## Matter:

**Matter**

**Matter is anything that has mass and takes up space**. *You can’t see oxygen gas, but it is made of atoms and has mass and takes up space.*

**Molecules**

**Molecules are made of 2 or more atoms**.

-*Some molecules are made up of all the same kind of atom (like oxygen 02).   
 What do we call these kinds of molecules?*

*-Some molecules like water H20 (hydrogen + oxygen) are made up  
 of different kinds of atoms.*

**Atoms**

**Atoms are the basic particle from which all elements are made.**  
**Atoms are the smallest part of an element that still has the same properties of that element!**

*-For example an atom of the element gold, has the same  
 properties (density, melting point etc) as a pound of gold.*

*-Atoms are so small they still cannot be seen.*

*-Scientists look at the behavior of atoms*.

**Element**

**An element is a substance made up of only one kind of atom**. **Elements cannot be broken down any smaller than an atom**. *There are about 118 known elements (Periodic Table).*

**Compounds**

**A compound is a substance made up of more than one kind of atom**. *Water is a compound (hydrogen + Oxygen)*

Atoms Sub atomic particles

Nucleus  
The center of an atom.

Protons

Positivly charged particles *in the nucleus of an atom*.

Neutrons

Neutral (no) charged particles *in the nucleus of an atom*.

Electrons

Negatively charged particles orbiting (zooming around) the nucleus of an atom.

## States of matter

## Kinetic Theory of Matter

***All particles (molecules) that make up matter are constantly in motion!***

* **Solids**

**Particles are packed close together and vibrate back and forth. There is very little movement, but there is movement!**

***Can you feel your chair move?***

* **Liquids**

**Particles move around freely, bumping and tumbling into each other.**

***Can you feel the water in your pool move?***

* **Gas**

**Particles are far apart and move at high speeds. Particles may collide, but do not otherwise interact.**

*Can you see or feel gas particles move?*

* **Plasma**

**Plasma is super heated gas. Fire is plasma.**

*Our Sun, thus all stars are plasma making plasma the most common state of matter in the universe.*

PHYSICAL & CHEMICAL PROPERTIES OF MATTER

**Physical Properties:**

Properties that do **not impact the chemical** make-up of a substance. The molecule formula does not change.

-State of Matter: solid, liquid, gas

-Weight, Example: a pound of gold is the same as an atom of gold.

-Density

-Size & Shape

-Solubility  
-Melting Point

-Freezing Point: Frozen water has the same molecule formula as liquid   
 water.

**Chemical Properties:**

Properties that do **change** the chemical make-up (the substance   
 is now a different substance).

Examples of Chemical Changes/Properties

-Rusting: If you leave a steel tool outside in the rain it will rust. The rust is   
 a new substance formed

-Burning

-Chemical Reactions

***Add heat = Greater particle movement***

***Subtract heat = Less particle movement***

**Absolute zero**

Absolute zero is matter’s lowest possible temperature. No heat energy remains in that substance. There is no particle movement at this temperature.

FYI, Ice is not near absolute zero. Ice still has heat energy inside of it (the particles are still moving)

Thermal Expansion

All gases, many liquids, and most solids expand with increased thermal energy (heat).

**HEAT**

**Heat** is a flow of energy from an object at a high temperature (lots of particle movement) to an object at a lower temperature (little particle movement).

Remember the molecules of matter are in constant motion.

Example:

1. Put ice in a warm drink
2. Does the ice melt because it is getting warmer or does the coldness of the ice cool the drink?
3. Answer, the heat from the drink warms the ice and the ice melts. The energy leaves the drink and flows to the ice, thus lowering the temperature of the liquid.