Radioactive Decay of Candium

Introduction

The rate of decay of a radioactive isotope of an element is measured in terms of its half-life. When a radioactive isotope decays, the decayed atoms form a daughter product. **The half-life of a radioactive element is the time it takes for half of its atoms to decay into the daughter product.** After two half-lives, one-fourth of the original isotope's atoms remain, and three-fourth have turned into the daughter product. After many more half-lives, a very small amount of the original parent isotope remains, and almost all of it has decayed into the daughter product.

Each radioactive isotope has its own characteristic half-life. For instance, the naturally occurring radioactive isotope of uranium (U-238) decays into thorium-234 with a half-life of 4.5 billion years. This means that half of the original amount of uranium-238 still remains after this time. In contrast, some radioactive isotopes decay quickly. FOr instance, polonium -214 has a half-life of 0.00016 seconds.

Materials

M&M™ candy pieces   Small dixie cup   graph paper   paper towel

Procedure

1. Take 100 atoms of candium (pieces of candy) and place onto your small dixie cup.
2. For half-life 0, no time has passed and no atoms have decayed yet.
3. Place you hand over the top and gently shake for 10 seconds.
4. **Gently** pour out candy.
5. Count the number of pieces with the print side up. These atoms have "decayed". Record the number of undecayed on your data table.
6. Return **only** the pieces with the print side down to the cup.
7. Consume the "decayed atoms". **YuM!**
8. Place all undecayed candies back into your small cup, cover, and shake gently for 10 seconds.
9. Continue shaking, counting, and consuming until all the atoms have decayed.
10. Create a graph of the data. Staple to this lab.

Data and Observations

Total Time	# of Undecayed Atoms
0	100

Post Lab Questions **Name: ________________________**

1. What is a half-life?

2. What is the independent variable? Dependent?

3. According to your graph, what was the half-life of the element candium in seconds?

4. Using the graph you created, what fraction of the atoms remain undecayed after 2 half-lives?

5. Based on your knowledge of half-life, is this what you expected? Why or why not.

6. What percentage of atoms remain undecayed after 3 half lives?

7. Based on your knowledge of half-life, is this what you expected? Why or why not.

8. What kind of function does your graph represent? (linear, exponential, etc.)