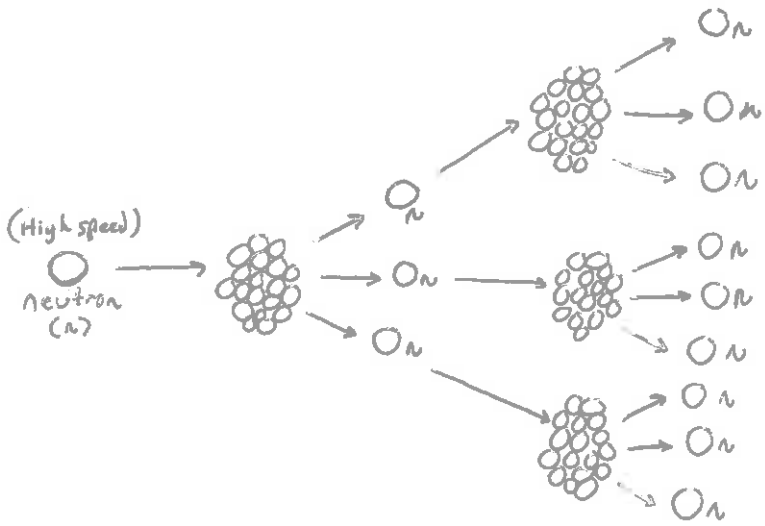
Nuclear fission

* Large amounts of energy is released from fission reactions. In this process the nucleus of certain fissionable material is split into two smaller fragment nuclei.

* When this happens this can cause other nuclei to split in a <u>chain reaction</u>.



- High speed neutrons bombard the fissionable material (uranium 235) causing the nucleus to split into fragments.
- During this splitting, more neutrons are released which can then collide with other uranium nuclei and cause these to split (A chain reaction).

* Not all material is fissionable. The material used in reactors is enriched uranium. The 'normal' isotope for uranium is U^{235} which is <u>NOT</u> fissionable.

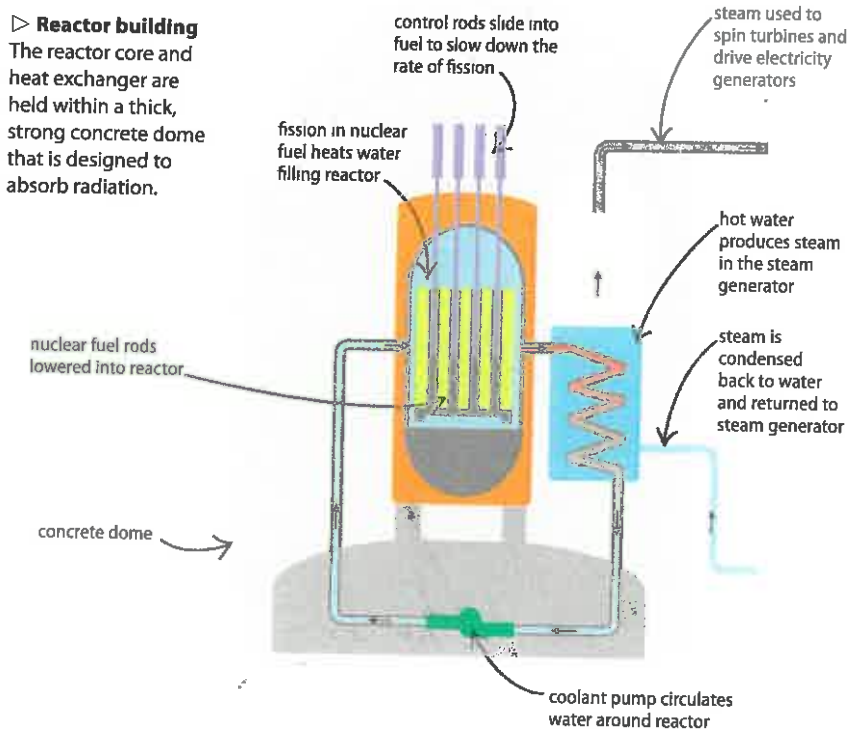
* We 'enrich' the U^{235} so that it contains 2-3% of U^{238} (a heavier and more unstable isotope) which is fissionable. The U^{235} can however be transformed into <u>other</u> heavier nuclei such as plutonium (Pu^{239}) which is fissionable.

Inside a nuclear Reactor

* The fission reaction takes place inside a reactor filled with water. The reactor has a core containing fuel rods made of radioactive material.

* The reaction heats the water, which is pumped through a heat exchanger, where the superheated water makes steam that drives the turbines.

* There are also control rods (mostly made of boron) which can soak up some of the free neutrons, limiting the number of fissions that occur and so controlling the process.



Cherenkov Radiation

The water surrounding a nuclear reactor has an eerie blue colour, which is caused by Cherenkov radiation, named after the Russian scientist Pavel Cherenkov (1904-1990). This happens because charged particles move through the water at an extremely high velocity