Introductory Organic Chemistry- II

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Lecture 26

Weekly Intro – 4

So, this is the introduction of the Week 4. Hello. So, today we are going to talk about what we are going to learn in this whole week. And the chapter, or the topic that we are going to discuss has the functionality of alcohols and carboxylic acids and their derivatives. It is a wide functionality range or functional group range that we can talk about.

Although, in our first course the Introductory Organic Chemistry-I, we have covered some introductory reactions of alcohols, epoxides and ethers. So, I would strongly encourage everyone to go back to that course to revise some of the important reactions of synthesis of alcohols, as well as some of the reactions that they do, some of the reactions of ethers and epoxides.

Now, in this week, what we are going to do is we are going to focus a little bit more on carboxylic acids and derivatives, wherein we will start talking about the functionality, we will start talking about where they are used and how they perform various reactions. We are going to talk about interconversion of various derivatives into each other.

At the same time, we will also go back and revise a little bit about alcohols, mainly, from the perspective of reduction and oxidation reaction. So, how alcohols can be oxidized to formaldehyde and then to further oxidation to form the carboxylic acids, and then carboxylic acids can be converted into various functional groups. So, that is the flow for this week. Let us start discussing carboxylic acids and their derivatives a little bit.

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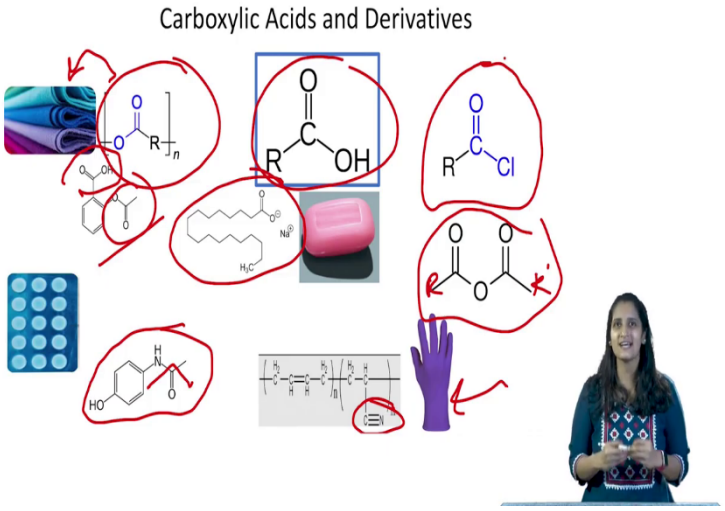

Now, this is the functionality, RC=OOH. And really, in our daily life, we are using some or the other derivative of carboxylic acid. In fact, many of the carboxylic acid derivatives are found in our body. But I have chosen some very key molecules here that have played very important role in history. So, to just begin with here is a Sodium Stearate molecule.

So, this is the Sodium salt of Stearic acid, and it is one of the components of soap. And just, nowadays we are talking about using soap due to the pandemic. But remember the first time we started using soap to now just because of the use of soap we have saved so many lives because we have been able to control a lot of infections.

So, just here is an example of carboxylic acid, and then there are many acids, you know, acetic acid, you have citric acid, tartaric acid. So many of them are found in nature that we use it in our foods, there are various assets that we use, as solvents. They are used as food preservatives, and so many applications. Here is the next functionality, we have the esters.

So, here is an example that we almost use every day it is a polyester molecule, so polyester fabric. So, the moment we figured out how to convert and or make these polyester molecules we have been able to save a lot of load on cotton and that is the molecule here. We also have Aspirin, it is a tablet that all of us must have consumed some other time in our life and Aspirin as we know here has a carboxylic acid functionality, as well as an ester function functionality.

So, RC=OOR is the ester functionality here. Then we come to amides, you have paracetamol. Again, something that we must have consumed has this amide functionality. Acetaminophen is another name for it, and then here we have Nitriles. So, C≡N is the next functional group.

Now, it may not look like other functional groups. It does not have that characteristic C=O linkage. Here is a nitrile glove that we are using almost every day now, but here is the thing that even though nitriles do not look like carboxylic acids they behave very similarly. So, they are going to do very similar reaction, so that is why we are going to include some of the reactions. Hydrolysis reactions of Nitriles in this chapter.

The two other functional groups here. One is this acid chloride and anhydride. So, sorry, this is R and R'. So, acid chloride and anhydride link functional groups. These two we do not find their use or applications in everyday life because they are very, very reactive, but they are precursor to most other things that we use in our everyday life.

So, even though you do not directly find them that here is the acid chloride or here is how you use it. Most industries, chemical industries are using them to form something different. So, that is why all of these are really important molecules. And we are going to look at how they do their reactions this week. So, let us start looking at carboxylic acids and their derivatives.