

Lesson Outline**LESSON 2*****Protons, Neutrons, and Electrons—How Atoms Differ*****A. The Parts of the Atom**

1. Protons and _____ have about the same _____.
2. _____ have much less mass than the other two particles in an atom.
3. Most of the mass of an atom is in the _____.

B. Different Elements—Different Numbers of Protons

1. The number of protons in an atom of an element is the element's _____.
2. Different elements contain different numbers of _____.
3. In a neutral atom, the number of _____ equals the number of protons because the number of _____ charges must equal the number of positive charges.

C. Neutrons and Isotopes

1. _____ are atoms of the same element that have different numbers of _____.
2. The total number of _____ and neutrons in an atom is the _____ of the atom.
3. The _____ of an element is the average mass of the element's _____.
 - a. The average atomic mass is _____ according to the abundance of each isotope.
 - b. *Weighted* means that the average atomic mass is based on the _____ of each atom in a sample and the number of atoms of that _____ that are present.

D. Radioactivity

1. _____ first noticed that some elements spontaneously give off _____.

Lesson Outline continued

2. _____ called elements that spontaneously emit radiation _____.
3. Radiation is made of energy and _____ that come from the _____ of radioactive atoms.
4. When atoms release particles of radiation, they change to different _____.
5. _____ is a process that occurs when an unstable _____ changes into another, more stable nucleus by emitting radiation.
 - a. Nuclear decay can produce three different types of _____.
 - b. A(n) _____ particle consists of _____ protons and two _____.
 - c. When alpha decay occurs, the atomic number of each atom that decays _____ by _____.
 - d. _____ decay occurs when a neutron in an atom changes into a(n) _____ and a high-energy electron called a(n) _____ particle.
 - e. When beta decay occurs, the atomic number of an atom _____ by _____.
 - f. Gamma rays contain a lot of _____ but no _____.
 - g. _____ rays are sometimes emitted during nuclear decay, but this decay does not change one element into another element.
6. Energy released during radioactive decay can be either _____ or harmful.

E. Ions—Gaining or Losing Electrons

1. A(n) _____ is an atom that is no longer neutral because it has gained or lost _____.
2. A positive ion is an atom that has _____ electrons.
3. A negative ion is an atom that has _____ electrons.