2SO_4} A \xrightarrow{NaOH} B$ **[CBSE PMT 2001]**

(a) CH_3COONa (b) CH_3COOH
(c) CH_3CHO (d) $CH_3-\underset{\underset{OH}{|}}{CH}-CH_2CHO$

9. $CH_3COCl \xrightarrow[Pd/BaSO_4]{2H} CH_3CHO + HCl;$

The above reaction is called **[JIPMER 1997]**

(a) Reimer-Tiemann reaction (b) Cannizzaro reaction
(c) Rosenmund reaction (d) Reformatsky reaction

10. The oxidation of toluene to benzaldehyde by chromyl chloride is called **[CBSE PMT 1996; AFMC 1998, 99; AIIMS 2000; JIPMER 2001; AFMC 2001; DCE 2004]**

(a) Cannizzaro reaction (b) Wurtz reaction
(c) Etard reaction (d) Reimer-Tiemann reaction

11. From which of the following tertiary butyl alcohol is obtained by the action of methyl magnesium iodide **[MP CET 2000]**

(a) $HCHO$ (b) CH_3CHO
(c) CH_3COCH_3 (d) CO_2

12. Catalyst used in Rosenmund reduction is **[Bihar MEE 1997]**

(a) $Pd/BaSO_4$ (b) Zn-Hg couple
(c) $LiAlH_4$ (d) Ni/H_2

13. $CH_3-CH_2-C \equiv CH \xrightarrow[H_2O]{R}$ Butanone, R is **[BHU 2003]**

(a) Hg^{++} (b) $KMnO_4$
(c) $KClO_3$ (d) $K_2Cr_2O_7$

14. Dry heating of calcium acetate gives **[DPMT 1979, 81, 96; NCERT 1981; KCET 1993; Bihar CEE 1995; MNR 1986; MP PMT 1997; MP PET 1993, 95; JIPMER 2002; AIIMS 1996; CPMT 1982, 86, 96, 2003; RPMT 2002]**

(a) Acetaldehyde (b) Ethane
(c) Acetic acid (d) Acetone

15. Identify the product C in the series

$CH_3CN \xrightarrow{Na/C_2H_5OH} A \xrightarrow{HNO_2} B \xrightarrow{\text{Tollen's reagent}} C$ **[MP PET 1999]**

(a) CH_3COOH (b) CH_3CH_2NHOH
(c) CH_3CONH_2 (d) CH_3CHO

16. Acetophenone is prepared by the reaction of which of the following in the presence of $AlCl_3$ catalyst **[AIIMS 1996]**

(a) Phenol and acetic acid
(b) Benzene and acetone
(c) Benzene and acetyl chloride
(d) Phenol and acetone

17. Isopropyl alcohol on oxidation gives **[RPMT 1997; BHU 1997]**

(a) Acetone (b) Acetaldehyde
(c) Ether (d) Ethylene

18. On heating calcium acetate and calcium formate, the product formed is **[DPMT 1984; EAMCET 1985; MP PMT 1996, 92; KCET 1990; CPMT 1979, 82, 84; BIT 1992; RPET 2000]**

(a) CH_3COCH_3 (b) CH_3CHO
(c) $HCHO + CaCO_3$ (d) $CH_3CHO + CaCO_3$

19. Which of the following compound gives a ketone with Grignard reagent **[CPMT 1988; MP PET 1997]**

(a) Formaldehyde (b) Ethyl alcohol
(c) Methyl cyanide (d) Methyl iodide

20. In the Rosenmund's reduction, $BaSO_4$ taken with catalyst Pd acts as

(a) Promotor (b) Catalytic poison
(c) Cooperator (d) Absorber

21. The Clemmenson reduction of acetone yields

(a) Ethanol (b) Ethanal
(c) Propane (d) Propanol

22. Catalyst $SnCl_2/HCl$ is used in **[BHU 1995]**

(a) Stephen's reduction
(b) Cannizzaro reaction
(c) Clemmensen's reduction
(d) Rosenmund's reduction

23. Methyl ethyl ketone is prepared by the oxidation of **[IIT-JEE 1987; MP PMT 1992]**

(a) 2-propanol (b) 1-butanol
(c) 2-butanol (d) t-butyl alcohol

24. Benzaldehyde can be prepared by oxidation of toluene by **[BHU 1986]**

(a) Acidic $KMnO_4$ (b) $K_2Cr_2O_7$
(c) CrO_2Cl_2 (d) All of these

25. $C_6H_6 + CO + HCl \xrightarrow{\text{Anhy } AlCl_3} X + HCl$

Compound X is **[DPMT 1979, 83]**

(a) $C_6H_5CH_3$ (b) $C_6H_5CH_2Cl$
(c) C_6H_5CHO (d) C_6H_5COOH

26. Which of the following gases when passed through warm dilute solution of H_2SO_4 in presence of $HgSO_4$ gives acetaldehyde

(a) CH_4 (b) C_2H_6
(c) C_2H_4 (d) C_2H_2

27. CH_3COCH_3 can be obtained by **[CBSE PMT 1992]**

(a) Heating acetaldehyde with methanol
(b) Oxidation of propyl alcohol
(c) Oxidation of isopropyl alcohol
(d) Reduction of propionic acid

28. Propyne on hydrolysis in presence of HCl and $HgSO_4$ gives **[DPMT 1980; CPM**

(a) Acetaldehyde (b) Acetone
(c) Formaldehyde (d) None of these

29. Which of the following on reaction with NH_3 gives urinary antiseptic compound **[MP PMT 1999]**

(a) $HCHO$ (b) CH_3CHO

(c) C_6H_5CHO (d) $C_6H_5CH_2CHO$

30. The oxidation product of 2-propanol with hot conc. HNO_3 is

(a) Ethanoic acid (b) Propanone

(c) Propanal (d) None of these

31. Hydrolysis of ozonide of 1-butene gives **[Kerala PMT 2003]**

(a) Ethylene only

(b) Acetaldehyde and Formaldehyde

(c) Propionaldehyde and Formaldehyde

(d) Acetaldehyde only

(e) Acetaldehyde and Oxalic acid

32. Ketones are prepared by

(a) Clemmensen's reduction (b) Cannizzaro reaction

(c) Rosenmund's reduction (d) Oppenaur's oxidation

33. O_3 reacts with $CH_2=CH_2$ to form ozonide. On hydrolysis it forms **[MP PET 1986, 90]**

(a) Ethylene oxide (b) $HCHO$

(c) Ethylene glycol (d) Ethyl alcohol

34. Ethyne on reaction with water in the presence of $HgSO_4$ and H_2SO_4 gives **[UPSEAT 1999; BVP 2003]**

(a) Acetone (b) Acetaldehyde

(c) Acetic acid (d) Ethyl alcohol

35. $CH_3-CH_2-C\equiv CH \xrightarrow[H_2SO_4]{HgSO_4} A$, the compound A is **[Orissa JEE 2004]**

(a) $CH_3-CH_2-\overset{\overset{O}{\|}}{C}-CH_3$

(b) $CH_3-CH_2-CH_2-CHO$

(c) $CH_3-CH_2-CH_2-COOH$

(d) None of these

36. When a mixture of methane and oxygen is passed through heated molybdenum oxide, the main product formed is **[KCET 2004]**

(a) Methanoic acid (b) Ethanal

(c) Methanol (d) Methanal

37. Benzoin is **[KCET 2004]**

(a) Compound containing an aldehyde and a ketonic group

(b) α, β-unsaturated acid

(c) α-hydroxy aldehyde

(d) α-hydroxy ketone

38. The oxidation of benzyl chloride with lead nitrate gives **[MP PMT 2004]**

(a) Benzyl alcohol (b) Benzoic acid

(c) Benzaldehyde (d) *p*-chlorobenzaldehyde

39. $R-CH=CH_2+CO+H_2 \xrightarrow[\text{High Pressure}]{\text{High Temp}} RCH_2CH_2CHO.$ **[DPMT 2004]**

The above reaction is

(a) Mendius reaction (b) Oxo process

(c) Sandorn's reaction (d) Stephen's reaction

40. Glycerol reacts with potassium bisulphate to produce **[Pb. CET 2003]**

(a) Allyl iodide (b) Allyl sulphate

(c) Acryl aldehyde (d) Glycerol trisulphate

41. The reagent used in Gatterman Koch aldehyde synthesis is **[CPMT 2004]**

(a) $Pb/BaSO_4$ (b) alkaline $KMnO_4$

(c) acidic $KMnO_4$ (d) $CO+HCl$

42.  On reductive ozonolysis yields **[JIPMER 1997]** **[Orissa JEE 2005]**

(a) 6-oxoheptanal (b) 6-oxoheptanoic acid

(c) 6-hydroxyheptanal (d) 3-hydroxypentanal

43. An alkene of molecular formula C_9H_{18} on ozonolysis gives 2,2 dimethyl propanal & 2-butanon, then the alkene is **[Kerala CET 2005]**

(a) 2, 2, 4-trimethyl –3-hexene

(b) 2, 2, 6-trimethyl-3-hexene

(c) 2, 3, 4-trimethyl-2-hexene

(d) 2, 2, 4-trimethyl-2-hexene

(e) 2, 2dimethyl-2-heptene

Properties

1. Identify the reactant X and the product Y

$$CH_3-CO-CH_3+X \rightarrow (CH_3)_3C-OMg-Cl$$

$$\downarrow \text{Hydrolysis}$$

$$Y+Mg(OH)Cl$$

[Kerala PMT 2003]

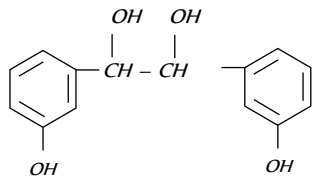
(a) $X=MgCl_2;\ Y=CH_3CH=CH_2$

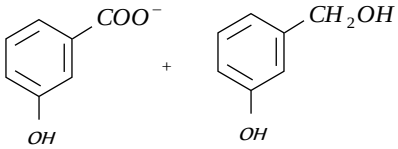
(b) $X=CH_3MgCl;\ Y=C_2H_5COCH_3$

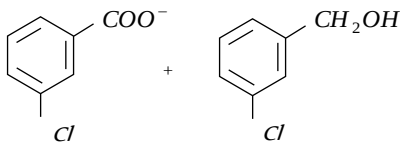
(c) $X=CH_3MgCl;\ Y=(CH_3)_3C-OH$

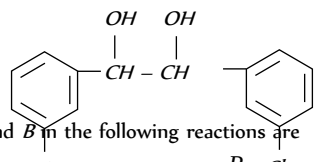
(d) $X=C_2H_5MgCl;\ Y=(CH_3)_3C-OH$

2. When *m*-chlorobenzaldehyde is treated with 50% KOH solution, the product (*s*) obtained is (are) **[CBSE PMT 2003]**

(a) 

(b) 

(c) 

(d) 

3. A and B in the following reactions are

$$R-\overset{\overset{O}{\|}}{C}-\overset{Cl}{\underset{R'}{}} \xrightarrow[KCN]{HCN} A \xrightarrow{B} \begin{matrix} R \\ R \end{matrix}\!\!>\!C\!<\!\begin{matrix} Cl \\ OH \\ CH_2NH_2 \end{matrix}$$

[CBSE PMT 2003]

(a) $A = RR'C\begin{matrix}CN\\OH\end{matrix}, B - LiAlH_4$

(b) $A = RR'C\begin{matrix}OH\\COOH\end{matrix}, B - NH_3$

(c) $A = RR'C\begin{matrix}CN\\OH\end{matrix}, B = H_3O^{\oplus}$

(d) $A = RR'CH_2CN, B = NaOH$

4. Reduction of Aldehydes and Ketones to hydrocarbon take place in the presence of **[CPMT 2003]**

(a) *Zn* amalgam and *HCl* acid

(b) $Pd/BaSO_4$

(c) Anhydrous $AlCl_3$

(d) *Ni*/*Pt*

5. Reduction of $>C=O$ to CH_2 can be carried out with **[DCE 2000]**

(a) Catalytic reduction (b) Na/C_2H_5OH

(c) Wolf-Kischner reduction (d) $LiAlH_4$

6. For C_6H_5CHO which of the following is incorrect **[CPMT 1985]**

(a) On oxidation it yields benzoic acid

(b) It is used in perfumery

(c) It is an aromatic aldehyde

(d) On reduction yields phenol

7. Grignard reagent on reaction with acetone forms **[BHU 1995; RPMT 2002; Roorkee 1990]**

(a) Tertiary alcohol (b) Secondary alcohol

(c) Acetic acid (d) Acetaldehyde

8. Which of the following is incorrect **[CBSE PMT 2001]**

(a) $FeCl_3$ is used in the detection of phenols

(b) Fehling solution is used in the detection of glucose

(c) Tollen's reagent is used in detection of unsaturation

(d) $NaHSO_3$ is used in the detection of carbonyl compounds

9. Consider the following statement Acetophenone can be prepared by

(1) Oxidation of 1-phenylethanol

(2) Reaction of benzalthanol with methyl magnesium bromide

(3) Friedel craft's reaction of benzene with acetyl chloride

(4) Distillation of calcium benzoate [SCRA 2001]

(a) 1 and 2 (b) 1 and 4

(c) 1 and 3 (d) 3 and 4

10. Which one of the following pairs is not correctly matched **[SCRA 2001]**

(a) $>C=O \xrightarrow{\text{Clemenson's reduction}} >CH_2$

(b) $>C=O \xrightarrow{\text{Wolf-Kishner reduction}} >CHOH$

(c) $-COCl \xrightarrow{\text{Rosenmund's reduction}} CHO$

(d) $-C\equiv N \xrightarrow{\text{Stephen reduction}} CHO$

11. Which of the following gives aldol condensation reaction **[CPMT 2001]**

(a) C_6H_5OH (b) $C_6H_5-\overset{O}{\overset{\|}{C}}-C_6H_5$

(c) $CH_3CH_2-\overset{O}{\overset{\|}{C}}-CH_3$ (d) $(CH_3)_3C-\overset{O}{\overset{\|}{C}}-CH_3$

12. Which of the following products is formed when benzaldehyde is treated with CH_3MgBr and the addition product so obtained is subjected to acid hydrolysis **[Haryana CEET 2000]**

(a) Secondary alcohol (b) A primary alcohol

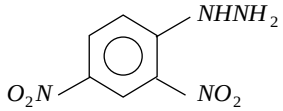
(c) Phenol (d) Tert-Butyl alcohol

13. Aldol condensation will not be observed in **[GATE 2001]**

(a) Chloral (b) Phenyl acetaldehyde

(c) Hexanal (d) Ethanol

14. Which of the following compounds containing carbonyl group will give coloured crystalline compound with



[Kerala (Med.) 2001]

(a) CH_3COCl (b) CH_3COCH_3

(c) $CH_3CO(OC_2H_5)$ (d) CH_3CONH_2

(e) $HO(C_6H_4)COOH$

15. Which of the following organic compounds exhibits positive Fehling test as well as iodoform test **[MP PET 1994; KCET 2001]**

(a) Methanal (b) Ethanol

(c) Propanone (d) Ethanal

16. Which of the following compound will undergo self aldol condensation in the presence of cold dilute alkali **[CBSE PMT 1994]**

(a) C_6H_5CHO (b) CH_3CH_2CHO

(c) $CH\equiv C-CHO$ (d) $CH_2=CH-CHO$

17. Acetaldehyde when treated with dilute *NaOH* gives **[EAMCET 1998]**

(a) CH_3CH_2OH

(b) CH_3COOH

(c) $CH_3-\underset{OH}{\underset{|}{CH}}-CH_2-CHO$

(d) CH_3-CH_3

18. C_2H_5CHO and $(CH_3)_2CO$ can be distinguished by testing with **[EAMCET 1998; CPMT 1994, 97; MP PET 1995; MP PMT 1996; RPMT 1997, 99]**

(a) Phenyl hydrazine (b) Hydroxylamine

(c) Fehling solution (d) Sodium bisulphite

19. Which of the following will undergo aldol condensation **[IIT 1998]**

(a) Acetaldehyde (b) Propanaldehyde

(c) Benzaldehyde (d) Trideuteroacetaldehyde

20. Which of the following oxidation reactions can be carried out with chromic acid in aqueous acetone at $5-10^oC$ **[Roorkee Qualifying 1998]**

(a) $CH_3(CH_2)_3C\equiv C-\underset{OH}{\underset{|}{CH}}-CH_3 \rightarrow CH_3(CH_2)_3C\equiv C-\overset{O}{\overset{\|}{C}}-CH_3$

