

Activity 8: Radioactivity

Learning Objectives

Part 1 *Recognize the types of ionizing radiation*

Write a balanced nuclear equation for radioactive decay

Part 2 *Gain familiarity with radiation units*

Perform dosage calculations for radioactive isotopes

Part 3 *Calculate the amount of a radioactive material remaining after time based on its half-life*

Distinguish effective and physical half-life

Estimated Completion Time 90 Minutes

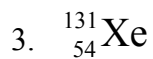
Instructor Information

Part 2 of this assignment stands alone and can be omitted or assigned outside of class if time is running short as it is more unit conversion.

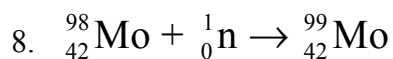
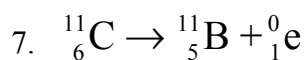
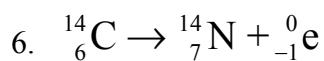
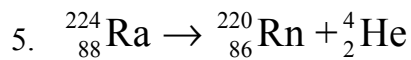
ANSWERS TO QUESTIONS

Part 1. Radioisotopes and Nuclear Equations

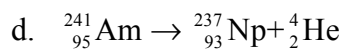
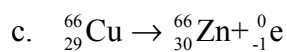
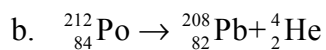
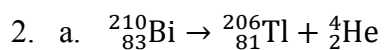
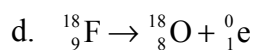
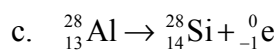
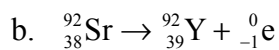
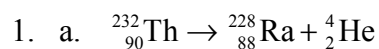
1. An alpha particle
2.
 - a. The number of protons in the reactant equals the total number of protons in the products.
 - b. The number of neutrons in the reactant equals the total number of neutrons in the products.
 - c. The mass number of the reactant equals the sum of the mass numbers of the products.



4. A beta particle



Activity 8: Skill Development—Radioisotopes and Nuclear Equations



Part 2. Radiation Units

1. 294 mCi
2. 333 mCi
3. A disintegration is a radioactive decay event where a nucleus emits a radioactive particle. A disintegration per second is the number of decay events per second.
4. 74,000 disintegrations per second

Activity 8: Skill Development—Radiation Units

1. 1.1×10^8 disintegrations per second
2. 1.7 mL
3. 5 doses (5 patients)

Part 3. Half-Life

1.
 - a. The half-lives of radioisotopes used in medicine are shorter than the naturally occurring radioisotopes.
 - b. The shorter half-lives allow radiation to be removed from the body more quickly so that less damage occurs to healthy tissue.
2. 6.25 mCi

Activity 8: Skill Development—Half-Life

1. The amount of time it takes for one-half of the radiation in a radioactive sample to be emitted through radioactive decay.
2. 7.5 mg
3. 14 days