## Answers to Some Questions in Exercises

### **7.1** (i) 2,2,4-Trimethylpentan –3-ol

(iii) Butane -2,3-diol

(v) 2- Methylphenol

(vii) 2,5 - Dimethylphenol

(ix) 1-Methoxy-2-methylpropane

(xi) 1-phenoxyheptane

7.2 (i) 
$$CH_3 - C - CH_2 - CH_3$$

$$\begin{array}{cccc} & OH & OH \\ | & | & | \\ (iii) & HOCH_2-CH_2-C-CH_2-C-CH_3 \\ | & | & | \\ CH_3 & CH_3 \end{array}$$

(v)  $C_2H_5 - O - CH_2 - CH_2 - CH_3$ 

7.3 (i) (a) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>OH, Pentan-1-ol;

(b)  $CH_3-CH_2-CH-CH_2-OH$ , 2-Methylbutan-1-ol;  $CH_3$ 

(c) 
$$CH_3$$
 (c)  $CH_3$ -C-CH $_2$ OH, 2,2-Dimethylpropan-1-ol  $CH_3$ 

(e)  $CH_3$ – $CH_2$ –OH– $CH_2$ – $CH_3$ , Pentan-3-ol OH

(g) 
$$CH_3$$
- $CH_2$ - $C$ -OH, 2-Methylbutan-2-ol  $CH_3$ 

**7.4** Hydrogen bonding in propanol.

#### UNIT 7

(ii) 5-Ethylheptane -2, 4-diol

(iv) Propane -1,2,3,-triol

(vi) 4-Methylphenol

(viii) 2,6-Dimethylphenol

(x) Ethoxybenzene

(xii) 2 –Ethoxybutane

(iv) 
$$C_2H_5$$

(X) CH<sub>3</sub>–CH<sub>2</sub>–CH–CH<sub>2</sub>–CH<sub>2</sub>–OH | | CH<sub>2</sub>Cl

OH

(f) 
$$CH_3$$
- $CH$ - $CH$ - $CH_3$ , 3-Methylbutan-2-ol  $CH_3$  OH

3-Methylbutan-1-ol

- **7.5** Hydrogen bonding between alcohol and water molecules.
- 7.8 o-Nitrophenol is steam volatile because of intramolecular hydrogen bonding.
- 7.12 Hint: Carryout sulphonation followed by nucleophilic substitution.

7.13 (i) 
$$CH=CH_2$$
  $CH(OH)CH_3$   $H^+/H_2O$ 

(ii) 
$$CH_2CI$$
  $CH_2OH$  + NaOH  $CH_2OH$ 

- (iii)  $CH_3(CH_2)_4Cl + NaOH \longrightarrow CH_3(CH_2)_4OH + NaCl$
- 7.14 Reaction with (i) sodium and (ii) sodium hydroxide
- 7.15 Due to electron withdrawing effect of nitro group and electron releasing effect of methoxy group.
- **7.20** (i) Hydration of Propene.
  - (ii) By nucleophilic substitution of -Cl in benzyl chloride using dilute NaOH.
  - (iii)  $C_2H_5MgBr + HCHO \rightarrow C_2H_5CH_2OMgBr \xrightarrow{H_2O} C_2H_5CH_2OH$

(iv) 
$$CH_3MgBr + CH_3COCH_3 \longrightarrow CH_3 - COMgBr \xrightarrow{H_2O} CH_3 - CH_3$$
  
 $CH_3 \longrightarrow CH_3 - COMgBr \xrightarrow{H_2O} CH_3 - COMgBr \xrightarrow{CH_3}$ 

- 7.23 (i) 1-Ethoxy-2-methylpropane.
  - (ii) 2-Chloro-1-methoxyethane.
  - (iii) 4-Nitroanisole.
  - (iv) 1-Methoxypropane.
  - (v) 1-Ethoxy-4,4-dimethylcyclohexane.
  - (vi) Ethoxybenzene.

