

Nuclear Reactions and Half-Life Worksheet
CH2000: Introduction to General Chemistry, Plymouth State University

1. Define for yourself each of the following variables:

n: _____

f_n : _____

N_n : _____

N_0 : _____

$t_{1/2}$: _____

2. What are the significant equations needed for doing half-life calculations?

3. Use a calculator to calculate each of the following:

a. $\ln(1)$

e. $(1/2)^2$

b. $\ln(0.245)$

f. $(1/2)^{0.342}$

c. $\log(1)$

g. $e^{-0.693(2)}$

d. $\log(0.245)$

h. $e^{-0.693(0.342)}$

4. What fraction of a radioactive sample remains after 25.3 half-lives?

5. If 5.63% of a radioactive sample remains, how many half-lives have passed?

6. If $t_{1/2} = 2.5$ days, how many half-lives have passed in 10 days?

7. If $t_{1/2} = 2.5$ days, how many half-lives have passed in 12.6 days?

8. If $t_{1/2} = 178$ sec, how many half-lives have passed in 60 sec?

9. If $t_{1/2} = 178$ sec, how many half-lives have passed in 25.5 min?

10. A sample initially containing 12.5 g of uranium now contains 3.5 g of uranium. What is the fraction remaining?

11. A sample currently contains 0.35g of radioactive iodine, which represents 12.5% of the initial sample. What was the original mass of iodine?

12. A solution contains 0.21M concentration of a radioactive material. What will the concentration be after 10 half-lives?

13. The half-life of a compound is 2.5 years. A sample initially having a radioactive count of 2500 Curries currently has 125 Curries. How many half-lives have passed?

14. The half-life of a compound is 12.5 years. 1.2% of the original amount of the compound remains in a sample. How old is the sample?

15. A sample originally containing 2.5 moles of a radioactive compound is found to contain 0.35 moles after 6 months. What is the half-life of the compound?