Lesson 2: Atomic Theory

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 SO2, how many grams of oxygen would combine with 8 grams of sulfur to form SO3?
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, 131I.
    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 131I?
    f. What is the atomic number of 131I?
    g. What is the mass number of 131I?
11. Which symbol represents an isotope of Co-60? 58Co, 60Ni, 87Sr, 59Co
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 CaCO3? of Al2(SO4)3? of (NH4)3PO4?
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