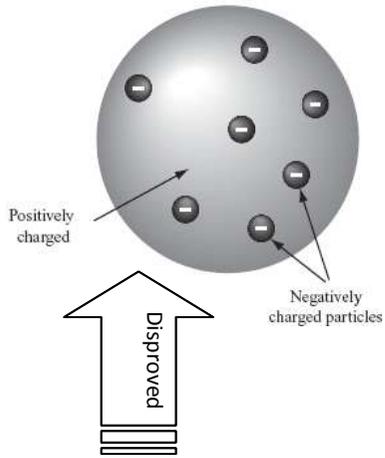
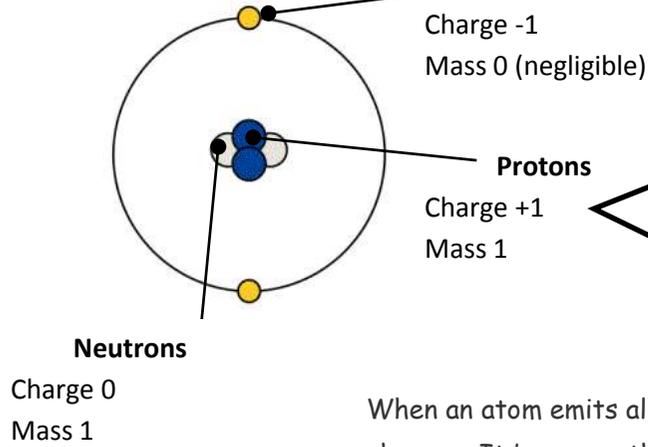


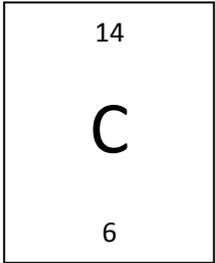
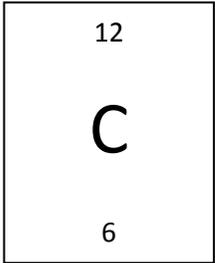
The Plum Pudding Model of an Atom



Structure of an atom



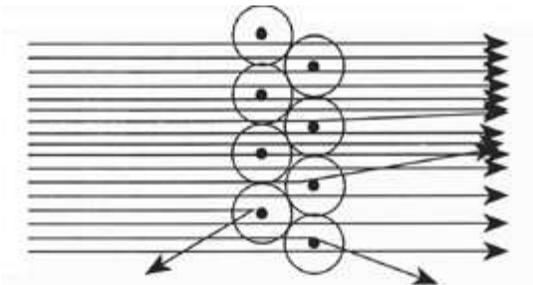
The number of electrons in an atom is always the same as the number of protons, so atoms are electrically neutral overall. Atoms can lose or gain electrons forming ions.



p=6, e=6, n=6

p=6, e=6, n=8

Rutherford and Marsden's scattering experiment.

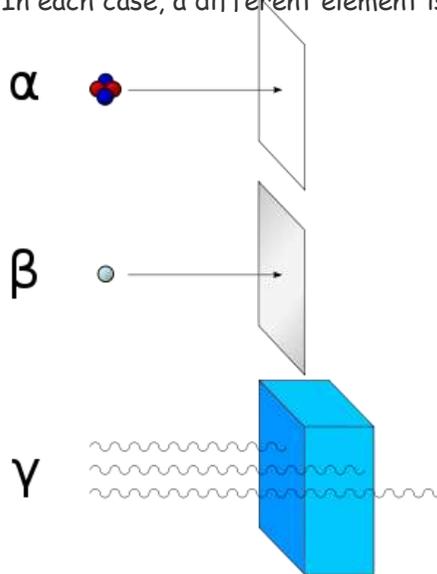


A beam of alpha particles was aimed at very thin gold foil and their passage through the foil detected. Some of the alpha particles emerged from the foil at different angles, and some even bounced straight back. The scientists realised that the positively charged alpha particles were being repelled and deflected by a tiny concentration of positive charge in the atom.

When an atom emits alpha or beta radiation, its nucleus changes. It becomes the nucleus of a different element because the number of protons in the nucleus determines which element the atom belongs to.

	alpha decay	beta decay
change in number of protons	-2	+1
change in number of neutrons	-2	-1

In each case, a different element is left behind.

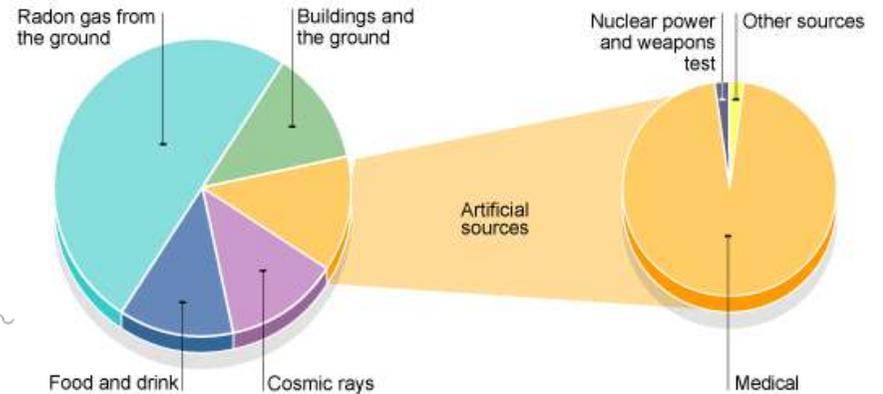


Isotopes are the atoms of an element with different numbers of neutrons. They have the same proton number, but different mass numbers.

The nuclei of some isotopes are unstable and they can 'decay' and release radiation. When a radioactive isotope decays, it forms a different atom with a different number of protons

Radiation

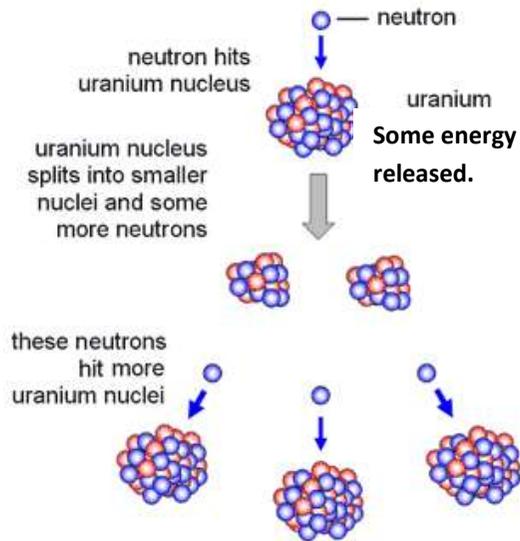
Background Radiation.



Nuclear fission

The process of splitting a nucleus is called nuclear fission. **Uranium-235** or **plutonium-239** isotopes are normally used as the fuel in nuclear reactors, because their atoms have relatively large nuclei that are easy to split, especially when hit by neutrons.

When a uranium-235 or plutonium-239 nucleus is hit by a neutron, the following happens:



The additional neutrons released may also hit other uranium or plutonium nuclei and cause them to split. Even more neutrons are then released, which in turn can split more nuclei. This is called a **chain reaction**.

Nuclear fusion

Nuclear fusion involves two atomic nuclei joining to make a large nucleus. Energy is released when this happens. The Sun and other stars use nuclear fusion to release energy when hydrogen nuclei join to form helium nuclei.

Here is one nuclear fusion reaction that takes place:

