Properties of Matter

Chemistry is the study of matter and its interaction with energy. Matter is anything that has **mass** and **volume**.

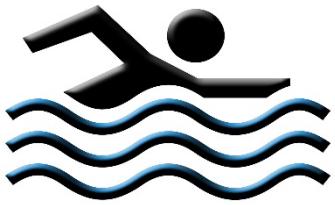
1. An object's mass refers to _____ and an object's volume refers to _____. Fill in each blank.
   a. the amount of space it takes up
   b. the reactivity of the object
   c. how dense an object is
   d. the amount of stuff present in the object

Extensive vs. Intensive Properties

2. Matter has characteristic properties. A **property** is a characteristic that distinguishes a substance. One way to describe matter is by using extensive and intensive properties. **Extensive** properties depend on the amount of matter present. **Intensive** properties do not depend on the amount of matter present.

   During the 2024 Paris Olympics, swimmers declared the pool used for their events was "slow." While "slow" is not an accurate way to describe water, which of the following is an extensive or an intensive property of water in the Olympics pool?

   The pool water is colorless.
   The density of water in the pool is 1.00 g/cm^3.
   The depth of water in the pool is 7 feet.
   The weight of water in the pool is 5,511,556 pounds.
   The temperature of the water in the pool is 80°.
   The volume of water in the pool is 660,000 gallons.



   Extensive Properties of Water

   Intensive Properties of Water

Physical vs. Chemical Properties

3. A **physical** property is a characteristic that can be observed or measured without changing the identity of the substance. Examples include boiling point, melting point, smell, density, color, shape, and size. A **chemical** property is a substance's ability to undergo changes that transform it into different substances. Examples include reactivity, flammability, and corrosivity.

   Copper is a metallic element. A sample of copper is studied in the lab and the following observations were made. A reddish-brown piece of copper has a mass of 15.00 grams. Its density is 8.9 g/cm^3. This sample conducts electricity and reacts with nitric acid. It does not dissolve in water. The sample can be flattened by gentle hammering. The copper melts at 1084°C. The copper rusts when exposed to oxygen. Which of these observations are physical properties? Which are chemical properties?

   Physical Properties:

   Chemical Properties:

Image: https://www.publicdomainpictures.net/en/view-image.php?image=28520&picture=swimming-symbol