Chemistry

Download Now

KD LIVE APP


2C2HIIII
C8HIIII
4C2HII

Historical Introduction

In starting it was considered that Compounds can be derived from two type of sources- living and non-living. Such compounds which are obtained from living source are known as organic compounds and such compounds which are obtained from non-living source are known as Inorganic compounds. But Wohler made an extra ordinary discovery when he converted an inorganic salt Ammonium Cyanate into an organic compound Urea.

NH_4CNO **(Ammonium Cyanate)** $\longrightarrow$ NH_2CONH_2 **(Urea)**

Important Definitions

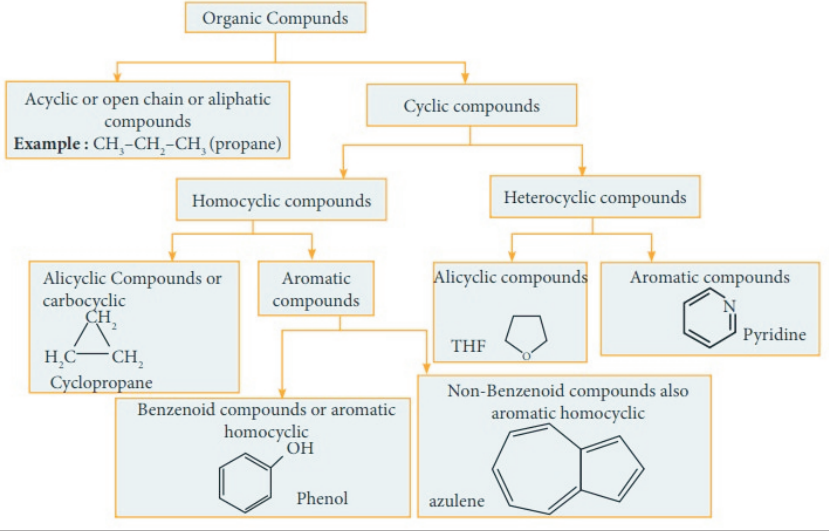
Catenation- Property found in Carbon Atoms to combine with each other and to make long Carbon – Carbon chain is known as Catenation.

Homologous Series- Such organic compounds which are different from one another by -CH_2- units are known as members of homologous series.

Isomers- Such Chemical compounds which has same chemical formula but different Structures are known as Isomers.

Functional Group- Atoms or Group of Atoms attached to Carbon chain which determine the properties of organic compounds are known as Functional Group.

Classification of Organic Compounds-



Hydrocarbons- Compounds of carbon and hydrogen are known as Hydrocarbons.

Types of Hydrocarbon- (1) Saturated Hydrocarbon (2) Unsaturated Hydrocarbon

Saturated Hydrocarbon- Such Hydrocarbons in which it is not possible to add more number of hydrogen atom at hydrocarbon chain are known as Hydrocarbons. Ex- Alkanes

Unsaturated Hydrocarbons- Such hydrocarbons in which hydrogen atoms can be added on carbon chain at carbon-carbon double bond or triple bond , are known as Unsaturated Hydrocarbons. Ex- Alkenes and Alkynes

Alkanes Definition and Formula

Alkanes are another name of saturated hydrocarbons. This means they only have carbon and hydrogen atoms in their chemical formula. And these atoms are bonded by single bonds only. That means all atoms share only one pair of electrons with each other.

The general formula for alkanes is C_nH_{2n+2}

Here n is the number of atoms of in Carbon in their chemical structure. So accordingly the number of Hydrogen Atoms is 2n+2. This chemical formula will stand true for all saturated hydrocarbons.

