

Types of Decay

Beta minus decay is when a neutron is converted into a proton. In the process an electron (or β^- particle) and an anti-electron neutrino is emitted.

The reaction has the general form:

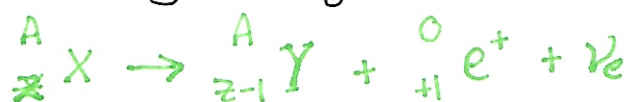


It must be an electron and anti-neutrino to conserve lepton number, the electron has a lepton number of +1. A neutrino is a lepton and so has a lepton number of +1 and so an anti-neutrino has a lepton number of -1 and so lepton number is conserved.

$$0 \rightarrow 0 + 1 - 1 = 0 \quad \checkmark \text{ same either side of the reaction.}$$

Beta plus decay is very similar to the above but a sort of opposite. A proton is converted into a neutron and in the process a positron (or anti-electron or β^+ particle) and electron neutrino is emitted.

This has the general form:



Here we have a positron and not an electron because of charge conservation. If we lose a proton then we must gain a positively charged particle. Then since we have an anti-electron we need a neutrino to conserve baryon number.

Alpha decay is when a helium nucleus is emitted, known as an alpha particle. As charge is conserved, the addition of an electron or positron is not required therefore a neutrino (or anti-neutrino) is not required to conserve lepton number. The general form is:

