The Science of Chemistry- Chapter One

Section 1- What is Chemistry?

* Chemistry deals with:

…so what is a chemical?

A chemical is any substance that has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- meaning it is always made of the same stuff no matter where it comes from

…okay, so where do chemicals come from?

1- (water and carbon dioxide)

2- (polyethylene plastic)

3- (aluminum)

**…and why is chemistry important?**

* **We depend on chemicals every day!**
* **Chemical reactions happen all around us!**

What is matter?

*
* All matter is made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ The type and arrangement of particles in the matter determine its properties
* There are 3 states of matter
	+ 1-
	+ 2-
	+ 3-

Solids

* Have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Particles are held \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Vibrate very slightly

Liquids

* Have a fixed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ but not a fixed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Particles are not held as tightly together as solids, they slip past one another
	+ This slippage allows liquid to flow and take the shape of its container

Gases

* Have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a fixed volume or shape
* Particles move \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and bounce off one another
* Will fill any container because the particles \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_from one another

Matter is constantly changing!

* + Ice melts
	+ Milk goes sour
	+ Metal rusts
* These changes are categorized into:
	+ 1-
	+ 2-

Physical Changes

* Examples:
	+ Sugar dissolves into tea
	+ Rocks are broken into pieces
	+ Paper ripped

Chemical Changes

* Can be shown in an equation

 Reactant(s) Product(s)

 mercury oxide mercury + oxygen

* Reactions rearrange what makes up the reactant and product, nothing is lost or gained, so mass does not change
* How can you tell if a chemical change happened?
	+ It may be happening if:
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is formed
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is formed (clear turns cloudy/small solids)
		- Release/absorption of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ occurs (change in temp or giving off light)
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ changes

BUT…some physical changes also have these signs!

* Section 2- Describing Matter
	+ Remember…matter is anything that has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!
	+ When talking about mass and volume you always need to identify the unit of measurement!
* Units of Measurement
	+ There are 5 common base units in chemistry

|  |  |  |  |
| --- | --- | --- | --- |
| What are we measuring? | Symbol | Unit used | Abbreviation of unit |
| Length | l | Meter | m |
| Mass | m | Gram | g |
| Time | t  | Second | s |
| Thermodynamic temp. | T | Kelvin | K |
| Amount of substance | n | Mole | mol |

* + These base units can be too large or small for some measurements, so they can be modified by adding pre-fixes.

|  |  |  |  |
| --- | --- | --- | --- |
| **Prefix** | **Abbreviation** | **Means** | **Example** |
| Kilo- | k  | 1,000 | 1 kilometer (km)= 1,000 m |
| Hecto- | h | 100 | 1 hectometer (hm)= 100 m |
| Deka- | da | 10 | 1 dekameter (dam)= 10 m |
|  |  | 1 | 1 meter (m) |
| Deci- | d | 1/10 | 1 decimeter (dm)= .1 m |
| Centi- | C | 1/100 | 1 centimeter (cm)= .01 m |
| Milli- | M | 1/1,000 | 1 millimeter (mm)= .001 m |

* We can easily convert between units by moving decimals!



Units are:

Grams (g)

Liters (L)

Meters (m)

* Examples:

100 g = \_\_\_\_\_\_\_\_\_\_\_\_\_ mg Move the decimal \_\_\_\_\_\_\_\_ places to the \_\_\_\_\_\_\_\_\_.

225.98 cm= \_\_\_\_\_\_\_\_\_\_\_\_\_\_ m Move the decimal \_\_\_\_\_\_\_\_ places to the \_\_\_\_\_\_\_\_\_.

34.5 kL = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ dL Move the decimal \_\_\_\_\_\_\_\_ places to the \_\_\_\_\_\_\_\_\_.

* Physical Properties do not involve a chemical change and can be determined without changing the nature of the substance
	+ Examples: Density, color, mass, volume, hardness
* Density
	+ The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a substance
* Density of a substance does not change with the amount of substance that you have.
* Chemical Properties describe a substances \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ Can only be identified by trying to cause a chemical change
	+ Examples: combustion, oxidation, decomposition