HALF-LIFE CALCULATIONS

Name _____

Half-life is the time required for one-half of a radioactive nuclide to decay (change to another element). It is possible to calculate the amount of a radioactive element that will be left if we know its half-life.

Example: The half-life of Po-214 is 0.001 second. How much of a 10 g sample will be left after 0.003 seconds?

Answer: Calculate the number of half-lives:

$$0.003 \text{ seconds} \times \frac{1 \text{ half-life}}{0.001 \text{ second}} = 3 \text{ half-lives}$$

After 0 half-lives, 10 g are left.
After 1 half-life, 5 g are left.
After 2 half-lives, 2.5 g are left.
After 3 half-lives, 1.25 g are left.

Solve the following problems.

1. The half-life of radon-222 is 3.8 days. How much of a 100 g sample is left after 15.2 days?

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2. Carbon-14 has a half-life of 5,730 years. If a sample contains 70 mg originally, how much is left after 17,190 years?

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3. How much of a 500 g sample of potassium-42 is left after 62 hours? The half-life of K-42 is 12.4 hours?

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4. The half-life of cobalt-60 is 5.26 years. If 50 g are left after 15.8 years, how many grams were in the original sample?

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5. The half-life of I-131 is 8.07 days. If 25 g are left after 40.35 days, how many grams were in the original sample?

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6. If 100 g of Au-198 decays to 6.25 g in 10.8 days, what is the half-life of Au-198?

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