

Half-Life Decay

Length of Activity:

Focus: Radioactivity and Half-life

Skills: Computer skills, typing, Internet use, reasoning, and arranging.

Key Question:

How does half-life affect the amount of a material now and then?

Possible Preconceptions:

That materials that are radioactive all decay at the same time and rate.

Method:

Students will fill in missing information about the radioactive elements by using an online half-life calculator. And then answer questions accordingly.

Materials List:

Computer with Internet access

Handouts

Bag representing the elements

Standards:

The student recognizes that energy may be changed in form with varying efficiency. (SC.B.1.4)

The student understands the basic principles of atomic theory. (SC.A.2.4)

The student understands that most natural events occur in comprehensible, consistent patterns. (SC.H.2.4)

Objectives:

Students will:

Compute half-life using an online calculator

Place items in order according to acquired calculations

Answer questions regarding half-life and radioactivity

Doing the Activity:

Pair up students and have them each a question sheet. The students are to answer the questions using the Internet as a resource, and the web site given as a half-life calculator.

<http://library.thinkquest.org/11771/english/hi/math/calcs/half-life.html>

Name: _____

Date: _____

Class: _____

Half-Life

Directions:

Answer the following questions.

1. What is the half life of the following elements:
 - a. Plutonium 242 3.79×10^5 years
 - b. Plutonium 239 2.4×10^4 years
 - c. Uranium 235 7.1×10^8 years
 - d. Uranium 238 4.51×10^9 years
2. Organize the three radioactive items by mass (lightest to heaviest) according to the data listed: **1,3,2.**
 - a. 137,410 years ago you had 135g of bag # 1
 - b. 307,402,000 years ago you had 135g of bag #2
 - c. 1,760,321,000 years ago you had 135g of bag #3
3. If you had 100 grams of ^{242}Po , how much would you have 100,000 years from now? If in 100,000 years you had the same amount of ^{242}Po and ^{235}U , how much ^{235}U do you have today? **83.286g. 83.294g.**
4. The Voyager spacecraft has an onboard battery consisting of 5g of ^{239}Pu . The battery will continue to function until there is less than 1 thousandths of a gram left. At that point the spacecraft will lose all power and drift aimlessly in space. How long until this happens? **294,905 years, 35 days, 11 hours, 9 minutes, and 36 seconds.**
5. Cite an example of how the half-life of elements is used in geology. What about in other scientific fields?