What's half-life

Half-life and isotopes

Radioactive isotopes are unstable atoms that decay in a predictable way over time.

The average amount of time taken for half the atoms in a substance to decay is known as the half-life of the substance.

Radioactive decay is part of nature and can be used within a number of different ways. For example, it can be used to date fossils (using the known radioactive decay model of Carbon-14), or to be used in radiopharmaceuticals for medical imaging (using the known radioactive decay model of Molybdenum-99 to produce Technetium-99m).

Simulate the radioactive decay of a fictitious radioactive isotope by playing the following game:

1. You will need to collect a large number of items of the same type. Items like plastic discs, coins, cut out bits of paper are best for this, as they need to have 2 distinct sides. You will need at least 30, but 50-100 of the same item produces a better result.
2. Identify (e.g. heads or tails on a coin) or mark (coloured in a different colour, marked with a letter, etc.) one side of all the items you have – this side indicates the atom has "decayed".
3. Put all of the items together in a cup or container, mix them around and empty it onto a table.
4. Sort all of the items with the mark facing upwards into one pile, and all of the other items into another pile.
5. Count the number of items with the mark facing up – these items have decayed and are removed from the game.
6. Record the number of decayed items in the table below.
7. Place the remaining items (the non-decayed items) back into the container and repeat steps 3-6 until there are less than 2 items left (that is, almost all of the items have decayed).
8. Repeat this process again and then calculate the average decay for each half-life, as indicated in the table below.
9. Graph your results as a line graph (either on paper or using a computer program) to visualise the average half-life decay for your fictitious radioactive isotope.

Half-Life	Game 1 Decay	Game 2 Decay	Average Decay
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			