Kinetics of Radioactive Decay – Reading Guide

*section 21.3 in OpenStax*

All radioactive nuclei decay via \_\_\_\_\_\_\_\_\_\_\_\_\_-order kinetics. Therefore, = \_\_\_\_\_\_\_\_.

The integrated rate law can be written as: *Nt* =

Describe what each of the following variables represent:

*Nt* =

*N0* =

λ =

Note: In chapter 12, we learned the first-order integrated rate equation can be represented as:

[A]t = [A]0

Explain how these variables relate to *Nt*, *N0*, and λ.

Work through Example 21.5 and then attempt the following practice problem.

Plutonium-236 is an alpha emitter with a half-life of 2.86 years. If a sample initially contains 1.35 mg of Pu-236, how long will it take for the sample to decay to 0.100 mg?

*(ans. 10.7 years)*

**Radiometric Dating**

Since the rate of decay is proportional to the number of nuclei, we can substitute rate of decay (counts/sec) for the N values. The age of the object can be found using the equation:

t =

Carbon-14 radiometric dating can be used to date organic objects up to about 50,000 years old. To determine the age of an object, the following numbers are needed. (*See example 21.6.*)

t1/2 = 5730 years

λ =

Rate0 =

**End of Chapter 21 Practice Problems**

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For detailed solutions to these problems, go to the [OpenStax website](https://openstaxcollege.org/textbooks/chemistry/resources) and download the “Student Answer and Solution Guide.”