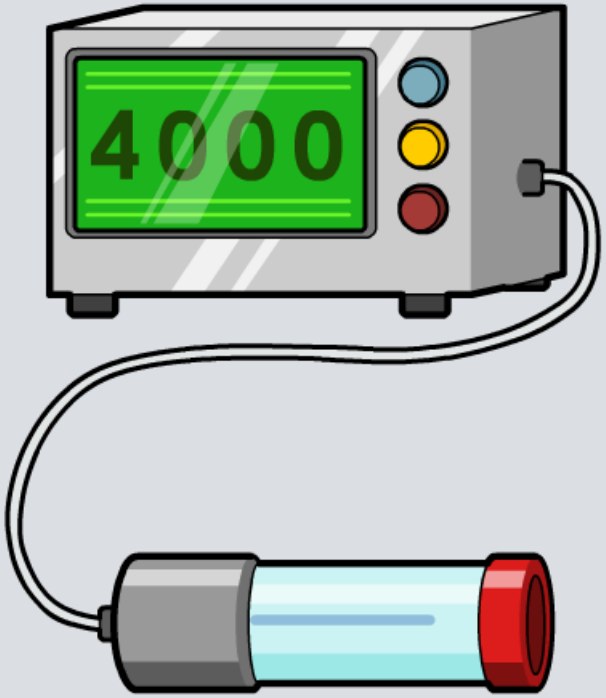
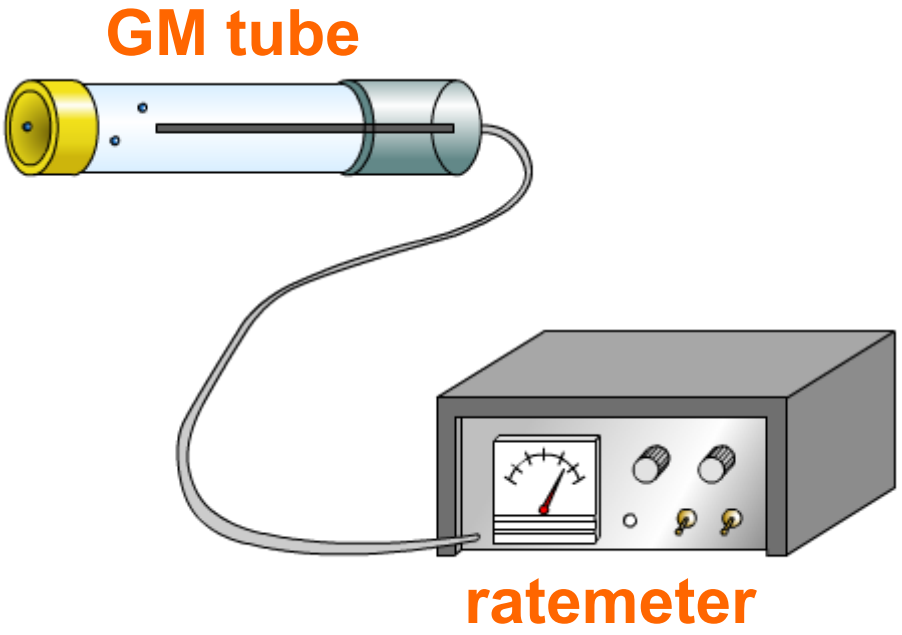
Half Life



How can radioactivity be measured?

Radioactivity cannot be seen, it has no smell, and does not make any sound, so how can it be detected?

Radioactivity can be detected with a **Geiger counter**, which is a Geiger-Müller (GM) tube connected to a ratemeter.



It can also be used to measure the amount of radiation.

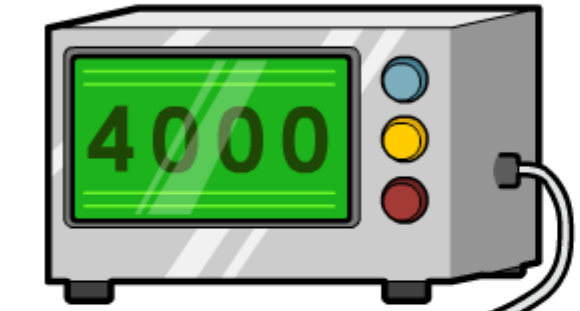
The ratemeter gives a reading in ‘counts per second’ and a loudspeaker ‘clicks’ for each particle, or burst of radiation, detected by the GM tube.

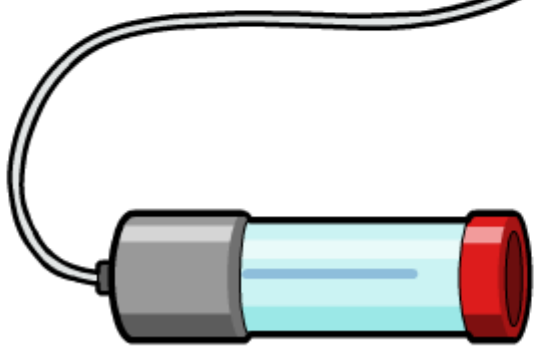
What happens to radioactivity?

