

Determination of the half-life of a model radioactive source [e.g. using cubes or dice]

Introduction

Radioactive decay is a random process. The number of radioactive atoms present in a given sample will halve in a fixed time period depending on the probability of decay for that particular radioisotope. This is known as the half-life of the substance. This is a simulation in which radioactive atoms are represented by cubes. The cubes are considered to be decayed when they land with a particular face upwards.

Apparatus

50 × cubes with one face shaded
margarine tub
tray

Diagram of Apparatus



Method

1. Count the cubes to ensure that you have 50 and put them into the margarine tub.
2. Shake the tub and gently throw the cubes into the plastic tray.
3. Record the number of cubes that have landed with the shaded face upwards and remove from the tray
[These represent the radioactive atoms that have decayed.]
4. Put the cubes remaining in the tray back into the margarine tub.
[These represent the radioactive atoms that have NOT yet decayed.]
5. Repeat steps 2 and 3 another 9 times.

Analysis

1. Use the results from the whole class to plot a graph of the number of radioactive atoms remaining (y -axis) against the number of throws (x -axis).
2. Use the graph to determine the half-life of the cubes.