



Half-life: Determining and Graphing the Half-life of M&Mium

Background: You should know the term “half-life” and know how it is related to radioactive elements. The half-life of a radioactive element is the time it takes for half of its atoms to decay into something else. For example, iodine-125 (I-125) has a half-life of about 60 days; therefore, in 60 days, 1g of I-125 will turn into half a gram of iodine-125 and half a gram of something else (the radioactive decay products of radium). After another 60 days have elapsed, only a $\frac{1}{4}$ of the original 1g of I-125 will remain.

Purpose: To determine the half-life of the element M&Mium.

Materials:

Bag of M&Mium Isotopes

****Radioactive members of this isotope family are easily distinguished via a bold **m** on the front surface of the atom.****

1 plastic cup

pencil/pen

white piece of paper

1 sheet of graph paper

Procedure:

1. Count the number of M&Mium atoms as you place them in the cup. Record the total number of radioactive atoms you start with in your data table (on the back of your graph paper).
2. Cover and shake/rattle the cup.
3. Carefully pour your atoms onto your white paper. You will see that several of the previously radioactive atoms in the group have decayed, and the **m** is no longer visible. This means that they are now considered "safe" and, since they are no longer radioactive, may actually be eaten without fear of any harm to you! Please do so, and **as you remove the edible atoms, count them so you may determine the number of atoms that have decayed in that particular shake. (NOTE: You should not eat any of the decayed M&Mium atoms until you are on your 3rd trial)**
4. Now you need to continue this pattern until no more radioactive members remain. Remember to record the number of decayed atoms after each shake!

Analysis:

Using the graph paper provided, construct a graph of N (Number of decayed atoms) as a function of the number of shakes. Use the average of the 3 trials to construct this graph. (*Remember to label your x-axis, y-axis, and indicate a title for your graph.*)

Conclusions:

1. Calculate the half-life of M&Mium? (i.e., What number of shakes are necessary to reduce the radioactive members to one-half?)