(b) $CH_3(CH_2)_3CH=CH-CH_2OH \rightarrow CH_3(CH_2)_3CH=CH-CHO$

(c) $C_6H_5CH_3 \rightarrow C_6H_5COOH$

(d) $CH_3(CH_2)_3CH_2OH \rightarrow CH_3(CH_2)_3CHO$

21. Acetaldehyde cannot show [AIIMS 1997]

(a) Iodoform test (b) Lucas test

(c) Benedict's test (d) Tollen's test

22. Benzaldehyde $+NaOH \rightarrow$ [CPMT 1997, 2001; CBSE PMT 1999; Pb. PMT 1999]

(a) Benzyl alcohol (b) Benzoic alcohol

(c) Hydrobenzamide (d) Cinnamic acid

23. The following reagent converts C_6H_5COCHO to $C_6H_5CHOHCOONa$ [Roorkee Qualifying 1998]

(a) Aq. *NaOH* (b) Acidic $Na_2S_2O_3$

(c) Na_2CrO_4 / H_2SO_4 (d) $NaNO_2 / HCl$

24. Benzyl alcohol and sodium benzoate is obtained by the action of sodium hydroxide on benzaldehyde. This reaction is known as

(a) Perkin's reaction (b) Cannizzaro's reaction

(c) Sandmeyer's reaction (d) Claisen condensation

25. To distinguish between formaldehyde and acetaldehyde, we require

(a) Tollen's reagent (b) Fehling's solution

(c) Schiff's reagent (d) Caustic soda solution

26. Which of the following does not give iodoform test [AIIMS 1992; MP PMT 1990, 96; CET Pune 1998 DPMT 1981; CPMT 1976]

(a) CH_3CH_2OH (b) CH_3OH

(c) CH_3CHO (d) $PhCOCH_3$

27. Which of the following will not give iodoform test [Kurukshetra CEE 1991; Bihar CEE 1995; CBSE PMT 1998; MP PMT 2004]

(a) Ethanal (b) Ethanol

(c) 2-propanone (d) 3-pentanone

28. Which of the following will not give the iodoform test [MNR 1994]

(a) Acetophenone (b) Ethanal

(c) Benzophenone (d) Ethanol

29. Haloform test is given by the following substance [EAMCET 1988]

(a) *HCHO* (b) $(CH_3)_2CO$

(c) CH_3OCH_3 (d) CH_3CH_2Cl

30. Dimethyl ketones are usually characterised through [MNR 1992]

(a) Tollen's reagent (b) Iodoform test

(c) Schiff's test (d) Benedict's reagent

31. The light yellow compound produced when acetone reacts with iodine and alkali, is [MP PMT 1992; EAMCET 1993]

(a) $CH_3.CO.CH_2I$ (b) CH_3I

(c) CHI_3 (d) None of these

32. If formaldehyde and *KOH* are heated, then we get [MP PET 1999; KCET 2000]

(a) Acetylene (b) Methane

(c) Methyl alcohol (d) Ethyl formate

33. Which of the following reagent reacts differently with $HCHO, CH_3CHO$ and CH_3COCH_3 [MP PET 1999]

(a) *HCN* (b) NH_2NH_2

(c) NH_2OH (d) NH_3

34. Acetaldehyde reacts with C_2H_5MgCl the final product is [Pb. CET 1985]

(a) An aldehyde (b) A ketone

(c) A primary alcohol (d) A secondary alcohol

35. Treatment of propionaldehyde with dilute *NaOH* solution gives

(a) $CH_3CH_2COOCH_2CH_2CH_3$

(b) $CH_3CH_2CHOHCH(CH_3)CHO$

(c) $CH_3CH_2CHOHCH_2CH_2CHO$

(d) $CH_3CH_2COCH_2CH_2CHO$

36. Aldol condensation of acetaldehyde involves the formation of which of the following intermediate [Pb. CET 1986]

(a) Acetate ion (b) A carbanion

(c) A carbonium ion (d) A free radical

37. $3CH_3COCH_3 \xrightarrow{HCl} (CH_3)_2C=CH-CO-CH=C(CH_3)_2$

This polymer (*B*) is obtained when acetone is saturated with hydrogen chloride gas, *B* can be [CBSE PMT 1989]

(a) Phorone (b) Formose

(c) Diacetone alcohol (d) Mesityl oxide

38. Aromatic aldehydes undergo disproportionation in presence of sodium or potassium hydroxide to give corresponding alcohol and acid. The reaction is known as [MNR 1987]

(a) Wurtz's reaction (b) Cannizzaro reaction

(c) Friedel-Craft's reaction (d) Claisen reaction

39. *m*-chlorobenzaldehyde on reaction with conc. *KOH* at room temperature gives [IIT-JEE 1991]

(a) Potassium *m*-chlorobenzoate and *m*-hydroxy benzaldehyde

(b) *m*-hydroxy benzaldehyde and *m*-chlorobenzyl alcohol

(c) *m*-chlorobenzyl alcohol and *m*-hydroxy benzyl alcohol

(d) Potassium *m*-chlorobenzoate and *m*-chlorobenzyl alcohol

40. Which of the following does not give yellow precipitate with $NaOH + KI$ [MP PMT 1997]

(a) Acetone (b) Acetaldehyde

(c) Benzaldehyde (d) Acetophenone

41. The alkaline $CuSO_4$ containing sodium potassium tartrate does not react with [MP PMT 1997]

(a) CH_3CHO (b) C_2H_5CHO

(c) $C_6H_5CH_2CHO$ (d) C_6H_5CHO

42. Correct order of reactivity of $CH_3CHO, C_2H_5COCH_3$ and CH_3COCH_3 is [MP PMT 1991]

(a) $CH_3CHO > CH_3COCH_3 > CH_3COC_2H_5$

(b) $C_2H_5COCH_3 > CH_3COCH_3 > CH_3CHO$

(c) $CH_3COCH_3 > CH_3CHO > C_2H_5COCH_3$

(d) $CH_3COCH_3 > C_2H_5COCH_3 > CH_3CHO$

43. One mole of an organic compound requires 0.5 mole of oxygen to produce an acid. The compound may be [NCERT 1981]

(a) Alcohol (b) Ether

(c) Ketone (d) Aldehyde

44. Aldehydes can be oxidised by [NCERT 1983]

(a) Tollen's reagent (b) Fehling solution

(c) Benedict solution (d) All of these

45. Silver mirror is a test for [DPMT 1983; CBSE PMT 1988]

(a) Aldehydes (b) Thio alcohols

(c) Amines (d) Ethers

46. $CH_3CH=CHCHO$ is oxidised to $CH_3CH=CHCOOH$ using [NCERT 1978]

(a) Alkaline $KMnO_4$ (b) Selenium dioxide

(c) Ammoniacal $AgNO_3$ (d) All of these

47. Which of the following does not turn Schiff's reagent to pink [DPMT 1981; CPMT 1989]

(a) Formaldehyde (b) Benzaldehyde
(c) Acetone (d) Acetaldehyde

48. Fehling's test is positive for [KCET 1993]

(a) Acetaldehyde (b) Benzaldehyde
(c) Ether (d) Alcohol

49. Acetaldehyde and acetone differ in their reaction with [KCET 1989]

(a) Sodium bisulphite
(b) Ammonia
(c) Phosphorus pentachloride
(d) Phenyl hydrazine

50. The final product formed when acetaldehyde is reduced with sodium and alcohol is [BHU 1976]

(a) Ethylene (b) Ethyl alcohol
(c) Ethene (d) All of these

51. The compound obtained by the reduction of propionaldehyde by amalgamated zinc and concentrated HCl is

(a) Propanol (b) Propane
(c) Propene (d) All of these

52. Formaldehyde when treated with KOH gives methanol and potassium formate. The reaction is known as [MP PET 1997]

(a) Perkin reaction (b) Claisen reaction
(c) Cannizzaro reaction (d) Knoevenagel reaction

53. Aldehydes and ketones give addition reaction with [KCET 1992]

(a) Hydrazine (b) Phenyl hydrazine
(c) Semicarbazide (d) Hydrogen cyanide
(e) All of these

54. Acetaldehyde reacts with [CBSE PMT 1991]

(a) Electrophiles only
(b) Nucleophiles only
(c) Free radicals only
(d) Both electrophiles and nucleophiles

55. The typical reactions of aldehyde is [Pb. CET 1986]

(a) Electrophilic addition (b) Nucleophilic substitution
(c) Nucleophilic addition (d) Nucleophilic elimination

56. Which will not give acetamide on reaction with ammonia [CPMT 1985]

(a) Acetic acid (b) Acetyl chloride
(c) Acetic anhydride (d) Methyl formate

57. The addition of HCN to carbonyl compounds is an example of [Haryana CEET 2000]

(a) Nucleophilic substitution
(b) Electrophilic addition
(c) Nucleophilic addition
(d) Electrophilic substitution

58. Which of the following reagents is used to distinguish acetone and acetophenone [RPMT 2002; KCET 1998]

(a) $NaHSO_3$ (b) Grignard reagent
(c) Na_2SO_4 (d) NH_4Cl

59. The product formed by the reaction of chlorine with benzaldehyde in the absence of a catalyst is [Tamil Nadu CET 2002]

(a) Chlorobenzene (b) Benzyl chloride
(c) Benzoyl Chloride (d) *o*-Chlorobenzaldehyde

60. Which of the following compound is resistant to nucleophilic attack by hydroxyl ions [CBSE PMT 1998; KCET (Med.) 2001; AFMC 2001]

(a) Methyl acetate (b) Acetonitrile
(c) Dimethyl ether (d) Acetamide

61. Glucose molecule reacts with X number of molecules of phenylhydrazine to yield osazone. The value of X is [CBSE PMT 1998]

(a) One (b) Two
(c) Three (d) Four

62. In which of the following reactions aromatic aldehyde is treated with acid anhydride in presence of corresponding salt of the acid to give unsaturated aromatic acid [BHU 1998, KCET (Med.) 2001]

(a) Friedel-Craft's reaction (b) Perkin reaction
(c) Wurtz reaction (d) None of these

63. $2CH_3-\underset{\underset{O}{\|}}{C}-CH_3 \xrightarrow[H^+]{Mg\,/\,Hg}$ Product, product in the reaction is [RPMT 2003]

(a) $H_3C-\underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{C}}-\underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3$ (b) $CH_3-\underset{\underset{O}{\|}}{C}-O-\underset{\underset{O}{\|}}{C}-CH_3$

(c) $CH_3-\underset{\underset{OH}{|}}{CH}-\underset{\underset{OH}{|}}{CH}-CH_3$ [MP PMT 1983] (d) None of these

64. Cinnamic acid is formed when C_6H_5-CHO condenses with $(CH_3CO)_2O$ in presence of [Orissa JEE 2003]

(a) Conc. H_2SO_4 (b) Sodium acetate
(c) Sodium metal (d) Anhydrous $ZnCl_2$

65. A mixture of benzaldehyde and formaldehyde on heating with aqueous $NaOH$ solution gives [IIT-JEE (Screening) 2001]

(a) Benzyl alcohol and sodium formate
(b) Sodium benzoate and methyl alcohol
(c) Sodium benzoate and sodium formate
(d) Benzyl alcohol and methyl alcohol

66. The reaction,

$$CH_3-\overset{\overset{O}{\|}}{C}-OCH_3+C_2H_5OH \xrightarrow{H^+ \text{ or } OH^-}$$

$CH_3-\overset{\overset{O}{\|}}{C}-OC_2H_5+CH_3OH$ is called [MP PMT 2003]

(a) Perkin's reaction (b) Claisen Schmidt reaction
(c) Esterification (d) Trans-esterification

67. Formaldehyde reacts with ammonia to give urotropine. The formula of urotropine is [MP PMT 1989, 96, 2003; AIIMS 1982; NCERT 1987; MP PET 1990, 91, 2000; CPMT 1978, 82, 86, 97; KCET 2003]

(a) $(CH_2)_6N_4$ (b) $(CH_2)_4N_3$
(c) $(CH_2)_6N_6$ (d) $(CH_2)_3N_3$

68. Aldol condensation will not take place in [CBSE PMT 1996, 99; RPMT 1999; CPMT 1988, 04]

(a) $HCHO$ (b) CH_3CH_2CHO
(c) CH_3CHO (d) CH_3COCH_3

69. Contents of three bottles were found to react

(i) Neither with Fehling's solution nor with Tollen's reagent
(ii) Only with Tollen's reagent but not with Fehling's solution
(iii) With both Tollen's reagent and Fehling's solution.

If they contained either ethanal (acetaldehyde) or propanone (acetone) or benzal (benzaldehyde), which bottle contained which

(a) In (i) benzal, in (ii) ethanal and in (iii) propanone
(b) In (i) benzal, in (ii) propanone and in (iii) ethanal
(c) In (i) propanone, in (ii) benzal and in (iii) ethanal
(d) In (i) propanone, in (ii) ethanal and in (iii) benzal

70. Action of hydrazine on aldehydes and ketones gives compound of the general structure

(a) $>C=N-NH_2$

(b) $>C=N-OH$

(c) $>C=N-NH-CONH_2$

(d) $>C=N-NH-C_6H_5$

71. The reaction in which sodium cyanide is used **[MP PET/PMT 1998]**

(a) Perkin reaction (b) Reimer-Tiemann reaction

(c) Benzoin condensation (d) Rosenmund reaction

72. Which one of the following reactions is a method for the conversion of a ketone into a hydrocarbon **[MP PET/PMT 1998; CBSE PMT 1989]**

(a) Aldol condensation (b) Reimer-Tiemann reaction

(c) Cannizzaro reaction (d) Wolf-Kishner reduction

73. Bakelite is a polymer of **[DPMT 1996; MP PET 2002]**

(a) $HCHO$ + phenol

(b) $HCHO$ + aldehyde (acetaldehyde)

(c) Phenol + H_2SO_4

(d) $HCHO$ + acetone

74. Clemmenson reduction involves $>C=O$ to $>CH_2$ in presence of **[DPMT 1996]**

(a) *Zn* / *Hg* (b) Alcohol

(c) *Zn* dust (d) *Zn* / alcohol

75. Aldol condensation involving $CH_3CHO+CH_3CHO$ gives the product **[DPMT 1996]**

(a) $CH_3CHOHCH_2CHO$ (b) $CH_3COCH_2CH_3$

(c) $CH_3CH=CH_2$ (d) None of these

76. Enol content is highest in **[Orissa JEE 2005]**

(a) Acetone (b) Acetophenone

(c) Acetic acid (d) Acetyl acetone

77. Which one of the following reacts with *HCN* and Tollen's reagent, but is not oxidised by Fehling's solution

(a) Methanal (b) Ethanal

(c) Benzaldehyde (d) Acetone

78. During reaction of benzaldehyde with alkali one of the product is

(a) Phenol (b) Benzyl alcohol

(c) Benzene (d) Benzophenone

79. Cannizzaro reaction is given by **[DPMT 1996]**

(a) *HCHO* (b) CH_3COCH_3

(c) CH_3CHO (d) CH_3CH_2OH

80. The reaction

$$C_6H_5CHO+CH_3CHO\rightarrow C_6H_5CH=CH-CHO$$

is known as **[BHU 1996]**

(a) Perkin's reaction (b) Claisen condensation

(c) Benzoin condensation (d) Cannizzaro's reaction

81. When two molecules of acetaldehyde condense in the presence of dilute alkali, it forms **[Bihar MEE 1996]**

(a) Acetal (b) Sodium formate

(c) Aldol (d) Mesitylene

(e) None of these

82. Acetaldehyde on treatment with dil. *NaOH* followed by heating gives

(a) $CH_3CH_2CH_2CH_2OH$

(b) $CH_3CH_2CH_2CHO$

(c) $CH_3-CH=CHCHO$

(d) $CH_3-CH=CHCH_2OH$

83. Reaction $\begin{matrix}R\\R\end{matrix}\!\!>\!CO+HCN\rightarrow R-\underset{CN}{\overset{R}{\underset{|}{\overset{|}{C}}}}-OH$ is **[Kurukshetra CEE 1998; IIT 1990]**

