

Use with textbook pages 302-309.

Radioactive decay

1. Define the following terms.

(a) half-life _____

(b) decay curve _____

(c) parent isotope _____

(d) daughter isotope _____

2. Complete the following tables.

Half-Life	Percent of parent isotope	Percent of daughter isotope
0		
1		
2		
3		
4		

Half-Life	Fraction of parent isotope	Fraction of daughter isotope
0		
1		
2		
3		
4		

3. A rock sample contains 120 g of a radioactive isotope. The radioactive isotope has a half-life of 5 years.

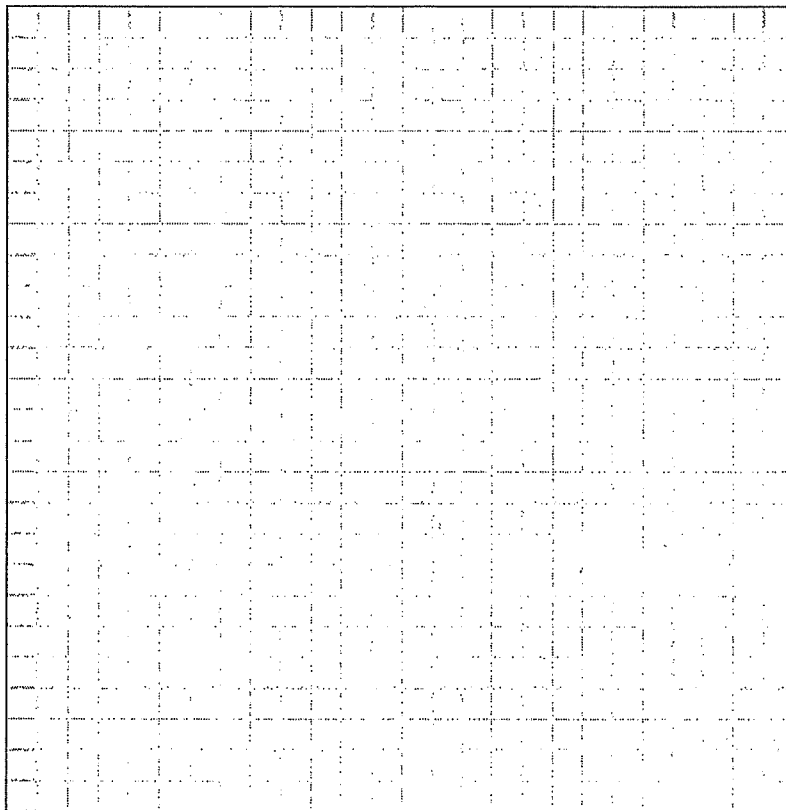
(a) Complete the following table.

Half-Life	Time (a)	Mass (g)
0	0	
1	5	
2	10	
3	15	
4	20	
5	25	

(b) How much of the radioactive isotope is left after 25 years have passed? _____

(c) How many half-lives have passed if there is only 15 g of the parent isotope left?
_____(d) How many years have passed if there is only 7.5 g of the parent isotope left?

- (e) Use the data in the table to graph a decay curve. Label the x-axis with Time (a) and the y-axis with Mass (g).



4. A rock sample contains 80 g of a radioactive isotope with a half-life of 20 years.

- (a) Complete the following table.

Half-Life	Time (a)	Mass of parent isotope (g)	Mass of daughter isotope (g)
0	0		
1	20		
2	40		
3	60		
4	80		
5	100		

- (b) How much of the parent isotope is left after 4 half-lives? _____
- (c) How much of the parent isotope is left after 100 years? _____
- (d) How much of the daughter isotope is present after 60 years? _____
- (e) How much time has passed if 77.5 g of the daughter isotope is present? _____
- (f) What is the ratio of parent isotope to daughter isotope after 2 half-lives? _____

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Calculating half-life

1. A radioactive isotope has a half-life of 10 minutes.
 - (a) What fraction of the parent isotope will be left after 30 minutes?

 - (b) What percent of the parent isotope will be left after 40 minutes?

 - (c) What fraction of the daughter isotope will be present after 20 minutes?

 - (d) What percent of the daughter isotope will be present after 50 minutes?

2. A 36 g sample of a radioactive isotope decayed to 4.5 g in 36 minutes. How much of the original parent isotope would remain after the first 12 minutes?

3. The half-life of a particular radioactive isotope is 8 hours. What percent of the parent isotope would remain after 1 day? _____
4. A radioactive isotope sample has a half-life of 4 days. If 6 g of the sample remains unchanged after 12 days, what was the initial mass of the sample?

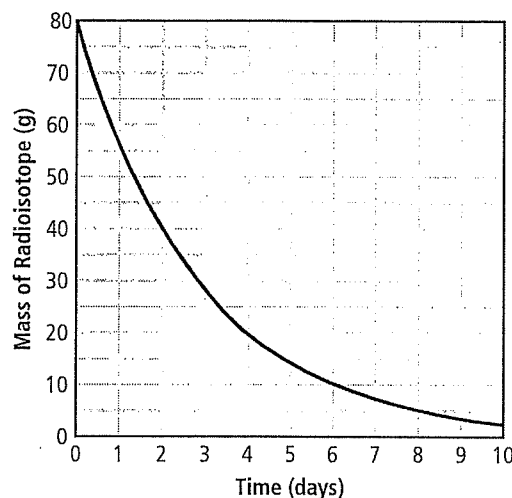
5. Suppose the ratio of a radioactive parent isotope to a stable daughter isotope within a rock sample is 1:3. The half-life of the parent isotope is 710 million years. How old is the rock sample? _____
6. A rock sample was dated using potassium-40. Measurement indicates that 1/8 of the original parent isotope is left in the rock sample. How old is the rock sample?

7. When a sample of lava solidified, it contained 28 g of uranium-238. If that lava sample was later found to contain only 7 g of U-238, how many years had passed since the lava solidified? _____
8. After 25 years, the number of radioactive cobalt atoms in a sample is reduced to $\frac{1}{32}$ of the original count. What is the half-life of this isotope? _____
9. The half-life of Sr-90 is 28 years. If an 80 g sample of Sr-90 is currently in a sample of soil, how much Sr-90 will be present in the soil 84 years later? _____

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Decay curves

1. Use the decay curve to answer the questions.

(a) What is the half-life of the isotope?
_____(b) How much of the parent isotope remains
after 4 days? _____(c) How much of the daughter isotope is
present after 6 days? _____(d) What fraction of the parent isotope remains
after 8 days? _____(e) How long does it take for the parent
isotope to decay to 5 g? _____

2. Use the decay curve to answer the questions.

(a) What is the common isotope pair for this
decay curve? _____(b) What is the half-life of the parent isotope?
_____(c) What does the intersection of the two lines
represent? _____(d) What fraction of the daughter isotope is
present after 5.2 billion years have passed?
_____(e) What is the ratio of parent isotope to
daughter isotope after 2.6 billion years
have passed? _____