CLASS 10- SCIENCE

CHAPTER 4- CARBON AND ITS COMPOUNDS

PART 5- ISOMERS, FUNCTIONAL GROUPS, HOMOLOGOUS SERIES AND NOMENCLATURE OF CARBON COMPOUNDS

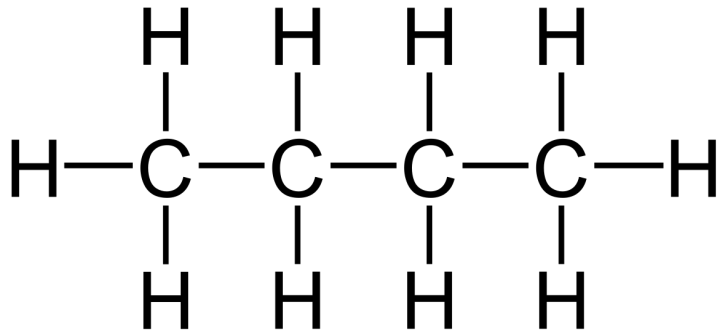
ISOMERS

- ✓Definition- Compounds having the same molecular formula but different structural formula and properties are called isomers, and this phenomenon is known as isomerism.

- ✓Structural isomers- Compounds having the same molecular formula but different structures due to different structural arrangement of atoms in their molecules are called structural isomers, and this phenomenon is known as structural isomerism.

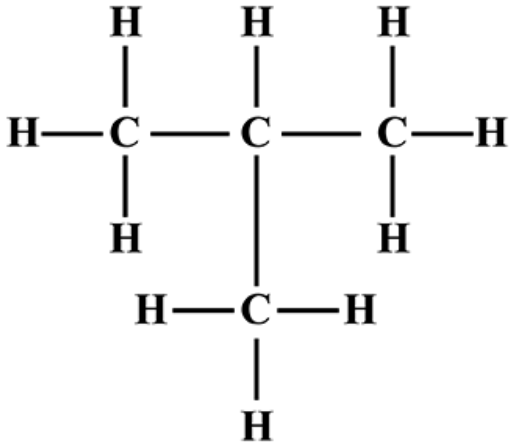
EXAMPLES OF STRUCTURAL ISOMERS

BUTANE (C_4H_{10})



n-butane

(straight chain)

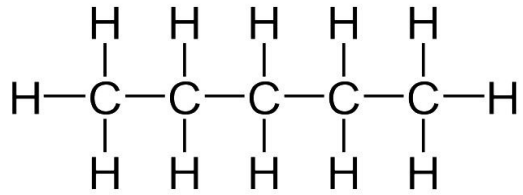


iso-butane

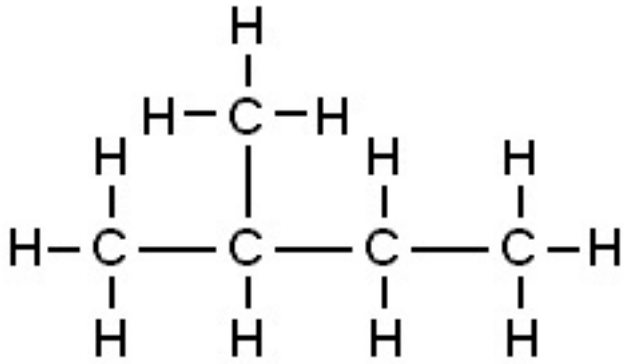
(branched chain)

EXAMPLES OF STRUCTURAL ISOMERS (contd.)

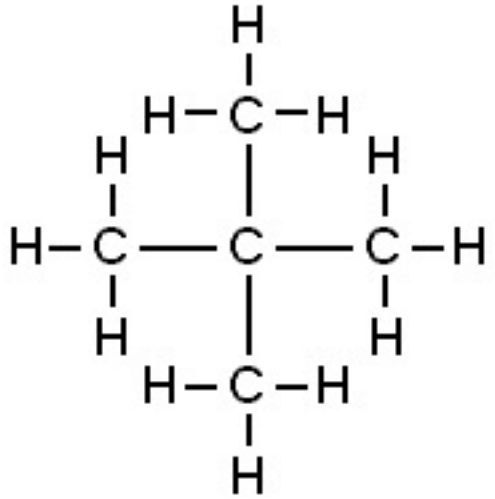
PENTANE (C_5H_{12})



n-pentane
(straight chain)



iso-pentane
(branched chain)



neo-pentane
(branched chain)

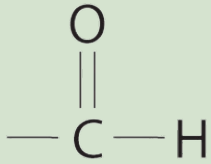
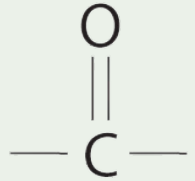
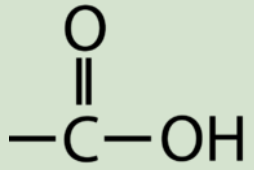
FUNCTIONAL GROUPS

- ✓Heteroatoms- In hydrocarbon chains, one or more hydrogen atom can be replaced by some other atom in accordance with their valencies and such atoms are called heteroatoms.