(a) Electrophilic substitution

(b) Electrophilic addition

(c) Nucleophilic addition

(d) Nucleophilic substitution

84. Benzaldehyde on reaction with acetophenone in the presence of sodium hydroxide solution gives **[BVP 2003]**

(a) $C_6H_5CH=CHCOC_6H_5$

(b) $C_6H_5COCH_2C_6H_5$

(c) $C_6H_5CH=CHC_6H_5$

(d) $C_6H_5CH(OH)COC_6H_5$

85. Aldehydes and ketones can be reduced to hydrocarbon by using

(a) $LiAlH_4$ (b) $H_2/Pd-BaSO_4$

(c) $Na-Hg/HCl$ (d) NH_2-NH_2/C_2H_5ONa

86. An important reaction of acetone is autocondensation in presence of concentrated sulphuric acid to give the aromatic compound **[KCET 2003; MP PET 1986, 89; MP PMT 1992, 2000]**

(a) Mesitylene (b) Mesityl oxide

(c) Trioxan (d) Phorone

87. Identify the organic compound which, on heating with strong solution of $NaOH$, partly converted into an acid salt and partly into alcohol **[KCET 2003]**

(a) Benzyl alcohol (b) Acetaldehyde

(c) Acetone (d) Benzaldehyde

88. Which of the following does not give brick red precipitate with Fehling solution **[AIIMS 1996]**

(a) Acetone (b) Acetaldehyde

(c) Formalin (d) *D*-glucose

89. Acetaldehyde and acetone can be distinguished by **[AIIMS 1996; DCE 1999; Pb. CET 2000]**

(a) Molisch test (b) Bromoform test

(c) Solubility in water (d) Tollen's test

90. Which compound is soluble in H_2O **[RPMT 1997]**

(a) *HCHO* (b) CH_3CHO

(c) CH_3COCH_3 (d) All

91. $CH_3CHO+CH_3MgBr\rightarrow \text{Product}\xrightarrow{H_2O}A$

What is *A* ? **[RPMT 1997]**

(a) Primary alcohol (b) Secondary alcohol

(c) Tertiary alcohol (d) Ketone

92. Which gives lactic acid on hydrolysis after reacting with *HCN* **[UPSEAT 2003; MI**

(a) $HCHO$ (b) CH_3CHO

(c) C_6H_5CHO (d) CH_3COCH_3

93. CH_3CHO react with aqueous *NaOH* solution to form **[MP PMT 1992]**

(a) 3-hydroxy butanal (b) 2-hydroxy butanal

(c) 4-hydroxy butanal (d) 3-hydroxy butanol

94. Fehling solution react with *HCHO* to form precipitate of **[MP PMT 1992]**

(a) White colour [CET Pune 1998] (b) Yellow colour

(c) Red colour (d) Blue colour

95. Product in following reaction is

$CH_3MgI+HCHO\rightarrow$ Product **[RPMT 2003; BHU 1998, 2005; DCE 1999]**

(a) CH_3CHO (b) CH_3OH

(c) C_2H_5OH (d) CH_3-O-CH_3

96. $A \xrightarrow[800^oC]{\Delta} CH_2=C=O$, Reactant '*A*' in the reaction is [RPMT 2003]

(a) CH_3CH_2CHO (b) CH_3CHO

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

97. Only an aldehyde having..... can undergo the aldol condensation

(a) At least one beta *H* atom

(b) At least one alpha *H* atom

(c) An aromatic ring

(d) No alpha *H* atom

98. Clemenson's reduction of ketones is carried out in [BHU 2000]

(a) H_2 with *Pd* catalyst (b) Glycol with KOH

(c) $LiAlH_4$ in water (d) $Zn-Hg$ with HCl

99. Reaction $\begin{matrix}R\\R\end{matrix}\!\!>\!C=O \xrightarrow[KOH\ /\ \text{glycol}]{H_2NNH_2} \begin{matrix}R\\R\end{matrix}\!\!>\!C\!<\!\begin{matrix}H\\H\end{matrix} + N_2 + H_2$ is called [MP PET 2003]

(a) Wolff–Kishner reaction (b) Tischenko reaction

(c) Reformatsky reaction (d) Gattermann reaction

100. Propanal on treatment with dilute sodium hydroxide forms [Kerala CET 2000]

(a) $CH_3CH_2CH_2CH_2CH_2CHO$

(b) $CH_3CH_2CH(OH)CH_2CH_2CHO$

(c) $CH_3CH_2CH(OH)CH(CH_3)CHO$

(d) CH_3CH_2COONa

101. Identify the product Y in the sequence $CH_3CHO + CH_3MgI \xrightarrow{\text{Ether}} X \xrightarrow{H_2O/H^+} Y$ [Kerala (Med.) 2001]

(a) CH_3OH (b) CH_3CH_2OH

(c) $(CH_3)_2CHOH$ (d) $(CH_3)_3COH$

102. What is the name of reaction when benzaldehyde changes into benzyl alcohol [CPMT 1996; RPET 1999]

(a) Friedel-Craft's reaction (b) Kolbe's reaction

(c) Wurtz reaction (d) Cannizzaro reaction

103. The reagent that gives an orange coloured precipitate with acetaldehyde [EAMCET 1997; Pb. PMT 2004; AIIMS 1987]

(a) NH_2OH (b) $NaHSO_3$

(c) Iodine (d) 2, 4-*DNP*

104. Which one is used in the manufacture of mirror [MP PET 1992]

(a) Red lead (litharge)

(b) Ammoniacal $AgNO_3$

(c) Ammoniacal $AgNO_3$ + Red lead

(d) Ammoniacal $AgNO_3 + HCHO$

105. When CH_3COCH_3 reacts with Cl_2 and *NaOH*, which of the following is formed [CPMT 1996]

(a) $CHCl_3$ (b) CCl_4

(c) CCl_2H_2 (d) CH_3Cl

106. Which gives difference between aldehyde and ketone [CPMT 1994]

(a) Fehling's solution (b) Tollen's reagent

(c) Schiff's reagent (d) Benedict's solution

(e) All of these

107. Aldehyde turns pink with [Bihar MEE 1997]

(a) Benedict solution (b) Schiff reagent

(c) Fehling solution (d) Tollen's reagent

(e) Mollisch reagent

108. Which of the following would undergo aldol condensation [KCET 1998] [MP PMT 1986; BHU 1995]

(a) $CCl_3.CHO$ (b) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CHO$

(c) $CH_3.CH_2.CHO$ (d) *HCHO*

109. The reaction of acetaldehyde with conc. $KMnO_4$ gives [DPMT 1982; AIIMS 1996]

(a) CH_3COOH (b) CH_3CH_2OH

(c) *HCHO* (d) CH_3OH

110. When acetaldehyde is heated with Tollen's reagent, following is obtained [CPMT 1989; MP PET/PMT 1988]

(a) Methyl alcohol (b) Silver acetate

(c) Silver mirror (d) Formaldehyde

111. Boiling point of acetone is [CPMT 1975, 89]

(a) 56^oC (b) 60^oC

(c) 100^oC (d) 90^oC

112. Urotropine is

(a) Hexamethylene tetramine

(b) Hexaethylene tetramine

(c) Hexamethylene diamine

(d) None of these

113. Magenta is [DPMT 1982; Kurukshetra CEE 1998]

(a) Alkaline phenolphthalein

(b) Methyl red

(c) *p*-rosaniline hydrochloride

(d) Red litmus

114. An aldehyde on oxidation gives [CPMT 1973, 03; DPMT 1983; Manipal MEE 1995]

(a) An alcohol (b) An acid

(c) A ketone (d) An ether

115. The reaction of an aldehyde with hydroxylamine gives a product which is called [MP PET 1993; AFMC 2002]

(a) Aminohydroxide (b) Hydrazone

(c) Semicarbazone (d) Oxime

116. Cannizzaro reaction is not shown by [BHU 1980; IIT 1983; KCET 1993; Bihar MEE 1995; RPMT 1997, 2000, 02]

(a) *HCHO* (b) C_6H_5CHO

(c) CH_3CHO (d) All of these

117. When acetone is heated with hydroxylamine, the compound formed is [MP PMT 1993]

(a) Cyanohydrin (b) Oxime

(c) Semicarbazone (d) Hydrazone

118. The product of the reaction between ammonia and formaldehyde is

(a) Urotropine (b) Formamide

(c) Paraformaldehyde (d) Methanol

119. Which of the following products is obtained by the oxidation of propionaldehyde [CPMT 1989]

(a) Acetic acid
(b) Formic acid and acetic acid
(c) Propanoic acid
(d) *n*-propyl alcohol

120. When acetaldehyde reacts with PCl_5, the resulting compound is

(a) Ethyl chloride (b) Ethylene chloride
(c) Ethylidene chloride (d) Trichloro acetaldehyde

121. Benzaldehyde and acetaldehyde can be differentiated by

(a) *HCN* (b) NH_2OH
(c) Hydrazine (d) *NaOH* solution

122. In the presence of a dilute base C_6H_5CHO and CH_3CHO react together to give a product. The product is [MP PET 1994]

(a) $C_6H_5CH_3$ (b) $C_6H_5CH_2CH_2OH$
(c) $C_6H_5CH_2OH$ (d) $C_6H_5CH=CHCHO$

123. Grignard's reagent reacts with ethanal (acetaldehyde) and propanone to give

(a) Higher aldehydes with ethanal and higher ketones with propanone
(b) Primary alcohols with ethanal and secondary alcohols with propanone
(c) Ethers with ethanal and alcohols with propanone
(d) Secondary alcohols with ethanal and tertiary alcohols with propanone

124. Base catalysed aldol condensation occurs with [IIT-JEE 1991]

(a) Benzaldehyde
(b) 2, 2-dimethyl propionaldehyde
(c) Acetaldehyde
(d) Formaldehyde

125. Benzaldehyde reacts with ammonia to form [CPMT 1989; AFMC 1998]

(a) Benzaldehyde ammonia
(b) Urotropine
(c) Hydrobenzamide
(d) Aniline

126. Glucose + Tollen's reagent $\rightarrow$ Silver mirror shows [CPMT 1997]

(a) Presence of acidic group
(b) Presence of alkaline group
(c) Presence of ketonic group
(d) Presence of aldehyde group

127. Fehling solution is [MP PMT 1989]

(a) Ammoniacal cuprous chloride solution
(b) Acidified copper sulphate solution
(c) Copper sulphate and sodium hydroxide + Rochelle salt
(d) None of these

128. Reduction of an aldehyde produces [MP PMT 1994; MP PET 2001]

(a) Primary alcohol (b) Monocarboxylic acid
(c) Secondary alcohol (d) Tertiary alcohol

129. Which of the following on reaction with conc. *NaOH* gives an alcohol [MP PET 1996]

(a) Methanal (b) Ethanal
(c) Propanal (d) Butanal

130. Schiff's reagent is [MP PMT 1989]

(a) Magenta colour solution decolourised with sulphurous acid
(b) Ammoniacal cobalt chloride solution
(c) Ammoniacal manganese sulphate solution
(d) Magenta solution decolourised with chlorine

131. Pyrolysis of acetone gives $CH_2=C=O$ called [MP PMT 1992, 93]

(a) Methylene oxide
(b) Methyl carbon monoxide
(c) Ketene
(d) Methone

132. Which one of the following on oxidation will not give a carboxylic acid with the same number of carbon atoms [CBSE PMT 1992; MP PET 1996]

(a) CH_3COCH_3 (b) CCl_3CH_2CHO
(c) $CH_3CH_2CH_2OH$ (d) CH_3CH_2CHO

133. Acetal is obtained by reacting in the presence of dry *HCl* and alcohol with [MP PET 1996]

(a) Aldehyde (b) Ketone
(c) Ether (d) Carboxylic acid

134. The reagent with which both aldehyde and acetone react easily is [CPMT 1973, 74

(a) Fehling's reagent (b) Grignard reagent
(c) Schiff's reagent (d) Tollen's reagent

135. Phenylmethanol can be prepared by reducing the benzaldehyde with

(a) CH_3Br (b) *Zn* and *HCl*
(c) CH_3Br and *Na* (d) CH_3I and Mg

136. Which of the following is used in the manufacture of thermosetting plastics

(a) Formaldehyde (b) Acetaldehyde
(b) Acetone (d) Benzaldehyde

137. Which compound undergoes iodoform reaction [DPMT 1984; CPMT 1989]

(a) *HCHO* (b) CH_3CHO
(c) CH_3OH (d) CH_3COOH

138. Which does not react with Fehling solution [MNR 1983, 93]

(a) Acetaldehyde (b) Benzaldehyde
(c) Glucose (d) Formic acid

139. Which of the following compound will react with ethanolic *KCN*

(a) Ethane (b) Acetyl chloride
(c) Chlorobenzene (d) Benzaldehyde

140. Schiff's reagent gives pink colour with [EAMCET 1980; MP PMT 2000]

(a) Aldehydes (b) Ethers
(c) Ketones (d) Carboxylic acid

141. Acetaldehyde reacts with Cl_2 (in excess) to give [MP PMT 1997]

(a) Chloral (b) Chloroform
(c) Acetic acid (d) Trichloroacetic acid

142. The compound which reacts with Fehling solution is [CPMT 1989]

(a) C_6H_5COOH (b) *HCOOH*
(c) C_6H_5CHO (d) CH_2ClCH_3

143. Which one of the following undergoes reaction with 50% sodium hydroxide solution to give the corresponding alcohol and acid

(a) Butanal (b) Benzaldehyde

(c) Phenol (d) Benzoic acid

144. Which one of the following is reduced with zinc and hydrochloric acid to give the corresponding hydrocarbon **[AIEEE 2004]**

(a) Acetamide (b) Acetic acid

(c) Ethyl acetate (d) Butan–2–one

145. Three molecules of acetone in the presence of dry *HCl* form **[MP PET 2004]**

(a) Mesitylene (b) Phorone

(c) Glyoxal (d) Mesityl oxide

146. Aldehydes and ketones can be reduced to corresponding hydrocarbons by **[Kerala PMT 2004]**

(a) Refluxing with water

(b) Refluxing with strong acids

(c) Refluxing with soda amalgam and water

(d) Refluxing with zinc amalgam and concentrated *HCl*

(e) Passing the vapour under heated PbO_2

147. Acetone reacts with iodine to form iodoform in the presence of

(a) $CaCO_3$ (b) $NaOH$

(c) KOH (d) $MgCO_3$

148. Cyanohydrin of which of the following forms lactic acid **[MHCET 2003]**

(a) CH_3CH_2CHO (b) CH_3CHO

(c) $HCHO$ (d) CH_3COCH_3

149. Which of the following is used to detect aldehydes **[MHCET 2004]**

(a) Million's test

(b) Tollen's reagent

(c) Neutral ferric chloride solution

(d) Molisch's test

150. Which of the following aldehydes give red precipitate with Fehling solution ? **[MHCET 2004]**

(a) Benzaldehyde (b) Salicylaldehyde

(c) Acetaldehyde (d) None of these

151. $A \longrightarrow (CH_3)_2C=CHCOCH_3 A$ is **[MHCET 2004]**

(a) Acetone (b) Acetaldehyde

(c) Propionaldehyde (d) Formaldehyde

152. The aldehyde which react with *NaOH* to produce an alcohol and sodium salt is **[Pb. PMT 2004]**

(a) $HCHO$ (b) CH_3CHO

(c) CH_3CH_2CHO (d) $CH_3CH_2CH_2CHO$

153. Acetaldehyde and Acetone can be distinguished by **[DCE 2003]**

(a) Iododorm test

(b) Nitroprusside test

(c) Fehling's solution test

(d) DNP test

154. $OCH-CHO \xrightarrow{OH^-} HOH_2C-COOH$

The reaction given is **[DCE 2003]**

(a) Aldol condensation (b) Knovengel reaction

(c) Cannizzaro reaction (d) None of these

155. The order of susceptibility of nucleophilic attack on aldehydes follows the order **[DCE 2002]**

(a) 1° > 3° > 2° (b) 1° > 2° > 3°

(c) 3° > 2° > 1° (d) 2° > 3° > 1° **[AIEEE 2004]**

156. In Wolf-Kishner reduction, the carbonyl group of aldehydes and ketones is converted into **[Pb. CET 2000]**

(a) $>CH_2$ group (b) $-CH_3$ group

(c) $-CH_2OH$ group (d) $>CHOH$ group

157. Which of the following react with $NaHSO_3$ **[Pb. CET 2003]**

(a) CH_3COCH_3 (b) CH_3CHO

(c) $HCHO$ (d) All of these

158. Fehling solution is **[Pb. CET 2003]**

(a) $CuSO_4$ + lime (b) $CuSO_4 + NaOH(aq)$

(c) $CuSO_4 + Na_2CO_3$ (d) None of these

159. Wolf kishner reduction, reduces **[Pb. CET 2003]**

(a) $-COOH$ group (b) $-C\equiv C-$ group

(c) $-CHO$ group (d) $-O-$ group

160. A compound has a vapour density of 29. On warming an aqueous solution of alkali, it gives a yellow precipitate. The compound is **[BHU 2004; CPMT 2004]**

