Lab Activity: Absolute Dating

INTRODUCTION:

Some isotopes spontaneously emit particles or energy to yield a different element or isotope. This is called radioactive decay. This decay occurs naturally and is not affected by temperature, pressure, or chemical change.

Radioactive decay takes place at a random rate. Although you cannot predict just when any given atom will decay, you can predict that the billions of atoms within a small piece of a radioactive element, a given number will decay at a regular and predictable rate.

OBJECTIVE:

To become familiar with the process of radioactive decay, the factors that affects radioactive decay, and the different decay rates of various elements.

VOCABULARY:

Radioactive Decay

Element

Isotope

Half-Life

Stable Product

Unstable Product

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PROCEDURE A:

1. Use single sheet of paper to represent the “Unstable C-14” at time 0. For sake of time in this experiment, two minutes will represent the needed 5,700 years for C-14 to decay to N-14.
2. Begin timing for exactly two minutes. At the end of the two minutes carefully cut the paper in half and place one piece of paper to the side. This represents “Stable N-14”. Record your results on the data table below.
3. With the remaining piece of paper, representing “Unstable C-14”, cut it in half again after an additional two minutes. Set the “Stable N-14” piece to the side and record your data.
4. Repeat procedure step 3 until you have cut the paper in half ten time.

DATA TABLE

Half-Life	**Time** (years)	**Unstable C-14** (%)	**Stable N-14** (%)
0	0	100	0
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

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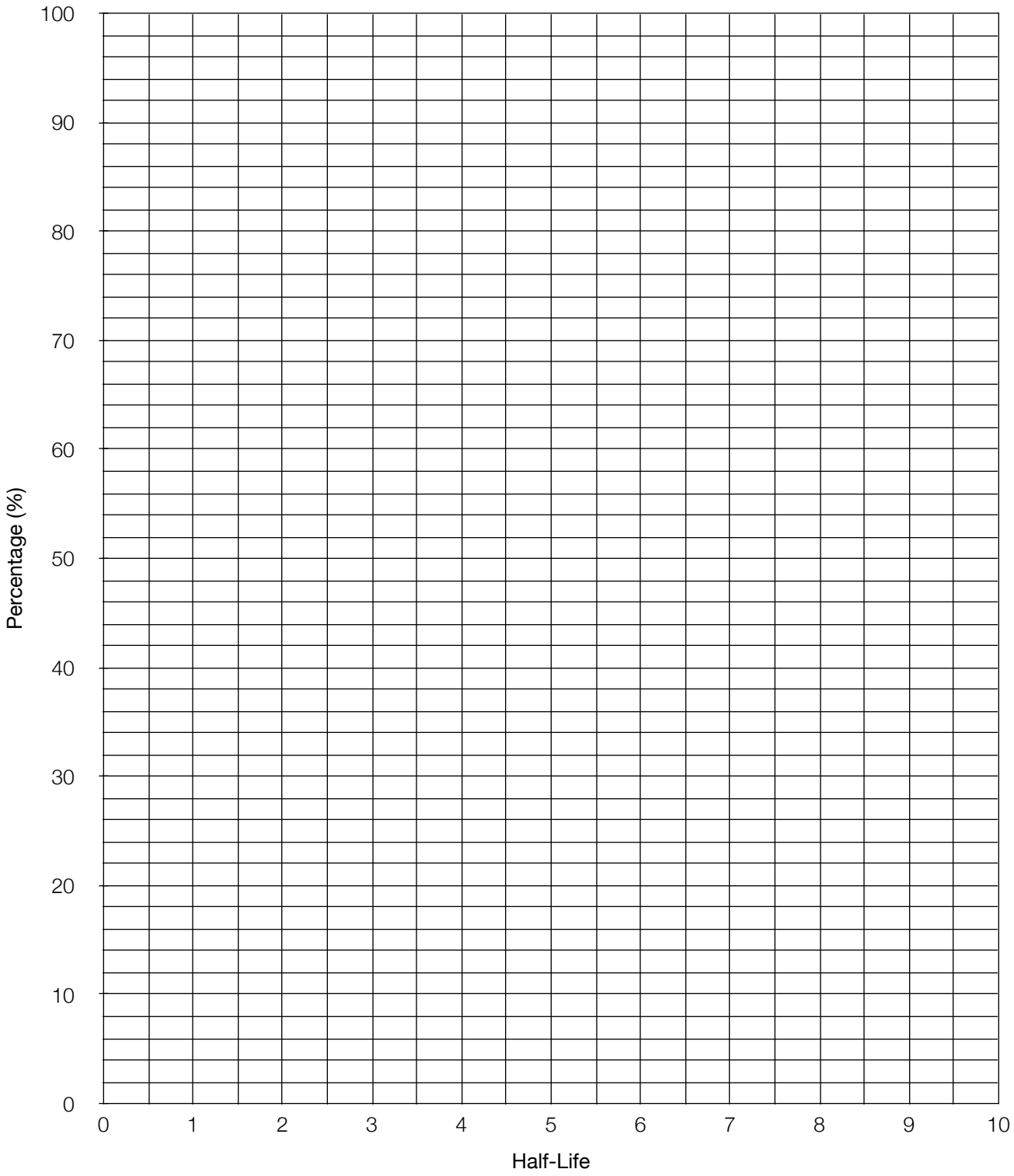
PROCEDURE B:

Graph your results from Procedure A below. Be sure to create two different lines and colors. One will represent the unstable C-14 and the other the stable N-14.



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DISCUSSION QUESTIONS:

1. What is the half-life for the unstable C-14??

2. Describe the transformation that occurred during the exercise?

3. Does the time for a half-life change as the radioactive “parent” material became stable?

4. Compare the half-life time of a large piece of C-14 and a small piece of C-14?

5. If a rock has a mass of 40 grams and was found to contain 5 grams of an unstable material and 35 grams of a stable material, how many half-lives old is the rock?

Half-life	Unstable	Stable

CONCLUSION: Explain why a radioactive rock will never become completely stable?