

## CHAPTER 4

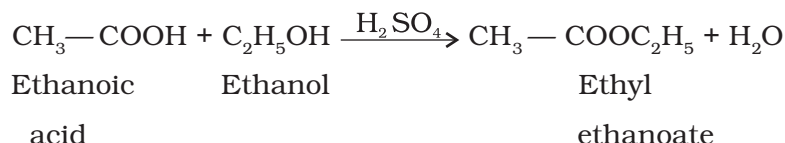
### ANSWERS

#### Multiple Choice Questions

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

#### Short Answer Questions

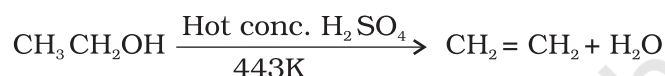
30.  $\text{H} : \text{C} \begin{smallmatrix} \cdot\cdot \\ \cdot\cdot \end{smallmatrix} \text{C} : \text{H}$  Electron dot structure of ethyne ( $\text{C}_2\text{H}_2$ )  
 $\text{H} - \text{C} \equiv \text{C} - \text{H}$  Structural formula of ethyne
31. (a) Pentanoic acid  
(b) Butyne  
(c) Heptanal  
(d) Pentanol
32. (a)  $-\text{OH}$  Hydroxyl/Alcohol  
(b)  $\begin{smallmatrix} -\text{C}-\text{OH} \\ || \\ \text{O} \end{smallmatrix}$  Carboxylic acid  
(c)  $\begin{smallmatrix} \text{O} \\ || \\ -\text{C}- \end{smallmatrix}$  Ketone  
(d)  $\begin{smallmatrix} | & | \\ -\text{C} & = & \text{C}- \end{smallmatrix}$  Alkene
33. (a) Carboxylic acid is ethanoic acid  
(b) Alcohol is ethanol  
(c) X is ethyl ethanoate



- 34.** Detergents work as cleansing agent both in hard and soft water. The charged ends of detergents do not form insoluble precipitates with calcium and magnesium ions in hard water.

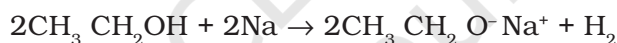
- 35.** (a) Ketone  
(b) Carboxylic acid  
(c) Aldehyde  
(d) Alcohol

- 36.** Ethanol on heating with excess concentrated sulphuric acid at 443 K results in the dehydration of ethanol to give ethene.

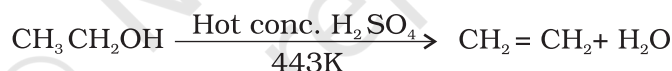


- 37.** Methanol is oxidised to methanal in the liver. Methanal reacts rapidly with the components of cells. It causes the protoplasm to coagulate. It also affects the optic nerve, causing blindness.

- 38.** Gas evolved is hydrogen.



- 39.** Sulphuric acid acts as a dehydrating agent.



- 40.** (a) Carbon tetrachloride ( $\text{CCl}_4$ )  
(b) Carbon dioxide ( $\text{CO}_2$ )

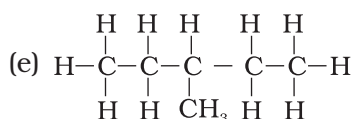
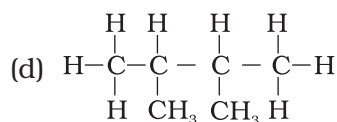
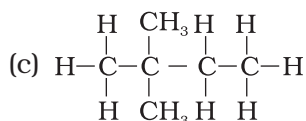
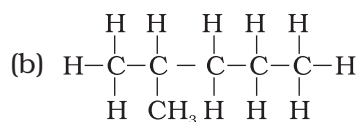
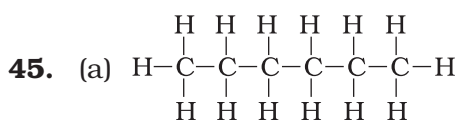
- 41.** (a) K, L, M  
2, 8, 7



- 42.** Carbon exhibits catenation much more than silicon or any other element due to its smaller size which makes the C–C bonds strong while the Si–Si bonds are comparatively weaker due to its large size.

- 43. Hint—** The two can be distinguished by subjecting them to the flame. Saturated hydrocarbons generally give a clear flame while unsaturated hydrocarbons give a yellow flame with lots of black smoke.