(a) CH_3CH_2CHO (b) $CH_3CHOHCH_3$

(c) CH_3COCH_3 (d) CH_3CH_2COOH

161. Which responds to +ve iodoform test ? **[Orissa JEE 2004]**

(a) Butanol (b) Butan-1-al

(c) Butanol-2 (d) 3-pentanone

162. The correct order of reactivity of *PhMgBr* with **[IIT-JEE (Screening) 2004]**

$Ph-\overset{\overset{O}{\|}}{C}-Ph$ (I) $\quad CH_3-\overset{\overset{O}{\|}}{C}-H$ (II) $\quad CH_3-\overset{\overset{O}{\|}}{C}-CH_3$ (III) is

(a) (I) > (II) > (III) (b) (III) > (II) > (I)

(c) (II) > (III) > (I) (d) (I) > (III) > (II)

163. The pair of compounds in which both the compounds give positive test with Tollen's reagent is **[IIT-JEE (Screening) 2004]**

(a) Glucose and Sucrose

(b) Fructose and Sucrose

(c) Acetophenone and Hexanal

(d) Glucose and Fructose

164. The most appropriate reagent to distinguish between acetaldehyde and formaldehyde is **[UPSEAT 2004]**

(a) Fehling's solution

(b) Tollen's reagent

(c) Schiff's reagent

(d) Iodine in presence of base

165. Silver mirror test can be used to distinguish between **[MP PET 2004]**

(a) Ketone and acid (b) Phenol and acid

(c) Aldehyde and acid (d) Alcohol and phenol

166. Paraldehyde is **[CPMT 1985; MP PET 1992, 96; RPMT 2000]**

(a) A trimer of formaldehyde

(b) A trimer of acetaldehyde

(c) A hexamer of formaldehyde

(d) A hexamer of acetaldehyde

167. Paraldehyde is used as a **[CBSE PMT 1989]**

(a) Medicine (b) Poison
(c) Polymer (d) Dye

168. Formalin is an aqueous solution of **[BHU 1979; DPMT 1983]**

(a) Formic acid (b) Formaldehyde
(c) Fluorescein (d) Furfuraldehyde

169. Hexamethylene tetramine is used as **[MP PMT 1979, 84]**

(a) Analgesic (b) Antipyretic
(c) Urinary antiseptic (d) All of these

170. Methyl ketone group is identified by **[BCECE 2005]**

(a) Iodoform test (b) Fehling solution
(c) Tollen's reagent (d) Shiff's reagent

171. Which of the following does not give Fehling solution test? **[BCECE 2005]**

(a) Acetone (b) Propanal
(c) Ethanal (d) Butanal

172. How will you convert butan–2–one to propanoic acid? **[IIT 2005]**

(a) Tollen's reagent (b) Fehling's solution
(c) *NaOH/I/H* (d) *NaOH/NaI/H*

173. Ketones react with *Mg-Hg* over water gives **[AFMC 2005]**

(a) Pinacolone (b) Pinacols
(c) Alcohols (d) None of these

174. Which of the following will form two isomers with semi carbazide **[Orissa JEE 2005]**

(a) Benzaldehyde (b) Acetone
(c) Benzoquinone (d) Benzophenone

175. A compound $A \rightarrow C_5H_{10}Cl_2$ on hydrolysis gives $C_5H_{10}O$ which reacts with NH_2OH, forms iodoform but does not give fehling test. A is **[DPMT 2005]**

(a) $CH_3-\underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{C}}-CH_2-CH_2-CH_3$

(b) $CH_3CH_2-\underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{C}}-CH_2CH_3$

(c) $CH_3CH_2CH_2CH_2\underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{CH}}$

(d) $CH_3-\underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{CH}}-\underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{CH}}-CH_2-CH_3$

176. $CH_3-CHO+HCN \rightarrow A$; Compound A on hydrolysis gives **[Kerala CET 2005]**

(a) CH_3-CH_2-COOH

(b) $CH_3-CH_2-CH_2-NH_2$

(c) $CH_3-CO-COOH$

(d) $CH_3CO-CH=NOH$

(e) $CH_3-\underset{\underset{OH}{|}}{\overset{\overset{}{|}}{CH}}-COOH$

177. Which one does not give cannizzaro's reaction **[Kerala CET 2005]**

(a) Benzaldehyde
(b) 2-methyl propanal
(c) *p*-methoxy benzaldehyde
(d) 2,2 dimethyl propanal
(e) Formaldehyde

Critical Thinking

Objective Questions

1. Which of the following will fail to react with potassium dichromate and dilute sulphuric acid

(a) Ethyl alcohol (ethanol)
(b) Acetaldehyde (ethanal)
(c) Secondary propyl alcohol (2-propanol)
(d) Acetone (propanone)

2. Acetone and acetaldehyde are differentiated by **[CPMT 1987, 93]**

(a) $NaOH+I_2$ (b) $Ag(NH_3)_2^+$
(c) HNO_2 (d) I_2

3. Which of the following will react with water **[IIT 1998]**

(a) $CHCl_3$ (b) Cl_3CCHO
(c) CCl_4 (d) $ClCH_2CH_2Cl$

4. An organic compound '*A*' has the molecular formula C_3H_6O, it undergoes iodoform test. When saturated with dil. HCl is gives '*B* of molecular formula $C_9H_{14}O$. *A* and *B* respectively are **[Tamil Nadu CET 2002]**

(a) Propanal and mesitylene
(b) Propanone and mesityl oxide
(c) Propanone and 2,6–dimethyl –2, 5-heptadien–4–one
(d) Propanone and mesitylene oxide

5. Which alkene is formed from the following reaction $CH_3CH_2CH_2CH=PPh_3+2-\text{Butanone}$ **[Manipal 2001]**

(a) 3- Methyl-3-heptene
(b) 4-Methyl-3-heptene
(c) 5-Methyl-3-heptene
(d) 1-Methyl-5- methane

6. Compound '*A*' (molecular formula C_3H_8O) is treated with acidified potassium dichromate to form a product '*B* (molecular formula C_3H_6O). '*B* forms a shining silver mirror on warming with ammoniacal silver nitrate. '*B* when treated with an aqueous solution of $H_2NCONHNH_2.HCl$ and sodium acetate gives a product '*C*. Identify the structure of '*C* **[IIT-JEE (Screening) 2002]**

(a) $CH_3CH_2CH=NNHCONH_2$

(b) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{}{|}}{CH}}=NNHCONH_2$

(c) $CH_3CH=\underset{\underset{CH_3}{|}}{\overset{\overset{}{|}}{NCO}}NHNH_2$

(d) $CH_3CH_2CH-NCONHNH_2$

7. Which is not true about acetophenone **[Manipal 2002]**

(a) Reacts to form 2, 4-dinitorphenyl hydrazine
(b) Reacts with Tollen's reagent to form silver mirror

(c) Reacts with $I_2 / NaOH$ to form iodoform

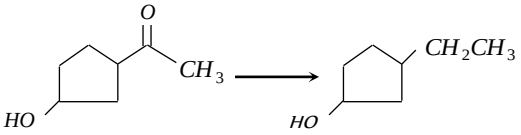
(d) On oxidation with alkaline $KMnO_4$ followed by hydrolysis gives benzoic acid

8. The enol form of acetone, after treatment with D_2O, gives **[IIT-JEE (Screening) 1999]**

(a) $CH_3-\overset{\overset{OD}{|}}{C}=CH_2$ (b) $CD_3-\overset{\overset{O}{\|}}{C}-CD_3$

(c) $CH_2=\overset{\overset{OH}{|}}{C}-CH_2D$ (d) $CD_2=\overset{\overset{OD}{|}}{C}-CD$

9. The appropriate reagent for the transformation



[IIT-JEE (Screening) 2000]

(a) $Zn(Hg), HCl$ (b) $NH_2NH_2OH^-$

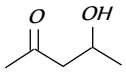
(c) H_2 / Ni (d) $NaBH_4$

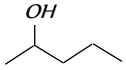
10. Which of the following has the most acidic hydrogen **[IIT-JEE (Screening) 2000]**

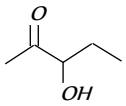
(a) 3-hexanone (b) 2, 4-hexanedione

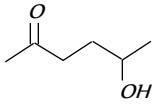
(c) 2, 5-hexanedione (d) 2, 3-hexanedione

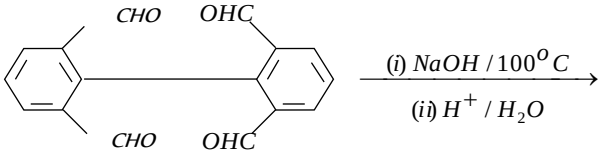
11. Which of the following will be most readily dehydrated in acidic conditions **[IIT-JEE (Screening) 2000]**

(a) 

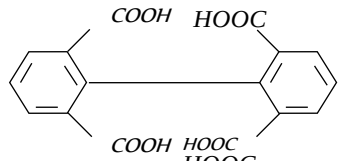
(b) 

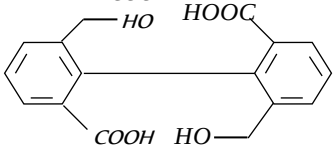
(c) 

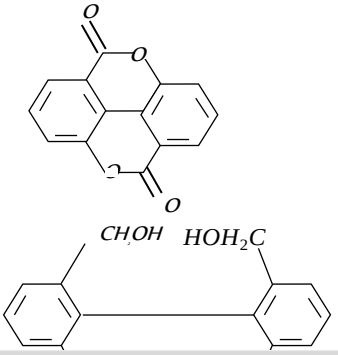
(d) 

12. 

Major Product is **[IIT-JEE (Screening) 2003]**

(a) 

(b) 

(c) 

(d)

13. Among the given compounds, the most susceptible to nucleophilic attack at the carbonyl group is **[IIT 1997]**

(a) *MeCOCl* (b) *MeCHO*

(c) *MeCOOMe* (d) *MeCOOCOMe*

14. Which of the following will give yellow precipitate with $I_2 / NaOH$ **[IIT 1997]**

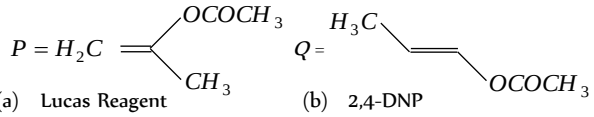
(a) $ICH_2COCH_2CH_3$

(b) $CH_3COOCOCH_3$

(c) CH_3CONH_2

(d) $CH_3CH(OH)CH_2CH_3$

15. The product of acid hydrolysis of *P* and *Q* can be distinguished by



(a) Lucas Reagent (b) 2,4-DNP

(c) Fehling's Solution (d) $NaHSO_3$

16. On vigorous oxidation by permanganate solution $(CH_3)_2C=CH-CH_2CH_2CH_3$ gives **[AIEEE 2002]**

(a) $CH_3-\overset{\overset{OH}{|}}{\underset{\underset{CH_3}{|}}{C}}-\overset{\overset{OH}{|}}{CH}-CH_2CH_3$

(b) $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!\!CHCO_2H + CH_3COOH$

(c) $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!\!CHOH + CH_3CH_2CH_2OH$

(d) $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!\!C=O + CH_3CH_2COOH$

17. Which of the following reactions give benzo phenone **[Roorkee Qualifying 1998]**

(a) $2C_6H_6 + CCl_4 \xrightarrow[(ii)H_2O]{(i)AlCl_3}$

(b) $C_6H_6 + C_6H_5COCl \xrightarrow{AlCl_3}$

(c) $o-CH_3C_6H_4COC_6H_5 \xrightarrow{Heat}$

(d) $o-HOOC-C_6H_4-COC_6H_5 \xrightarrow[260^oC]{Cu}$

18. Aldehyde and ketones can decolourize by **[CPMT 2003]**

(a) Bromine water (b) Quick lime

(c) dil. H_2SO_4 (d) None of these

19. Which of the following statements regarding chemical properties of acetophenone are wrong

(1) It is reduced to methyl phenyl carbinol by sodium and ethanol

(2) It is oxidised to benzoic acid with acidified $KMnO_4$

(3) It does not undergo iodoform electrophilic substitution like nitration at meta position

(4) It does not undergo iodoform reaction with iodine and alkali [Tamil Nadu CET 2001]

(a) 1 and 2 (b) 2 and 4

(c) 3 and 4 (d) 1 and 3

20. The product(*s*) obtained via oxymercuration $(HgSO_4 + H_2SO_4)$ of 1-butyne would be [IIT-JEE 1999]

(a) $CH_3CH_2COCH_3$

(b) $CH_3CH_2CH_2CHO$

(c) $CH_3CH_2CHO + HCHO$

(d) $CH_3CH_2COOH + HCOOH$

21. The most reactive compound towards formation of cyanohydrin on treatment with *KCN* followed by acidification is

(a) Benzaldehyde (b) *p*-Nitrobenzaldehyde

(c) Phenyl acetaldehyde (d) *p*-Hydroxybenzaldehyde

22. The key step in cannizzaro's reaction is the intermolecular shift of

(a) Proton (b) Hydride ion

(c) Hydronium ion (d) Hydrogen bond

23. Benzophenone does not react with [BHU 2003]

(a) RNH_2 (b) SO_3

(c) $NaOH$ (d) Na_2CO_3

24. The most suitable reagent for the conversion of $RCH_2OH \rightarrow RCHO$ is [AIIMS 2004]

(a) $KMnO_4$

(b) $K_2Cr_2O_7$

(c) CrO_3

(d) *PCC* (Pyridine chloro chromate)

25. The conversion of acetophenone to acetanilide is best accomplished by using : [UPSEAT 2004]

(a) Backmann rearrangement

(b) Curtius rearrangement

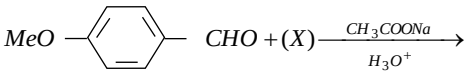
(c) Lossen rearrangement

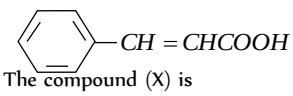
(d) Hofmann rearrangement

26. Which of the following will not give iodoform test ? [UPSEAT 2004]

(a) Isopropyl alcohol (b) Ethanol

(c) Ethanal (d) Benzyl alcohol

27. 

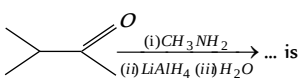


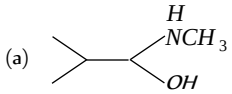
The compound (X) is [IIT-JEE 2005]

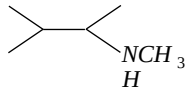
(a) CH_3COOH (b) $BrCH_2 - COOH$

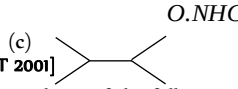
(c) $(CH_3CO)_2O$ (d) $CHO - COOH$

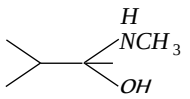
28. The major organic product formed from the following reaction



(a) 

(b) 

(c) 

(d) 

29. Products of the following reaction

$CH_3C \equiv C\,CH_2CH_3 \xrightarrow[(2)\,Hydrolysis]{(1)O_3}$ ...are [CBSE PMT 2005]

(a) $CH_3CHO + CH_3CH_2CHO$

(b) $CH_3COOH + CH_3CH_2CHO$

(c) $CH_3COOH + HOOCCH_2CH_3$

(d) $CH_3COOH + CO_2$

30. A compound, containing only carbon, hydrogen and oxygen, has a molecular weight of 44. On complete oxidation it is converted into a compound of molecular weight 60. The original compound is [KCET 2005]

[GATE 2001]

(a) An aldehyde (b) An acid

(c) An alcohol (d) an ether

[Orissa JEE 2003]

AR Assertion & Reason

For AIIMS Aspirants

Read the assertion and reason carefully to mark the correct option out of the options given below :

(a) If both assertion and reason are true and the reason is the correct explanation of the assertion.

(b) If both assertion and reason are true but reason is not the correct explanation of the assertion.

(c) If assertion is true but reason is false.

(d) If the assertion and reason both are false.

(e) If assertion is false but reason is true.

