

## Announcements

Wednesday, January 28, 2009

- Ch 2 MC assignment was due before class today.  
(Rework problems for practice after it's due.)
- Ch 3 MC due next Wed, Feb 4.
- Ch 4 MC due Wed, Feb 11.

**Quiz 1** on names and symbols of common elements is **Monday, Feb 2**. See the course webpage for the handout of elements you need to have memorized.

**Do the D2L postlab quiz** if you didn't do it in lab.

Abha's section 11 quiz will be posted later today (you'll be given 48hr after it's posted)

**Experiment 2** in lab next week. Have the prelab done before you come to lab!

If you're having trouble with conversions or density:

- See me during my office hours
- See a tutor in the academic support center - bring a problem you're having trouble with
- Work with a friend or study group
- Post a question to the D2L discussions

# Elements, compounds, and mixtures

**Elements** have only one type of: atom



smallest piece of element

**Compounds**: pure substances with more than one different element *fixed ratio of elements*

Chemical formulas: show ratio of elements in a pure substance

NaCl: 1:1 ratio Na:Cl

H<sub>2</sub>O: 2:1 H:O

Fe: element (iron)

Br<sub>2</sub>: element

(compound)  
CO: carbon monoxide

Co: cobalt element

**Homogeneous mixtures**: same consistency throughout

lemonade (no pulp)

tap water

**Heterogeneous mixtures**: not same throughout

lemonade (w/ pulp)

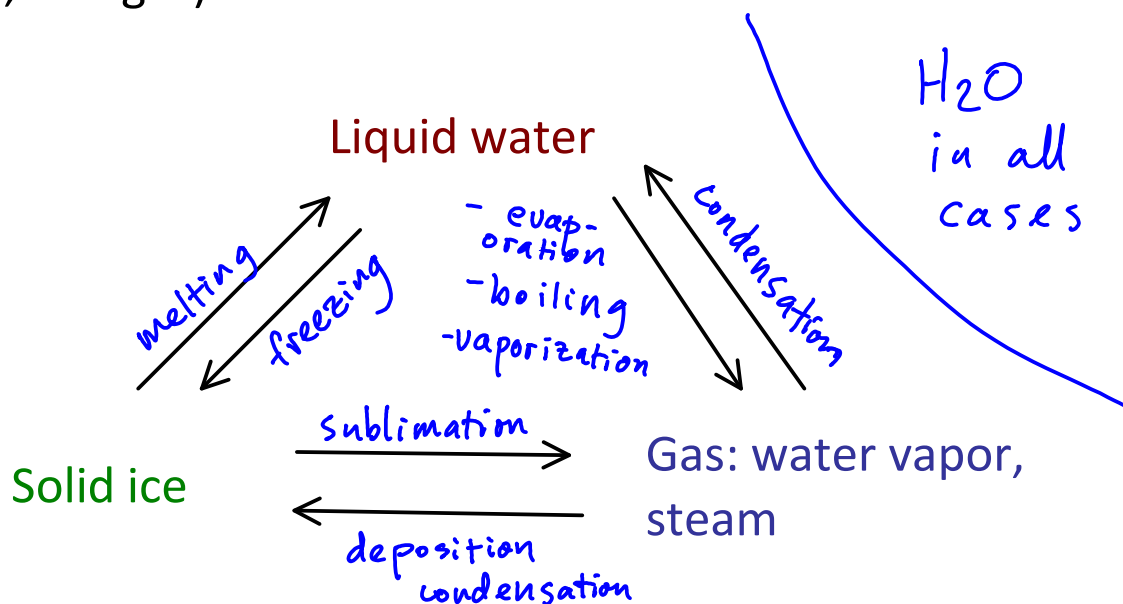
gravel

variable composition

## Physical and chemical changes

**Physical changes:** change the form or appearance of substance, but still have... *Same matter present same elements or compounds*

Phase changes are physical changes (between solid, liquid, and gas)



Dissolving, mixing, grinding are physical changes

Filtration, distillation, and other methods of separating mixtures into their pure substances are also physical changes.

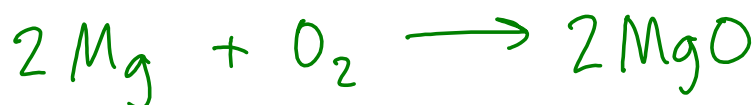
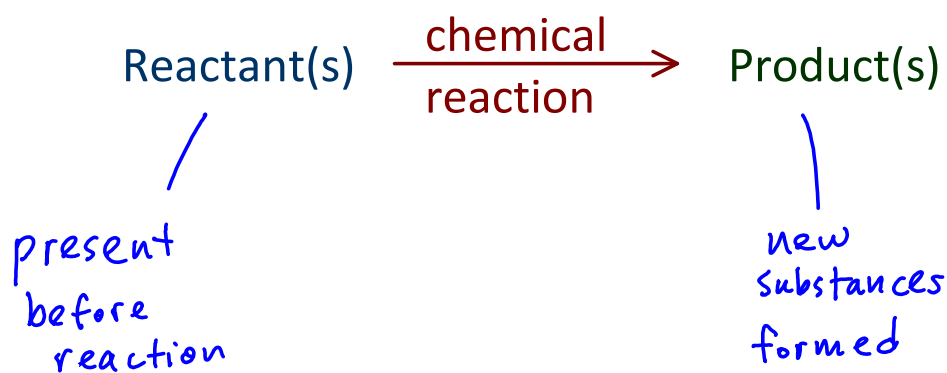
## Chemical changes

