

All of the AQA science revision sheets at www.tes.com/teaching-resources/shop/teachsci1

**Decay
Alpha** decay causes the **charge** and **mass** of the nucleus to **decrease**:

**Beta** decay causes the **charge** of the nucleus to **increase**. When an electron is lost a proton is changed into a neutron:

**Gamma** rays do not change the mass or charge.

**Finding half-life from a graph:**
 - Mark where half the activity level is.
 - Find the corresponding time (1.8s in this example)

1 half life = 320 ÷ 2 = 160
2 half lives = 160 ÷ 2 **= 80Bq**

As a % this is
(80 ÷ 320) x 100 = 25%

**Half Life**The time taken for the number of radioactive nuclei in an isotope to halve. Activity (the rate at which a source decays) is measured in becquerels Bq (1Bq = 1 decay per second).
eg. if the initial activity of a sample is 320Bq what will it be after two half-lives?

**Irradiation and Contamination
Exposure** to radiation (**irradiation**) can damage living cells by **ionising** atoms within them. Radioactive sources should be kept in lead lined boxes. Irradiation does not make something radioactive.

**Contamination** is where radioactive atoms get into something. Touching a radioactive source without gloves will contaminate your hands. The contaminating atoms can then **decay**, releasing harmful radiation.

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Carbon-14 🡪 Nitrogen-14 + β particle

Uranium-238 🡪 Thorium-234 + α particle

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| --- | --- | --- | --- | --- |
|  | **Type of particle** | **Properties** | **How ionising** | **Uses** |
| Alphaα | alpha particle – two protons and two neutrons (helium nuclei). | Can only travel a few cm in air and are absorbed by a sheet of paper. | Very | Smoke alarms. The α-particles ionises air particles, causing a current to flow. Smoke will bind to the ions, stopping the current so the alarm sounds. |
| Betaβ | A fast moving electron. | Have no mass and a charge of -1. Travel a few meters in air and are absorbed by about 5mm of aluminium. | Moderate | Testing thickness of sheets of metal.  |
| Gammaγ | Are electromagnetic waves. | Usually pass through materials. Absorbed by thick sheets of lead or several meters of concrete.  | Weakly | See EM waves sheet. |

**Radioactive Decay**

**Isotopes**Different forms of the same element.
Isotopes of an element have the same number of protons but a different number of neutrons:

**All** elements have isotopes but there are only a few that are stable.
Others **decay** into other elements to become more **stable** by giving out radiation.

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8 protons, **8 neutrons**

8 protons, **10 neutrons**

**Isotopes and Nuclear Radiation**