1. Assertion : Acetic acid does not undergo haloform reaction.

Reason : Acetic acid has no alpha hydrogens. [IIT 1998]

2. Assertion : Benzonitrile is prepared by the reaction of chlorobenzene with potassium cyanide.

Reason : Cyanide (CN) is a strong nucleophile. [IIT 1998]

3. Assertion : Lower aldehyde and ketones are soluble in water but the solubility decreases as molecular mass increases.

Reason : Aldehydes and ketones can be distinguished by Tollen's reagent. [AIIMS 1994]

4. Assertion : Acetaldehyde on treatment with alkaline gives aldol.

Reason : Acetaldehyde molecules contains α hydrogen atom. [AIIMS 1997]

5. Assertion : Acetylene on treatment with alkaline $KMnO_4$ produce acetaldehyde.

Reason : Alkaline $KMnO_4$ is a reducing agent. [AIIMS 2000]

[CBSE PMT 2005]

6. Assertion : Acetophenone and benzophenone can be distinguished by iodoform test.

Reason : Acetophenone and benzophenone both are carbonyl compounds. [AIIMS 2002]

7. Assertion : Isobutanal does not give iodoform test

Reason : It does not have α-hydrogen. [AIIMS 2004]

8. Assertion : Benzaldehyde is more reactive than ethanol towards nucleophilic attack.

Reason : The overall effect of –I and +R effect of phenyl group decreases the electron density on the carbon atom of $> C = O$ group in benzaldehyde.

9. Assertion : Aldol condensation can be catalysed both by acids and bases.

Reason : β-Hydroxy aldehydes or ketones readily undergo acid catalysed dehydration.

10. Assertion : Ketones are less reactive than aldehydes.

Reason : Ketones do not give schiff's test.

11. Assertion : Oximes are less acidic than hydroxyl amine.

Reason : Oximes of aldehydes and ketones show geometrical isomerism.

12. Assertion : The bond energy of $> C = O$ is less than $> C = C <$ in alkenes.

Reason : The carbon atom in carbonyl group is sp^2 hybridised.

13. Assertion : $R - C \equiv 0^+$ is more stable than $R - C^+ = 0$.

Reason : Resonance in carbonyl compound provides C and O.

14. Assertion : Formaldehyde cannot be prepared by Rosenmund's reduction.

Reason : Acid chlorides can be reduced into aldehydes with hydrogen in boiling xylene using palladium or platinum as a catalyst supported on barium sulphate. This is known as Rosenmund's reduction.

15. Assertion : CH_3CHO reacts with NH_3 to form urotropine.

Reason : Urotropine is used as medicine in case of urinary troubles.

16. Assertion : α-Hydrogen atoms in aldehydes and ketones are acidic.

Reason : The anion left after the removal of α-hydrogen is stabilized by inductive effect.

17. Assertion : 2, 2–Dimethyl propanal undergoes Cannizzaro reaction with concentrated *NaOH*.

Reason : Cannizzaro is a disproportionation reaction.

18. Assertion : Benzaldehyde undergoes aldol condensation.

Reason : Aldehydes that do not have α–hydrogen undergo aldol condensation.

Answers

Introduction

1	a	2	b	3	a	4	c	5	a
6	c	7	b	8	b	9	a	10	b
11	b	12	d	13	d	14	b	15	a
16	c	17	c	18	c				

Preparation

1	c	2	c	3	d	4	b	5	b,c
6	c	7	c	8	d	9	c	10	c
11	c	12	a	13	a	14	d	15	d
16	c	17	a	18	d	19	c	20	b
21	c	22	a	23	c	24	c	25	c
26	d	27	c	28	b	29	a	30	b
31	c	32	d	33	b	34	b	35	a
36	d	37	d	38	c	39	b	40	c
41	d	42	a	43	a				

Properties

1	c	2	c	3	a	4	a	5	c
6	d	7	a	8	c	9	c	10	b
11	c	12	a	13	a	14	b	15	d
16	b	17	c	18	c	19	abd	20	abcd
21	b	22	a	23	a	24	b	25	d
26	b	27	d	28	c	29	b	30	b
31	c	32	c	33	d	34	d	35	c
36	b	37	a	38	b	39	d	40	c
41	d	42	a	43	d	44	d	45	a
46	c	47	c	48	a	49	b	50	b
51	b	52	c	53	d	54	b	55	c
56	d	57	c	58	a	59	c	60	c
61	b	62	b	63	a	64	b	65	a
66	d	67	a	68	a	69	c	70	a
71	c	72	d	73	a	74	a	75	a
76	d	77	c	78	b	79	a	80	b
81	c	82	c	83	c	84	a	85	d
86	a	87	d	88	a	89	d	90	d
91	b	92	b	93	a	94	c	95	c
96	a	97	b	98	d	99	a	100	c
101	c	102	d	103	d	104	d	105	a
106	e	107	b	108	c	109	a	110	c
111	a	112	a	113	c	114	b	115	d
116	c	117	b	118	a	119	c	120	c
121	d	122	d	123	d	124	c	125	c
126	d	127	c	128	a	129	a	130	a
131	c	132	a	133	a	134	b	135	b
136	a	137	b	138	b	139	d	140	a
141	a	142	b	143	b	144	d	145	b
146	d	147	b	148	b	149	b	150	c
151	a	152	a	153	c	154	c	155	b
156	a	157	d	158	d	159	c	160	a
161	c	162	c	163	d	164	d	165	c
166	d	167	a	168	b	169	c	170	a
171	a	172	c	173	b	174	a	175	a
176	e	177	b						

Critical Thinking Questions

1	d	2	bc	3	b	4	c	5	a
6	a	7	b	8	b	9	b	10	b
11	a	12	b	13	a	14	a,d	15	c
16	d	17	b,d	18	d	19	c	20	a
21	b	22	b	23	d	24	d	25	a
26	d	27	c	28	b	29	c	30	a

Assertion & Reason

1	c	2	d	3	b	4	a	5	d
6	b	7	c	8	a	9	b	10	b
11	e	12	e	13	b	14	b	15	e
16	c	17	b	18	d				

Answers and Solutions

Introduction

1. (a) $CH_3-\underset{\text{Acetaldehyde}}{\overset{\overset{O}{\|}}{C}}-H+\underset{\substack{\text{Hydrogen}\\\text{Cyanide}}}{HCN}\longrightarrow CH_3-\underset{\substack{|\\CN\\|\\\text{Acetaldehyde}\\\text{Cynohydrin}}}{\overset{\overset{OH}{|}}{C}}-H$ (optically active)

2. (b) $\underset{sp^2\text{ hybridised}}{>C=O}$

7. (b) $\underset{\text{2 propanone}}{CH_3\overset{\overset{O}{\|}}{C}CH_3}$

10. (b) $CHOCHO$

11. (b) $R\overset{\sigma}{\diagdown}\underset{R}{\overset{\sigma}{\diagup}}C\overset{\pi}{=}\underset{\sigma}{O}$

13. (d) $Cl-\underset{Cl}{\overset{\overset{Cl}{|}}{C}}-\overset{\overset{O}{\|}}{C}-H$
2, 2, 2, trichlorœthanal

18. (c) Among Carbonyl Compounds, reactivity decrease with increase in alkyl groups as alkyl groups (+*I* effect) decrease positive character on *C*-atom. Thus, the correct order of reactivity is

$HCHO > CH_3CHO > C_6H_5CHO$

Preparation

1. (c) $HC \equiv CH \xrightarrow[20\%\ H_2SO_4]{1\%\ HgSO_4} \underset{(A)}{CH_3CHO} \xrightarrow[H_2O]{CH_3MgX}$

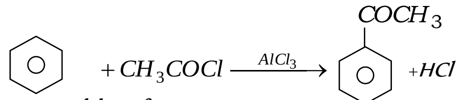
$$\underset{(B)}{CH_3CHOHCH_3} \xrightarrow{[O]} \underset{\text{Acetone}}{CH_3COCH_3}$$

4. (b) $(CH_3)_2C = C(CH_3)_2 \xrightarrow{O_3} 2CH_3 - CO - CH_3$

5. (c) Ketonic hydrolysis: $CH_3 - CO - CH_2COOC_2H_5$

$$\xrightarrow[H_2O]{NaOH} CH_3COCH_3 + C_2H_5OH + CO_2$$

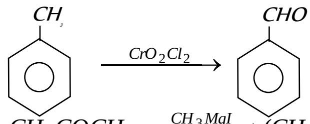
6. (c)



It is Friedel-Crafts reaction. Acetophenone

9. (c) $CH_3COCl \xrightarrow[Pd\ /\ BaSO_4]{2H} CH_3CHO + HCl$

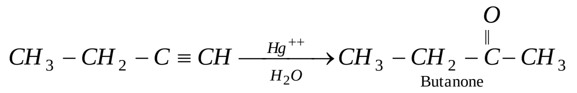
10. (c)



Etard reaction

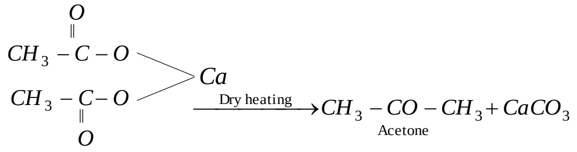
11. (c) $\underset{Acetone}{CH_3COCH_3} \xrightarrow{CH_3MgI} \underset{tert\text{–Butyl alcohol}}{(CH_3)_3COH}$

13. (a) It is hydration of alkynes.



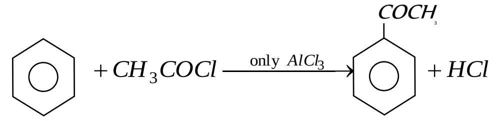
$$CH_3 - CH_2 - C \equiv CH \xrightarrow[H_2O]{Hg^{++}} \underset{\text{Butanone}}{CH_3 - CH_2 - \overset{\overset{\large O}{\|}}{C} - CH_3}$$

14. (d)



$$\begin{matrix} CH_3 - \overset{\overset{O}{\|}}{C} - O \\ CH_3 - \underset{\underset{O}{\|}}{C} - O \end{matrix} \rangle Ca \xrightarrow{\text{Dry heating}} \underset{\text{Acetone}}{CH_3 - CO - CH_3} + CaCO_3$$

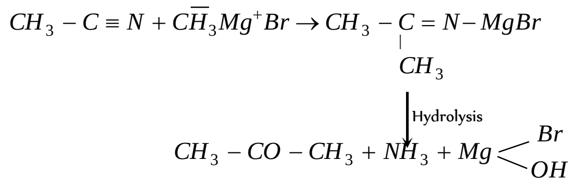
16. (c)



18. (d) $\begin{matrix} CH_3COO \\ CH_3COO \end{matrix} \rangle Ca + Ca \langle \begin{matrix} OOCH \\ OOCH \end{matrix} \xrightarrow{\text{Distill}}$

$$2CH_3CHO + 2CaCO_3$$

19. (c)

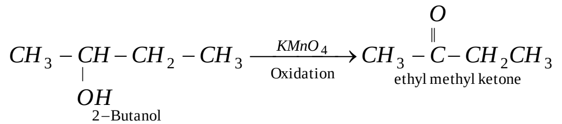


$$CH_3 - C \equiv N + C\overline{H}_3Mg^{+}Br \rightarrow CH_3 - \underset{\underset{CH_3}{|}}{C} = N - MgBr$$

$$\downarrow \text{Hydrolysis}$$

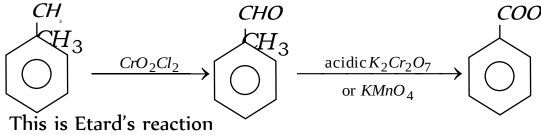
$$CH_3 - CO - CH_3 + NH_3 + Mg \langle \begin{matrix} Br \\ OH \end{matrix}$$

23. (c)



$$\underset{\text{2–Butanol}}{CH_3 - \underset{\underset{OH}{|}}{CH} - CH_2 - CH_3} \xrightarrow[\text{Oxidation}]{KMnO_4} \underset{\text{ethyl methyl ketone}}{CH_3 - \overset{\overset{O}{\|}}{C} - CH_2CH_3}$$

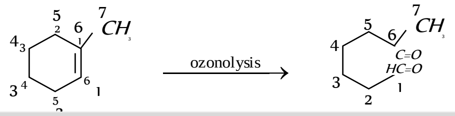
24. (c)



This is Etard's reaction

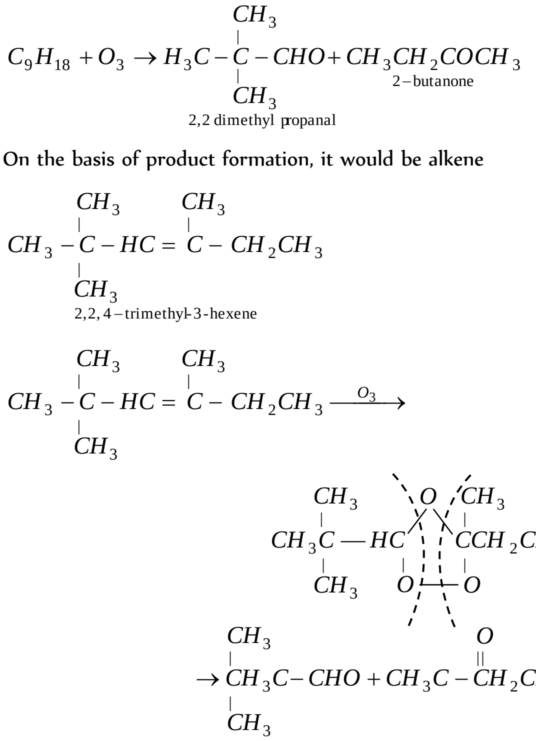
32. (d) $\underset{\text{Isopropyl alcohol}}{\begin{matrix} R \\ R \end{matrix} \rangle CH - OH} \xrightarrow[\text{Aluminium ter butoxide}]{[(CH_3)_3CO]_3Al} \underset{\text{Ketone}}{\begin{matrix} R \\ R \end{matrix} \rangle C = O}$

34. (b) $HC \equiv CH + H_2O \xrightarrow{HgSO_4\ /\ H_2SO_4} CH_3CHO$



42. (a)

43. (a)



$$C_9H_{18} + O_3 \rightarrow \underset{\text{2,2 dimethyl propanal}}{H_3C - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CHO} + \underset{\text{2–butanone}}{CH_3CH_2COCH_3}$$

On the basis of product formation, it would be alkene

$$\underset{\text{2,2,4–trimethyl-3-hexene}}{CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - HC = \overset{\overset{CH_3}{|}}{C} - CH_2CH_3}$$

$$CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - HC = \overset{\overset{CH_3}{|}}{C} - CH_2CH_3 \xrightarrow{O_3}$$

$$CH_3\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} — \underset{\underset{O}{|}}{HC} \overset{O}{\diagup\diagdown} \underset{\underset{O}{|}}{\overset{\overset{CH_3}{|}}{C}}CH_2CH_3$$

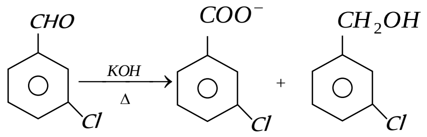
$$\rightarrow CH_3\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CHO + CH_3\overset{\overset{O}{\|}}{C} - CH_2CH_3$$

Properties

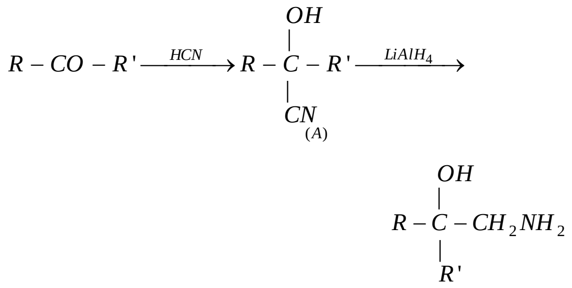
1. (c) $CH_3COCH_3 + CH_3MgCl \rightarrow \underset{(X)}{(CH_3)_3C - OMgCl}$

$$\xrightarrow{\text{hydrolysis}} \underset{(Y)}{(CH_3)_3\ C - OH} + Mg(OH)Cl$$

2. (c) It is cannizzaro reaction –2



3. (a)

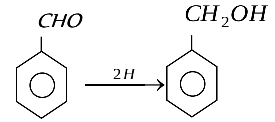


$$R - CO - R' \xrightarrow{HCN} \underset{(A)}{R - \underset{\underset{CN}{|}}{\overset{\overset{OH}{|}}{C}} - R'} \xrightarrow{LiAlH_4}$$

$$R - \underset{\underset{R'}{|}}{\overset{\overset{OH}{|}}{C}} - CH_2NH_2$$

5. (c) Reduction of $>C = O$ to CH_2 can be carried out with Wolf Kischner reduction.

6. (d)



Benzaldehyde Benzylalcohol

on reduction it gives benzylalcohol and not phenol.

