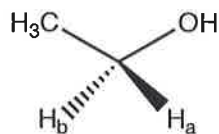


Names: Key & _____
Consider ethanol.

Quiz 20



1. What type or types of molecular interactions [induced dipole-induced dipole; dipole-induced dipole; dipole-dipole; hydrogen bonding; covalent bonding; ionic; pi-interactions] could alcohol dehydrogenase make with the methyl group during binding?

induced dipole - induced dipole

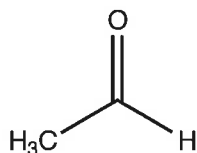
2. What type or types of molecular interactions [induced dipole-induced dipole; dipole-induced dipole; dipole-dipole; hydrogen bonding; covalent bonding; ionic; pi-interactions] could alcohol dehydrogenase make with the hydroxyl group during binding?

*dipole - induced dipole hydrogen bonding
dipole - dipole*

3. Build a molecular model of ethanol. Hold the methyl group in your right hand and the hydroxyl group in your left hand. Considering the interactions that you listed for #1 and #2, alcohol dehydrogenase will bind ethanol in a specific orientation. Imagine that your mouth is the active site of alcohol dehydrogenase. Notice that you would have a strong preference for reacting with one of the hydrogens on the sp^3 -hybridized C1 over the other one based on its proximity to your mouth. To distinguish between these hydrogens, biochemists use prochiral nomenclature. Align your model as in the chemical structure of ethanol above with C1 in the middle (H_b should be rotated back and H_a should be forward). Assign the priority of the three forward groups attached to C1 (molecular weight takes priority here). Moving from highest to lowest priority, if you rotate clockwise, H_a is *pro-R*. Moving from highest to lowest priority, if you rotate counterclockwise, H_a is *pro-S*. Is H_a *pro-R* or *pro-S*? *pro-S*

4. Rotate your model of ethanol such that C1 is in the middle, H_a is back, and H_b is forward with the hydroxyl and methyl groups. Assign the priority of the three forward groups attached to C1 (molecular weight takes priority here). Moving from highest to lowest priority, if you rotate clockwise, H_b is *pro-R*. Moving from highest to lowest priority, if you rotate counterclockwise, H_b is *pro-S*. Is H_b *pro-R* or *pro-S*? *pro-R*

Consider acetaldehyde:



5. Assign the priority of the three groups attached to the sp^2 -hybridized C1 (molecular weight takes priority here). From your prospective looking down onto this planer molecule, moving from highest to lowest priority, if you rotate clockwise, you are looking at the *re*-face. From your prospective looking down onto this planer molecule, moving from highest to lowest priority, if you rotate counterclockwise, you are looking at the *si*-face. Is your prospective on the *re*-face or the *si*-face? *si-face*

If a hydride is added on the *re*-face, it will become the *pro-R* hydrogen. If a hydride is added on the *si*-face, it will become the *pro-S* hydrogen.