- Chemical change:**
- A new type of matter is formed
  - A new chemical formula is written
  - Also known as a chemical reaction

**Clues** that a chemical change has occurred (all of these are evidence that a new substance has formed)

- Color change
- Odor, gas evolved (but not just from boiling)
- Flame, burning
- Temperature change on its own

**Chemical equation** represents a chemical reaction:



## Physical and chemical properties

**Physical properties** describe the physical form of a substance. They can involve physical changes

- Boiling point, freezing point, melting point
- Color, odor, taste, consistency
- Density

**Chemical properties** describe behavior of a substance in chemical changes (usually in presence of other chemicals or heat)

- Sodium fizzes and ignites in water
- Magnesium does not react with water

*both are chemical properties*

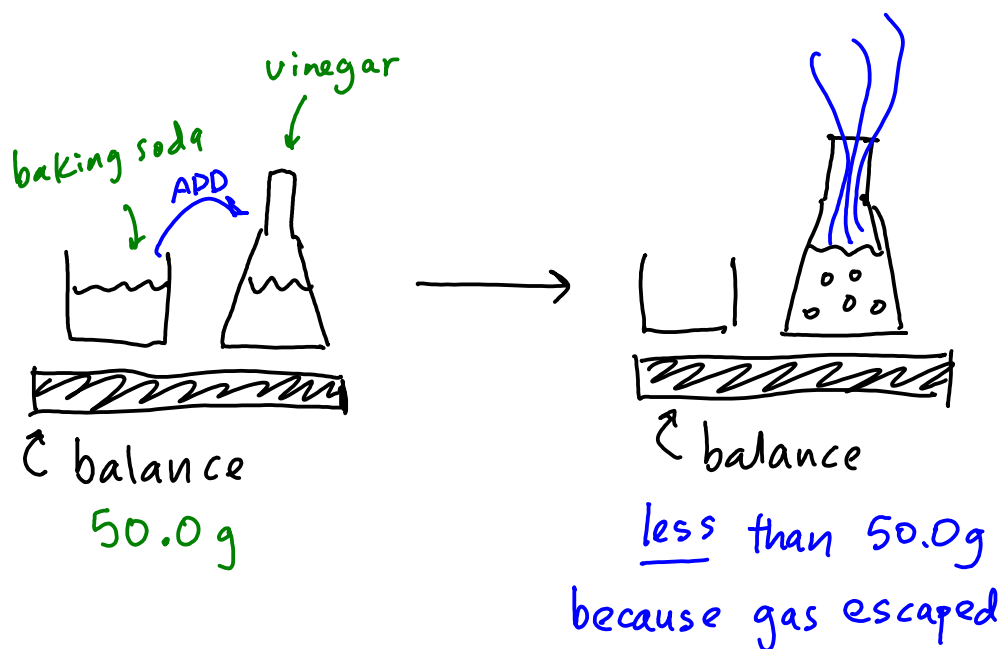
Identify the type of property:

- Baking soda will react with vinegar but not with water *chem.*
- Baking soda is a fine, white powder *phys*
- Hydrogen is explosive *chem.*

*Baking soda dissolves in  $H_2O$  phys property*

## Law of conservation of mass

**Law of conservation of mass:** in a chemical reaction, matter can be neither... *created nor destroyed*



# Temperature

- Temperature:**
- measure of atomic or molecular motion
  - measured with... *thermometer*

## temperature units

<u>K</u>	<u>°C</u>	<u>°F</u> <i>↖ US non-scientific</i>
Kelvin (SI unit)	degree Celsius	degree Fahrenheit
0 <i>absolute zero</i>	-273.15 °C	-459.67 °F

273.15	0 °C <i>water freezes</i>	32 °F
<i>↓ +100 K</i>	<i>↓ +100 °C</i>	<i>↓ +180 °F</i>
373.15	100 °C <i>water boils</i>	212 °F

K = °C + 273.15 or °C = K - 273.15

*book rounds it to 273 .  
use 273 in  
Mastering Chemistry*

38.0 °C = ? K

$$38.0 + 273.15 = 311.2 \text{ K}$$
$$38.0 + 273 = 311 \text{ K}$$

## Fahrenheit/Celsius conversions

$$^{\circ}\text{F} = \frac{\overbrace{9}^{\text{first}}}{\underbrace{5}_{\text{size of unit}}} ^{\circ}\text{C} + \underbrace{32}_{\text{zero point}} \quad \text{or} \quad ^{\circ}\text{C} = \frac{\overbrace{5}^{\text{first}}}{9} (^{\circ}\text{F} - 32)$$

$$\overset{\cdot\cdot}{82} ^{\circ}\text{F} = \underline{\quad} ^{\circ}\text{C}$$

$$^{\circ}\text{C} = \frac{5}{9} (\underline{82} - 32) = \underline{\overset{\cdot\cdot}{28} ^{\circ}\text{C}}$$

2 sig figs

$$82 ^{\circ}\text{F} = ? \text{ K}$$

$$^{\circ}\text{F} \longrightarrow ^{\circ}\text{C} \longrightarrow \text{K}$$

$$\underline{27.7777} ^{\circ}\text{C} + 273.15 = \underline{300.9277} \text{ K}$$

↓

301 K