

## Section 7.2

### Half-Life

# Check Your Understanding

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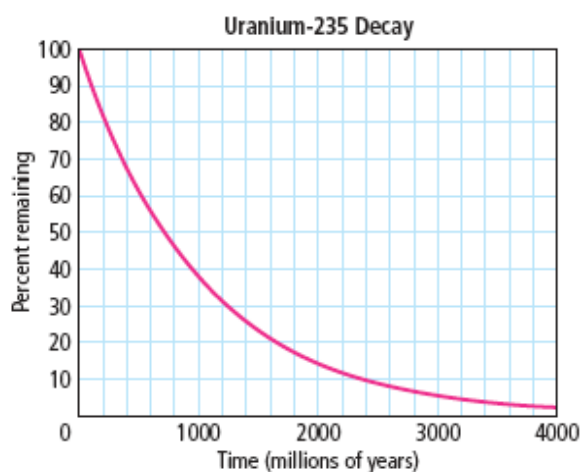


### Checking Concepts

1. Define half-life.
2. Distinguish between a parent isotope and a daughter isotope.
3. All isotopes decay in a similar pattern. What is the main difference between the rates of decay of different isotopes?
4. Explain the meaning of this statement: "A radioisotope can be used as a clock."
5. How does the lava cooling to form rock set the potassium-40/argon-40 clock to zero?
6. Iodine-131 has a half-life of eight days. If a sample contained 512 g of iodine-131, what mass of iodine would remain after 32 days?
7. A sample of rock contains 800 g of a radioisotope. How much of the radioisotope will remain after three half-lives?
8. How are decay curves different for different isotopes?

## Understanding Key Ideas

9. Consider the following graph showing the decay curve for uranium-235.



- What is the half-life of uranium-235?
- What percentage of uranium-235 remains after 1420 million years?
- The daughter product in this decay is lead-207. What percentage of the total possible amount of lead-207 has been produced after 1420 million years?
- What percentage of uranium-235 remains after three half-lives?
- If 80 g of uranium-235 decays for 355 million years, estimate the mass of uranium-235 that remains.
- How many years does it take for 60 percent of the original amount of uranium-235 to decay?

Use the following chart to answer questions 10 to 13.

Isotope		Half-Life of Parent (y)	Effective Dating Range (y)
Parent	Daughter		
Uranium-235	Lead-207	710 Million	> 10 Million
Potassium-40	Argon-40	1.3 Billion	10 000 to 3 Billion
Carbon-14	Nitrogen-14	5730	Up to 50 000

10. Which parent isotope has the slowest rate of radioactive decay?
11. State which isotopes would be useful for dating a material that is:
- (a) 3000 years old
  - (b) 30 000 years old
  - (c) 60 000 years old
  - (d) 60 million years old
12. If an original 10 g sample of carbon-14 decayed for 11 460 years, what mass of nitrogen-14 would have been produced?
13. Which of the three parent isotopes decays through beta decay?

***Pause and Reflect***

Why do you think it is important to date the age of the remains of living organisms? Why is it important to date the age of rocks and Earth? How might this information be useful to you in your life?