Radioactive Decay Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Classwork/ Homework Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ per \_\_\_\_\_\_

Goal: ![C:\Users\Richard\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\L79RXIA3\MC900211963[1].wmf]()How do scientists use radioactive decay to find the absolute date of rocks and fossils?

Introduction

Geologists use the rate of decay (break down) of radioactive elements to help them determine the age of rocks. Scientists know that it takes a certain amount of time for half the element to decay. They refer to this time as a **half life**. Since these radioactive elements break down at a constant rate (the same way all the time) we can write an equation representing their decay.

Activity

1. Toss all the undecayed Skittles.
2. Count all the decayed and undecayed skittles and toss again.
3. Stop until you have reached “0” undecayed skittles.
4. Graph your data using a line graph. The x axis is number of tosses and the y axis is the number of “undecayed”skittles.

|  |  |  |
| --- | --- | --- |
| Number of Toss/ Halflife | # of decayed Skittles ("S" side up) | # of undecayed skittles ("S" side down) |
| 0 |  |  |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| 10 |  |  |



Analysis

1. What did you notice happen to the number of undecayed skittles as your tosses increased?
2. How many tosses did it take to reach zero?
3. If each toss represented a half life how many half lives did it take to decay?
4. If this represented to decay of Carbon 14 to Nitrogen 14 how many years would it take for the carbon 14 to completely decay into Nitrogen 14? (The half life of Carbon 14 is 5700 years.)

Math in Science!!!!

* p = the initial amount the of the element
* x = the number of half- lives

Amount of Radioactive element = p times(1/2)x

Example. Techneturium- 99 has a halflife of 6 hours, which means it takes 6 hours for half the substance to decay. Find the amount of Techneturium- 99 remaining from a 100 mg sample after 90 hours. Complete the table and use the formula to find the amount left after 90 hours.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hours | 6hrs | 12 | 18 | 24 | 30 | 36 | 42 |  |  |  |  |  |  |  |  |
| Half- lives | 1 | 2 | 3 | 4 | 5 | 6 | 7 |  |  |  |  |  |  |  |  |

Amt. of element = p times (1/2)x Lets find p and x.

Practice. See if you can solve these problems. MAKE SURE TO SHOW YOUR WORK!

1. Bohrium- 267 has a half life of 15 seconds. Find the amount that remains from a 16 mg sample after 120 seconds.

2. Radioactive glucose is used in cancer detection. It has a half-life of 100 minutes. How much of a 100 mg sample of glucose will remain after 24 hours? **(You will need to convert 24 hours to minutes to find the number of halflives.)**

3. Cesium-137 is a radioactive element with a half-life of 30 years. it is used to study upland soil erosion. How much of a 50 mg sample of cesium-137 would remain after 180 years?

4. Carbon-14 is used by archeologists to find the approximate age of animal and plant fossils. It has a half life of 5730 years. If the fossil originally contained 100 g of Carbon -14 how much would be left after 34380 years?

5. Potassium-40, used to determine the absolute age of rocks, has a half-life of 1,300,000,000 years. If a rock originally contained 1000 grams how much would it contain after 4,550,000,000 years?