

Radioactive Half-life

Name - _____

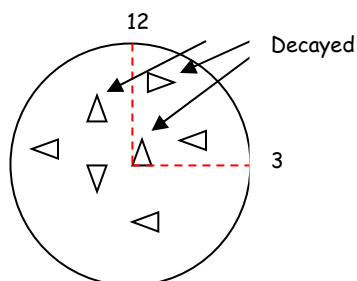
Partner - _____

Purpose - What happens to the rate of radioactive decay in a sample as time passes and what is the half-life of this lab's sample?

Materials - 100 popcorn kernels empty petri dish

Procedure -

- 1.) Gather 100 popcorn kernels along with your petri dish from the equipment area. The popcorn kernels represent parent nuclei that are undergoing radioactive decay. These kernels will be referred to as parent kernels.
- 2.) Count the popcorn kernels to make sure that there are 100 kernels. Put the kernels into your petri dish and put the lid on. Shake the container and carefully drop the kernels onto your desk. Each kernel is like an hour hand of a clock. If the kernel point is pointing between the 12 and 3 on an imaginary clock then the kernels have decayed.



- 3.) All others not pointing between the imaginary 12 and 3 have not undergone nuclear decay. Count all kernels that HAVE decayed. Decayed kernels represent daughter nuclei. These nuclei are picked up and removed after writing the value in the table below (figure 1). Record the number of parent nuclei left that DIDN'T decay as the parent nuclei for the next round. This is one unit of time as measured in shakes.
- 4.) Put the parent kernels back in the petri dish with the lid on. Repeat step 2 and 3. This is the second unit of shake time.
- 5.) Repeat step 4 until all parent kernels have decayed into daughter nuclei. ALWAYS RECORD THE NUMBER DECAYED EVEN IF IT IS ZERO!

6.) Make two graphs. On the first graph plot the number of daughter kernels produced versus time as measured in shakes. On the second graph plot the number of parent kernels remaining versus time as measured in shakes. Draw a line of best fit. (Hint - the line is probably curved)

Data and Observations -

Figure 1 -

<u>Time (shakes)</u>	<u>Number of Parent Kernels</u>	<u>Number of Daughter Kernels</u>
0	100	-
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Discussion Questions -

1.) What happened to the number of parent kernels over time? Be detailed in your answer! (2)

2.) What happened to the rate at which daughter kernels are produced? Be detailed! (2)

- 3.) On the graph of parent kernels compared to time, at what time (shakes) did the number of parent kernels become approximately 50? How much time passed before the number of parent kernels was 25? (2)
- 4.) Using your response from (#3), what is the half-life of popcorn as determined by your shakes? (1)
- 5.) If you had performed this experiment with 10 000 kernels of popcorn, do you think that the answer would be different? Give reasons in explaining. (2)
- 6.) If the parent kernels decayed when the point was between the hours of 12 and 1 of your imaginary clock, how would this affect the results? Be detailed in your answer. (2 marks means I need more) (2)

Conclusion -

