# The Half-Life of Candy

**Estimated Time: 30 minutes**


**SUMMARY**

Candy is always awesome, but what if it can be used to teach students about the half-life of radioactive elements? In the activity, you can use Skittles or M&M's (or for a non-food option pennies) to simulate radioactive decay. Scientists use the rate of decay to determine how old organic materials are within a few hundred years.


**WHAT YOU'LL LEARN**

- Rate of radioactive decay
- Graphing results to create a predictive curve

| Materials Used | Resources Used |
|---|---|
| • 10 candies with one side imprinted (skittles or M&M's) or 10 coins with two different sides (pennies or dimes)<br>• Plastic bag or cup<br>• Graph paper<br>• Ruler<br>• Pencil | • https://courses.lumenlearning.com/boundless-chemistry/chapter/carbon/ |

**WHAT TO DO**

Isotopes have the same chemical properties and same atomic number but different masses and different physical properties. Isotopes are different in their nuclear properties of the atom. For example, carbon has three main isotopes (carbon 12, carbon 13, and carbon 14) and all have the atomic number 6 (6 protons in the nucleus). However, they have different numbers of neutrons in the nucleus. Carbon 12 and 13 are stable—they do not decay over time—but carbon 14 is radioactive. Radioactive materials contain some nuclei that are stable and some that are unstable. They decay at different times at a fixed rate called half-life. The half-life of a radioactive isotope is the amount of time that passes before half of a quantity of isotope is stable. For instance, carbon 14 has a half-life of 5,730 years. This means in one gram of carbon 14, half of it will be stable in 5,730 years. This science is used in radiometric dating, which uses the natural abundance of radioactive atoms to their remaining decay products.

1. Take 10 candies or pennies and put them into a bag or cup.
2. Carefully shake the bag and spill the contents onto a clean flat surface.
3. Pick up only the candies with the imprint showing (M for M&Ms). For pennies, only pick up the coins that are head's up. These are still radioactive.
4. Count the number of radioactive materials and write on your paper as "trial 1" and return them to your bag or cup.
5. The candies or coins left should be moved to the side - these have decayed to a stable state.
6. Repeat steps 3-6 until all material is stable, or you have completed 10 trials. Make sure you label the data set with the correct trial number.

7. Use your graph paper and create a graph with the vertical axis (y-axis) as the number of candies and the horizontal axis (x-axis) as the trial number. What do you observe about your graph? If you were looking at an old object that had 25% of the amount of radioactive material, around what trial number would it be according to your graph?

**TIPS**

- **Isotropes are slightly different than allotropes, which have different chemical and physical properties. Carbon has many allotropes, such as diamond and graphite. One of our favorite allotropes of carbon is the fullerene or buckyball - Carbon 64. If you look at our STEM Center logo, it is a "flattened" version of a fullerene!**
- **Try this experiment again with more material and compare your graphs!**