

Modeling Radioactive Decay

Formulating Models Because of safety concerns, it is not possible to directly experiment with radioactive isotopes in the classroom. Thus, in this lab, you will use pennies to model the half-life of a typical radioactive isotope. Each penny represents an individual atom of the radioisotope.

Materials 100 pennies, Large plastic cup, graph paper

Procedure

1. Count out 100 pennies and place into the plastic cup.
2. Place your hand over the top of the cup and shake the cup several times.
3. Pour the pennies onto a table. Remove all the pennies that are “heads-up.” These pennies represent atoms of the radioisotope that have undergone radioactive decay.
4. Count the number of pennies that remain (“tails-up” pennies) and record this number in the Decay Results data table as the Number of pennies remaining for trial 1.
5. Place all of the “tails-up” pennies back in the plastic cup.
6. Repeat steps 2 through 5 for as many times as needed until no pennies remain.

Decay Results	
Trial number	Number of pennies remaining
0	100
1	
2	
3	
4	
5	
6	
7	
8	

Analysis

1. Make a graph of Trial number (x-axis) versus Number of pennies (y-axis) remaining from the Decay Results data table. Draw a smooth curve through the plotted points.
2. How many trials did it take for 50% of the samples to decay? 75%? 90%?
50%: _____
75%: _____
90%: _____
3. If the time between each trial is 1 minute, what is the half-life of the radioisotope?

4. Suppose that instead of using pennies to model the radioisotope, you use 100 dice. After each toss, any die that comes up a “6” represents a decayed atom and is removed. How would the result using the dice compare with the result obtained from using the pennies?