- ✓The heteroatoms and the group containing them make carbon compounds more reactive and impart chemical properties to them and so are called functional groups.

- ✓Few important functional groups are- Hydroxyl, Aldehyde, Ketone, Carboxyl and Halogen groups.

FUNCTIONAL GROUP IN CARBON COMPOUNDS

Heteroatom	Functional Group	Formula of Functional Group
Cl/Br	Halo- (Chloro/bromo)	—Cl, —Br (substitutes for hydrogen atom)
Oxygen	Alcohol	—OH
	Aldehyde	
	Ketone	
	Carboxylic Acid	

HOMOLOGOUS SERIES

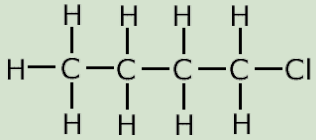
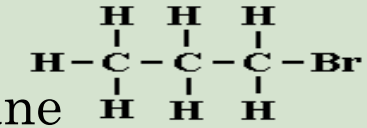
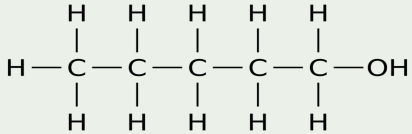
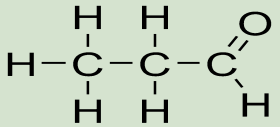
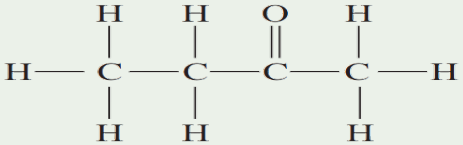
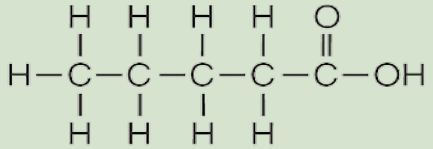
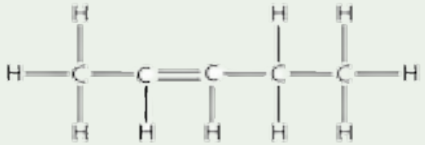
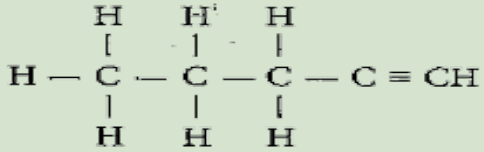
- ✓Definition- A series of organic compounds or hydrocarbons having the same functional group and similar chemical properties, where the successive members differ by CH_2 unit or 14 mass units is known as homologous series.
- ✓Examples- Methane (CH_4), ethane (C_2H_6), propane (C_3H_8), etc. belong to the same homologous series of alkanes, where the successive members differ by CH_2 unit.
- ✓Similar examples exists in alkenes, alkynes and in other homologous series of compounds with same functional groups.

CHARACTERISTICS OF HOMOLOGOUS SERIES

- ✓Members of the homologous series have the same general formula.
- ✓Members have the same functional group.
- ✓Members have similar chemical properties due to the same functional group.
- ✓The successive members differ by CH_2 unit or 14 mass unit.
- ✓Members show gradual change in physical properties due to difference in their molecular mass. For example, melting point and boiling point increases with increase in molecular mass.

NOMENCLATURE OF CARBON COMPOUNDS

- ✓Identify the number of carbon atoms in the compound, like compound with four carbon atoms is butane.
- ✓If the carbon chain is unsaturated, then the final ‘ane’ in the name of the carbon chain gets substituted by ‘ene’ or ‘yne’ for double and triple bonds respectively. For example, butane will become butene or butyne.
- ✓Identify the functional group present and indicate it in the name of the compound either by adding a prefix or a suffix. For example, a four carbon chain with an aldehyde group will be named as butanal.

CLASS OF COMPOUNDS	PREFIX/ SUFFIX	EXAMPLES
Halo alkane	Prefix- chloro, bromo, etc.	 Chlorobutane/ Bromopropane 
Alcohol	Suffix- ol	 Pentanol
Aldehyde	Suffix- al	Propanal 
Ketone	Suffix- one	 Butanone
Carboxylic acid	Suffix- oic acid	Pentanoic Acid 
Alkenes	Suffix- ene	 Pentene
Alkynes	Suffix- yne	Pentyne 

THANK YOU