2.6.1: Systems of Measurement

Learning Objectives

- State and understand the uses of the three systems of measurement used in chemistry.

The units that people use change, based on where the person lives and the purpose of using each unit. The **metric system** is used by the citizens of nearly all countries, as shown below in Figure 2.6.1.1. Its units, such as meters, liters, and grams, are based on multiples of 10, making metric conversions very simple. The United States has legally adopted the metric system for measurements, but does not use it in everyday practice. Instead, citizens living in the United States use the **U.S. system** of units, which is occasionally referred to as the **English system** of units. U.S. units, such as inches, cups, and ounces, are not used in science because of the difficulty in converting from one unit to another.

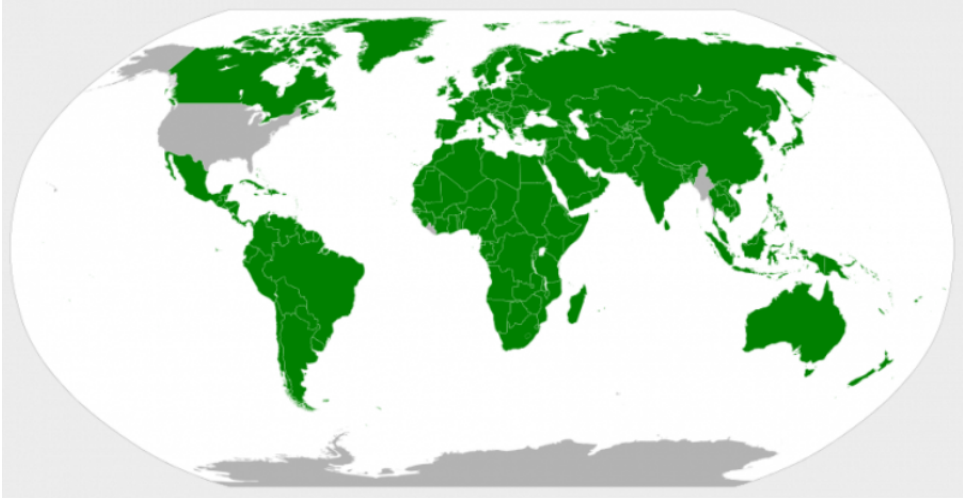

Figure 2.6.1.1: Global map. Countries colored in green have adopted the metric system, and those shaded in gray use the U.S. system of units.

How long is a yard? The answer depends on when the question was asked. Today, the definition of a "yard" is standardized. However, at one time the value of a "yard" was arbitrarily defined as the distance from the tip of the king's nose to the end of his outstretched hand, which created a significant problem: When a new king was crowned, the definition of the yard changed.

How hot is a cup of coffee? A citizen in the United States measures temperatures in degrees Fahrenheit, but a Canadian citizen would take a temperature measurement in degrees Celsius. This difference in units can cause confusion, since most individuals do not have an intrinsic understanding of units that they do not typically use in their everyday lives. Misunderstandings can be amplified when individuals are discussing science. The **International System of Units** is a system of measurement based on the metric system and has been adopted by scientists as their official system of measurement. The acronym **SI** is commonly used to refer to this system and stands for the French term, *Le Système International d'Unités*. While the metric and SI systems share many common units, there are some key differences, generally based on the unit's versatility.