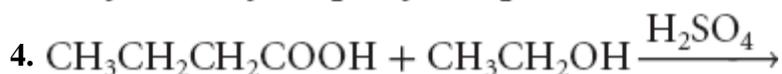
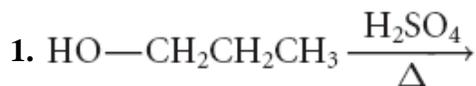


Addition, Substitution, Elimination, and Esterification Reactions

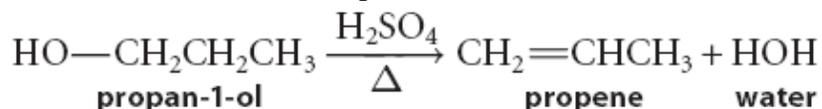
Sample Problem

Identify each type of reaction and then complete the equation.

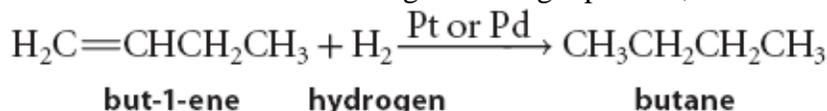


Solution

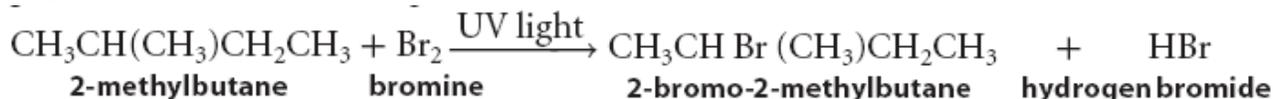
1. The alcohol is heated in the presence of a strong acid. This reaction is an elimination reaction. An alkene and a small second product are formed in elimination reactions:



2. A small molecule reacts with an alkene in such a way that two parts of the small molecule become bonded to two adjacent carbons in the organic molecule. This reaction is an addition reaction. The addition reaction gives a single product, as follows:



3. A small molecule reacts with an alkane in the presence of ultraviolet light in such a way that one part of the small molecule is bonded to a carbon of the organic molecule. This is a substitution reaction. Depending on how much bromine is present, the reaction may continue until all the hydrogen atoms have been substituted. Furthermore, the first bromine atom could replace any one of the hydrogen atoms. Only one of the many products that are possible for this reaction is given here:



4. A carboxylic acid reacts with an alcohol. This is an esterification reaction. An ester and water will be formed as products. The equation is completed as follows:

