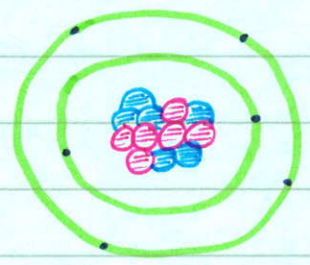


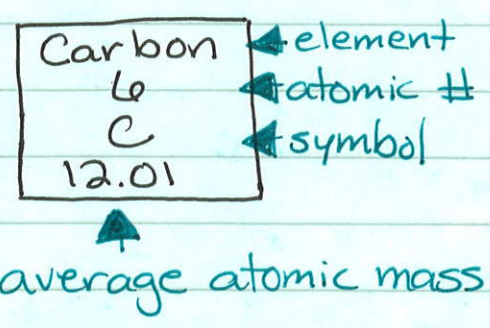
Chapter 1 Classifying Matter

1-1 Matter: anything that has mass and takes up space

Atom: a building block of matter



⊕ = proton
 ⊖ = neutron
 • = electron



- The atomic mass is the sum of the protons and the neutrons (electrons are too tiny).
- An atom starts out with equal electrons and protons, but electrons can leave or join the valence shell (the outermost shell).

Substance - matter with a composition that is always the same
 2 kinds

↓
Elements

- just one type of atom
- there are 115 different kinds of atoms
- atoms can hang out in groups
 O_2 = oxygen we breathe
 O_3 = ozone
- represented by symbols

→ Compounds

- contains at least 2 different elements that are chemically bonded
- shown by a chemical formula
 CO_2 = carbon dioxide
 CO = carbon monoxide
 H_2O = water
 H_2O_2 = hydrogen peroxide
- each compound has its own unique properties (very cool)

Mixture - matter that can vary in composition
2 kinds - not chemically combined... so they can be separated

Heterogeneous

- Substances are not evenly mixed
- examples
 - sand + water
 - trail mix
 - ore (rock w/ metals, minerals, or gems)

Homogeneous

- Substances are evenly mixed
- known as a solution
 - * the solute dissolves into the solvent

1-2

Physical Properties - characteristics that you can observe and/or measure



States of matter:

gas
 liquid
 solid

the atoms in each of these are moving, but the atoms in the solid are packed tighter than in the liquid... and even more so than in the gas

Size dependent physical properties

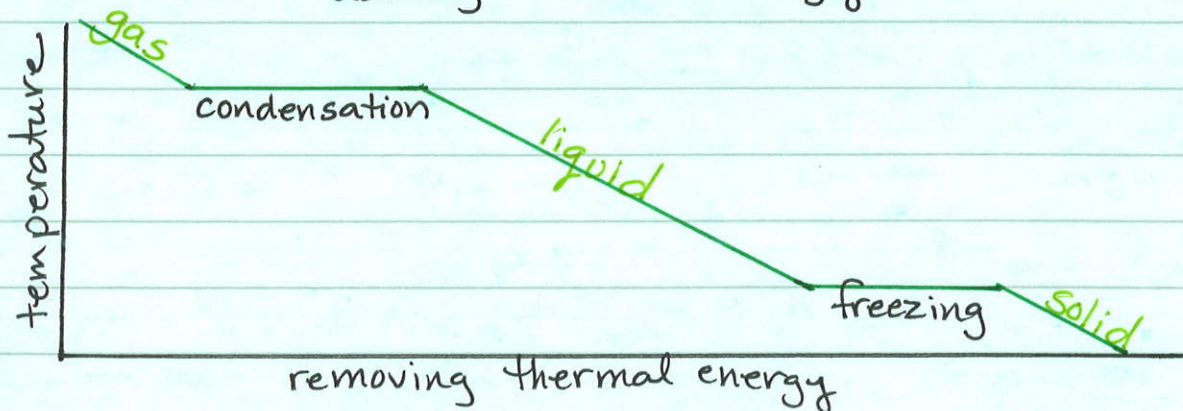
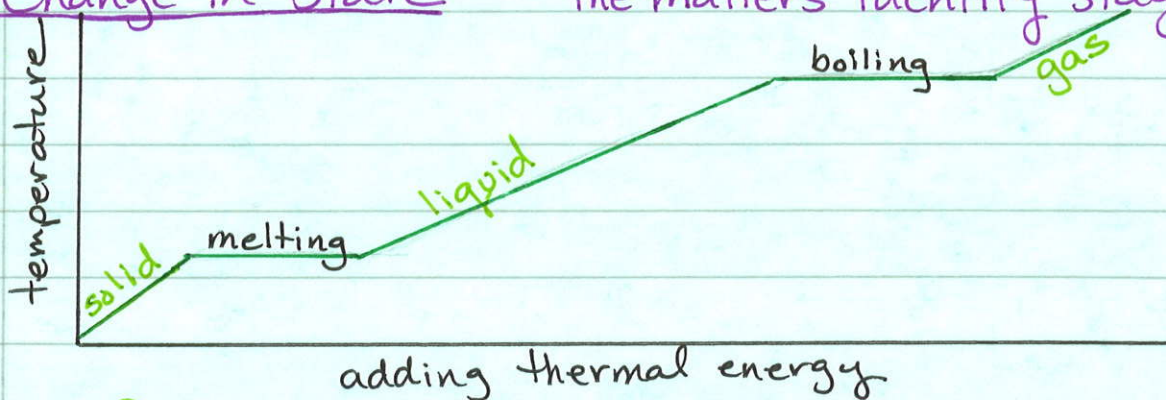
- mass - the amount of matter in an object
- volume - the amount of space the object takes up

