

Types of Matter

Elements
Compounds
Mixtures

Elements

- The purest form of a substance
- Can be found on the periodic table
 - 118 known elements
- Has a unique set of properties that help identify it
 - Properties include boiling point, melting point, density, color, hardness, texture, flammability, reactivity, etc.
- Are grouped into categories based on their properties

Compounds

- A substance made up of two or more elements that are combined chemically
- Properties of each element changes
- Elements are in definite proportions
- Common compounds
 - Baking soda (sodium hydrogen carbonate)
 - Water (hydrogen oxygen)
 - Salt (sodium chloride)

Compounds

- In order for elements to combine, they must react with each other causing a chemical change
- Subscripts indicates the number of atoms of each element
 - If there is no subscript we assume one
 - Na_2 means 2 atoms of sodium
- To break down compounds, there needs to be another chemical change
 - Sometimes multiple changes are needed

Must be broken down by chemical means!!!

Mixtures

- A combination of two or more substances that can be separated by physical means
- Are NOT chemically combined
- Are NOT always the same throughout
- Because no chemical change, each substance within has the same chemical makeup it did before the mixture
- Sometimes you can see the different substances and sometimes you cannot

It all depends!

- Fe + S mixed with a spoon is a mixture and can be separated using a magnet
- Fe + S mixed with heat added is a compound because it can not be separated by physical means

Review

- Elements are pure
- Compounds are consistent in their ratios and hard to break apart
- Mixtures are NOT consistent in their ratios and easy to break apart

Different types of mixtures

Homogeneous (Solutions)

- Material throughout the mixture will have the same amount of each substance in each sample
- Won't see the particles in the mixture
- Looks like one substance
- Will not separate over time
 - **Examples:**
 - Chocolate Milk
 - Soda
 - Vanilla Ice Cream
 - Brownies

Homogeneous (Solutions) vocab

- Dissolving: process of substances spreading out evenly throughout the mixture
- Solute: substance that is being dissolved
- Solvent: substance in which the solute is dissolved into
- Soluble: able to dissolve
- Insoluble: unable to dissolve
 - Therefore not really a solution

Heterogeneous (Suspensions)

- Material throughout a mixture will have varying amounts of substances in each sample
- Temporarily mixed, will settle out with time
- Can be separated by passing through a filter
- Particles large enough to be seen
 - **Examples**
 - Oil & vinegar
 - Snow globes
 - Chocolate chip cookies
 - Stew
 - Vegetable soup

Colloids

- Mixture that is partially like a suspension and partially like a solution
- Particles are fairly small and fairly well mixed
- Not heavy enough to separate over time
- Can see particles with light
 - **Examples**
 - Fog
 - Mayonnaise
 - Whipped cream
 - Stick deodorant

Breaking down mixtures

- Magnet taking iron out of sand.
- Filter used to filter sand out of water.
- Allow time to pass for mixtures to separate.
- Separate by hand

Can be broken down by physical means!!!

States of Matter

Four states of matter

- Solid: definite volume and shape
- Liquid: definite volume, no definite shape
- Gas: no definite volume or shape
- Plasma: highly electrically charged particles
 - Not found on earth

Characteristics of a solid

- Elasticity: ability to stretch and return to original form
- Malleable: can be pounded into a shape
- Brittleness: inability to be pounded into shapes
- Ductility: ability to be pulled into wire
- Textile strength: how well the material stands up to tension

Characteristics of liquids

- Viscosity: liquid's resistance to flow
- Surface tension: the force acting on the particles at the surface of a liquid that cause the liquid to form spherical drops

Changing states

- Melting point: solid becomes a liquid
- Boiling point: liquid to gas
- Freezing point: liquid to solid
- Condensation: gas to liquid

- Sublimation: solid to gas without the liquid step.