

## Stoichiometry 2

# What is Stoichiometry?

### INFORMATION

Chemical reactions, mathematically speaking, are an efficient and tidy process. As a result of the law of definite proportions, nature has made it easy to determine how many atoms of various elements are required to make a particular compound. When carrying out chemical reactions, it is necessary to understand how many atoms of the elements involved are required to make complete units of the product or products. Just as you cannot make a cheese sandwich without two slices of bread and one slice of cheese (see **Stoichiometry 1 – Cheese Sandwiches**), you cannot make a complete formula unit if you do not have all of the atoms available to do so.

**Stoichiometry** is the arithmetic of chemical reactions. It is a means of determining how much of the reactants are required or how much product is produced for a particular situation. Careful stoichiometry calculations are necessary to carry out efficient reactions; they are necessary to acquire the necessary amount of product; they help businesses protect their bottom line.

Much in the same way that the rules of hockey are necessary to play hockey consistently from game to game, the rules of stoichiometry are required to get consistent results from reaction to reaction.

### The Significance of the Mole

The mole concept is necessary to normalize the quantities of elements and compounds involved in chemical reactions. To use a tired euphemism, it allows the comparison of apples to apples.

The question below demonstrates the need for normalized quantities.

### Key Question

1. A hardware company sells tool kits that include four tools – one pair of pliers, one adjustable wrench, and two screwdrivers. The company needs to ship 1000 toolkits by the end of the day. They have 88.22 kg of pliers, 77.81 kg of wrenches, and 45.69 kg of screwdrivers in stock. Does the hardware company have enough tools to make all of the toolkits?