**Addition Reactions**

An additions reaction occurs with organic compounds who have double or triple bonds between other carbon atoms(alkenes and alkynes). In a typical reaction, a small molecule is reacted with the original compound to form either one product or two isomers. When the original reactant is an asymmetric alkene and some sort of halide the reaction will form two isomers. The more abundant or major compound in this case will be the one where the hydrogen bonded to the carbon with the most amount of hydrogens in the alkene. An addition reaction can be determined if the carbon atoms are bonded to more atom in the product then in the reactant.

**Elimination Reaction**

In an elimination reaction, atoms are removed from a compound and a double bond forms between 2 carbon atoms. An elimination reaction will have less atoms in the product then in the reactant. When an asymmetric reacts and an elimination reaction occurs often isomers are formed. The major isomer is the one where the hydrogen atom is removed from the carbon atom with the most amount of hydrogen atoms which is also bonded to the carbon atom which lost a functional group. An alkyl halide and a strong base will go through elimination.

**Substitution Reaction**

In every substitution reaction a carbon bond is broken and a new one is formed with another compound. Typically a substitution reaction involves two compounds that swap a functional group and result in two products. Alcohols and haloalkanes are the compounds that most frequently result in substitution reactions. Alcohols and acids with halogens often undergo substitution. Haloalkanes and hydroxide ions also often undergo substitution. Other compounds such as regular alkanes can also undergo substitution however it is very difficult as they unreactive. When identifying this reaction it should be noted that the products and reactants should have the same number of bonds.

**Oxidation and Reduction Reactions**

Oxidation and Reduction reactions are not separate reactions per se as the oxidation of an organic compound requires the reduction of an inorganic compound and vice versa. During a redox reaction the compound being oxidized loses electrons while the compound being reduced gains electrons from the compound being oxidized. When an alcohol is reacted with an oxidizing agent it results in an aldehyde or ketone depending on the location of the hydroxyl group on the alcohol. When an aldehyde is reacted with an oxidizing agent it results in a carboxylic acid. An alkene can be reacted with a reducing agent and result in an alkane. These reactions can all be flipped on their heads as when a carboxylic acid is reduced it produces an aldehyde and when a aldehyde is reduced it produces an alcohol. Alkenes can be reduced to alkanes as well.

**Unknown Summary**

Unknown #1 was found to be propene which was an addition reaction with HF, this was found because two compounds were reacted and resulted in two isomers which appeared to be an addition reaction with markovnikov’s rule. HF also is a halide and halides tend to be involved in addition reactions. Propene was found as it had 3 carbons which is in the products and addition reactions require an alkene.

Unknown #2 was found to be cycloheptanol as when it reacted with K2Cr2O7 an oxidizing agent a ketone was produced which indicated the original compound was an alcohol and cycloheptanone as an alcohol is cycloheptanol.

Unknown #3 was found to be 2-methylpentanol because when it reacts with K2Cr2O7 an oxidizing agent the alcohol can go under direct oxidation and oxidize to a carboxylic acid. 2-methyl pentanol will also turn into 2-methylpentene when it undergoes elimination with H2SO4 as the hydroxyl group is removed and a double bond replaces it. Unknown #4 was found to be hexanoic acid

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