

## 12.11: Reaction Mechanisms and the Elementary Step

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What most people conceptualize as an airplane is the final product. They do not see the long, complex assembly line that begins with a few parts and gradually becomes the finished product. Assembly lines are intricate organizations that go through a series of complicated steps to bring hundreds (maybe thousands) of parts together into the completed aircraft.

### Reaction Mechanisms and the Elementary Step

Chemical reactions rarely occur in one simple step. The overall balanced equation for a chemical reaction does not always tell us how a reaction actually proceeds. In many cases, the overall reaction takes place in a series of small steps. An **elementary step** (or elementary reaction) is one step in a series of simple reactions that show the progress of a reaction at the molecular level. A **reaction mechanism** is the sequence of elementary steps that together comprise an entire chemical reaction. As an analogy, consider the route that you might take while driving to the grocery store. That route may consist of several turns, similar to the elementary steps. The overall reaction specifies only the beginning point (your house) and the final destination (the store), with no information about the specifics in between.

### Summary

- An elementary step (or elementary reaction) is one step in a series of simple reactions that show the progress of a reaction at the molecular level.
- A reaction mechanism is the sequence of elementary steps that together comprise an entire chemical reaction.

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