List of Alkanes

Methane (CH_4)	CH_4
Ethane (C_2H_6)	$CH_3\text{-}CH_3$
Propane (C_3H_8)	$CH_3\text{-}CH_2\text{-}CH_3$
Butane (C_4H_{10})	$CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_3$
Pentane (C_5H_{12})	$CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_3$
Hexane (C_6H_{14})	$CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_3$
Heptane (C_7H_{16})	$CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_3$
Octane (C_8H_{18})	$CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_3$
Nonane (C_9H_{20})	$CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_3$
Decane ($C_{10}H_{22}$)	$CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_3$

Unsaturated Hydrocarbons are categorized in following two categories :

Alkenes - They are organic compounds containing double bonds in their chemical structure. They are interchangeably known as olefins. Alkenes are class of unsaturated hydrocarbons containing carbon and hydrogen atoms having one or more carbon-carbon double bonds in its chemical structure.

The general formula of the homologous series of hydrocarbon is C_nH_{2n}. Hence, alkene contains 2 hydrogen atoms less than its corresponding alkane. Ethylene having the formula C_2H_4 is the simplest alkene. The IUPAC name of ethylene is ethane and it has the largest industrial production among all the alkenes.

List of Alkenes

Ethene (C_2H_4) $CH_2=CH_2$

Propene (C_3H_6) $CH_3-CH=CH_2$

Butene (C_4H_8) $CH_3-CH_2-CH=CH_2$

Pentene (C_5H_{10}) $CH_3-CH_2-CH_2-CH=CH_2$

Hexene (C_6H_{12}) $CH_3-CH_2-CH_2-CH_2-CH=CH_2$

Alkynes

Alkynes are unsaturated hydrocarbons containing a triple bond between two carbon atoms. The least number of hydrogen atoms is present in alkynes among alkanes, alkenes, and alkynes. The general formula of this class of organic compound is C_nH_{2n-2}. The first stable of an alkyne is ethyne or acetylene.

Acetylene is essential alkyne and the compound finds its use for many different purposes such as arc welding. Acetylene in this example is present in the flame as oxyacetylene flame (mixing acetylene with oxygen). It is also the precursor for many other compounds. Therefore, it is essential and interesting to learn about the nomenclature and preparation of this class of organic compounds.

Ethyne (C_2H_2)	$CH \equiv CH$
Propyne (C_3H_4)	$CH_3\text{-}C \equiv CH$
Butyne (C_4H_6)	$CH_3\text{-}CH_2\text{-}C \equiv CH$
Pentyne (C_5H_8)	$CH_3\text{-}CH_2\text{-}CH_2\text{-}C \equiv CH$
Hexyne (C_6H_{10})	$CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}C \equiv CH$

Alkyl-When any of the Hydrogen from alkane is removed the remaining structure is known as Alkyl.

C_nH_{2n+2} is General formula for alkanes but when 1 Hydrogen Atom is removed from the structure formula of Alkyl will have one Hydrogen less then the parent Alkane, so general formula of Alkyl is C_nH_{2n+1} .

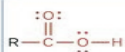
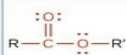
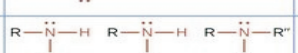
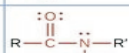
List of Alkynes

Methyl	CH_3-	
Ethyl	C_2H_5-	CH_3-CH_2-
Propyl	C_3H_7-	CH_3-CH_2-CH_2-
Butyl	C_4H_9-	CH_3-CH_2-CH_2-CH_2-
Pentyl	C_5H_{11}-	CH_3-CH_2-CH_2-CH_2-CH_2-

Functional Group- An atom of Group of Atoms Attached to Alkyl Chain which determines the chemical and physical properties of an Organic compound is known as Functional Group.

List of most Common Functional Groups:

List of most Common Functional Groups:

Compound Name	Structure of Compound and Functional Group (red)	Example	
		Formula	Name
alkene		C_2H_4 	ethene
alkyne		C_2H_2 	ethyne
alcohol		CH_3CH_2OH 	ethanol
ether		$(C_2H_5)_2O$ 	diethyl ether
aldehyde		CH_3CHO 	ethanal
ketone		$CH_3COCH_2CH_3$ 	methyl ethyl ketone
carboxylic acid		CH_3COOH 	acetic acid
ester		$CH_3CO_2CH_2CH_3$ 	ethyl acetate
amine		$C_2H_5NH_2$ 	ethylamine
amide		CH_3CONH_2 	acetamide