***Elements, Compounds and Mixtures***

* Scientists like to classify things.
* One way that scientists classify matter is by its composition.
* Ultimately, all matter can be classified as mixtures, elements and compounds.

**Why isn’t it a good idea to classify matter by its phases?**

* Because one kind of substance can exist in more than one phase – such as H20. And matter changes phases rather easily.

**Why isn’t matter classified according to its**

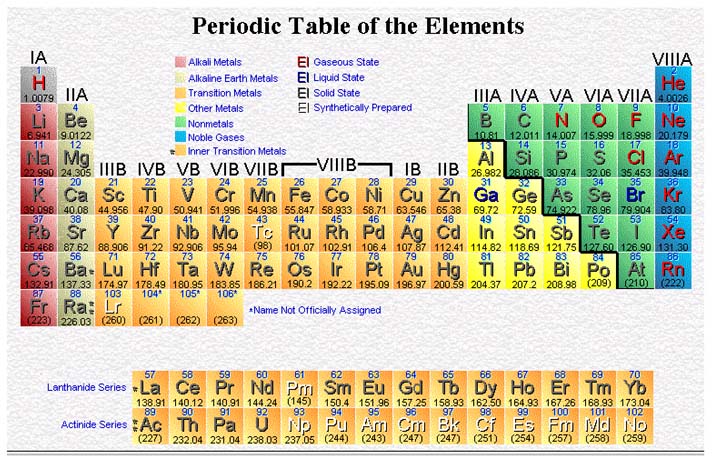
**physical characteristics, such as color?**

* Scientists wouldn’t find it very useful to group gold, sunflowers, and the sun together.
* Scientists ask themselves these questions?
  + Is the matter uniform throughout?
  + Can it be separated by physical means?
  + Can it be separated by chemical means?

**By asking these questions scientists can classify matter into:**

* Elements, Compounds, Mixtures

***Elements***

* Elements are the simplest pure substance.
  + An element can not be changed into a simpler substance by heating or any chemical process.
* The smallest particle of an element that has the properties of that element is called an atom.
  + An atom is the basic building block of matter.
* There are more than one hundred known elements in the universe listed on the periodic table of elements.
* An **element** is a pure substance (only 1 type of particle) that **cannot** be separated into simpler substances by physical or chemical means.
* All elements are made of atoms.
* Atoms of the same element are alike.
* Atoms of different elements are different.
* In 1813, a system of representing elements with symbols was introduced.
  + Each symbol consists of one or two letters.
  + Two letters are needed for a chemical symbol when the first letter of that element’s name has already been used.

***Compounds***

* Compounds are also pure substances.
* But compounds are made from more than one element.
* Water is a compound.
* Water can be broken down into simpler substances – hydrogen and oxygen.

***Compounds Have Formulas***

* H20 is the chemical formula for water, and H2O2 is the formula for hydrogen peroxide.
* The formula tells you which elements make up a compound as well as how many atoms of each element are present.

***How to read a formula***

**H20**

This is a subscript. It tells us how many atoms of that element exist in one unit of that compound.

Hydrogen is made of 2 H atoms and 1 O atom.

No subscript is used when only one atom of an element is present.

Let’s try it…

* **Sulfuric Acid H2SO4**
  + 2 Hydrogen
  + 1 Sulfur
  + 4 Oxygen
* **Hydrogen Peroxide H2O2**
  + 2 Hydrogen
  + 2 Oxygen
* **Carbon Dioxide CO2**
  + 1 Carbon
  + 2 Oxygen
* **Carbon Monoxide CO**
  + 1 Carbon
  + 1 Oxygen
* **Calcium Carbonate CaCO3**
  + 1 Calcium
  + 1 Carbon
  + 3 Oxygen

***Mixtures***

* A mixture is a combination of two or more substances where there is **no** chemical combination or reaction.

A mixture is a combination of two or more substances where there is **no** chemical combination or reaction.

Mixtures combine physically in no specific proportions.   
They just mix.

Solids, liquids and gases can be combined to create a mixture.

***Properties of Mixtures:***

* Each substance in a mixture keeps its identity
* You can physically separate them
* They also contain elements, compounds, or both
* And they can be formed using any ratio of components

Mixtures may be **homogeneous** or **heterogeneous**

***Homogeneous***

* The prefix “homo” indicates the same
* **Homogeneous mixtures** have the same appearance and properties throughout the mixture
* **Milk, toothpaste, and mayonnaise are homogeneous mixtures. They are also colloids.**

***Heterogeneous***

* The prefix “hetero” indicates difference
* **Heterogeneous mixtures** consist of visibly different substances

***Types of Mixtures***

* There are **THREE** types of mixtures:
  + - * Solutions
      * Suspensions
      * Colloids

***Solutions***

* A **solution** is a mixture that appears to be a single substance, but it is actually composed of **2 or more substances** that are distributed evenly amongst each other.
  + **SOLUTIONS ARE HOMOGENEOUS**

A solution has two parts

* The substance in the smallest amount and the one that **DISSOLVES** is called the **SOLUTE**
* The substance in the larger amount is called the **SOLVENT** - it does the dissolving
* IN most common instances water is the solvent

***Suspensions***

* A **suspension** is a mixture in which particles of a material are dispersed throughout a liquid or gas, but are **large enough that they settle out**.
  + **SUSPENSIONS ARE HETEROGENEOUS**

***Colloids***

* A **colloid** is a mixture in which the particles are dispersed throughout but are **not** heavy enough to settle out.
  + **COLLOIDS ARE HOMOGENEOUS**

Compounds vs Mixtures

**Combine chemically Not chemically forming molecules combined**

**Combine in Can combine in set proportions any proportion**

**Separated chemically Separated physically**

***Element, Compound, or Mixture?***

Rocks -- Element, Compound, or Mixture?

Copper -- Element, Compound, or Mixture?

Jelly Beans -- Element, Compound, or Mixture?

Table Sugar -- Element, Compound, or Mixture?

Diamond -- Element, Compound, or Mixture?

Tea -- Element, Compound, or Mixture?

Salt -- Element, Compound, or Mixture?

Neon Gas -- Element, Compound, or Mixture?

Salad -- Element, Compound, or Mixture?

Pure Water -- Element, Compound, or Mixture?

Aluminum -- Element, Compound, or Mixture?

Lemonade -- Element, Compound, or Mixture?

Silver -- Element, Compound, or Mixture?

Sand -- Element, Compound, or Mixture?

***Challenge Time***

* Are YOU an element, mixture or compound?