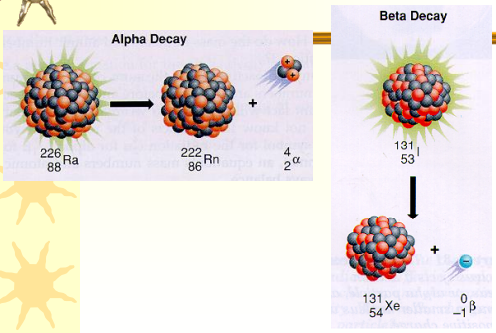
Nuclear Decay

Radioactive decay:

- alpha decay - ejection of a helium nucleus
- beta decay - ejection of an electron due to a deconstruction of a neutron into a proton and electron.
- gamma decay - ejection of energy, with no loss of mass.

Examples of Nuclear Decay



How old is something?

Half-life - the amount of time it takes for one half of the original material to decompose into a new substance.

When something is alive, it eats and replenishes the amount of carbon-14 in its body.

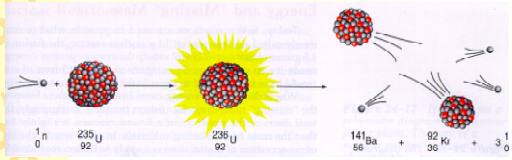
When it dies, the carbon-14 cannot be replenished, therefore it slowly decomposes at a half-life of 5730 years.

Using this information, we can determine the age of a fossil.

Fission

Fission - a large nucleus is split into two smaller nuclei of approximately equal mass.

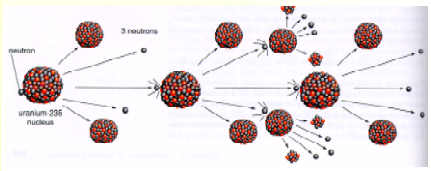
Fission reactions release large amounts of energy



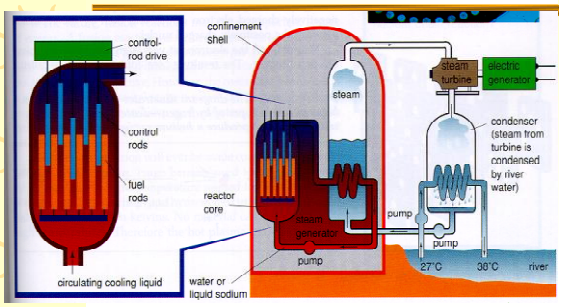
Nuclear Reactors

Nuclear Reactors

- Fission reactions occur inside nuclear reactors under controlled conditions
- Each neutron expelled by the nuclear reaction goes on to hit another nucleus and then another to produce a chain reaction.



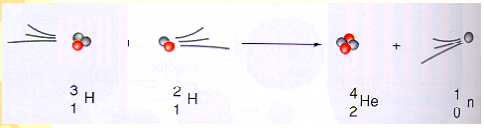
How a nuclear reactor works



Fusion

Fusion - two small nuclei join to form a large nucleus and large amounts of energy.

Fusion reactions occur only at very high temperatures and/or pressures.



Transmutation

Transmutation is the process of converting one element into another (using bombardment with high energy particles).

- The target nucleus is the isotope which is bombarded
- The projectile is the particle fired at the nucleus,
- The product is the new nucleus produced by the reaction
- The ejected particle is the light nucleus or particle emitted in the reaction