

8/24/15

Section 3

Chapter 1: Atoms

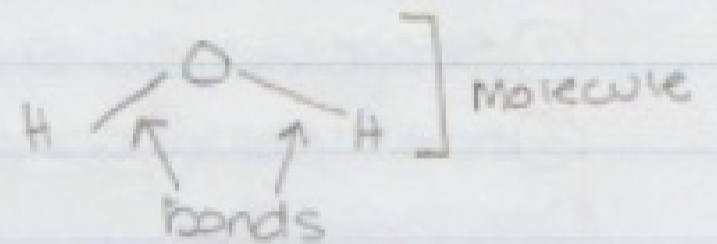
ltw due Friday!!

- ① matter: anything that occupies space and has mass
  - Ⓐ composed of atoms and/or molecules
- ② Atoms: smallest particle still characterizing a chemical element
- ③ molecules: made of more than one atom, joined together w/ a bond

Ex. water -  $H_2O$

2 hydrogen

1 oxygen



- Ⓐ Atoms in molecules determine shape + properties of the molecule

Can classify matter by its state and composition

### Classifying matter

① State - physical form

② Composition - component/

Ⓐ solid (s)

liquid (l)

gas (g)

→ packing  
shape/form  
compressibility  
flow (freedom of movement)

particles

that make up matter

- By state

### Solid

- ① flow: no freedom of motion
- ② shape: rigid - do not take shape of container
- ③ closely packed
- ④ incompressible - volume does not change

### Crystalline

- long range pattern
- Ex. table salt, diamonds

### Amorphous

- no long range pattern
- Ex. plastic, glasses

## Liquids

- ① Flow: some freedom of motion, but not enough to escape container
- ② Shape: takes shape of container b/c can flow
- ③ closely packed
- ④ incompressible

## gases

- ① Flow: has freedom - can escape container
- ② Shape: takes shape of container
- ③ not closely packed - due to the freedom of motion
- ④ compressible

## - By composition

① Pure substance - made of one component/particle

Ex. glass of water - same composition between samples

② mixture - made of more than 1 component/particle

Ex. lemonade, air (oxygen, nitrogen, CO<sub>2</sub>, hydrogen, CO, etc)

- different compositions b/w samples

① Element - cannot be broken down by any chemical reaction,  
- basic building block of matter

② Compound

- can be broken down

- 2 or more kinds of atoms

Ex. water [H<sub>2</sub>O]

- composed of a single kind of atom

Ex. Helium balloon H

hydrogen gas - 2 H atoms }  
molecule

① Homogeneous

- uniform - ratio of components are constant

Ex. coffee

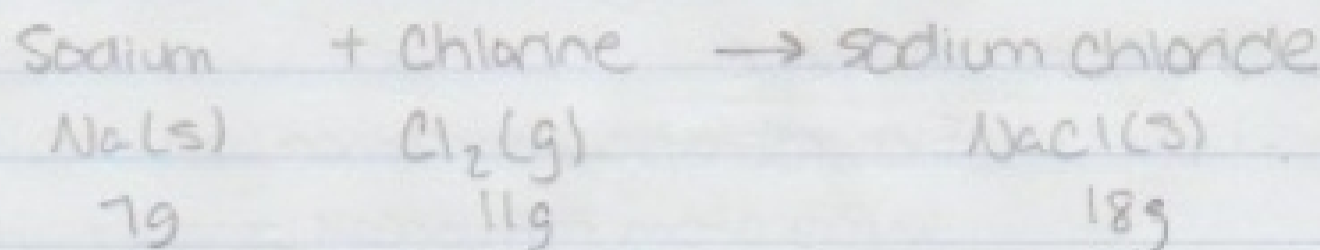
② heterogeneous

- not uniform - ratio of components are not same

Ex. sand + water

① Law of conservation of mass - In a chemical reaction (rxn), matter is neither created nor destroyed

- chemical rxn: one or more substances are converted to one or more different substances



② Law of definite proportions - a compound will have the same ratio of atoms no matter how and the source by which it's prepared

Ex. water  $2\text{H} : 1.0\text{g} \times 2 = 2.0\text{g}$

$1\text{O} : 16\text{g} \times 1 = 16.0\text{g}$

mass ratio:

③ Law of multiple proportions - matter comes in chunks, not continuous

$\frac{16.0\text{g O}}{2.0\text{g H}} = 8:1$

### Dalton's Atomic Theory

① Elements are made of tiny, indestructible particles, atoms

② Atoms of given element have the same mass + properties that distinguish <sup>from</sup> other atoms of other elements

③ Atoms combine in simple, whole # ratios to form compounds

④ Atoms of one element cannot change into atoms of another

Carbon  $\nrightarrow$  iron

### Atoms

① Subatomic particles

(A) electrons ( $e^-$ ) negative charge  $1-$

(B) protons ( $p^+$ ) positive charge  $1+$

(C) neutrons ( $n^0$ ) neutral charge

② most of mass of atom is in core/center (nucleus)

(A) nucleus

- protons and neutrons

- positively charged