

Half-Life of M&Ms[®]

Purpose: to determine the relationship between the number of half-lives and percent activity

Materials: Graphical Analysis, ~ 200 M&Ms[®], plastic container

Procedure:

1. Obtain the M&Ms[®] and a container to put them in.
2. Shake the container and carefully pour out the contents onto the tabletop.
3. Count the number of Ms up candies (non-decayed) and the number of Ms down candies (decayed). Record the numbers on the data table.
4. Set aside the decayed candies. Put the non-decayed candies back into the container and re-shake and pour them out again. Again separate the non-decayed from the decayed candies. Record the non-decayed and decayed numbers.
5. Continue in this manner until all the M&Ms[®] have decayed.
6. Calculate the percent activity for each half-life:

$$\% \text{ activity} = \# \text{ of non-decayed candies} / \text{beginning } \# \text{ of candies}$$

7. Plot the percent activity against the number of half-lives, using Graphical Analysis. Remove connecting points option and have the program draw the best smooth curve to show the relationship on the graph.

Print out the following table to record your data. Use the data to create the graph.

| # of Half-Lives | # Non-Decayed (M's Up) | # Decayed (M's Down) | % Activity |
|-----------------|------------------------|----------------------|------------|
| 0 | | | |
| 1 | | | |

| | | | |
|----|--|--|--|
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |



Questions:

1. What fraction of the original amount would be remaining after 10 half-lives?
2. Would radioisotopes with long or short half-lives be used in medicine?
3. Calculate the amount remaining of 150. g of a radioisotope with a half-life of 30. minutes after a period of 2 hours.
4. Radioisotopes used in medicine are stored for a period of ten half-lives before they are discarded. How much time would have elapsed before disposal of a radioisotope which has a half-life of 30. days?
5. If, on September 1, a school purchased a radioisotope of mass 350. g with a half-life of 45 days, how much of the sample would be left on June 1?

6. What description would you give to the relationship between percent activity and number of half-lives? Is it a direct relationship? Indirect? Inverse? Exponential?
7. Why are the M&Ms[®] a good model for radioisotopes in this activity?
8. What other everyday material could be used in place of the M&Ms[®] ?

Graded Assignment:

Turn in your graph **and** answered questions to the HALF-LIFE OF M&MS DROPBOX. Access the dropbox by clicking on the DROPBOX link on the above navigation bar. This activity is worth 25 points - 15 for questions and 10 for the graph.