

Decay Series

One nuclear reaction is not always enough to produce a stable nuclide. A **decay series** is a series of radioactive nuclides produced by successive radioactive decay until a stable nuclide is reached. The heaviest nuclide of each decay series is called the **parent nuclide**. The nuclides produced by the decay of the parent nuclides are called **daughter nuclides**. All naturally occurring nuclides with atomic numbers greater than 83 are radioactive and belong to one of three natural decay series. The parent nuclides are uranium-238, uranium-235, and thorium-232. The transmutations of the uranium-238 decay series are charted in **Figure 8**.

Locate the parent nuclide, uranium-238, on the chart. As the nucleus of uranium-238 decays, it emits an alpha particle. The mass number of the nuclide, and thus the vertical position on the graph, decreases by four. The atomic number, and thus the horizontal position, decreases by two. The daughter nuclide is an isotope of thorium.

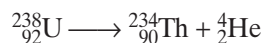


FIGURE 8 This chart shows the transmutations that occur as ${}_{92}^{238}\text{U}$ decays to the final, stable nuclide, ${}_{82}^{206}\text{Pb}$. Decay usually follows the solid arrows. The dotted arrows represent alternative routes of decay.

Uranium-238 Decay Series