9. (c) $\underset{\text{1-Phenylethanol}}{C_6H_5CHOHCH_3} \xrightarrow{[O]} \underset{\text{Acetophenone}}{C_6H_5COCH_3}$

$C_6H_6 + CH_3COCl \xrightarrow[\text{reaction}]{\text{Friedel craft's}} C_6H_5COCH_3 + HCl$

10. (b) Wolf-Kishner reduction does not convert $> CO$ to $CHOH$ but converts it to $> CH_2$.

11. (c) Although both $CH_3CH_2COCH_3$ and $(CH_3)_3CCOCH_3$ contain α-hydrogen, yet $(CH_3)_3CCOCH_3$ does not undergo Aldol condensation due to steric hindrance.

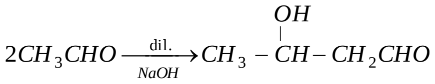
12. (a) $\underset{\text{Benzaldehyde}}{C_6H_5CHO} \xrightarrow[H^+/H_2O]{CH_3MgBr} \underset{2^\circ\text{Alcohol}}{C_6H_5CH(OH)CH_3}$

13. (a) Chloral CCl_3CHO, has no α-hydrogen atom and hence does not undergo aldol condensation.

14. (b) Among the given compounds only acetone gives crystalline coloured derivative with 2, 4 DNP.

15. (d) Ethanal among the given compounds gives positive iodoform test.

17. (c)



$$2CH_3CHO \xrightarrow[NaOH]{\text{dil.}} CH_3-\overset{\overset{\displaystyle OH}{|}}{C}H-CH_2CHO$$

18. (c) $C_2H_5CHO + 2Cu^{+2} + 5OH^- \rightarrow \underset{\text{Red ppt}}{Cu_2O} + 3H_2O$

$+ C_2H_5COO^-$

$CH_3COCH_3 + 2Cu^{+2} + 5OH^- \rightarrow$ No reaction

19. (abd)Deuterium behaves like H and hence trideuteroacetaldehyde also undergoes aldol condensation but benzaldehyde does not since it has no α-hydrogen.

21. (b) 1^o Primary alcohol$\xrightarrow{ZnCl_2/HCl}$

White turbidity only heating

2^o $Alcohol \xrightarrow{ZnCl_2/HCl}$ White turbidity

after 5 min heating

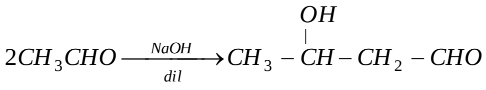
3^o Alcohol$\xrightarrow{ZnCl_2/HCl}$ easily in seconds

24. (b) Benzaldehyde on treatment with 50% aqueous or ethanolic alkali solution undergoes Cannizzaro's reaction like $HCHO$ (no α -hydrogen atom) *i.e.*, one molecule is oxidised and one is reduced with the formation of benzoic acid and benzyl alcohol respectively.

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

25. (d) $2HCHO \xrightarrow[\text{Conc.}]{NaOH} CH_3OH + HCOONa$

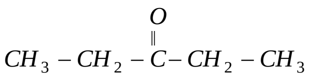
It is a Cannizzaro's reaction.



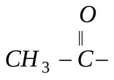
$$2CH_3CHO \xrightarrow[\text{dil}]{NaOH} CH_3-\overset{\overset{\displaystyle OH}{|}}{C}H-CH_2-CHO$$

It is aldol condensation reaction.

27. (d)

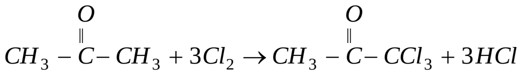


$CH_3-CH_2-\overset{\overset{\displaystyle O}{\|}}{C}-CH_2-CH_3$ do not have

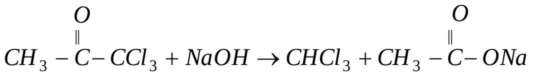


$CH_3-\overset{\overset{\displaystyle O}{\|}}{C}-$ group

29. (b)

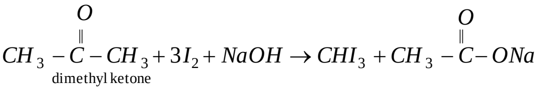


$$CH_3-\overset{\overset{\displaystyle O}{\|}}{C}-CH_3 + 3Cl_2 \rightarrow CH_3-\overset{\overset{\displaystyle O}{\|}}{C}-CCl_3 + 3HCl$$



$$CH_3-\overset{\overset{\displaystyle O}{\|}}{C}-CCl_3 + NaOH \rightarrow CHCl_3 + CH_3-\overset{\overset{\displaystyle O}{\|}}{C}-ONa$$

30. (b)

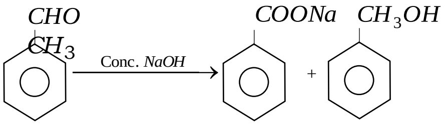


$$\underset{\text{dimethyl ketone}}{CH_3-\overset{\overset{\displaystyle O}{\|}}{C}-CH_3} + 3I_2 + NaOH \rightarrow CHI_3 + CH_3-\overset{\overset{\displaystyle O}{\|}}{C}-ONa$$

31. (c) CHI_3 is yellow compound when iodine reacts with $NaOH$ and ketone.

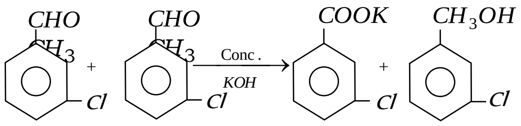
32. (c) $HCHO + HCHO \xrightarrow{KOH} HCOOK + CH_3OH$

38. (b) 2



This reaction is called as Cannizzaro's reaction.

39. (d)



41. (d) The solution represented is fehling's and it has no tendency to oxidise benzaldehyde.

42. (a) Increasing alkyl group the reactivity decreases.

43. (d) $RCHO + \frac{1}{2}O_2 \rightarrow RCOOH$

44. (d) All test for Aldehyde because ketone require strong oxidising agent.

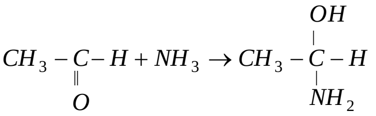
$2[Ag(NH_3)_2]^+ + RCHO \rightarrow RCOOH + 2Ag + 4NH_3 + H_2O$

45. (a) Silver mirror test is the test of aldehyde.

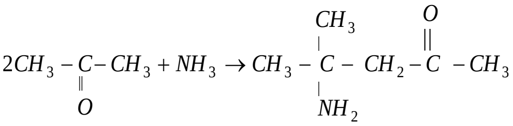
46. (c) $CH_3CH = CHCHO + 2[Ag(NH_3)_2]^+ \rightarrow$

$2Ag + 4NH_3 + CH_3CH = CHCOOH + H_2O$

49. (b)



$$CH_3-\underset{\underset{\displaystyle O}{\|}}{C}-H + NH_3 \rightarrow CH_3-\overset{\overset{\displaystyle OH}{|}}{\underset{\underset{\displaystyle NH_2}{|}}{C}}-H$$



$$2CH_3-\underset{\underset{\displaystyle O}{\|}}{C}-CH_3 + NH_3 \rightarrow CH_3-\overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle NH_2}{|}}{C}}-CH_2-\overset{\overset{\displaystyle O}{\|}}{C}-CH_3$$

50. (b) $CH_3CHO + 2H \xrightarrow{Na/C_2H_5OH} CH_3CH_2OH$

51. (b) $CH_3CH_2CHO + 4H \xrightarrow[HCl]{Zn/Hg} CH_3CH_2CH_3 + H_2O$

This reaction is called clemmenson's reduction.

52. (c) In cannizaro's reaction the one substance is oxidized and other is reduced.

$HCHO + HCHO \xrightarrow{KOH} CH_3OH + HCOOK$

55. (c) Nucleophilic as addition of HCN, $NaHSO_3$ *etc.*

57. (c) Addition of HCN to carbonyl compounds is an example of nucleophilic addition.

58. (a) Acetone forms sodium bisulphate adduct but acetophenone does not. Aromatic ketones do not gives addition product with $NaHSO_3$.

59. (c) $\underset{\text{Benzaldehyde}}{C_6H_5CHO} + Cl_2 \rightarrow \underset{\text{Benzoylchloride}}{C_6H_5COCl} + HCl$

60. (c) $CH_3 \rightarrow \overset{..}{\underset{..}{O}} \leftarrow CH_3$ The electron density of oxygen is highly increased therefore resistant its nucleophilic attack.

63. (a) $2CH_3-\underset{\text{Acetone}}{CO}-CH_3 \xrightarrow[H_2O]{Mg/Hg} H_3C-\underset{OH}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-\underset{OH}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-CH_3$ (Pinacol)

64. (b) $C_6H_5CHO+(CH_3CO)_2O \xrightarrow{CH_3CO_2Na} C_6H_5CH=CHCO_2H$

It is Perkin's reaction.

65. (a) Crossed aldol reaction gives benzyl alcohol and sodium formate.

$\underset{\text{Benzaldehyde}}{C_6H_5CHO}+\underset{\text{Formaldehyde}}{HCHO} \xrightarrow{NaOH\ (aq)} C_6H_5CH_2OH+\underset{\text{Sod. formate}}{HCOONa}$

$\underset{\text{Benzyl alcohol}}{}$

66. (d) The substitution of alkoxy group of ester by an alcohol, is called trans-esterification. It occurs in presence of either an acid or base.

67. (a) $6HCHO+4NH_3 \rightarrow \underset{\text{Urotropine}}{(CH_2)_6N_4}+6H_2O$

68. (a) In $HCHO$ because α-Hydrogen atom is absent.

71. (c) $C_6H_5-\overset{O}{\overset{\|}{C}}-H+H-\overset{O}{\overset{\|}{C}}-C_6H_5 \xrightarrow{\text{alc } NaCN} C_6H_5-\underset{OH}{\overset{|}{CH}}-\overset{O}{\overset{\|}{C}}-C_6H_5$ (Benzoin)

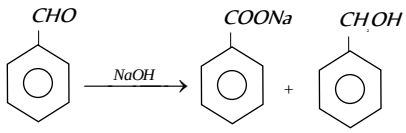
72. (d) $CH_3-\overset{O}{\overset{\|}{C}}-CH_3 \xrightarrow[KOH\ /\ Glycol]{NH_2-NH_2} CH_3-CH_2-CH_3+H_2O+N_2$

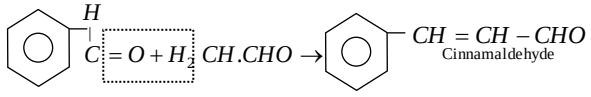
75. (a) $2CH_3CHO \xrightarrow[\text{dil}]{NaOH} CH_3-\underset{OH}{\underset{|}{CH}}-CH_2-CHO$ (Aldol)

76. (d) The amount of enolic form is highest (76%) in acetyl acetone because keto group is a much better electron-withdrawing group.

$\underset{\text{acetyl acetone (keto form, 24\%)}}{CH_3\overset{O}{\overset{\|}{C}}CH_2\overset{O}{\overset{\|}{C}}CH_3} \rightleftharpoons \underset{\text{enolic form (76\%)}}{CH_3\overset{O-H\cdots O}{\overset{|}{C}}=CH-CCH_3}$

$\longleftrightarrow CH_3\overset{O\cdots H-O}{\overset{\|}{C}}-CH=\underset{|}{C}-CH_3$

78. (b) 

80. (b) 

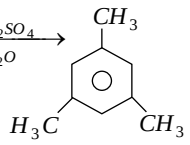
82. (c) $CH_3CHO \xrightarrow{dil\ NaOH} CH_3-\underset{OH}{\underset{|}{CH}}-CH_2-CHO$ (Aldol)

$\xrightarrow{Heat} CH_3-CH=CH-CHO+H_2O$

83. (c) $\begin{matrix}R\\R\end{matrix}\!\!>C=O+HCN \rightarrow \begin{matrix}R\\R\end{matrix}\!\!>C<\begin{matrix}CN\\OH\end{matrix}$ is an example of nucleophilic addition reaction.

84. (a) $C_6H_5CHO+CH_3COC_6H_5 \xrightarrow[-H_2O]{NaOH} C_6H_5-\underset{\text{Benzyl acetophenone}}{CH=CH-\overset{O}{\overset{\|}{C}}-C_6H_5}$

85. (d) *HI*/*P*, *Zn*/*Hg*/conc. *HCl* and $NH_2-NH_2/OH^-/C_2H_5ONa$ used to the reduction of $-\overset{O}{\overset{\|}{C}}-$ group into $-CH_2-$ group.

86. (a) $3CH_3COCH_3 \xrightarrow[-3H_2O]{Conc.H_2SO_4}$  (Mesitylene)

87. (d) $2C_6H_5CHO \xrightarrow{50\%\ NaOH} C_6H_5COONa+C_6H_5CH_2OH$

It is Cannizzaro's reaction.

88. (a) Because acetone require stronger oxidising agent and hence not oxidized with Fehling solution to give brick red *ppt.*

89. (d) $CH_3CHO \xrightarrow{[Ag(NH_3)_2]} \underset{\text{Silver mirror test}}{CH_3COOH+Ag_{\downarrow}}+NH_3$

While acetone do not react.

90. (d) Due to $H-$ bonding all are soluble in water.

91. (b) $CH_3-\underset{H}{\overset{|}{C}}=O+CH_3MgBr \rightarrow CH_3-\underset{H}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-OH$ (2^o alcohol)

92. (b) $CH_3CHO \xrightarrow{HCN} CH_3CH(OH)CN \xrightarrow{2H_2O/H^+} CH_3CH(OH)COOH$

93. (a) This reaction is aldol condensation

$2CH_3CHO \xrightarrow{\text{dil NaOH}} CH_3-\underset{OH}{\underset{|}{CH}}-CH_2-CHO$

3–hydroxy butanal

94. (c) $HCHO+2Cu^{+2}+5OH^- \xrightarrow[\text{solution}]{\text{Fehling}} HCOO^-+\underset{\text{Red } ppt}{Cu_2O}+3H_2O$

95. (c) $H-CHO+CH_3MgI \rightarrow CH_3-CH_2-OH+Mg\begin{matrix}OH\\I\end{matrix}$

100. (c) $CH_3CH_2-\overset{O}{\overset{\|}{C}}\bullet+H\overset{\alpha}{\underset{CH_3}{\underset{|}{CH}}}-CHO \xrightarrow{OH^-} CH_3-CH_2-\underset{CH_3}{\underset{|}{\underset{OH}{\underset{|}{CH}}}}-CHCHO$

101. (c) $CH_3MgI+CH_3CHO \rightarrow \left[CH_3-\underset{CH_3}{\underset{|}{\overset{OMgI}{\overset{|}{C}}}}-H\right]$

$$\xrightarrow{H_3O^+} (CH_3)_2CHOH$$
2–Propanol

102. (d) Cannizzaro's reaction involve self oxidation and self reduction.

103. (a) $CH_3CHO + NH_2NH$–(C$_6$H$_3$(NO$_2$)$_2$) $\rightarrow$

Brady's reagent (2, 4 – DNP)

$CH_3CH = N - NH$–(C$_6$H$_3$(NO$_2$)$_2$)

Orange crystalline solid

105. (a) $2CH_3COCH_3 + Cl_2 / NaOH \rightarrow 2CHCl_3 +$

$2CH_3COONa + HCl$

106. (e) Fehling solution $\Rightarrow$ Alkaline $CuSO_4 + Na - K$ tartarate

Tollen's reagent $\Rightarrow$ $NH_4OH + AgNO_3$

Schiff's reagent $\Rightarrow$ *P*-rosaniline hydrochloride or magneta

Benedict's solution $\Rightarrow$ Alkaline $CuSO_4$ + Citrate ions

All these reagents are used to distinguish between aldehydes and ketones. Aldehydes reacts with all these reagents while ketones do not react.

107. (b) Schiff's reagent $\xrightarrow{SO_2}$ Colourless
(Pink)

$\xrightarrow{\text{Aldehyde}}$ Pink colour

108. (c) $\overset{\beta}{CH_3}-\overset{\alpha}{CH_2}-CHO$ aldehydes having $\alpha - H$ *atom* can participate in aldol condensation. The H – atom attached to α carbon atom are called α -hydrogen.