44. (a) —(iv)      (b) — (i)  
(c) — (ii)      (d) — (iii)



46. **Hint—** (a) Ni acts as a catalyst  
(b) Concentrated  $\text{H}_2\text{SO}_4$  acts as a catalyst  
(c) Alkaline  $\text{KMnO}_4$  acts as an oxidising agent

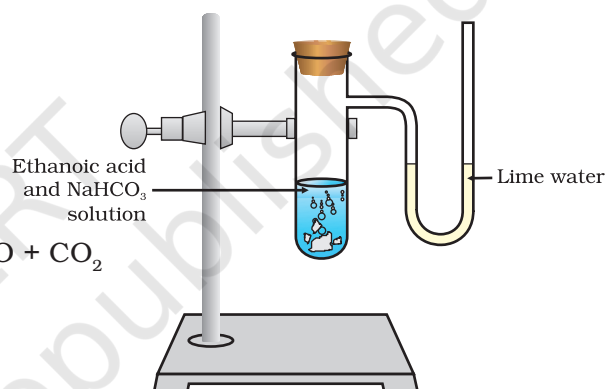
### Long Answer Questions

47.  $\text{CH}_3\text{COOH} + \text{NaHCO}_3 \rightarrow \text{CH}_3\text{COO Na} + \text{H}_2\text{O} + \text{CO}_2$   
X is sodium ethanoate

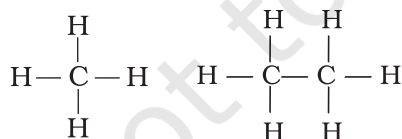
Gas evolved is carbon dioxide

**Hint—** Activity

Lime water will turn milky, a characteristic property of  $\text{CO}_2$  gas



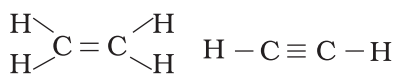
48. (a) Compounds of carbon and hydrogen are called hydrocarbons. Example, methane, ethane etc.  
(b) Saturated hydrocarbons contain carbon- carbon single bonds.  
Unsaturated hydrocarbons contain atleast one carbon - carbon double or triple bond.



Methane

Ethane

Saturated hydrocarbons



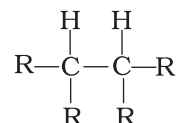
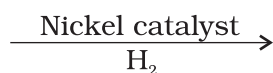
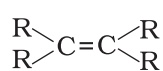
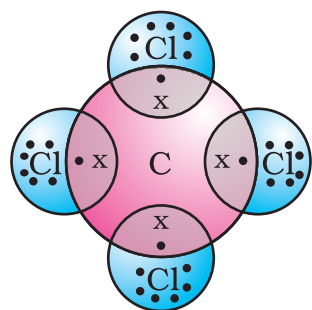
Ethene

Ethyne

Unsaturated hydrocarbons

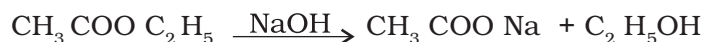
- (c) Functional group – An atom/group of atoms joined in a specific manner which is responsible for the characteristic chemical properties of the organic compounds. Examples are hydroxyl group ( $-\text{OH}$ ), aldehyde group ( $-\text{CHO}$ ), carboxylic group ( $-\text{COOH}$ ) etc.

**49. Hint—** Hydrogenation reaction

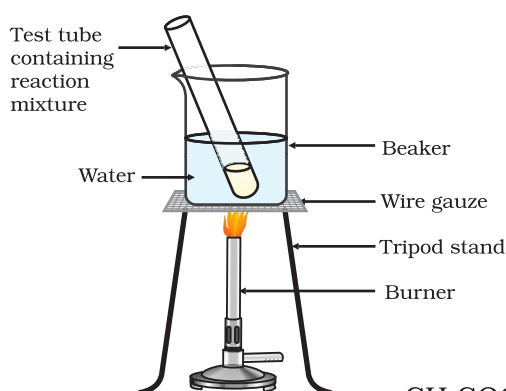


**50.** a)  $\text{CCl}_4$

(b) Saponification is the process of converting esters into salts of carboxylic acids and ethanol by treating them with a base.



