Chemistry Study Materials for Class 12
(NCERT Based Notes of Chapter - 10)

Ganesh Kumar Date:- 14/09/2020

Haloalkanes and Haloarenes

Molecular asymmetry and Optical isomerism

Optical isomerism is due to molecular asymmetry. If all the 4 valencies of a carbon atom are satisfied by 4 different groups, it is called **asymmetric carbon or chiral carbon or stereo centre**. The resulting molecule is called asymmetric molecule. Such molecules are non-super imposable to their mirror images and are called **chiral molecules** and this property is known as **chirality**. The molecules which are super imposable to their mirror images are called achiral molecules. A chiral carbon is denoted by an asteric (*) mark.

e.g.: 2-Chlorobutane [$CH_3 – C^*HCl – CH_2 – CH_3$]

Here the 2nd C is chiral, since all the four valencies of this C are satisfied by 4 different groups.

Other examples: 2-butanol [$CH_3 – C^*HOH – CH_2 – CH_3$]

2-bromopropanoic acid [$CH_3 – C^*HBr – COOH$]

Lactic acid [$CH_3 – C^*HOH – COOH$]

Enantiomers

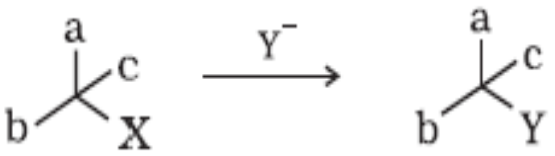
The stereo isomers related to each other as non-super imposable mirror images are called ***enantiomers***. They have identical physical properties. They differ only in the direction of rotation of the plane polarised light. If one of the enantiomers is dextro rotatory, the other will be laevo rotatory.

Racemic mixture

A mixture containing d and l form of a compound in equal proportion has zero optical rotation and such a mixture is called ***racemic mixture or racemic modification***. It is denoted by dl or (±). Here the rotation due to one isomer is cancelled by the rotation due to the other isomer. The process of conversion of an enantiomer in to a racemic mixture is called **racemisation**.

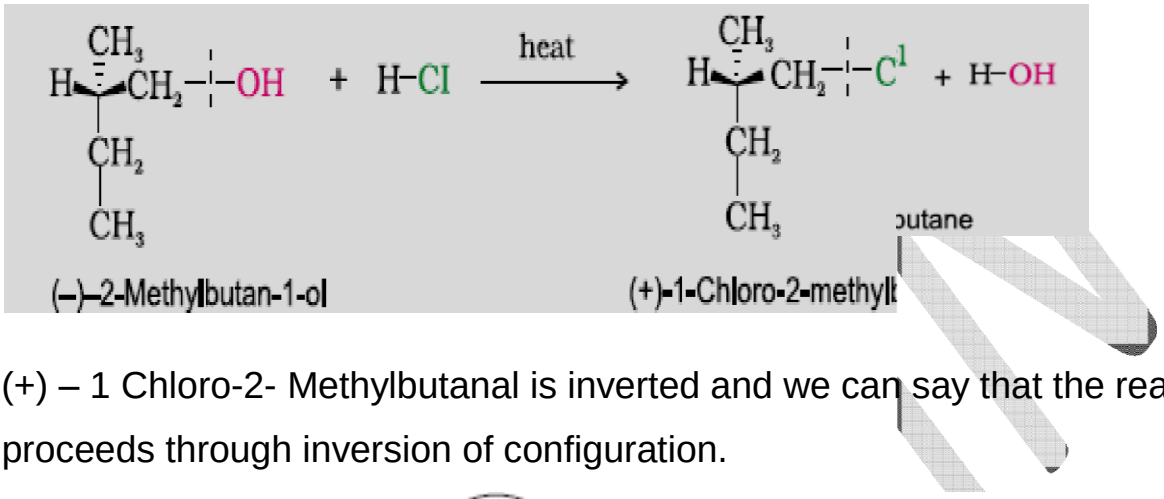
Retention and Inversion of configuration

If during a chemical reaction, there is no change in the spatial arrangement of bonds to an asymmetric centre, we can say that the reaction proceeds through *retention* of configuration. (Or, preservation of the integrity of configuration of a compound is termed as retention).

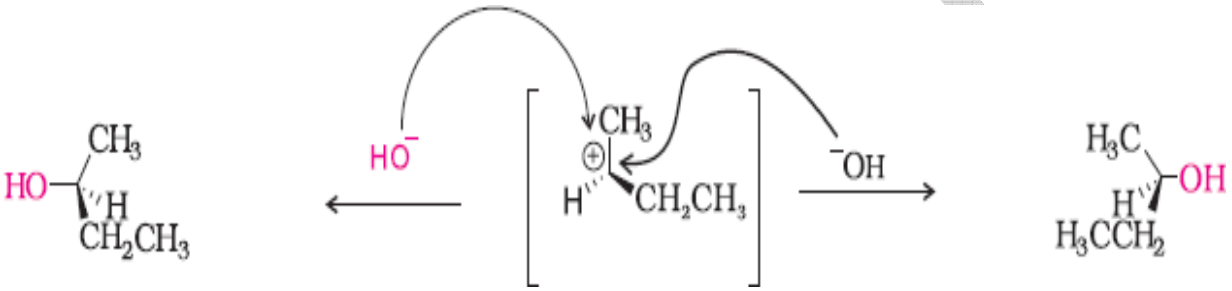


In general, if during a chemical reaction, no bond to the stereo centre is broken, the product will have the same configuration as that of the reactant. Such reactions always proceed through retention of configuration.

E.g. Reaction of 2-Methyl-1-butanol with HCl.



(+) – 1 Chloro-2- Methylbutanal is inverted and we can say that the reaction proceeds through inversion of configuration.



(-) 2-Butanol Planar carbocation (+) 2-butanol

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