Radioactivity is the **spontaneous** breaking up of **unstable nuclei** with the emission of one or more types of radiation.

Radioactivity

Henri Becquerel discovered radioactivity accidently when he developed a photographic plate that had been beneath some uranium salts *before* he had exposed them to sunlight.
Pierre and Marie Curie isolated two highly radioactive elements **Polonium** and **Radium** from pitch blende.

Some isotopes have large unstable nuclei with their many protons and neutrons jostling for position and as a result can become ***radioactive.*** **Radioisotopes** are forms of **elements that emit radiation due to their unstable nuclei.**

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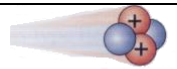
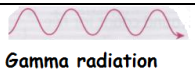
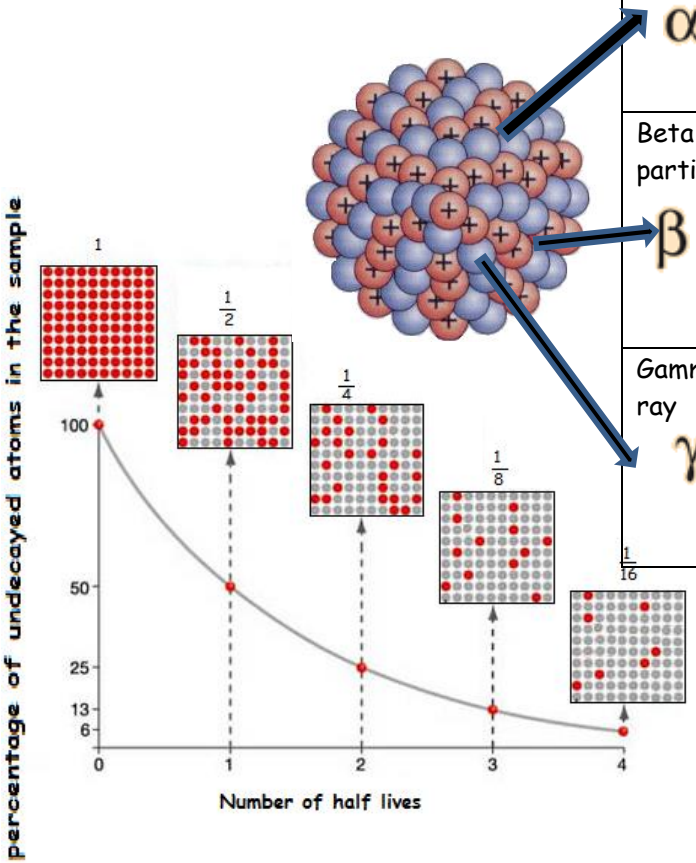
Radiation type	Image	Penetrating power stopped by…	*Charge*	Example	Uses	Nuclear Equations (new elements can be formed, does not involve bonding electrons) + How to work out equation
Alpha particle α	 Alpha particle Helium nucleus	A sheet of paper	Positive	Americium -241	Smoke detectors	$^{241}_{95}Am \rightarrow {}^{237}_{93}Np + {}^{4}_{2}He$ Plus energy released Drop 4 on the mass, and 2 on the atomic number
Beta particle β	 Beta particle High energy electron	5 mm of aluminium	Negative	Carbon-14	Find age of objects in archaeology	$^{14}_{6}C \rightarrow {}^{14}_{7}N + {}^{0}_{-1}e$ Plus energy released **Add 1 to atomic number go up a symbol don't change mass**
Gamma ray γ	 Gamma radiation High energy wave of radiation	Thick block of lead	No charge	Cobalt-60	Food irradiation Radiotherapy	$^{60}_{27}Co \rightarrow {}^{60}_{27}Co + hf$ Plus energy released **No changes at all !!!!!**



Half-life is the **time taken** for **half** of the atoms in a sample to **decay**.

Smoke detector batteries do run out but the radioactive source has a half-life of 432.2 years!