Why does radioactivity decrease over time?

A Geiger counter is used to detect and measure the amount of radiation emitted by a radioactive source.

Click "**play**" to find out what happens to the amount of radioactivity detected over time.





What is half-life?

Radioactive decay is a spontaneous process that cannot be controlled and is not affected by temperature.

However, each radioactive element has its own particular **decay rate**, which is called the **half-life**.

> The **half-life** of a radioactive element is the **time** that it takes **half the nuclei in a sample to decay.**

For example, the half-life of the isotope iodine-131 is **8 days**.

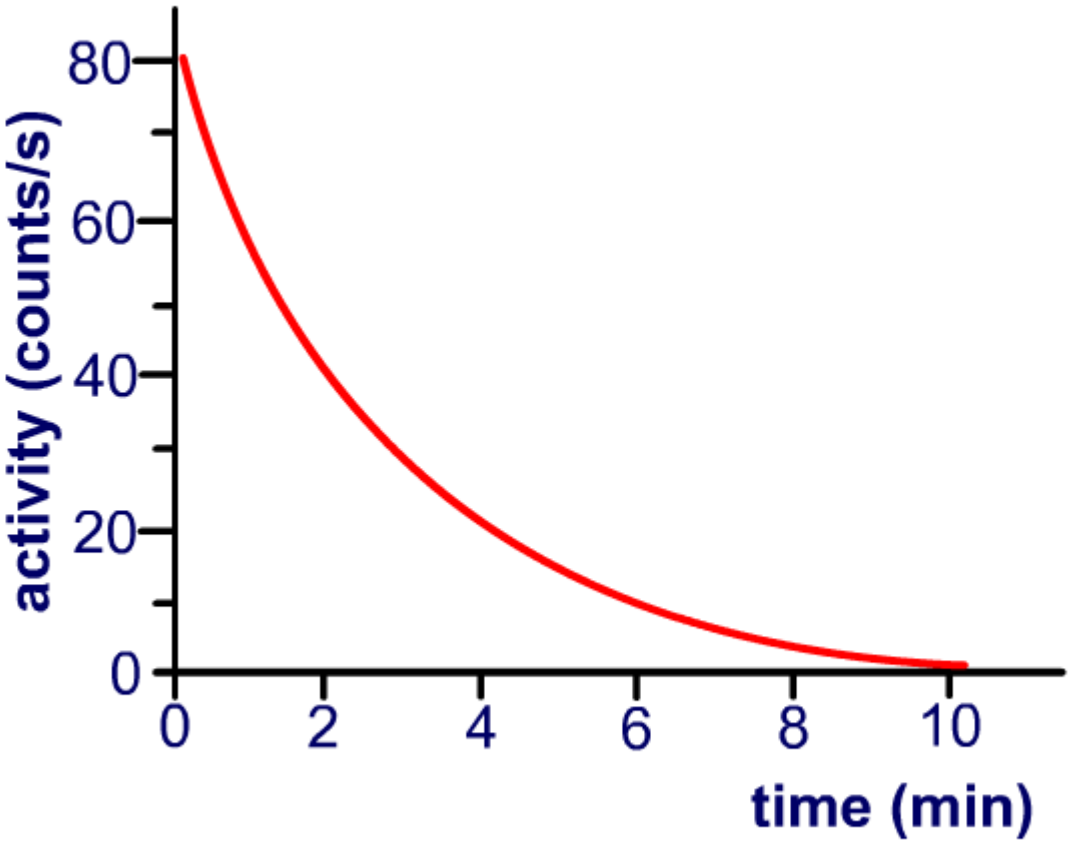
This means that after 8 days half the nuclei in a sample of iodine-131 have decayed. Eight days later, half the remaining nuclei have decayed and so on.

How is half-life calculated?

How is half-life calculated from a decay curve?

For a radioactive sample, the average number of nuclei that decay per second is called the **activity**.

Click "**play**" to find out how the changes in the activity of a radioactive sample can be used to figure out its **half-life**.



How long are half-lives?

Half-lives range from millionths of a second to millions of years.

Some types of nuclei are more unstable than others and decay at a faster rate.

Radioisotope	Half-life
boron-12	0.02 seconds
radium-226	1602 years
uranium-235	710 million years

Xenon-133 is a radioactive isotope used for studying lung function. Why does its half-life of 5.2 days make it suitable for this use?

Uranium-235, which is used in nuclear reactors and nuclear weapons, has a half-life of 710 million years. Why is the use of uranium-235 considered controversial?