6.1: Introduction to Reactions

Introduction

“What has one voice, and is four-footed in the morning, two-footed in the afternoon and three- footed at night”?

-The Sphinx (Oedipus)

In any reaction, a transformation from a starting material to a final product is the basis. In other words, a budding green chemist such as yourself will investigate how a chemical will undergo one or more treatments to produce a needed product in a manner consistent with the dogmas of GC. Typically, any chemist is chiefly interested in the concepts of yield and specificity, namely, how efficiently is the conversion done based on a theoretical yield and how exactingly is it done (with respect to a series of products). These latter terms have long been the “mantras” of organic, synthetic, and biochemical studies. The secret to any successful transformation is ensuring that we get high yield and maximum specificity no matter what else is generated. A successful chemical transformation for a green chemist, however, must go beyond these staid concepts and introduce the concepts of safety, waste, energy, and number of steps (which are reflected in the first three terms).

The history of chemistry has been one of neglecting such concepts because of the lack of environmental consciousness, low regard for safety, and lack of understanding of economics or life cycle. When we approach the riddle of doing chemistry, we have not done so with an eye to mimicking nature. We have always approached it anthropomorphically, that is to say, with the resolute conviction that we can do it better, but we fail.