**51. Activity**



- Take 1 mL ethanol (absolute alcohol) and 1 mL glacial acetic acid along with a few drops of concentrated sulphuric acid in a test tube.
- Warm in a water-bath at about  $60^\circ\text{C}$  for at least 15 minutes as shown in the Figure (It should not be heated directly on flame as the vapours of ethanol catch fire)
- Pour into a beaker containing 20-50 mL of water and smell the resulting mixture.

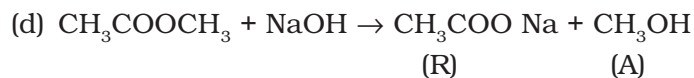
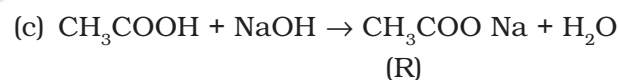
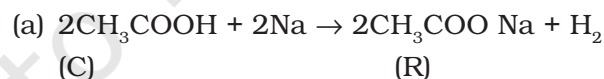


**52.** C — Ethanoic acid

R — Sodium salt of ethanoic acid (sodium acetate) and gas evolved is hydrogen

A — Methanol

S — Ester (Methyl acetate)



53. (a) It will turn milky



With excess  $\text{CO}_2$ , milkyiness disappears.



(c) As  $\text{C}_2\text{H}_5\text{OH}$  and  $\text{Na}_2\text{CO}_3$  do not react, a similar change is not expected



(d) The lime water is prepared by dissolving calcium oxide in water and decanting the supernatant liquid.

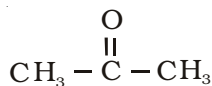
54. **Hint—** (a) By the dehydration of ethanol in the presence of concentrated  $\text{H}_2\text{SO}_4$ .



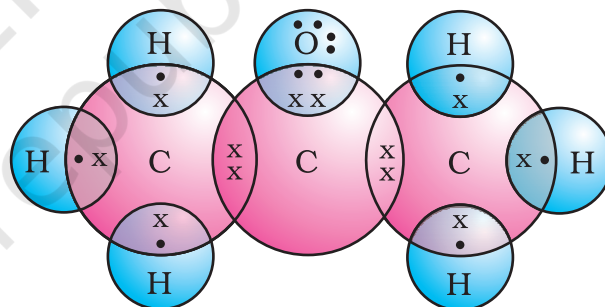
(b) By the oxidation of propanol using oxidising agent such as alkaline  $\text{KMnO}_4$ .



55.



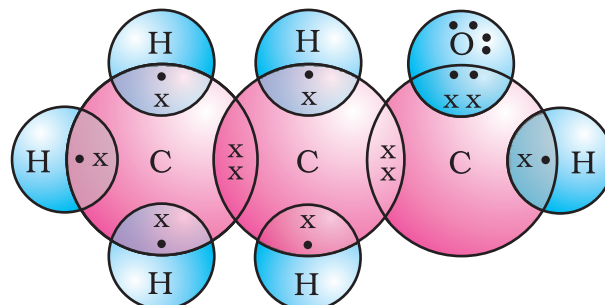
Propanone



Electron dot structure of propanone

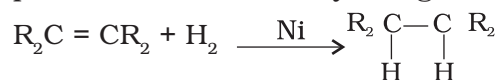


Propanal



Electron dot structure of propanal

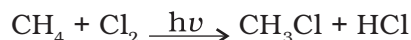
- 56. Hint—** (a) Unsaturated hydrocarbons add hydrogen in the presence of nickel catalyst to give saturated hydrocarbons.



- (b) Ethanol is oxidised to ethanoic acid in the presence of alkaline  $KMnO_4$  on heating.



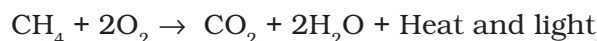
- (c) In the presence of sunlight, chlorine is added to hydrocarbons.



- (d)  $CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$   
Ester

Used in the preparation of soap

- (e) Most carbon compounds release a large amount of heat and light on burning



- 57.** Since compound C gives 2 moles of  $CO_2$  and 3 moles of  $H_2O$ , it shows that it has the molecular formula  $C_2H_6$  (Ethane). C is obtained by the addition of one mole of hydrogen to compound B so the molecular formula of B should be  $C_2H_4$  (Ethene). Compound B is obtained by heating compound A with concentrated  $H_2SO_4$  which shows it to be an alcohol. So compound A could be  $C_2H_5OH$  (Ethanol)

