

Chapter 10 Nuclear Chemistry

Section 10.1 Radioactivity**(pages 292–297)**

This section discusses the different types of nuclear radiation and how they affect matter.

Reading Strategy (page 292)

Previewing Before you read the section, rewrite the topic headings in the table as *how*, *why*, and *what* questions. As you read, write an answer to each question. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

| Exploring Radioactivity | |
|--|---|
| Question | Answer |
| What is nuclear decay? | Nuclear decay is the process in which a radioisotope spontaneously decays into another isotope. |
| What are types of nuclear radiation? | Alpha, beta, gamma |
| What are the effects of nuclear radiation? | Nuclear radiation can ionize atoms, molecules may change, and cellular function may break down. |
| How can nuclear radiation be detected? | Nuclear radiation can be detected with devices such as Geiger counters and film badges. |

Nuclear Decay (pages 292–293)

- Define radioactivity. Radioactivity is the process in which an unstable atomic nucleus emits charged particles and energy.
- A radioisotope is any atom that contains an unstable _____.
Circle the correct answer.
energy level nucleus orbital

Types of Nuclear Radiation (pages 293–296)

- Circle the letters that identify each common type of nuclear radiation.
 - X-rays
 - b. gamma rays
 - c. beta particles
- Circle the letters that identify which groups of particles make up an alpha particle.
 - two electrons
 - b. two protons
 - c. two neutrons

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5. Circle the letters that identify each event that takes place during beta decay.
- a. A proton decomposes into a neutron and an electron.
 - b. A neutron decomposes into a proton and an electron.
 - c. An electron is emitted from the nucleus.

6. What is a gamma ray? A gamma ray is a penetrating ray of energy emitted by an unstable nucleus.

7. Use the terms in the box to complete the following table about nuclear radiation.

| | |
|-------------------|----------------|
| 1- | 4 |
| Gamma ray | Alpha particle |
| Paper or clothing | 0 |

| Characteristics of Nuclear Radiation | | | |
|--------------------------------------|--------|------------------|----------------------------|
| Radiation Type | Charge | Mass (amu) | Usually Stopped By |
| Alpha particle | 2+ | 4 | Paper or clothing |
| Beta particle | 1- | $\frac{1}{1836}$ | Aluminum sheet |
| Gamma ray | 0 | 0 | Several meters of concrete |

Effects of Nuclear Radiation (pages 296–297)

8. Circle the letter of the correct answer. Why does nuclear radiation sometimes damage cells? _____
- a. It dries cells out.
 - b. It strengthens chemical bonds.
 - c. It ionizes atoms.

9. Is the following sentence true or false? One potential danger of radon gas is that prolonged exposure to it can lead to lung cancer.
true

Detecting Nuclear Radiation (page 297)

10. Geiger counters and film badges are used to detect nuclear radiation.