

Half-life of Radioactive elements

Radioactive elements lose their radioactivity in a systematic way. Half the radioactivity is lost over a period which is called the Half-life. Over the next half-life the radioactivity is again reduced by a factor $\frac{1}{2}$, and so on. We can express this as:

$$N_n = \frac{N_0}{2^n}; \text{ where } t = n \times t_{1/2}$$

N_n is radiation level after time t

N_0 is original radiation level

$t_{1/2}$ is half-life of the element

The half-life of an element is a fixed value for that element and cannot be altered in any way. Different elements have different half-lives.

Examples:

Uranium 4.5×10^9 years

Polonium 3×10^{-7} s

This phenomenon is used eg. to date geological samples of different materials. A famous example is the Radio Carbon method which utilises the ^{14}C isotope (see separate hand-out).