Chemistry Study Materials for Class 11

(NCERT Based Revision Notes of Chapter- 12)

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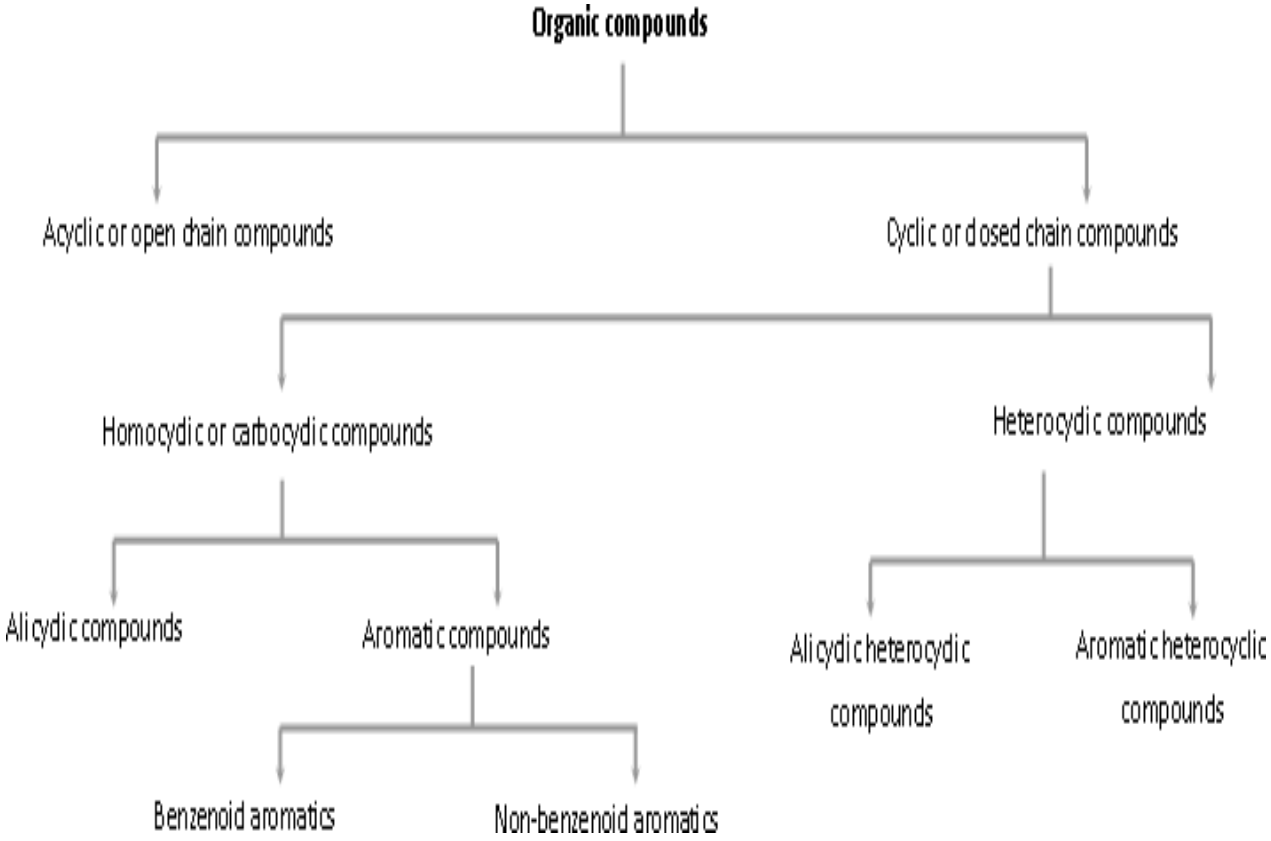
Tetravalency of carbon

Carbon is always tetra covalent, i.e. it forms 4 covalent bonds with other atoms C Due to Tetravalency of carbon it has a tetrahedron shape.

Catenation- The self linking property of carbon is known as catenation.



Classification of organic compound.

Homologous series: Homologous series is defined as a family or group of structurally similar organic compounds all members of which contain the same functional group.