#### **UNIT 8**

- 8.2 (i) 4-Methylpentanal
  - (iii) But-2-enal
  - (v) 3,3,5-Trimethylhexan-2-one
  - (vii) Benzene -1,4-dicarbaldehyde
- $\begin{array}{ccc} & CH_3 & O \\ I & II \\ \textbf{8.3} & \text{(i)} & H_3C-CH-CH_2-C-H \end{array}$

(iii) 
$$H_3C$$
  $\longrightarrow$   $C-H$ 

- (ii) 6-Chloro-4-ethylhexan-3-one
- (iv) Pentane-2,4-dione
- (vi) 3,3-Dimethylbutanoic acid

(ii) 
$$O_2N$$
  $C-CH_2-CH_3$ 

$$\begin{array}{ccc} & \text{Br} & \text{O} \\ | & | & | \\ \text{(vi)} & \text{H}_3\text{C-CH-CH-CH}_2\text{-C-OH} \\ | & | & \\ \text{C}_6\text{H}_5 \end{array}$$

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# (viii) H<sub>3</sub>C-C≡C-CH=CH-C-OH

- **8.4** (i) Heptan-2-one
- (ii) 4-Bromo-2-methylhexanal
- (iii) Heptanal

- (iv) 3-Phenylprop-2-enal
- (v) Cyclopentanecarbaldehyde
- (vi) Diphenylmethanone

$$\textbf{8.5} \qquad \text{(i)} \qquad \begin{array}{c} \text{NO}_2 \\ \text{CH=N.NH} \\ \end{array} \\ \begin{array}{c} \text{NO}_2 \\ \text{NO}_2 \\ \end{array}$$

(ii) N-OH

(iii) 
$$CH_3$$
- $CH$  $< OCH_3 OCH_3$ 

(iv) 
$$\begin{array}{c} O \\ \parallel \\ NNH-C-NH_2 \end{array}$$

(vi) 
$$H-C \stackrel{OH}{\underset{H}{\overleftarrow{OCH_3}}}$$

$$\text{(ii)} \quad \bigcap^{\overset{O}{\parallel}}_{\overset{C}{\sim}} \bar{O}$$

(iv) 
$$OC_2H_5$$
  
 $C$   
 $I$   
 $OC_2H_5$ 

- 8.7 (ii), (v), (vi), (vii): Aldol condensation. (i), (iii), (ix) Cannizaro reaction. (iv), (viii) Neither.
- **8.10** 2-Ethylbenzaldehyde (draw the structure yourself).
- **8.11** (A) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>COOCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, butyl butanoate.
  - (B) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>COOH (C) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>OH. Write equation yourself.
- 8.12 (i) Di-tert-butyl ketone < Methyl tert-butyl ketone < Acetaldehyde
  - (ii) (CH<sub>2</sub>)<sub>2</sub>CHCOOH < CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>COOH < CH<sub>2</sub>CH(Br)CH<sub>2</sub>COOH < CH<sub>2</sub>CH<sub>2</sub>CH(Br)COOH
    - (iii) 4-Methoxybenzoic acid < Benzoic acid < 4-Nitrobenzoic acid < 3,4-Dinitrobenzoic acid.

OH

(iv) C<sub>6</sub>H<sub>5</sub>COCl-AlCl<sub>3</sub>

$$(v)$$
  $COO$ 

(vii) 
$$C_6H_5CH=C-CHO + other$$

$$(ix)$$
  $\bigcirc$   $=0$ 

(x) 1. 
$$BH_3$$
; 2.  $H_2O_2/\overline{O}H$ ; 3.  $PCC$ 

8.19 The compound is methyl ketone and its structure would be: CH<sub>3</sub>COCH<sub>2</sub>CH<sub>3</sub>CH<sub>3</sub>

#### **UNIT 9**

**9.1** (i) 1-methylethylamine or propan-2-amine

- (ii) Propan-1-amine
- (iii) N-methyl-2-methylethylamine or N-methylpropan-2-amine (iv) 2-methylpropan-2-amine
- (v) N-methylbenzenamine or N-methylaniline
- (vi) N-Ethyl-N-methylethanamine

- (vii) 3-Bromoaniline or 3-Bromobenzenamine
- **9.4** (i)  $C_6H_5NH_2 < C_6H_5NHCH_3 < C_2H_5NH_2 < (C_2H_5)_2NH$ 
  - (ii)  $C_6H_5NH_2 < C_6H_5N(CH_3)_2 < CH_3NH_2 < (C_2H_5)_2NH$
  - (iii) (a) p-nitroaniline < aniline < p-toluidine
    - (b)  $C_6H_5NH_2 < C_6H_5NHCH_3 < C_6H_5CH_2NH_2$
  - (iv)  $(C_2H_5)_3N > (C_2H_5)_2NH > C_2H_5NH_2 > NH_3$  (v)  $(CH_3)_2NH < C_2H_5NH_2 < C_2H_5OH$
  - (vi)  $C_6H_5NH_2 < (C_9H_5)_9NH < C_9H_5NH_9$



