Elements, Compounds, & Mixtures

Pure Substance – a sample of matter that has definite chemical & physical properties.

Element – pure substance that cannot be separated into simpler substance by physical or chemical means.

Atoms - The smallest unit of an element that maintains the properties of that element.

Molecules – composed of *two or more* elements that are joined by chemical bonds

- Elements can be the same: Ex: H_2, 0_2, N_2
- Elements can be different: Ex: $C_6H_{12}0_6$, H_20

Compounds – pure substance composed of two or more *different* elements joined by chemical bonds.

- Made of elements in a specific ratio that is always the same
- Water is H_20 – It will always will have 2 hydrogen atoms and 1 oxygen atom joined together
- Can only be separated by chemical means, not physically
- Have their own *physical* and *chemical* properties
- Chemical and physical properties are different than the elements they are made from
    - Example H_20
        - Hydrogen is a gas
        - Oxygen is a gas
        - Water is a liquid at room temperature

Mixtures – a combination of two or more pure substances that are *not chemically* combined.

- Substances held together by *physical forces*, not chemical
- No chemical change takes place
- Each item retains its properties in the mixture
- They can be separated physically

Types of Mixtures – There are two main categories

1. **Homogeneous** – molecules are mixed up in an even distribution

Solutions – a mixture that appears to be a single substance

- **Solute** – the substance being dissolved
- **Solvent** – the substance in which the solute is being dissolved
- Water is considered a universal solvent
- Particles do not scatter light
- Ex: sugar water, lemonade, Kool-Aid , soda, air

Colloids* – a mixture of tiny particles that are bigger than those in a solution, but smaller than in a suspension

- Do not settle out over time
- Scatter light
- Ex: Mayonnaise, milk, gelatin, whipped cream

*some sources say that colloids are homogeneous mixtures while others say they are heterogeneous mixtures, some also say it should be in its own category.

2. **Heterogeneous** - molecules are *not* mixed up in an even distribution

Suspensions – a mixture in which particles are dispersed in liquid or a gas and will eventually settle out

- Particles can scatter light
- Can be filtered out using a filter
- Ex: snow globe, sand in a bucket of water, muddy water

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