Lecture 1:

LECTURE: ELEMENTS

1 extra credit pt for printing

It's all elemental!
An element is about as simple as it gets. It cannot be broken down into anything else. We know a substance is an element if we keep making it smaller and smaller, but each piece is still made up of _____ type of atom. An element is a _____ substance, or a substance that has only one type of particle or atom.

Gold = Element
For example, gold (Au), is a pure substance, an element. If you take a nugget of gold and keep breaking it down, each particle (atom) looks exactly the same. It is made up of ONLY gold atoms.

Names of Elements
Each element has a special name and some are very ancient. The element copper is derived from Cyprus, where it was once mined. Vanadium, which forms beautiful compounds, is named after the Scandinavian goddess Vanadis. The International Union of Pure and Applied Chemistry (IUPAC) decides on the element names.

Element Symbols: An element also has a _____, made up of either one or two letters. If the symbol has two letters, the first is capitalized and the second is _____ case. Many of the symbols are the first letter or two of the element: hydrogen (H), oxygen (O), nickel (Ni), helium (He). Other symbols are of the first letter and the 3rd letter, while others are derived from the Latin, Greek or German name: chlorine (Cl), iron (Fe).

Guessing Game: Can you guess the right symbol for each element?

1. Lithium: _____
2. Beryllium: _____
3. Boron: _____
4. Nitrogen: _____
5. Sodium: _____
6. Chromium: _____
7. Uranium: _____
8. Californium: _____
9. Plutonium: _____
10. Mercury: _____

Element Properties
Every element is unique, with its own special properties that make it different from every other element. We call these _____ properties. Of course, some elements are pretty similar to one another, but there's always something that makes it different from the rest. These small differences, both physical & chemical, separate the elements into 3 main categories.

Element Categories: There are 3 categories for elements:

1. _____ 2. _____ 3. _____

Each element falls into one of these categories and shares common properties, though keep in mind - there are always exceptions.

Metals

- _____ conductors of electricity and heat
- _____ (metallic luster)
- _____ (hammered into sheets)
- _____ (drawn into thin wires)

Example: Aluminum (Al)
Think of aluminum foil, it is a classic metal.
Why?

- it's shiny
- It's malleable - flattened into very thin sheets
- it conducts electricity

Nonmetals

- _____ conductors of electricity and heat
- _____ (not shiny)
- _____ - not malleable
- _____ ductile
- Examples: gases (Hydrogen, Helium, Oxygen, etc) & odd non-gases (Sulfur, Carbon, Phosphorous).

Metalloids or _____

- possess properties of both metals and nonmetals - some metalloids are ductile but not shiny, etc.
- Usually, they look like a _____, but behave *chemically* like a _____
- The _____ metalloids are: Boron, Silicon, Germanium, Arsenic, Antimony, Tellurium, Polonium.

LECTURE: COMPOUNDS

While some elements are found in their pure form in nature, most are bonded to other elements. A compound is a _____ substance made up of two or more elements that are _____ _____. In order to combine two elements to make a compound, the elements have to *chemically react* with one another. The elements in a compound are not simply mixed together, they are actually joined or _____ to one another in a specific way. Complicated? Basically, ***a compound is one or more elements stuck together***!

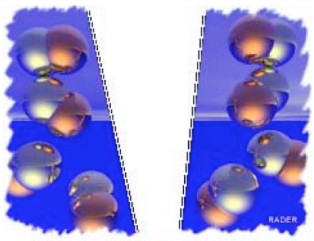
Definite Ratios: A compound is made up of a _____ of these elements. Salt (sodium chloride) is made up of 1 sodium atom and 1 chloride atom. The ratio is always 1:1 (1 to 1, or 1/1). It doesn't matter if you were looking at salt in California, Siberia, or Mars - it's always the same. Similarly, in water, there are always 2 hydrogen atoms to 1 oxygen atom. In fact, we call this the _____.

Classified Compounds: We really have only two types of compounds:

1. _____ are compounds that contain carbon (and usually hydrogen. They are called organic because it was ONCE believed that they could only be formed by living organisms.
2. _____ are all other compounds

Compound Properties: Just like elements, each compound has unique properties that help identify and distinguish the compound. Usually, a compound's properties are _____ from its constituent elements. For example, look at salt, sodium chloride. Sodium: reacts violently with water Chlorine: a poisonous deadly gas However, when we put the two together - we get salt, which is definitely safe to eat and dissolves in water.

Breakin' it down: Since compounds are made up of several elements, it makes sense that we can separate the elements. In other words, a compound can be broken down into similar elements through chemical change (heat, reactions). For example, carbonic acid is a gas that gives soda its carbonation or fizz. This compound can be broken down into simpler carbon dioxide and water. What happens when you open up a soda and leave it out? The released pressure lets the carbonic acid separate into its simpler elements - and goes flat.



IT'S NOT PHYSICAL: The only way to break down a compound is through CHEMICAL change, not physical change. Think about it - compounds are made up of elements that are BONDED to one another. The only way to rip apart the bonds is by providing some serious energy to the whole thing. _____ is one way to separate a compound. _____ is another method, where an electric current is used to break down the compounds.

Review

1. What are the 3 categories of major elements?

2. Describe the differences between metals, nonmetals, & metalloids.

3. How are elements and compounds alike? And different?

4. What are 2 ways to break down a compound?