

# 25.1 NUCLEAR RADIATION

## Section Review

### Objectives

- Explain how an unstable nucleus releases energy
- Describe the three main types of nuclear radiation

### Vocabulary

- radioisotopes
- radioactivity
- radiation
- alpha particle
- beta particle
- gamma ray

### Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

- Isotopes with unstable nuclei are 1 and are called 2.
- The 3 of radioisotopes decay to 4 nuclei plus emission of large amounts of 5. The radiation may be alpha, 6, or gamma. 7 radiation consists of alpha particles (positively charged 8 nuclei) that are easily stopped by a sheet of paper. Beta radiation is composed of fast-moving particles, which are 9. Beta radiation is more penetrating than alpha radiation; it is stopped by 10.
- 11 radiation is electromagnetic radiation. Gamma radiation has no 12 or electrical charge. It is extremely penetrating.
- 13 bricks and 14 reduce the intensity of gamma radiation but do not completely 15 it.

## Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

- Beta radiation is emitted when a radioisotope decays.
- Gamma radiation has a negative charge.
- Gamma radiation is high-energy electromagnetic radiation.
- ${}_{84}^{210}\text{Po} + {}_{-1}^0\text{e} \rightarrow {}_{83}^{210}\text{Bi}$
- When a beta particle is emitted, the atomic number increases by 1, and the mass number stays the same.

## Part C Matching

Match each description in Column A to the correct term in Column B.

### Column A

- radioisotopes
- radioactive decay
- gamma ray
- alpha particles
- beta particles

### Column B

- the process in which an unstable nucleus releases energy by emitting radiation
- isotopes that have unstable nuclei and undergo radioactive decay
- high-energy photon with no mass or electrical charge
- electrons resulting from the breaking apart of a neutron in an atom
- helium nuclei emitted from a radioactive source

## Part D Problems

Answer the following in the space provided.

- Write nuclear equations for these processes.
  - The alpha decay of  ${}_{84}^{210}\text{Po}$
  - The beta decay of  ${}_{83}^{210}\text{Bi}$