

^{228}Pa

In “Artificial collateral chains to the thorium and actinium families” Ghiorso et al. discovered ^{228}Pa in 1948 ([1948Gh01](#)). Thorium targets were irradiated with 80 MeV deuterons from the Berkeley 184-inch cyclotron. The α -decay chains beginning at ^{228}Pa were measured following chemical separation. “After the decay of the above-described series, a second group of alpha-particle emitters can be resolved. This second series, which decays with the 22-hour half-life of its protactinium parent, is a collateral branch of the 4n radioactive family as follows: ${}_{91}\text{Pa}^{228} \xrightarrow{\alpha} {}_{89}\text{Ac}^{224} \xrightarrow{\alpha} {}_{87}\text{Fr}^{220} \xrightarrow{\alpha} {}_{85}\text{At}^{216} \xrightarrow{\alpha}$.” The half-life was measured as 22 h for ^{228}Pa .

Adapted from reference ([2013Fr03](#))

[1948Gh01](#) A. Ghiorso, W. W. Meinke, and G. T. Seaborg, Phys. Rev. **74**, 695 (1948).

[2013Fr03](#) C. Fry and M. Thoennessen, At. Data Nucl. Data Tables **99**, 345 (2013).

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