CONCEPT: RADIOACTIVE HALF-LIFE

- Half-Life (_____): The amount of time required for ______ of a radioisotope to decay.
 - □ Radioisotope: Isotopic version of an element that has an unstable _____ and emits radiation as it decays.
 - □ The radioactive decay of an unknown radioisotope with a half-life of 1 day is displayed as:

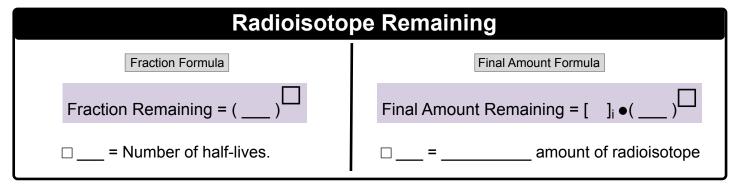
Radioactive Decay

10.0 g
$$_{Z}^{A}X$$
 $\xrightarrow{1 \text{ day}}$ 5.0 g $_{Z}^{A}X$ $\xrightarrow{1 \text{ day}}$ 2.5 g $_{Z}^{A}X$ $\xrightarrow{1 \text{ day}}$ 1.25 g $_{Z}^{A}X$

____half lives _____% half lives _____%

Radioisotope Remaining

• The fraction, percentage and final amount of a radioisotope after each half-life can be calculated by different means.



□ Multiplying the fraction remaining value by _____ gives the percentage remaining of the radioisotope.

EXAMPLE: Sodium-24, a radioisotope used in examining human circulation, has a half-life of around 15 days. Approximately what percentage of a sample would remain after 3 months, if a month is considered 30 days?

PRACTICE: The half-life of arsenic-74 is about 18 days. If a sample initially contains 100.00 mg arsenic-74, what mass (in mg) would be left after 72 days?

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PRACTICE: The half-life of iodine-131, an isotope used in thyroid therapy, is 8.021 days. What percentage of iodine-131 remains in a sample that is estimated to be 40.11 days old?

PRACTICE: What is the concentration of a CO₂ in a container after 4 half-lives if 0.325 mol of CO₂ is initially placed into a 5.0 L reaction vessel?

PRACTICE: What is the half-life of the radioisotope that shows the following plot of remaining percentage vs. time?