Size - Independent physical properties

- melting point/boiling point
- density - the mass per unit volume of a substance
- conductivity - how well the substance carries an electric current
- Solubility - the ability for one substance to dissolve into another
- magnetism

1-3 Physical Changes - a change in size, shape, form, or state of matter where the matter's identity stays the same

Change in State



Sublimation - when a solid turns directly into a gas, with no liquid state.

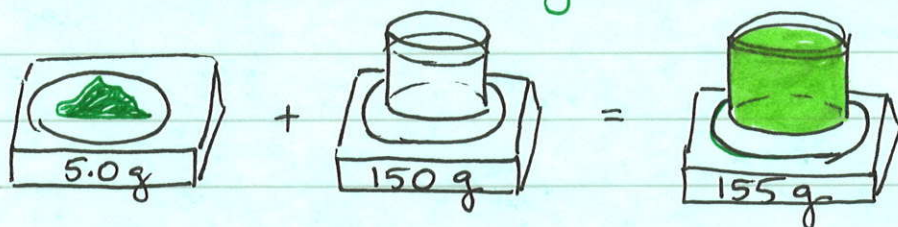
CO₂ and I do this



Change in Shape or Size - chew, pour, fold, ...

Dissolving - boil

Conservation of Mass - the total mass before and after the change are the same.



1-4 Chemical Properties and Changes

Chemical properties are characteristics of matter that can be observed as it changes to a different matter.

Chemical change - a change in matter where the substance changes into a different substance

Examples:

wood $\xrightarrow{\text{chemical property: flammability}}$ ashes
 chemical change: burning gases
 smoke
 moisture

hydrogen peroxide $\xrightarrow{\text{chemical property: light sensitivity}}$ water + oxygen
 H_2O_2 chemical change: exposure to light $\text{H}_2\text{O} + \text{O}$

1-4 continued

Signs suggesting
a chemical change.

Color change

bubbles ← be careful*

energy change → substance gets hot or cold

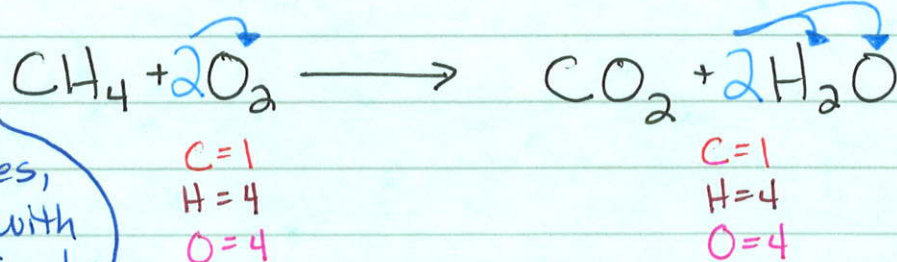
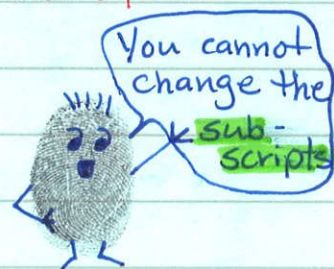
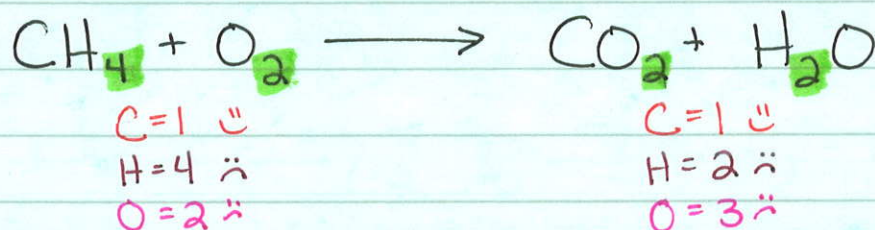
odor ← often decomp.

When water boils, bubbles are produced - this is NOT a chemical change!

* The only proof of a chemical change is the formation of a new substance.

Chemical reactions occur when atoms collide with enough force so that chemical bonds are broken and/or formed.

Chemical changes also follow the Law of Conservation of mass!

You must use the distributive property.

1-4 continued, again

How fast a reaction happens is determined
by: temperature
concentration
surface area

Chemical Equations ... balancing!