Functional groups:A functional group may be defined as an atom or a group of atoms present in a molecule which largely determines the chemical properties.

Nomenclature of Organic compound

1.) The longest carbon chain in the molecule is identified.

2.) The numbering is done in such a way that the branched carbon atoms get the lowest possible value.

3.) The names of the alkyl groups attached as a branch are then prefixed to the name of the parent alkane and its position is indicated by numbers. The substituents are alkane molecules with one less hydrogen atom. Hence, they are named by replacing **'ane'** in its name by **'yl'**. 4.) The lower number is given to the first in alphabetical order.

5.) If two or more similar substituents are present, then the prefix di (for 2), tri (for 3), tetra (for 4), etc., are used before the name of the substituents and the position of each substituent is specified and separated by commas

Organic compounds having Functional Groups: The chain of carbon atoms containing the functional groups is numbered in such a way that the functional group attached to the carbon atom gets the lowest possible number in the chain. When there are more functional groups then a priority order is followed as: COOH ,-SO3H,-COOR,-COCl,-CONH2,-CN, -HC=O> C=O, -OH, -NH2> C=C= < -C≡ C-.

Isomerism:Two or more compounds having the same molecular formula but different physical and chemical properties are called isomers and this phenomenon is called isomerism.

Isomerism can be divided into two types

(i) **Structural Isomers** have different *structural formulae* because their atoms are linked together in different ways

Chain isomerism: When two or more compounds having same molecular formula but different carbon skeletons are referred to as chain isomers.

Position Isomerism : Compounds which have the same structure of carbon chain but differ in position of double or triple bonds or functional group are called position isomers.

Functional Isomerism : Compounds which have the same molecular formula but different functional group are called functional isomers and this phenomenon is called functional isomerism.

Metamerism: It is due to the presence of different alkyl groups on either side of functional group in the molecule.

(ii) Stereoisomers have the same structure and bond order but their atoms and groups of atoms are arranged differently in space.

Geometric Isomerism

Involves a double bond, usually C=C, that does not allow *free rotation* about the double bond (unlike a C-C single bond). They are not superimposable.

e.g. *cis*-but-2-ene and *trans*-but-2-ene

Optical isomerism

Involves an atom, usually carbon, bonded to four different atoms or groups of atoms They exist in pairs, in which one isomer is the mirror image of the other. e.g. butan-2-ol

Fission of covalent bond

Heterolytic cleavage: In this cleavage the bond breaks in such a way that the shared pair of electron remains with one of the fragments. Heterolytic fission yields carbocations or carbanions.

H3C – Br +CH3 + Br-

Homolytic Cleavage: In this cleavage the shared pair of electron goes with each of the bonded atom.

R – X R. + X.Homolytic fission yields free radical

Concept of Nucleophiles and Electrophiles

Nucleophiles : A reagent that brings an electron pair is called nucleophile ie nucleus seeking e g -OH

Electrophiles: A reagent that takes away electron pair is called electrophile I e electron seeking e g > C= O , R3C – X

Inductive Effect: The displacement of the electron along the chain of the carbon atoms due to presence of an atom or group at the end of the chain.

ɗ+++ ɗ ++ ɗ+

CH3- C H2 CH2 Cl

Resonance Effect :The polarity produced in the molecule by the interaction of two pi bonds or between a pi bond and lone pair of electron present on an adjacent atom. There are two types of resonance effect:

1) Positive resonance effect : In this effect the transfer of electrons is away from an atom or substituent group attached to the conjugated system.

The atoms or groups which shows +R effect are halogens,-OH , -OR,-NH2

2) Negative resonance effect : In this effect the transfer of electrons is towards the atom or substituent group attached to the conjugated system. The atoms or groups which shows -R effect are –COOH , -CHO , -CN

Electromeric effect: The complete transfer of shared pair of pi electrons to one of the atoms joined by a multiple bond on tne demand of an attacking reagent.Electromeric effect can be classified into +E and -E effects based on the direction of transfer of the electron pair.When the electron pair moves towards the attacking reagent, it is termed as the +E effect. The -E effect can be found in reactions when the electron pair moves away from the attacking reagent

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