Identifying Stereochemical Labels for Stereoisomers

Transcript

Instructor: Brett McCollum

00:00:00:00 - 00:01:02:84
Instructor: In this video, you're going to learn how to use the electron pushing formalization as a way to represent reaction mechanisms in organic chemistry. It's important to keep in mind that at this point, we're going to focus on learning the rules for using the electron pushing formalization as a way to communicate. But later as you move through the course, it will actually be an important tool for you to begin to think about chemical reactions and make predictions about what would be the outcome of those reactions. To practice today, we're going to start by looking at the reaction of ethanol with ammonia. We're going to draw our reaction, the ethanol molecule reacting with ammonia, and that reaction will form ethoxide ion and the ammonium ion.

00:01:07:57 - 00:01:46:51
Instructor: And I've included the formal charges on our atoms in the product. We look at this reaction and the important first step is to think about what has changed as you go from the reagents to the products. We see that an acid base reaction has occurred. A proton has transferred from ethanol to the ammonia to form ammonium. But with the electron pushing formalization, we want to take the position of the electrons and the flow of the electrons, not the flow of the proton.

00:01:46:51 - 00:02:17:09
Instructor: We have to think about what electrons were used to form that new bond between a nitrogen and a hydrogen in the product. Let's draw those electrons in. We'll start by thinking about where are all of the lone pair electrons that are implicit. Let's make them explicit. We have two pairs of lone pairs on the oxygen and one lone pair on the nitrogen.

00:02:17:09 - 00:03:03:01
Instructor: To form our product, we're going to use this lone pair because it's no longer here in the product to form a new chemical bond with the hydrogen. In contrast, the oxygen has two lone pairs initially, and in the product, it will have three. This bonding pair has now become a lone pair in the product. We're going to represent that change now by using curved arrows to show the flow of the electrons as we move from reagent to product. Here we have the lone pair on the nitrogen attacking the proton.

00:03:03:17 - 00:03:44:96
Instructor: Because that hydrogen can only have one chemical bond it at a time, that will break the bond with the oxygen, and that electron pair moves onto the oxygen atom, resulting in three lone pairs on the oxygen, increasing the amount of negative charge, the number of electrons, making it a negative one formal charge. Whereas the nitrogen that initially was neutrally charged has shared some of its electron density and become positively charged, and that's how we can describe this reaction using the electron pushing formalization.