

Half-Life Calculations Study Sheet

Name _____ Per _____

Standard CHEM 11f: Students know how to calculate the amount of a radioactive substance remaining after an integral number of half lives have passed.

Example: If you have 0.25 grams of a radioactive substance with a half-life of 3 days, how long ago did you have 64 grams?

64g 32g 16g 8g 4g 2g 1g 0.5g 0.25g

Answer: Draw a chart to determine the number of half-lives to get from the ending amount to the starting amount... each half-life is worth 3 days. $8 \text{ HL} \times 3 \text{ days} = 24 \text{ days ago}$.

Example: The Half-Life of Polonium-214 is 0.001 second. How much of a 10 gram sample will be left after 0.003 seconds?

Answer: Calculate the number of Half-Lives: $0.003 \text{ sec} \times (1 \text{ HL} / 0.001 \text{ sec}) = 3 \text{ HL}$ Draw a chart!
 $10\text{g} \rightarrow 5\text{g} \rightarrow 2.5\text{g} \rightarrow 1.25\text{g}$ 1.25 grams are left.

Solve the following problems. SHOW ALL OF YOUR WORK!

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

2. Carbon-14 has a half-life of 5730 years. If a sample contains 70 mg originally, how much is left after 17790 years?

3. How much of a 500 gram sample of potassium-42 is left after 62 hours? The HL is 12.4 hours.

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

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

6. If 100 grams of Au-198 decays to 6.25 grams in 10.8 days, what is the HL of Au-198?