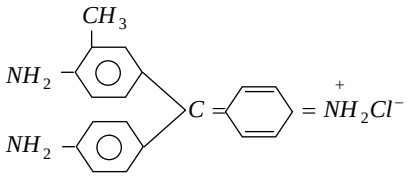
109. (a) $\underset{\text{Acetaldehyde}}{CH_3CHO} \xrightarrow[\text{Oxidation}]{KMnO_4} \underset{\text{Acetic acid}}{CH_3COOH}$

110. (c) $CH_3CHO + 2[\underset{\text{Tollen's reagent}}{Ag(NH_3)_2}]OH \rightarrow$

$\underset{\text{Silver mirror}}{CH_3COONH_4} + 2Ag + 3NH_3 + H_2O$

112. (a) It is used as a medicine to treat urinary infections.

113. (c) *p*-rosaniline hydrochloride.



It is used for the identification of aldehydes.

115. (d) $R - CHO \xrightarrow{H_2N-OH} \underset{\text{Oxime}}{RCH = N - OH}$

$CH_3CHO + NH_2OH \rightarrow \underset{\text{Acetaldoxime}}{CH_3 - CH = N - OH} + H_2O$

116. (c) Cannizzaro's reaction is shown by aldehydes in which α-*H* atom is absent. CH_3CHO contains $3, \alpha$ -*H* atoms thus, does not show this reaction.

117. (b) $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!C = O + NH_2OH \rightarrow \begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!C = N - OH + H_2O$
Acetoxime

119. (c) $\underset{\text{Propanal}}{CH_3 - CH_2 - CHO} \xrightarrow{\text{Oxidation}} \underset{\text{Propanoic acid}}{CH_3CH_2 - COOH}$

120. (c) $CH_3 - CHO + PCl_5 \rightarrow CH_3 - CH\!<\!\begin{matrix}Cl\\Cl\end{matrix} + POCl_3$
Ethylidene Chloride or Gem dihalide

121. (d) Benzaldehyde gives cannizaro's reaction whereas acetaldehyde gives aldol condensation.

2 C$_6$H$_4$(CHO) $\xrightarrow{\text{Conc } NaOH}$ C$_6$H$_4$(COONa) + C$_6$H$_4$(CH$_2$OH)

Cannizaro reaction

$2CH_3CHO \xrightarrow{\text{dil } NaOH} \underset{OH}{CH_3 - CH} - CH_2 - CHO$
(Aldol)

122. (d) C$_6$H$_4$(CO–CH$_2$–CHO) $\rightarrow$ C$_6$H$_4$(CH(OH)–CH–CHO)

C$_6$H$_4$(CH = CH – CHO)
Cinnamaldehyde

123. (d) $CH_3 - MgBr + CH_3 - \underset{\|}{\overset{O}{C}} - H \xrightarrow{H_2O}$

$CH_3 - \underset{CH_3}{CH} - OH + MgBr(OH)$

$CH_3MgBr + CH_3 - \underset{CH_3}{\overset{|}{C}} = O \xrightarrow{H_2O}$

$\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!C\!<\!\begin{matrix}OH\\CH_3\end{matrix} + MgBr(OH)$

125. (c) $3C_6H_5CHO + 2NH_3 \rightarrow$ (C$_6$H$_5$CH = N)$_2$CH – C$_6$H$_5$ $+ 3H_2O$
Hydrobenza mide

127. (c) $CuSO_4 + NaOH +$ Roschellesalt$(Na - K$ tartarate$)$

128. (a) $\underset{\text{Aldehyde}}{R - CHO} \xrightarrow{\text{Reduction}} \underset{1^o \text{ alcohol}}{R - CH_2 - OH}$

129. (a) $HCHO + HCHO \xrightarrow[Conc]{NaOH} CH_3OH + HCOONa$

131. (c) $\underset{\text{Acetone}}{CH_3 - CO - CH_3} \xrightarrow{\text{Pyrolysis}} \underset{\text{Ketene}}{CH_2 = C = O}$

132. (a) $CH_3 - \underset{\|}{\overset{O}{C}} - CH_3 \xrightarrow[H_2SO_4]{K_2Cr_2O_7} CH_3COOH + HCOOH$

one carbon atom is less in the ketone group

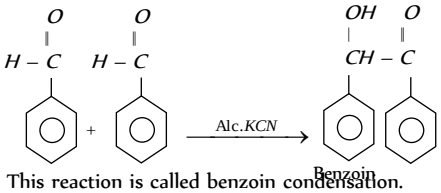
134. (b) $\underset{\text{Aldehyde}}{R - \underset{H}{\overset{|}{C}} = O} + \underset{\text{Grignard reagent}}{R - Mg - X} \rightarrow R - \underset{H}{\overset{|}{\underset{|}{\overset{R}{C}}}} - OMgX$

$R - \underset{R}{\overset{|}{\underset{|}{C}}} = O + R - Mg - X \rightarrow R - \underset{R}{\overset{|}{\underset{|}{\overset{R}{C}}}} - O - MgX$
Ketone

137. (b) $CH_3CHO \xrightarrow[I_2]{NaOH} \underset{\text{Yellowppt}}{CHI_3}$

138. (b) Fehling solution is a weak oxidising agent therefore unable to oxidise benzaldehyde.

139. (d)



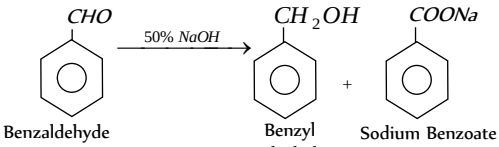
This reaction is called benzoin condensation.

140. (a) $\text{Aldehyde} + \underset{\text{(Colourless)}}{\text{Schiff's reagent}} \rightarrow \text{Pinkcolour}$

Ketone do not give this test.

141. (a) $CH_3CHO \xrightarrow{Cl_2} \underset{\text{(Choral)}}{CCl_3CHO} + 3HCl$

143. (b) Benzaldehyde will undergo Cannizzaro's reaction on treatment with 50% *NaOH* to produce benzyl alcohol and benzoic acid as it does not contain α-hydrogen



144. (d) Butane 2-one will get re o butane when treated with Zinc and hydrochloric acid following Clemmensen reduction, whereas *Zn/HCl* do not reduce ester, acid, amide

145. (b) Phoron

$$CH_3\!>\!C=O + H_2CH-\overset{O}{\overset{\|}{C}}-CHH_2 + O=C<\!CH_3 \xrightarrow[-2H_2O]{\text{Dry } HCl} \underset{\text{Phoron}}{CH_3\!>\!C=CH-\overset{O}{\overset{\|}{C}}-CH=C<\!CH_3}$$

146. (d) $RCHO + 4H \xrightarrow{Zn-Hg\,/\,HCl} R-CH_3 + H_2O$

$$R\!>\!C=O + 4H \xrightarrow{Zn-Hg\,/\,HCl} R\!>\!CH_2 + H_2O$$

147. (b) Acetone on iodination gives iodoform in the presence of *NaOH*

$$\underset{\text{Acetone}}{CH_3-\overset{O}{\overset{\|}{C}}-CH_3} + 3I_2 + 4NaOH \xrightarrow{-3H_2O} \underset{\text{Iodoform}}{CHI_3} + \underset{\text{Sodium acetate}}{CH_3COONa} + \underset{\text{Sodium iodide}}{3NaI}$$

148. (b) We know that

$$\underset{\text{Acetaldehyde}}{CH_3-\overset{H}{\overset{|}{C}}=O} \xrightarrow{+HCN} CH_3-\overset{H}{\overset{|}{\underset{|}{C}}}-OH \xrightarrow{+H_2O} \underset{\text{Cyanohydrin}}{CH_3-\overset{H}{\overset{|}{\underset{CN}{\overset{|}{C}}}}-OH} \xrightarrow{} CH_3-\overset{H}{\overset{|}{\underset{COOH}{\overset{|}{C}}}}-OH$$

Lacticacid

Thus Lactic acid is formed.

149. (b) Tollen's reagent is used to detect aldehydes. Aldehyde reduce Tollen's reagent to give Silver mirror while these are oxidised to acid.

$$R\!>\!C=O + Ag_2O \longrightarrow RCOOH + \underset{\text{Silver mirror}}{2Ag}$$

150. (c) Only aliphatic aldehyde reduce fehling solution. Hence, acetaldehyde give red ppt. with fehling solution.

151. (a) Two molecules of acetone condense in presence of dry *HCl* gas to form mesityl oxide.

$$CH_3\!>\!C=O + H_2-CH-\overset{O}{\overset{\|}{C}}-CH_3 \xrightarrow[-H_2O]{HCl} \underset{\text{Mesityloxide}}{(CH_3)_2C=CH.COCH_3}$$

152. (a) Formaldehyde and *NaOH* reacts to produce alcohol and sodium salt of an acid.

$$2HCHO + NaOH \longrightarrow \underset{\text{Alcohol}}{CH_3OH} + \underset{\text{Sodium formate}}{HCOONa}$$

This reaction is Cannizzaro's reaction

153. (c) Acetaldehyde reduces Fehling solution giving red ppt. while acetone do not.

154. (c) It is an example of Cannizzaro reaction

$$\begin{matrix}CHO\\|\\CHO\end{matrix} + NaOH \longrightarrow \begin{matrix}CH_2OH\\|\\COONa\end{matrix}$$

155. (b) $R-\overset{+\delta}{\overset{\|}{\underset{O}{C}}}-H$; Susceptibility of nucleophilic attack on aldehyde is decreased by electron releasing effect of *R* group. Decreasing order of aldehyde towards nucleophilic attack is 1° > 2° > 3° *R* group.

156. (a) Wolf kischner reduction : Hydrazine (NH_2-NH_2) followed by reaction with strong base like *KOH* reduce carbonyl group into alkyl group.

$$\underset{\text{Carbonyl group}}{>\!C=O} + \underset{\text{Hydrazine}}{NH_2-NH_2} \xrightarrow[\textit{reduction}]{\text{Wolf-Kishner}}$$

$$>\!C=N-NH_2 \xrightarrow{KOH} \underset{\text{Alkylgroup}}{>\!CH_2}$$

157. (d) Ketones and Aldehyde add to $NaHSO_3$ to give white precipitate

$$R\!>\!C=O \xrightarrow{NaHSO_3} R\!>\!C<\!\begin{matrix}OH\\SO_3Na\end{matrix}$$

158. (d) Fehling's solution is the solution of $CuSO_4 + NaOH$ + Roschel salt (Sodium potassium tartarate). Aldehyde give red precipitate with Fehling's solution.

159. (c) It reduce $-CHO$ group into hydrocarbon.

160. (a) Molecular weight of the compound

$= 2 \times \text{Vapour density}$

$= 2 \times 29 = 58$

Molecular weight of CH_3CH_2CHO, $CH_3CHOHCH_3$, CH_3COCH_3 and CH_3CH_2COOH are 58, 60, 58 and 74 respectively. Both CH_3CH_2CHO and CH_3COCH_3 have molecular weight 58 but only aldehyde *i.e.*, CH_3CH_2CHO on warming with aqueous alkali gives yellow precipitate.

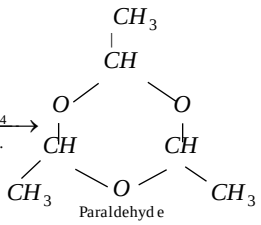
161. (c) $\underset{\text{2 butanol}}{CH_3-CH_2-\overset{OH}{\overset{|}{C}}H-CH_3}$ contain $CH_3-\overset{OH}{\overset{|}{C}}H-$ group by which it give +ve iodoform test.

162. (c) In nucleophilic addition reaction, the carbonyl compound will respond in preference which is sterically more exposed and electronically have intact positive charge over carbonyl carbon. So reactivity order towards reaction with *phMgBr* is (II) > (III) > (I).

163. (d) Tollen's reagent oxidizes the compound having aldehyde group like glucose and also oxidizes α-hydroxy ketones having $-COCH_2OH$ group as in fructose.

164. (d) Acetaldehyde have CH_3CO- group so it give positive iodoform test with I_2 and $NaOH$ while formaldehyde does not have $-CH_3CO$ group so it will not give the positive haloform test.

165. (c) Aldehyde reduce silver mirror whereas acid do not reduce silver mirror.

166. (d) $3CH_3CHO \xrightarrow[\text{room temp.}]{\text{conc. } H_2SO_4}$ 

Paraldehyde

168. (b) Formaline contains $40\%\,HCHO, 8\%\,CH_3OH$ and 52% water. It is used as biological preservative.

172. (c) $C_2H_5-\underset{\underset{O}{\|}}{C}-CH_3 + I_2 + NaOH \rightarrow C_2H_5CO_2^-Na^+ + CHI_3$

$C_2H_5CO_2^-Na^+ \xrightarrow{H^+} C_2H_5COOH + Na^+$

173. (b) Two molecules of ketones undergo reduction in the presence of Mg/Hg to form pinacol.

$2\,\underset{\text{acetone}}{\underset{CH_3}{\overset{CH_3}{>}}C=O} \xrightarrow[\text{benzene as solvent}]{Mg/Hg} \left[CH_3-\underset{O}{\overset{CH_3}{C}}-\underset{O}{\overset{CH_3}{C}}-CH_3 \;\; Mg\right] \xrightarrow{HOH} CH_3-\underset{OH}{\overset{CH_3}{C}}-\underset{OH}{\overset{CH_3}{C}}-CH_3 + Mg(OH)_2$

2,3-dimethylbutane-2,3-diol (pinacol)

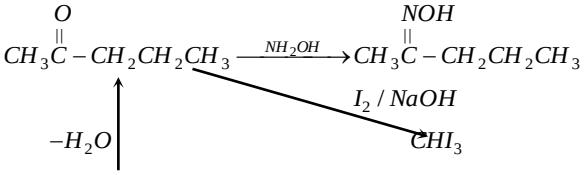
174. (a) $C_6H_5CH=O + H_2NNHCONH_2 \rightarrow C_6H_5CH=NNHCONH_2$ (semicarbazone)

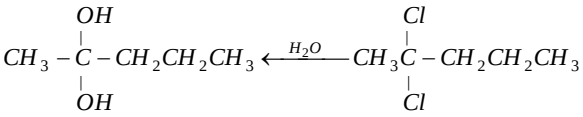
The product shows E and Z configuration

E-

Z-

175. (a) As A reacts with hydroxylamine it means A may be aldehyde or ketone. but it does not react with fehling solution hence A must be a ketone. Secondly it forms iodoform which is a characteristic reaction of methyl ketone.

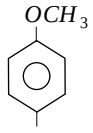




176. (e) $CH_3CHO + HCN \rightarrow \underset{OH}{\overset{OH}{CH_3C-C-CN}} \xrightarrow{H_3O^+}$ (A)

$CH_3-\underset{H}{\overset{OH}{C}}-COOH$

177. (b) Aldehyde, which does not have the $\alpha-H$ atom, gives cannizzaro's reaction on heating with conc. alkali solution (50%)

C_6H_5CHO ($\alpha-H$ atom absent) $\quad CH_3-\overset{\alpha}{\underset{CH_3}{CH}}-CHO$ ($\alpha-H$-atom) $\quad$ 

$\alpha-H$-atom absent

$\underset{CH_3}{\overset{CH_3}{CH_3C-CHO}}$ ($\alpha-H$-atom absent) $\quad HCHO$ ($\alpha-H$-atom absent)

Critical Thinking Questions

1. (d) Acetone oxidise by $K_2Cr_2O_7$ & conc. H_2SO_4 into carboxylic acid. It is not oxidised by dilute H_2SO_4.

2. (b) Acetaldehyde react with tollen's reagent while ketone do not react with tollen's reagent.

3. (b) $CCl_3-CHO + H_2O \rightarrow \underset{\text{(Chloral hydrate)}}{CCl_3.CHO.H_2O} \rightarrow$

$CCl_3.CH\begin{<}OH\\OH\end{>}$

4. (c) The compound A with formula C_3H_6O gives iodoform test, it is propanone forms a compound B having carbon atoms three times, the number of carbon atoms in propanone, it is 2, 6-dimethyl-2, 5-heptadien-4-one.

5. (a) $\underset{\text{2-Butanone}}{\overset{CH_3}{CH_3CH_2-C=O}} + CH_3CH_2CH_2CH=PPh_3$

$\rightarrow \overset{CH_3}{CH_3CH_2C=CHCH_2CH_2CH_3} + Ph_3PO$ (3-methyl,3-heptene)

6. (a) $\underset{\text{(A)}}{CH_3-CH_2-CH_2OH} \xrightarrow{[O]} \underset{\text{(B)}}{CH_3-CH_2-CHO}$

$CH_3-CH_2-\overset{H}{\underset{|}{C}}=O + H_2NNHCONH_2 \xrightarrow{HCl}$

$$CH_3CH_2CH = N - NHCONH_2$$

7. (b) Acetophenone is a ketone and does not react with Tollen's reagent to give silver mirror.

8. (b) $\underset{\text{Acetone (ketoform)}}{CH_3-\overset{\overset{O}{\|}}{C}-CH_3} \left[\underset{\text{enol form}}{CH_3-\overset{\overset{OH}{|}}{C}=CH_2} \right] \rightleftharpoons$

$$CH_3-\overset{\overset{OD}{|}}{C}=CH_2 \rightleftharpoons CH_3-\overset{\overset{O}{\|}}{C}-CH_2D \rightleftharpoons$$

$$CH_2=\overset{\overset{OH}{|}}{C}-CH_2D \overset{D_2O}{\rightleftharpoons} CH_2=\overset{\overset{OD}{|}}{C}-CH_2D \rightleftharpoons$$

$$DCH_2-\overset{\overset{O}{\|}}{C}-CH_2D \rightleftharpoons D_3C-\overset{\overset{O}{\|}}{C}-CD_3$$

The enol form of acetone on treatment with D_2O undergoes enolisation, deutration (addition of D_2O) and dehydration (removal of H_2O). The repeated enolisation, deutration and dehydration ultimately gives $CD_3.COCD_3$ (B).

9. (b) Both $Zn(Hg), HCl$ and NH_2NH_2, OH^- can reduce $-COCH_3$ group to $-CH_2-CH_3$ group, but HCl will also bring about dehydration of alcohol to form alkene. Therefore, appropriate reagent for the conversion is NH_2NH_2, OH^-.

10. (b) 2, 4-hexanedione (a 1, 3-diketone) has the most acidic hydrogen. This is because the carbanion left after the removal of H^+ is resonance stabilised in this case.

$$\underset{\text{2,4-Hexanedione}}{CH_3-\overset{\overset{O}{\|}}{C}-CH_2-\overset{\overset{O}{\|}}{C}-CH_2CH_3} \xrightarrow[-H_2O]{OH^-}$$

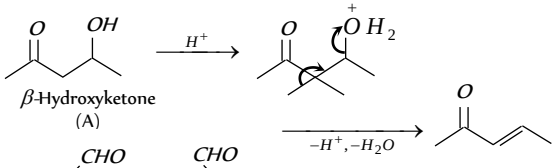
$$CH_3-\overset{\overset{O}{\|}}{C}-\overset{-}{C}H-\overset{\overset{O}{\|}}{C}-CH_2CH_3$$

$$CH_3-\overset{\overset{O}{\|}}{C}-\overset{-}{C}H-\overset{\overset{O}{\|}}{C}-CH_2CH_3$$

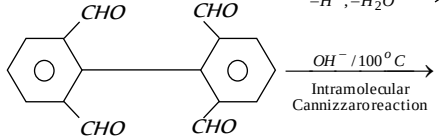
$$\leftrightarrow CH_3-\overset{\overset{O^-}{|}}{C}=CH-\overset{\overset{O}{\|}}{C}-CH_2CH_3$$

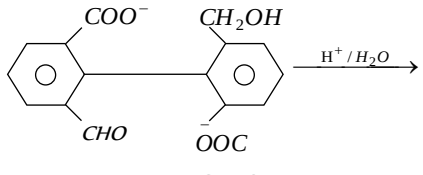
$$\leftrightarrow CH_3-\overset{\overset{O}{\|}}{C}-CH=\overset{\overset{O^-}{|}}{C}-CH_2CH_3$$

11. (a) Aldols (β-hydroxy aldehydes or β-hydroxyketones) readily undergo dehydration to form α, β-unsaturated aldehydes or ketones.



12. (b)



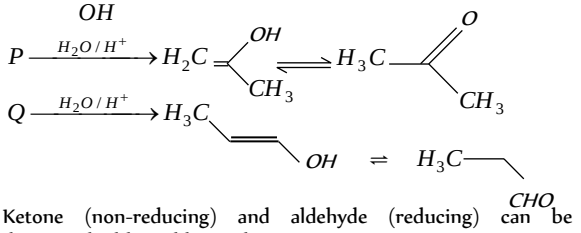


13. (a) Amongst aldehyde & the acid derivatives, acid chloride are the most susceptible to nucleophilic attack due to strong $-I$ effect & weak $+R$ effect of the Cl-atom as a result of which carbonyl carbon has the highest electron deficiency. The actual order is *MeCOCl* > *MeCOOCOMe* > *MeCOOMe* > *MeCHO*.

14. (ad) $ICH_2COCH_2CH_3 \xrightarrow{I_2 / NaOH} CHI_3 + CH_3CH_2COONa$

$$\underset{OH}{CH_3-CH-CH_2CH_3} \xrightarrow[NaOH]{I_2} CH_3CH_2COONa + CHI_3$$

15. (c)

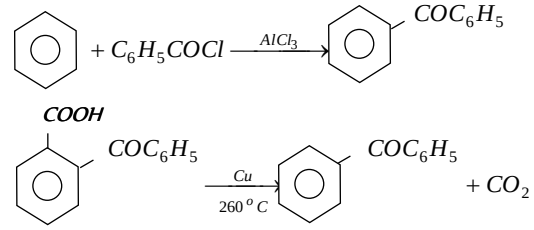


Ketone (non-reducing) and aldehyde (reducing) can be distinguished by Fehling solution.

16. (d) $\begin{matrix} CH_3 \\ CH_3 \end{matrix}\!\!>\!C=CHCH_2CH_2CH_3 \xrightarrow{KMnO_4}$

$$\begin{matrix} CH_3 \\ CH_3 \end{matrix}\!\!>\!C=O + HOOCCH_2CH_3$$

17. (bd)



18. (d) Aldehyde & ketone are colourless & stable compound

19. (c) It undergoes electrophilic substitution at *m*-position and also gives iodoform test.

20. (a) $\underset{\text{But-1-yne}}{CH_3-CH_2-C\equiv CH} + H_2O \rightarrow$

$$\left[CH_3-CH_2-\overset{\overset{OH}{|}}{C}=CH_2 \right] \xrightarrow[\text{tautomerism}]{\text{keto-enol}}$$

$$\underset{\text{Butan-2-one}}{CH_3-CH_2-\overset{\overset{O}{\|}}{C}-CH_3}$$

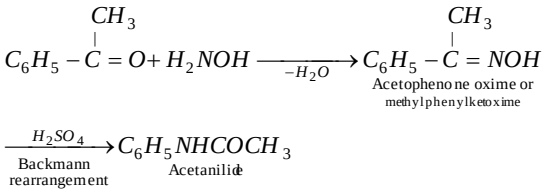
21. (b) Due to electron withdrawing nature of NO_2 group, the partial +ve charge on the carbon atom of the $>C=O$ group in *p*-nitrobenzaldehyde increases and hence becomes more susceptible to nucleophilic attack by CN^- ion.

22. (b) Cannizzaro reaction is an example of hydride ion (H^-) transfer reaction.

23. (d) Except Na_2CO_3 benzophenone react with rest of option.

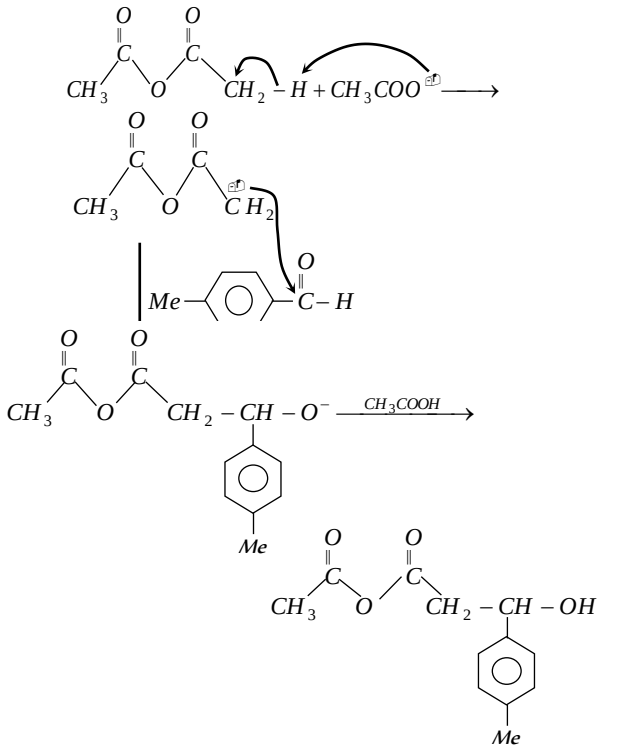
24. (d) The alcohol can be converted to aldehyde group by treating with oxidising agent Pyridinium chloro chromate $(C_6H_5\overset{\oplus}{N}HCrO_3Cl^-)$ it is abbreviated as *PCC* and is called Collin's reagent. This reagent is used in non aqueous solvent like CH_2Cl_2 It is a very good reagent because it checks the

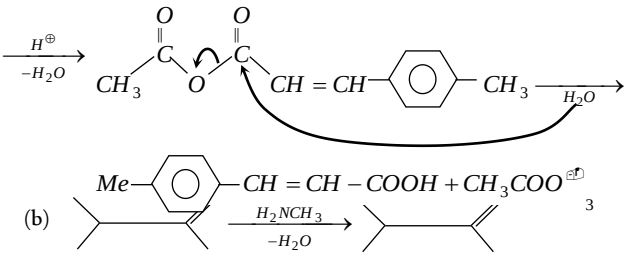
further oxidation of aldehyde to carboxylic acid while rest oxidising agent oxidise aldehyde into carboxylic acid.

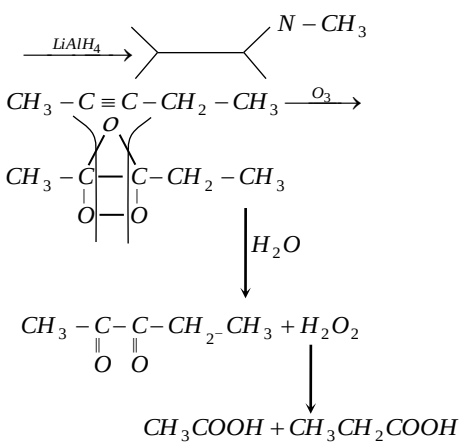
25. (a) 

26. (d) Benzyl alcohol does not have the CH_3CO- group or $CH_3CH_2O^-$ so it will not give the positive iodoform test.

27. (c) This is perkin reaction



28. (b) 

29. (c) 

30. (a) On complete oxidation the obtained compound shows increament in molecular weight of only 16. It means only one oxygen atom is added here. This condition is fulfilled by only aldehyde which on oxidation gives acid.

$$RCHO \xrightarrow{[O]} RCOOH$$

Hence, original compound must be

$$\underset{\text{mol. wt. 44}}{CH_3CHO} \xrightarrow{[O]} \underset{\text{mol. wt. 60}}{CH_3COOH}$$

Assertion & Reason

3. (b) It is true that lower aldehyde and ketones are soluble in water but as the molecular mass increases their solubility decreases. On adding Tollen's reagent to a solution of Carbonyl compound if silver mirror is obtained than it is aldehyde. Therefore Tollen's reagent is used for the identification of aldehydes and ketones. Here, assertion and reason both are true but the reason is not the correct explanation of assertion.

4. (a) Carbonyl compounds having α-hydrogen atom condenses to produce aldol in presence of alkali.

$$\underset{\underset{\text{Acetaldehyde}}{\underset{O}{\|}}}{CH_3-CH} + HCH_2CHO \xrightarrow{\text{dil. } NaOH} \underset{\underset{\text{Aldol}}{OH}}{CH_3-CH-CH_2CHO}$$

5. (d) Acetylene, on treatment with alkaline $KMnO_4$ is oxidised to produce oxalic acid.

$$\underset{\text{Acetylene}}{\overset{CH}{\|}\\CH} \xrightarrow[\text{alk. } KMnO_4]{4[O]} \underset{\text{Oxalic acid}}{\overset{COOH}{|}\\COOH}$$

Therefore, both assertion and reason are false.

6. (b) Acetophenone and benzophenone can be distinguish by iodoform test. Both are carbonyl compounds. Assertion and reason both are true but reason is not the correct explanation of assertion.

7. (c) $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH-CHO$

Isobutanol has α-hydrogen atom.

Acetaldehyde, acetone and methyl ketones having CH_3CO group undergo haloform reaction. The halogen atoms of the methyl group are first replaced by hydrogen atoms. This reaction is used as a test of CH_3CO –group. Due to absence of CH_3CO –group isobutanal does not give iodoform test.

8. (a) Benzaldehyde is less reactive than ethanol towards nucleophilic attack. The combined effect of $-I$ and $+R$ effect of phenyl group is electron donating which increases the electron density on the carbon atom of the $C=O$ in benzaldehyde.

9. (b) Both carbanions (formed in presence of base) and enol form (formed in presence of an acid) act as nucleophiles and hence add on the carbonyl group of aldehydes and ketones to give aldols.

10. (b) The positive inductive effect of two alkyl groups in ketones makes the carbon atom less positive and makes it less reactive in comparison to aldehydes.

11. (e) Oximes are more acidic because, there is a delocalisation of π electrons (*i.e.,* resonance) and it stabilises it and its conjugate acid. But no such resonance exists in hydroxyl amine base (NH_2O^-)

12. (e) The bond energy of carbonyl group is 179 *Kcal mol* and in $C=C$ the bond energy is 145.8 *Kcal.* The carbonyl group shows resonance and thus possesses higher bond energy.

$$C=O \qquad C^+-O^- \longleftrightarrow$$

13. (b) Both carbon and oxygen are nonmetals and try to complete their octet. In $R-C\equiv O^+$ each has complete octet whereas in $R-C^+=O,$ carbon atom has in complete octet.

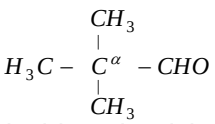
14. (b) *HCHO* cannot be prepared by Rosenmund's reduction because formyl chloride is unstable at room temperature.

15. (e) *HCHO* reacts with NH_3 to form urotropine

$$6HCHO+4NH_3 \rightarrow (CH_2)_6N_4+6H_2O$$

16. (c) The anion left after the removal of α-hydrogen is stabilized by resonance effect.

17. (b) Aldehydes which do not contain α-hydrogens undergo Cannizzaro reaction.



2, 2 dimethyl propanal (no α hydrogen)

18. (d) Aldehydes having a methyl or methylene group in the α-position or more correctly having atleast one hydrogen atom in the α-position undergo dimerisation in presence of a base at low temperature to form β-hydroxy aldehydes called aldols.

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

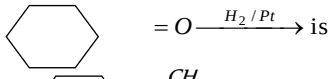
(d) Acetaldehyde

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

(a) $C_6H_5OCH_3$ (b) CH_3OH

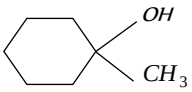
(c) $CH_3-\overset{O}{\overset{\|}{C}}-CH_3$ (d) C_2H_5OH

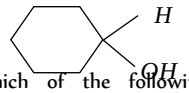
8. The product of following reaction

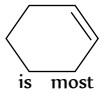


is **[Kerala CET 2000]**

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

(a) Friedel-Craft's alkylation

(b) Friedel-Craft's acylation

(c) Cannizzaro reaction

(d) Claisen condensation

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 **[AIIMS 2004]**

(a) $NaHSO_4$

(b) $C_6H_5NHNH_2$

(c) NH_2OH

(d) $NaOH - I_2$

Answers and Solutions

(SET -27)

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

$C_6H_5COOK + KOH \xrightarrow{\Delta} K_2CO_3 + \underset{\text{Benzene}}{C_6H_6}$

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
$H_2C=O > RCHO > ArCHO > R_2C=O > Ar_2C=O$.

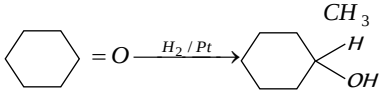
5. (b) Benzaldehyde does not have the α-hydrogen so it will undergoes cannizzaro's reaction.

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

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

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

$$CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{OH}{|}}{C}} - CH_2 - \overset{\overset{O}{||}}{C} - CH_3$$
(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) $CH_3CHO + HCN \rightarrow CH_3CHOHCN \xrightarrow{\text{hydrolysis}}$

$$CH_3CHOHCOOH$$
D+L isomer of lacticacid

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 $CH_3 - \overset{\overset{O}{\|}}{C} -$ 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.

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

$$C_6H_5COCH_3 + NaHSO_3 \longrightarrow \text{No reaction}$$