Lesson 1: Classifying Matter

Notes:

Matter – anything that has mass and volume.

***Orally*:** *Give examples of matter. Is air an example of matter? Why?*

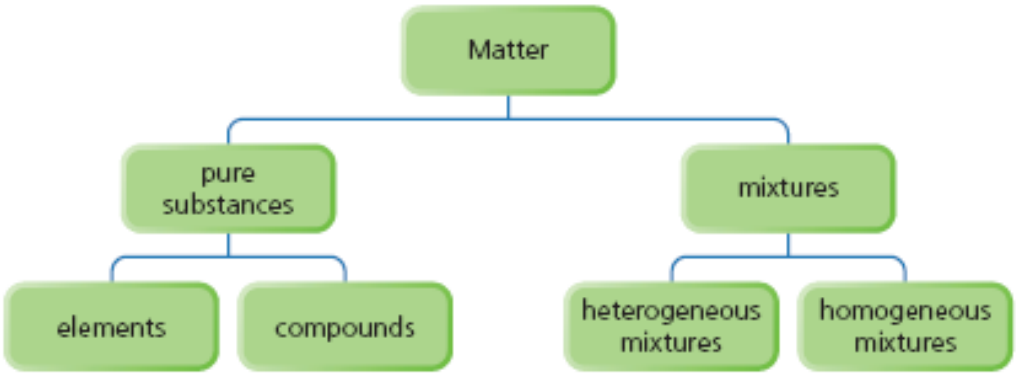
Element – a class of substances that cannot be separated into simpler substances by chemical means. Elements contain only one kind of atom. e.g., A sample of the element gold is only made up of only gold atoms. (refer to the periodic table of elements).

Atom – the smallest unit of matter that retains all of the original properties of a given element. Democritus was the first philosopher to propose the idea of atoms.

Compound – a class of substances that are made up of two or more elements that are chemically bound in a fixed ratio. (i.e., the elements are not simply mixed). e.g., Water is made of 2 hydrogen atoms and 1 oxygen atom (H_2O).

Molecules – substances that are made up of two or more atoms that are chemically bound. e.g., H_2 is a molecule of an element while H_2O is a molecule of a compound.

Pure Substance – matter that is made of one kind of substance. ***Orally**: You can have pure water if the substance only contains water and nothing else.* (Record the flow chart below).



Mixture – a combination of two or more pure substances that are "mixed" together but do not chemically bind to each other.

a. heterogeneous mixture – mixtures that contain particles that are visibly distinguishable. These mixtures are not uniform in composition.
e.g., trail mix, "nuts and bolts"
***Orally**: Can you think of other mixtures that can be described as heterogeneous?*
How can we show that these mixtures are not uniform throughout the sample?

b. Homogeneous mixture – mixtures where the individual components cannot be distinguished from each other (i.e., same phase). These mixtures are uniform throughout the sample.
e.g., Iced-tea, air, alloys

***Oral**ly: Same question as above.*

- **Teacher Demo: Replacement of Copper by Silver**
  Show the class a 0.1 mol/L solution of silver nitrate. Discuss the fact that this compound includes silver, yet there is no evidence of the silver in the solution, because the properties of the compound are different than those of its component elements.
  Allow the class to examine a brand new penny, and then let a student add it to the silver nitrate solution. Gather the class to watch while the silver crystallizes out of the solution as it is replaced with the copper. It will first darken, and then take on a shine.
  By the next day, the crystals will take up more space than the penny, although the lattice is very loose. Tell students that, if melted, these crystals would make a piece of pure silver.

  – *Ask What They Think Now:* Ask, *If you were presented with a possible compound, what might you do to test it?* Students should make a series of suggestions to eliminate mixtures (e.g., examine the possible compound to see if it can be physically separated, put it in water, use a magnet, use a screen to filter it, etc.).

Assign:

Page 90 “Before you leave this page” #1, 3
Page 95 “Check your understanding of Topic 2.1” #1, 2, 5 (see page 91)

If students finish early, have them read “properties of matter and chemical reactions” on pages 89-90 and answer #2, 4 on page 90 and #3,4 on page 95.