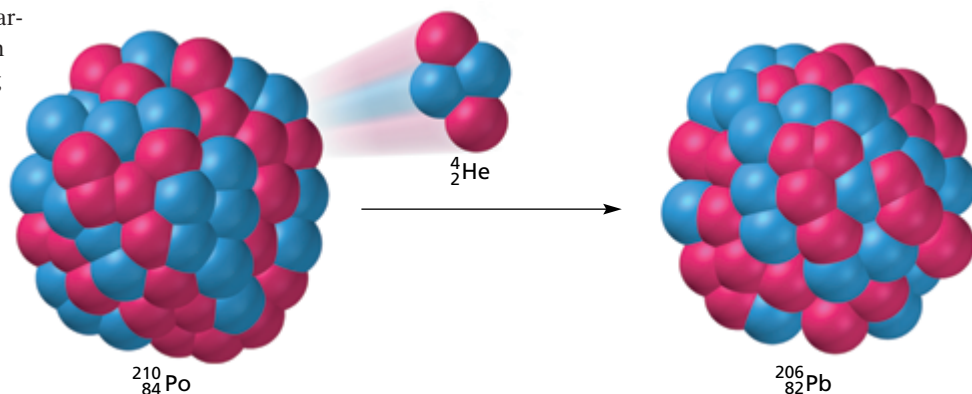
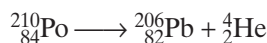


FIGURE 4 An alpha particle, identical to a helium nucleus, is emitted during the radioactive decay of some very heavy nuclei.



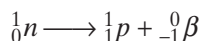
Alpha Emission

An **alpha particle** (α) is two protons and two neutrons bound together and is emitted from the nucleus during some kinds of radioactive decay. Alpha particles are helium nuclei and have a charge of 2+. They are often represented with the symbol ^4_2He . Alpha emission is restricted almost entirely to very heavy nuclei. In these nuclei, both the number of neutrons and the number of protons need to be reduced in order to increase the stability of the nucleus. An example of alpha emission is the decay of $^{210}_{84}\text{Po}$ into $^{206}_{82}\text{Pb}$, shown in **Figure 4**. The atomic number decreases by two, and the mass number decreases by four.



Beta Emission

Nuclides above the band of stability are unstable because their neutron/proton ratio is too large. To decrease the number of neutrons, a neutron can be converted into a proton and an electron. The electron is emitted from the nucleus as a beta particle. A **beta particle** (β) is an electron emitted from the nucleus during some kinds of radioactive decay.



An example of beta emission, shown in **Figure 5**, is the decay of $^{14}_6\text{C}$ into $^{14}_7\text{N}$. Notice that the atomic number increases by one and the mass number stays the same.

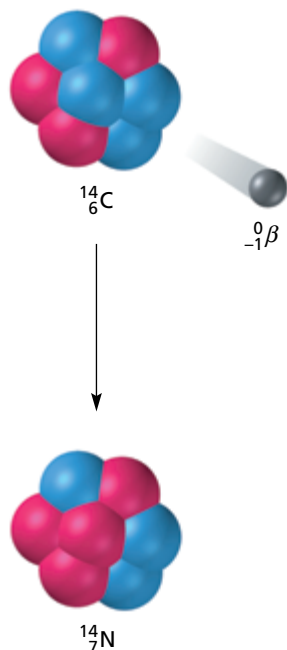
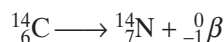


FIGURE 5 Beta emission causes the transmutation of $^{14}_6\text{C}$ into $^{14}_7\text{N}$. Beta emission is a type of radioactive decay in which a neutron is converted to a proton with the emission of a beta particle.

Positron Emission

Nuclides below the band of stability are unstable because their neutron/proton ratio is too small. To decrease the number of protons, a proton can be converted into a neutron by emitting a positron. A **positron** is a particle that has the same mass as an electron, but has a positive charge, and is emitted from the nucleus during some kinds of radioactive decay.