

## Lesson 2: Atomic Theory

text: 2-30

what to know:

- names and symbols of selected elements, supplement-2 (those marked)
- what chemistry is, 1-1
- structure and classification of matter
- historical development of the concept of the atom (Dalton's theory), law of conservation of mass, law of definite proportions, 1-3
- chemical formulas and law of multiple proportions, 1-4 (omit law of combining volumes and Avogadro's hypothesis)
- contributions of Millikan, Thomson, and Rutherford to an understanding of the nuclear atom, §1-5
- nature and properties of subatomic particles, 1-5
- atomic number, mass number, isotopes, mass spectrometer, fractional abundance,
- molecular & formula masses, mole, molar mass, atomic mass unit, 1-7
- how the number of grams, the number of moles and the number of atoms(or molecules or formula units) of a substance are related, 1-7

questions:

- 1.Using a specific example, explain how laws and theories are related and how the term "model" fits into this discussion.
- 2.Which explains why gases are compressible, Boyle ' s Law or the kinetic theory?
- 3.When do theories become laws?
- 4.Describe the experiment which indicated that the nucleus occupies a very small fraction of the volume of the atom. Who first did the experiment?
- 5.Are compounds considered to be mixtures. Explain your answer.
- 6.Describe the relative charges and masses of protons, electrons and neutrons.
- 7.According to the Law of Multiple Proportions, if 8 grams of oxygen combines with 8 grams of sulfur to form SO<sub>2</sub>, how many grams of oxygen would combine with 8 grams of sulfur to form SO<sub>3</sub>?
8. The identity of potassium is determined by the number of (electrons, neutrons, protons) in the atom.
- 9.Dalton's theory states that all atoms of a given element are identical. Is this true? Explain.
- 10.Given the nuclide,  $^{131}_{53}\text{I}$ .
  - a. How many protons are in its nucleus?
  - b. How many neutrons are in its nucleus?
  - c. How many electrons are in an iodine atom?
  - d. How many electrons are in its nucleus?
  - e. Give the symbol for an isotope of  $^{131}_{53}\text{I}$ ?
  - f. What is the atomic number of  $^{131}_{53}\text{I}$ ?
  - g. What is the mass number of  $^{131}_{53}\text{I}$ ?
- 11.Which symbol represents an isotope of Co-60?  $^{58}_{27}\text{Co}$ ,  $^{60}_{28}\text{Ni}$ ,  $^{87}_{38}\text{Sr}$ ,  $^{58}_{28}\text{Co}$
- 12.What is the mass of 1.50 moles of calcium atoms(40) in grams?
- 13.How many atoms are there in 3.94 grams of gold(197)?
- 14.What is the mass (in grams) of one lead atom(207)?
- 15.How many atoms are there in 1.80 g of magnesium(24.0)?
- 16.How many g of calcium(40.0) have the same number of atoms as 8.0 g of sulfur(32.0)?
- 17.Does every atom of carbon have a mass of exactly 12.000 amu? Explain your answer.
- 18.Gallium is 60% Ga-69 and 40% Ga-71, what is the approximate average molar mass of gallium?
- 19.What is the molar mass of a metal if 21.9 g of the metal combines exactly with 40.0 g of Br(80)?

Assume that one atom of the metal combines with 2 atoms of bromine.
- 20.What is the molar mass of CaCO<sub>3</sub>? of Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>? of (NH<sub>4</sub>)<sub>3</sub>PO<sub>4</sub>?
- 21.Discuss the term "purity" as it relates to substances. 4-8
- 22.Additional practice problems: #s 19, 21, 29, 39, 49, 53, 61 pages 34-37