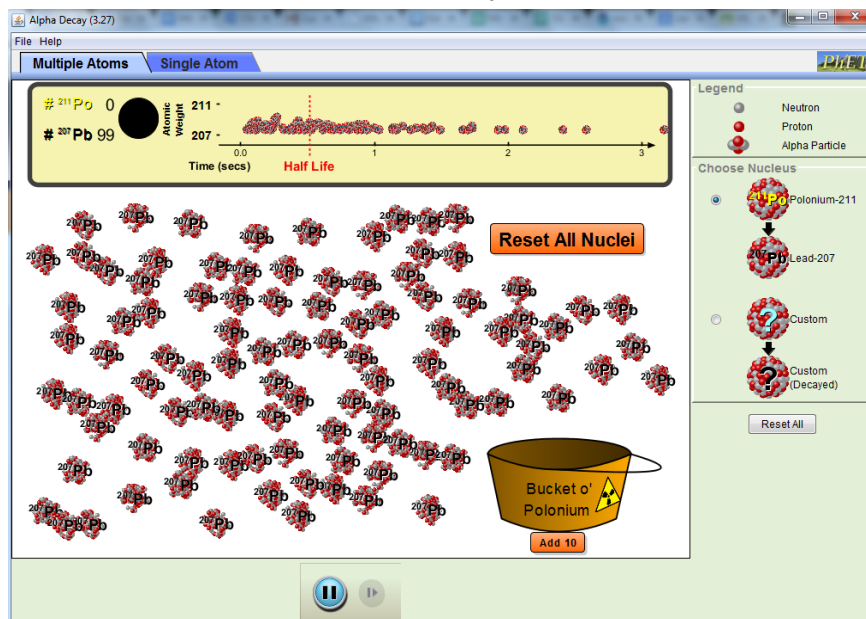


Phet Simulation

Alpha Decay

Go to Phet Simulations. Find and open the sim called [Alpha Decay](#).

pHET is undergoing a transition in their simulations, so at the current time, this is not an HTML 5 simulation, so it doesn't work as quickly. This is a "Browser Compatible" simulation, so it will take a while to load. I can get it to run on Chrome and Firefox. I haven't tried any other browsers.



Click on 'Run Now' and when the simulation opens click on the 'Single Atom' Tab.

Watch the Polonium-211 atom until it decays. Click 'Reset Nucleus' and watch it again. Repeat this at **least 8** more times.

1) Make at least 3 observations that compare the Polonium nucleus before and after it decays.

2) Click the Pause button immediately after a decay so you can look at the particle that comes flying out of the nucleus. What is this particle made of?

3) Why does the mass number change from 211 to 207 after a decay?

4) Why does the Polonium (Po) become Lead (Pb) after a decay? (You may have to look at a Periodic Table to determine this)

5) Look at the Decay Time Chart across the top of the screen. It should display the decayed nuclei of all of the previous trials you watched. Does there appear to be any pattern for the decay times that are represented on the chart? What does this tell you about the decay of a specific nucleus having a predictable pattern or being random?

6) Now click on 'Multiple Atoms' and quickly empty the Bucket o' Polonium by rapidly clicking the 'Add 10' button until the bucket is empty. Watch the atoms decay and watch the Decay Chart across the top. Make 3 observations about what happens.

7) Click on 'Reset All Nuclei'. Is the pattern of decayed nuclei across the top the same as it was the first time? You might have to repeat this a few times to be sure of your answer. Describe any similarities and/or differences in what you see when you do this.

8) Click on 'Reset All Nuclei' again and this time click the Pause button every half second. Make a data table below showing the time in half second increments and the number of Polonium-211 atoms left at each half second. What should the first data point for everyone be?

Use google sheets to make this graph. Please create the sheet using the pull down menu within the google classroom assignment.

9) Make a properly-labeled graph of this data below showing time on the horizontal axis and number of Polonium-211 atoms on the vertical. You will need to pick the best scale for both axes so the data fits nicely on the graph. What type of mathematical function best fits this graph? Find the proper graph fit in google sheets to create the best fit graph.

10) Using the graph best fit equation CALCULATE the half life of the decay. How well does it match the half life line that is drawn on the number line on the screen?

11) Use this half life to CALCULATE the time that is expected for the nuclei to drop from 99 to 33. Click on 'Reset All Nuclei' again and this time try to pause when it hits 33. How well did the result match the expected result?

12) How should this activity be changed to be more engaging?

