

SCIENCE

Carbon and its Compounds

27. What are functional groups? Write the formula of the functional group present in alcohols, aldehydes, ketones and carboxylic acids.

Ans: Functional groups are atoms or group of atoms which determine chemical properties of organic compounds.

Alcohol	—	OH
Aldehydes	—	$\begin{array}{c} \text{O} \\ \parallel \\ \text{—C—H} \end{array}$
Ketones	—	$\begin{array}{c} \text{O} \\ \parallel \\ \text{—C—} \end{array}$
Carboxylic acids	—	$\begin{array}{c} \text{O} \\ \parallel \\ \text{—C—OH} \end{array}$

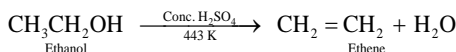
28. Write the structural formula of ethanol and list its two physical properties. What happens when it is heated with excess of conc. H_2SO_4 at 443 K? State the role of conc. H_2SO_4 in this reaction.

Ans: $\text{CH}_3\text{CH}_2\text{OH}$ is structural formula

Physical properties:

- (i) It is liquid with specific smell
- (ii) It is soluble in water.

When ethanol is heated with conc. H_2SO_4 at 443 K, ethene is formed.



Conc. H_2SO_4 acts as dehydrating agent.

29. Give reason why carbon neither forms C^{4+} cations nor C^{4-} anions, but forms covalent compounds which are bad conductor of electricity and have low melting and low boiling points.

Ans: Carbon cannot lose four electrons to form C^{4+} ions as very high energy is required to remove four electrons. Carbon can not gain four electrons to form C^{4-} ions as 6 protons cannot hold 10 electrons and energy needs to be supplied to overcome repulsion.

Carbon can share four electrons to form covalent compounds. Carbon compounds do not conduct electricity as they are non-polar and do not form ions.

They have low melting and boiling points due to weak van der Waal's forces of attraction.

30. Why homologous series of carbon compounds are so called? Write chemical formula of two consecutive members of a homologous series and state the part of these compounds that determines their (i) physical properties, and

(ii) chemical properties.

Ans: The series consists of members of same family with similar physical and chemical properties, therefore, called homologous series.

(i) CH_3OH

(ii) $\text{CH}_3\text{CH}_2\text{OH}$ are two consecutive members of homologous series.

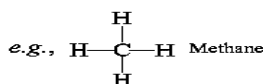
Alkyl group $\text{CH}_3\text{—}$ & $\text{CH}_3\text{CH}_2\text{—}$ part determines physical properties.

Functional group —OH determines chemical properties of the compounds.

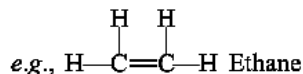
31. (a) Differentiate between alkanes and alkenes. Name and draw the structure of one member of each.

(b) Alkanes generally burn with clean flame. Why?

Ans: (a) Alkanes are saturated hydrocarbons and contain single bonds only



Alkenes are unsaturated hydrocarbons having double or triple bonds.



(b) Alkanes have higher percentage of hydrogen and less percentage of carbon, therefore burn with clear flame.

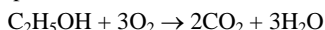
32. What happens when:

(a) Ethanol is burnt in air,

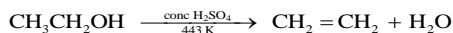
(b) Ethanol is heated with excess conc. H_2SO_4 at 443 K,

(c) A piece of sodium is dropped into ethanol?

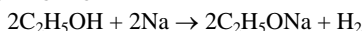
Ans: (a) CO_2 and H_2O are formed. Heat and light is produced.



(b) Ethene is formed



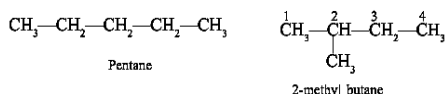
(c) Hydrogen gas and sodium ethoxide is formed



33. What is meant by isomers? “We cannot have isomers of first three members of alkane series.” Give reason to justify this statement. Draw the structures of two isomers of pentane, C_5H_{12} .

Ans: Isomers are those compounds which have same molecular formula and different structural formula.

In first three members of alkane series, branching is not possible, therefore, isomers are not possible.



(Contd.....)