Nuclear Fission

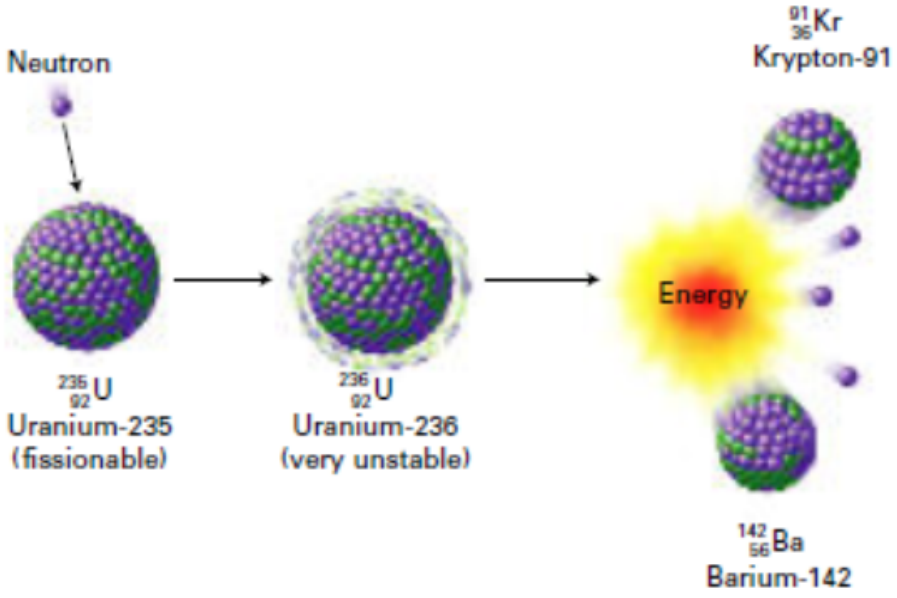
Fission – the splitting of a nucleus into smaller fragments.

- uranium-235 and plutonium-239 are the only fissionable isotopes.

In a chain reaction, some of the neutrons produced react with other fissionable atoms, producing more neutrons which react with more fissionable atoms.

Nuclear fission can release enormous amounts of energy.

Fission can be controlled so energy is released more slowly (Fig 25.11).



http://www.youtube.com/watch?v=zKDcAcrlWoA

http://www.youtube.com/watch?v=G1jtWR_tcX4

Nuclear Moderation

Process that slows down neutrons so the reactor fuel (uranium-235 or plutonium-239) captures them to continue the chain reaction.

Nuclear Absorption

Process that decreases the number of slow-moving neutrons.

- slows down the chain reaction
- control rods (cadmium) absorb neutrons to slow down fission process prevents overheating

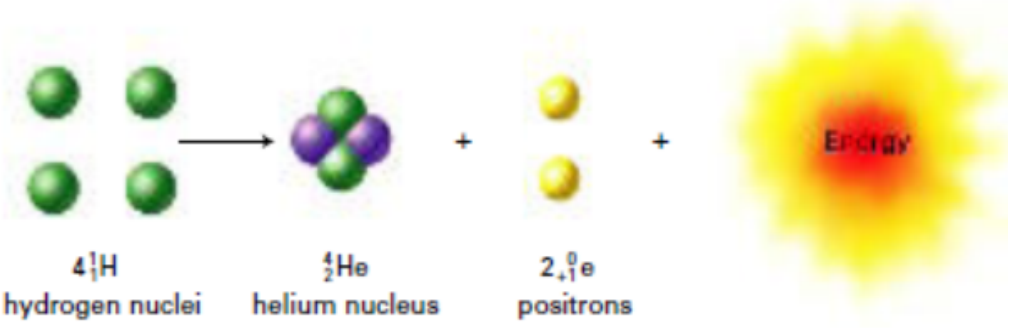
Nuclear Waste

- fuel rods from nuclear power plants, containing a mixture of highly radioactive isotopes, are a major source of nuclear waste.
- Spent fuel rods are placed in holding tanks, or ‘swimming pools’, where the water cools the rods, and also acts as a radiation shield to reduce the radiation levels.

Nuclear Fusion

Fusion occurs when nuclei combine to produce a nucleus of greater mass.

- in solar fusion, hydrogen nuclei (protons) fuse to make helium nuclei (also produces two positrons)
- fusion reactions release more energy than fission reactions.
- occur only at very high temperatures – in excess of 40 000 000°C.



http://www.youtube.com/watch?v=fSr3V498A3I

http://www.youtube.com/watch?v=pusKlK1L5To

p. 813 #15-20