

## Chapter 5

### Building Blocks of Matter

#### A. Studying Matter

1. Almost everything you see is matter.
2. Matter - anything that has mass and takes up space.
3. Mass - a measure of the amount of matter in an object
4. To study matter, scientists ask a question then gather info to answer the question.
5. Scientists first try to observe matter directly by using senses of sight, smell, hearing, taste, and touch.
6. Some equipment to aid in observation - telescope, microscope
7. Direct evidence - information gathered by direct observation.
8. When scientists can't observe matter directly, they study it indirectly using indirect evidence.
9. Indirect evidence - a set of clues that scientists use to make logical guesses about things they can't test directly.
10. Hypothesis - a logical guess based on direct and indirect evidence.

#### B. The Atom

1. Atom - basic unit of all matter
2. An atom is a particle too small to be seen fully.
3. Models of atoms larger than real thing opposite of most models.
4. A million atoms stacked on top of one another would not be as thick as a piece of paper.
5. There has been different models of the atom.
6. Nucleus - center or core of atom
7. It contains neutrons & protons that are tightly packed together. (Over 99% of the atoms mass is its nucleus)
8. Electrons - particles which travel around the nucleus.
9. Newest atom model is called the charge cloud. Most common model is Bohr's model.
10. Most of atom is empty space (between nucleus & electrons)
11. Protons - positively charged particles  
Electrons - negatively charged particles

#### Atom model (Bohr's Model)

#### C. Elements

1. Not all atoms are alike
2. Element - matter made up of one kind of atom - basic kind of matter.
3. Smallest particle of an element is an atom
4. There are 118 total elements, only 92 occur naturally on earth. Others are made by a machine.
5. One way in which atoms differ is their number of protons.
6. Shorter ways of writing elements using symbols.
7. These used by scientists all over the world. Ex. - O = oxygen.
8. Periodic table organized by metals, nonmetals, and gases.
9. Symbols for elements can be one or two letters.

10. Can be, but don't have to be, first letters.
11. A lot of symbols have Latin meanings. Ex. - Fe - ferrum - Latin for iron.
11. Know chart pg. 21 for test

#### *D. Molecules and Compounds*

1. Sometimes atoms combine in pairs or threes, sometimes hundreds.
2. Compounds - formed when atoms of different elements combine (new substances).
3. Molecule - simplest particle of many compounds made up of two or more atoms.
4. Sometimes two atoms of the same element combine to form a molecule. (atom of oxygen + atom of oxygen ---> molecule of oxygen)
5. Compounds are only formed when atoms of two *different elements* join.
6. Salt and sugar are compounds.
  - salt - NaCl (sodium, chlorine)
  - sugar - C<sub>6</sub>H<sub>12</sub>O<sub>6</sub> (carbon, hydrogen, oxygen)
7. Water (H<sub>2</sub>O) is a compound that can be a solid, liquid, or gas. (three states of matter)\_
8. It is easier to write symbols than spell out name. (H<sub>2</sub>O vs. dihydrogen monoxide)
9. Small number is the number of atoms of the element in the compound.
10. Formula - a group of symbols and numbers that stand for a compound

#### *Molecule*

#### *Chemical Reactions*

- New substances form as a result of breaking old bonds and forming new ones.
- Can't see bonds break, but there are indicators.
- 4 indicators of a chemical reaction:
  - Formation of a new solid (called precipitate)
  - Change in color
  - Production of light or heat
  - Formation of a gas (bubbling)

Properties after the reaction are different from the properties of the original substances

Have to be careful when mixing things!

Ammonia + Clorox = Cl<sub>2</sub> gas (poisonous!!)