Chemistry

Class-XI

THE P-BLOCK ELEMENTS

GENERAL INTRODUCTION

History And Introduction

Nicholas Lemley, in 1675 had divided chemical substance into 3 parts.

- (i) Mineral substance: which are obtained from minerals. e.g., gold, silver, iron etc.
- (ii) Vegetable substance: which are obtained from vegetables. e.g., sugar, citric acid etc.

(iii) Animal substance: which are obtained from animals. e.g., albumin, gelatin etc. After some time when many of the chemical substance were discovered, it was found that some of them can be obtained from both vegetables and animals. So, this classification was failed. So chemical substance was then divided into two parts:

- (i) **Organic compounds**: which are obtained from living organism.
- (ii) Inorganic compounds: compounds which are obtained from any other sources except living organisms.

VFT (Vital force Theory)

- Berzelius in 1815 suggested that there is a mysterious force in living organisms which was named as Vital Force and said that organic compounds cannot be synthesized in lab. Before this any organic compound could not be synthesized in lab.
- In 1828 Wholer (German Scientist) synthesized an organic compound in lab which was urea.
- Urea was synthesized in lab by heating of Ammonium cyanate (NH₄CNO). So VFT was failed.

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Kekune's Principle

- Carbon has four valencies.
- Carbon has a property of catenation. It can make large chain with addition of other carbons.
- A carbon atom can share, 2, 4 or 6 electrons with other carbons & can form single, double or triple bond.

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For a carbon atom, it is not possible to make more than 3 bonds with adjacent carbon atom because a carbon atom completes its octet from overlapping which consists directional property.

Some Important Definitions

- (1) **Catenation:** The property of atoms of an element to link with one another forming chains of identical atoms is called catenation.
- (2) Homologous series: Homologous series may be defined as
 - (a) series of similarly constituted compounds in which the members possess the same functional group.
 - (b) have similar chemical characteristics and
 - (c) have a regular gradation in their physical properties.
 - (d) The two consecutive members differ in their molecular formula by CH₂.
- (3) Isomerism: The name was given by Berzelius. The organic compounds having some molecular formula and molecular weight but different properties (chemical and physical) and the phenomenon is called isomerism. Isomerism is actually permutation and combination of arrangement of atoms in different style either structurally or 3 –dimensionally to form molecules by the nature.

Homologous Series

The organic compounds which are structurally similar having same functional groups, combinedly gives a series known as homologous series and the members as **homologues**. The homologous series is characterised by:

- (i) The two adjacent members are differing by a CH₂ group or 14 atomic mass unit.
- (ii) All the members of a series have same general formula, general methods of preparation and similar chemical properties due to same functional group.
- (iii) The homologues show difference in physical properties due to change in molecular mass and structural arrangement of molecule.

Some standard Homologous Series Are							
S.No.	Name of Series	General Formula	I-homologue	II-homologue			
1	Alkane	C _n H _{2n+2}	CH4	СН3-СН3			
2	Alkene	C _n H _{2n}	$CH_2 = CH_2$	$CH_2 = CH - CH_3$			
3	Alkyne	C _n H _{2n-2}	$HC \equiv CH$	$HC \equiv C - CH_3$			
4	Halo alkane	$C_nH_{2n+1}X$	СН3-Х	СН ₃ – СН ₂ – Х			
5	Alcohol	$C_nH_{2n+2}O$	СН3- ОН	СН ₃ – СН ₂ – ОН			
6	Ether	$C_nH_{2n+2}O$	CH3 – O – CH3	CH ₃ - O - CH ₂ - CH ₃			

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7	Aldehyde	C _n H _{2n} O	Н-СНО	СН3-СНО
8	Ketone	C _n H _{2n} O	$CH_3 - C - CH_3$	$CH_3 - C - CH_2 - CH_3$
9	Carboxylic acid	$C_nH_{2n}O_2$	н-соон	СН3-СООН
10	Ester	C _n H _{2n} O ₂	$C - C - O - CH_3$	$H - C - 0 - CH_2CH_3$ $H - C - 0 - CH_2CH_3$ $CH_3 - C - 0 - CH_3$
11	Amide	$C_nH_{2n+1}NO$	H-CONH ₂	CH ₃ - CONH ₂
12	Nitro alkane	C _n H _{2n+1} NO ₂	CH ₃ −N ≥0	$CH_3-CH_2-N \gtrsim 0$
13	Amine	$C_nH_{2n+3}N$	CH ₃ -NH ₂	CH ₃ -CH ₂ -NH ₂