

Matter & Energy

HONORS CHEMISTRY

- Chemistry is the study of the composition of matter and the changes matter can undergo
- But what exactly is **matter**???

Matter is...

- Basically matter is anything that has mass and volume (occupies space).
 - Examples: trees, water, buildings, air
- In short, **EVERYTHING** around you is made of matter!

Mass vs. Weight

- **Mass** – the amount of matter inside an object
 - Mass is constant
- **Weight** – measure the force of gravity acting upon a mass
 - Weight changes with gravity



Properties of Matter

- Properties are characteristics used to describe an object.
- **Physical Property**
 - A condition of a substance that can be observed or measured without changing the substance's composition.
 - Ex: color, luster, hardness
- A **physical change** involves the changing of physical properties (such as appearance or state)
 - However, the composition or type of matter does NOT change

Phase Changes

- Phase changes can involve a change in volume, but mass remains constant.
- Adding or removing energy (or heat) from matter results in phase changes
- What are some examples of phase changes?

Properties of Matter

- **Chemical Property**

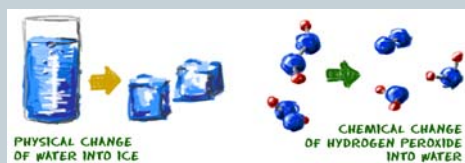
- Property that describes how a substance can change into a NEW substance
- Ex: flammability, reactivity with water/air/oxygen

- During a **chemical change**, the original substance is changed into a new and different substance

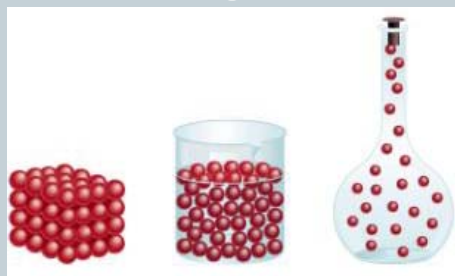
- What is another name for a chemical change?

Properties of Matter

- How is a chemical change different from a physical change?



3 Stages of Matter



3 Stages of Matter

- **Solid**
 - Definite shape and volume
 - Cannot flow or take shape of container
- **Liquid**
 - Constant volume
 - Takes shape of container its in (flows)
- **Gas**
 - Takes shape of container
 - Expands to fill any volume
 - **Vapor** – substance that is currently a gas but is normally a liquid or solid at room temperature

Classification of Matter

- A **mixture** is a combination of two or more substance that can be separated by physical means.
- Matter that cannot be separated physically is called a **pure substance**. (Needs to be chemically separated)

Classifying Pure Substances

- **Elements**
 - Simplest kind of matter
 - All one kind of atom
- **Compound**
 - Substance that can only be broken down by chemical means
 - Made of two or more atoms chemically combined (not just physically blended!)
 - When broken down, the pieces have completely different properties than the original compound



Classifying Mixtures

- A mixture is a physical blend of at least 2 substances.
 - Can have a different compositions
- Heterogeneous
 - The mixture is NOT uniform in composition
- Homogeneous
 - Same composition throughout (looks uniform)
 - Also called a **solution**



The Periodic Table

- Elements are represented by a one or two letter **symbol**.
- Compounds are represented by a **formula**.
- The first letter in a symbol is always capitalized
 - If there is a second letter it is lowercase (ie: He, Li, Cr)
- Columns = Groups or Families
- Rows = Periods

Classifying Elements

- Elements can be classified as:

- Metals
 - Located to the left of the "zigzag" line
- Nonmetals
 - Located to the right of the "zigzag" line
- Metalloids
 - Located directly above or below the "zigzag" line

Periodic Table of the Elements - Types of Matter
