



Year: 11

Topic: 6.6 Half life

Knowledge and Understanding to be developed:

This topic covers the random nature of radioactive decay and introduces the concept of half-life. Learners will plot decay curves and use them to determine the half-lives of radioactive materials. Different uses of radioactive materials will be studied, the uses being related to their half-lives and their penetrating powers

Mathematical Skills There are a number of opportunities for the development of mathematical skills in this topic. These include calculating how the activity of a radioactive source changes after a given number of half-lives. These topics afford learners the opportunity to recognise expressions in standard form; to use ratios, fractions and percentages; to substitute numerical values into algebraic equations using appropriate units for physical quantities; to solve simple algebraic equations.

Key Terms to be learned this topic:

Probability	decay
radioactive materials	alpha
Half life	tracers
Decay curve	Carbon dating

**Learning Objectives and Outcomes:
Students should be able to :**

- (a) the random nature of radioactive decay and to model the decay of a collection of atoms using a constant probability of decay, e.g. using a large collection of dice, coins or a suitably programmed spreadsheet
- (b) how to plot or sketch decay curves for radioactive materials, understand that a given radioactive material has a characteristic half-life and determine the half-life of a material from the decay curve
- (c) how to perform simple calculations involving the activity and half-life of radioactive materials in a variety of contexts, e.g. carbon dating
- (d) the different uses of radioactive materials, relating to the half-life, penetrating power and biological effects of the radiation e.g. radioactive tracers and cancer treatment

SPECIFIED PRACTICAL WORK

- Determination of the half-life of a model radioactive source, e.g. using dice.