Introductory Organic Chemistry
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Lecture - 13
Learning Objectives for Week - 3

Hello and welcome to introduction of Week 3. In this week, we are going to study chirality and stereochemistry. So, chirality is a geometric property of some molecules and ions. A chiral molecule, is really, has a non-superimposable mirror image. So, really the atomic connectivity stays the same, but the way we have arranged the atoms in space, in 3 D space, differs okay. So, it also gives some kind of handedness to the molecules. Such non superimposable mirror images are called as enantiomers.

I will not go into the details right now, but I will tell you that the presence of these enantiomers really makes a huge difference in our lives. Remember that the receptors or the binding sites in our body are also chiral in nature such that they have handedness. So, when we take a mixture of enantiomers it may be the case that only one of them can bind to the receptors in our body.

In fact, let me go over some of the more common chiral compounds around us. So, we have all smelt oranges and we have all smelt lemons, right? Why do they smell different? Really the molecule in place is, in fact, limonene in both cases. It has the same molecular formula, a similar structural formula, but only difference in the way is that the way we have arranged the groups in 3 D space. So, the handedness really plays a role in the way we smell compounds, right? So, you can imagine that the R-limonene is the one that smells more like orangey and has a rounded smell whereas, the S-limonene is more sharp and has a lemony smell.

A similar example can be given for spearmint and caraway seeds, they smell differently, but really the molecule at place is really the same molecular formula of carvone. But again you will notice that the different enantiomeric forms of this carvone give you two different smells. So, as you can see that different enantiomers will interact differently with our body and hence it is very important that the drug molecules that we use as medicines are enantiomerically pure, meaning they are not a mixture of 2 compounds with 2 different handedness, but really a pure compound.

In this chapter, we are gonna go over this concept of chirality we are going to look at how to name these compounds and we are also going to look at the relationship between various molecules. One thing to understand is that whenever we perform a chemical reaction more often we give rise to a mixture of compounds and sometimes the mixture is gonna be the mixture of enantiomers.

So, it is important to learn chirality much before we learn the reactivity of compounds and really as we go on to study reactivity in the next chapters, pay attention to what kind of molecules are getting formed at the end of the reaction; are we forming a pair of enantiomers, are we forming a pair of diastereomers, are the questions you should be asking as we start studying the reactions.

So, the learning outcome for this weeks are firstly, being able to identify chiral compounds and being able to predict if they will exhibit chirality or not. Secondly, being able to name various chiral compounds. So, these include the nomenclature of R and S or E or Z, being able to look at a molecule in the dash and wedge form and also, being able to identify the dash and wedge and Fischer stereoisomers and also being able to name these stereoisomers based on R and S and E and Z kind of nomenclature.

The other thing that we should ponder over is being able to figure out the relationship between two compounds. What is the relationship between them? Are they isomers? Are they stereoisomers? If yes, what kind of stereoisomers they are? So, all of these are going to be really important. So, when we are going over the chapter please pay attention to these concepts and it will be much easier for you to understand the chapter that way.