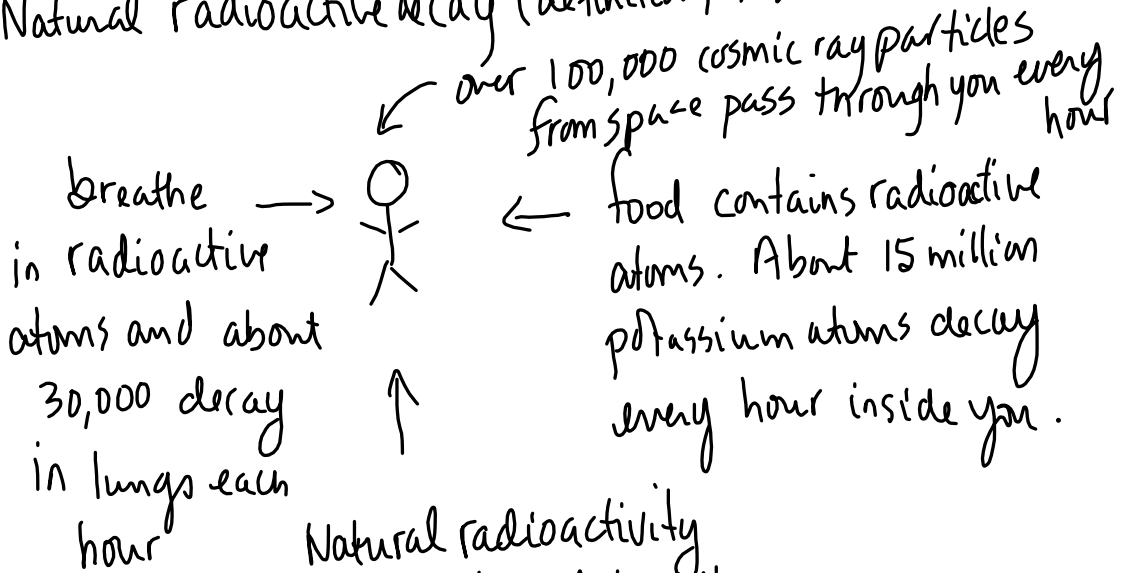


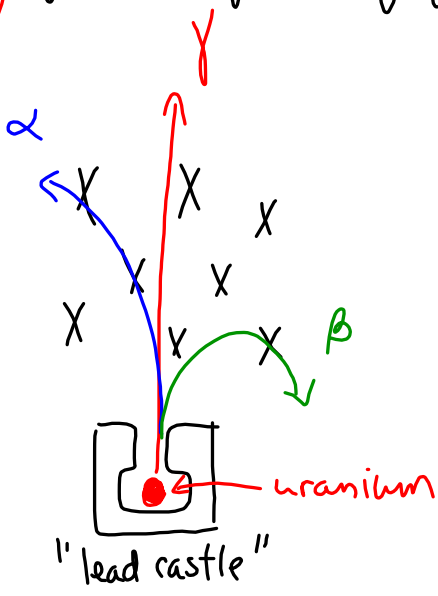
§7-2 Radioactive Decay

Radioactivity

- Natural radioactive decay (definition) → see sheet.

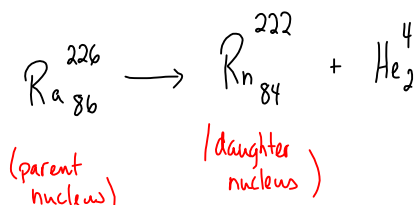


Sources of Background Radiation

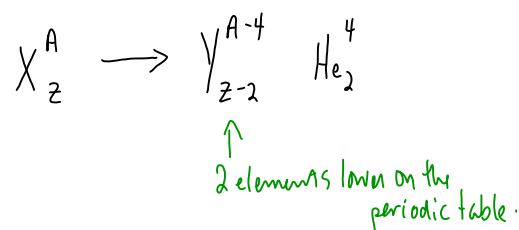


Alpha Particles

- helium-4 nucleus He_2^4
- 2 protons + 2 neutrons \rightarrow held together by the strong nuclear force.
- alpha decay occurs when 2 protons + 2 neutrons are emitted as a single particle.
- Radium-226 is an alpha emitter and the daughter nucleus is radon-222:



General equation:



Balancing Nuclear equations:

- the total # of nucleons is conserved (A)
- the total charge is conserved (Z)

Properties of alpha particles:

- emitted from the nucleus with one or more discrete energies of about 5 MeV.

- there is evidence that the nucleons exist in the nucleus in discrete energy levels. (similar to electrons)

- mass of α -particle is 6.8×10^{-27} kg, so what is the speed of a 5 MeV α -particle??

$$E_k = \frac{1}{2}mv^2$$

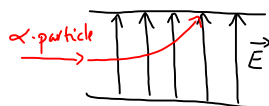
- not very penetrating, easily absorbed by a sheet of thick paper, sheet of aluminium foil, + human skin.

$$v^2 = \frac{2E_k}{m}$$

$$v = \sqrt{\frac{2E_k}{m}}$$

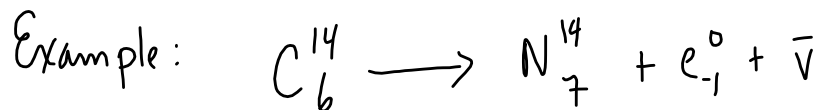
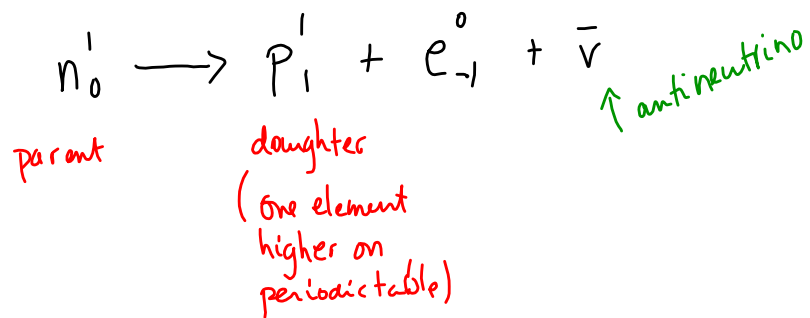
- deflected in both electric and magnetic fields.

$$v = 1.5 \times 10^7 \text{ m s}^{-1}$$



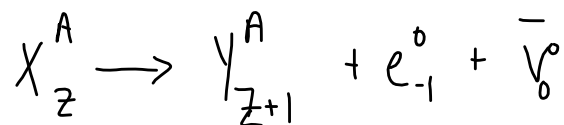
Beta Particles (also called beta minus)

- beta particles are electrons.
- they are released from the nucleus when a neutron decays into an electron, proton and an antineutrino.



essentially a neutron is "converted" to a proton.

General Equation:



Antineutrinos → see sheet

Properties of β particles → see sheet.

