Names\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lab: “Half Life of M and M’s”** (4 students per group)

1. Define **half life**, and state the units.
2. Define **activity** of a radioactive sample, and state the units.

**Introduction**

You will perform this lab with your choice of one of the following (Choose one.) This represents your hypothetical nuclide.

M and M’s

Skittles

pennies

Each of the materials has a “right side up” and an “upside down.” Decide which will represent an atom of the Parent Element and which will represent an atom of the Daughter Element.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Parent Atom

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Daughter Atom

**Safety**

1. If anyone in your group is allergic to anything in M and M’s or Skittles, you will need to do the lab with pennies.
2. The candies are not and never were radioactive so they are safe to eat if you obey the following:
   1. Do not work at the lab tables.
   2. Candies should only touch clean cups, paper plates, and should be moved around using the “coffee stirring sticks” provided.
   3. Candies can only be eaten after you have collected all the data. Members of the lab group who wish to eat the candies must share nicely.

**Procedure**

1. Obtain a cup of your “hypothetical nuclide.”
2. Count the total number of atoms you start with.
3. Record this value as the total number of parent atoms at time zero.
4. Shake the cup and pour it out onto a plate. This represents the situation at the end of the “a 5 second time interval”.
5. Separate the parent and the daughter atoms and count how many you have of each.
6. Record the information in the chart for this “time”.
7. Remove the daughter atoms and set them aside.
8. Put all the parent atoms back into the cup.
9. Repeat steps 3-8 until you have less than 10 atoms remaining.

|  |  |  |
| --- | --- | --- |
| **Time(seconds)** | **Number of Parent Atoms** | **Number of Daughter Atoms** |
| **0** |  |  |
| **5** |  |  |
| **10** |  |  |
| **15** |  |  |
| **20** |  |  |
| **25** |  |  |
| **30** |  |  |
| **35** |  |  |
| **40** |  |  |
| **45** |  |  |

**Analysis**

1. On a single graph, graph the number of parent atoms vs time and the number of daughter atoms versus time. (Time is on the X axis.)
2. What is the value of the half life for your element?
3. When is approximately 25% of the original left? Answer in seconds and how many half lives?
4. How many half-lives will it take until the ratio of Parent Atoms to Daughter Atoms is 1 to 7?
5. If you started with a larger original sample how would this affect the half life? EXPLAIN
6. If you started with a larger original sample how would this affect the initial activity? EXPLAIN

**Cleanup**

If you used pennies, please return them to your teacher. If you followed all safety rules, please enjoy eating the candies. Dispose of all paper products appropriately. We hope you enjoyed this learning experience.