

Radioactive Decay and Half-Life Practice Problems

- Determine the fraction of the isotope that is remaining.**
 - Use the remaining fraction of the isotope, to determine how many half-lives have passed? Ie. If there is 1/8 of a sample left then: $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$ - 3 half-lives have passed.**
 - Multiply the number of half-lives that have passed by the half-life. Ie. 3 X 200 years.**
- The half-life of iodine-131 is 8.1 days. How long will it take for three-fourths of a sample of iodine-131 to decay?
 - Radon-222 is a radioactive gas with a half-life of 3.82 days. How long would it take for fifteen-sixteenths of a sample of radon-222 to decay?
 - Uranium-238 decays very slowly, with a half-life of 4.47 billion years. What percentage of a sample of uranium-238 would remain after 13.4 billion years? **(1. Determine how many half-lives have passed. 2. Multiply $\frac{1}{2} \times \frac{1}{2} \dots$ depending on how many half-lives have passed).**
 - A sample of Strontium-90 is found to have decayed to one-eighth of its original amount after 87.3 years. What is the half-life of strontium-90? **(1. Determine how many half-lives have passed for 1/8 of the sample to be remaining. 2. Divide the # of years that have passed by the number of half lives to determine the length of the half-life).**
 - A sample of Francium-212 will decay to one-sixteenth its original amount after 80 minutes. What is the half-life of francium-212?
 - The ratio of carbon-14 to carbon-12 in a prehistoric wooden artifact is measured to be one-eighth of the ratio measured in a fresh sample of wood from the same region. The half-life of carbon-14 is 5,715 years. Determine its age.
 - Health officials are concerned about radon levels in homes. The half-life of radon-222 is 3.82 days. If a sample of gas contains 4.38 micrograms of radon-222, how much will remain in the sample after 15.2 days?
 - Bismuth-212 undergoes a combination of alpha and beta decays to form lead-208. Depending on which decay process occurs first, different isotopes are temporarily formed during the process. Identify these isotopes by completing the equations given below: