

HALF-LIFE PROBLEMS

Name _____

Block _____

1. An isotope of cesium (cesium-137) has a half-life of 30 years. If 1.0 g of cesium-137 disintegrates over a period of 90 years, how many g of cesium-137 would remain?

$$\frac{1.0}{30} = 3 \text{ half-lives}$$

$$= \left(\frac{1}{2} \right)^3 \times 1.0 \text{ g}$$

2. Actinium-226 has a half-life of 15 hours. If 100 mg of actinium-226 disintegrates over a period of 45 hours, how many mg of actinium-226 will remain?

$$\frac{45}{15} = 3 \text{ half-lives}$$

$$\left(\frac{1}{2} \right)^3 \times 100 \text{ mg}$$

3. Radium-226 was the first radioactive element discovered, but it took 5.0 minutes to get the radium from the residue in the laboratory. If 0.5 mg of radium-226 was measured from the reaction, how many mg of radium-226 were placed in the crucible used 0.5 minutes later if the half-life of radium-226 is 1600 seconds?

$$\frac{5.0}{1600} = 0.003125 \text{ half-lives}$$

$$\left(\frac{1}{2} \right)^{0.003125} \times 0.5 \text{ mg}$$

4. The half-life of isotope X is 2.0 years. How many years would it take for a 4.0 mg sample of X to decay until there was only 0.50 mg of it remain?

$$3 \times 2.0 \text{ y} = 6 \text{ y}$$

$$\left. \begin{array}{l} 4.0 \\ 2.0 \\ 1.0 \end{array} \right\} 3 \text{ half-lives}$$

5. Polonium-214 has a half-life of 16.0 minutes. How many minutes would it take for a 10.0 mg sample to decay until there was only 1.25 mg of it remain?

$$3 \times 16 = 48 \text{ min}$$

$$\left(\frac{1}{2} \right)^3 \times 10 = 1.25 \text{ half-lives}$$

6. The half-life of Pu-240 is three minutes. How much of a 0.5 gram sample remains after 15 minutes? (Remember you divided by two every 3 minutes of this isotope, until it reached half its mass for 5 results plus. How much should you divide 0.5 gram by when 0.125 grams of Pu-240 remains?)

$$\frac{0.5}{5} = 0.1 \text{ g}$$

$$\begin{array}{r} 0.5 \\ \div 2 \\ \hline 0.25 \\ \div 2 \\ \hline 0.125 \end{array}$$

$$3 \text{ min} \times 5 = 15 \text{ min}$$

$$0.5 \div 2 \div 2 \div 2 \div 2 \div 2 = 0.03125 \text{ g}$$

Half Life Calculations Physical Science If8767 Answers

LP Steffe



Half Life Calculations Physical Science If8767 Answers:

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