^{194}Rn α decay (0.78 ms)   2006An36

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, [1] and Jun Chen[2]	NDS 169, 1 (2020)	15-Oct-2020

Parent: ^{194}Rn: E=0; J^π=0$^+$; $T_{1/2}$=0.78 ms *16*; Q(α)=7862 *10*; %α decay=100.0

^{194}Rn-E: Assumed as the ground state of ^{194}Rn.

^{194}Rn-$T_{1/2}$: Half-life (2006An36) determined from analysis of 26 full-energy correlated (recoil)(7700 α) decays.

^{194}Rn-Q(α): From 2017Wa10.

^{194}Rn-%α decay: %α assumed 100.

First identification of ^{194}Rn nuclide by 2006An36.

2006An36: ^{194}Rn was produced and identified in ^{144}Sm(^{52}Cr,2n) reaction at E=236 MeV on a ^{144}SmF$_3$ rotating target on a carbon backing at UNILAC heavy-ion facility of GSI, with SHIP velocity filter for separating evaporation residues. Several different types of detectors were used: the decays of the evaporation residues were measured by implanting residues in a thick 16-strip position-sensitive silicon detector (PSSD) with a typical FWHM≈20 keV for α particles in 6-8 MeV range. An array of six silicon detectors of similar shape (BOX detectors), mounted upstream of PSSD detector, was used to measure the energies of α, β and conversion electrons. Three thin time-of-flight detectors in front of the PSSD and BOX detectors permitted identification of reaction products from the scattered beam particles; and distinction between the decay events and implantation events through anti-coincidence technique. An additional thick Si detector was installed as a veto detector behind the PSSD detector in an anti-coincidence mode. This allowed distinction between the decays and the punch-through events (from high-energy protons and α particles produced in the reactions on the carbon backing). For γ rays, a four-fold segmented Clover Ge detector was used behind the PSSD detectors for prompt and delayed γ(residues) coin and/or $\alpha\gamma$ coin measurements. Identification of the isotope by time and position correlation of α decays from ^{194}Rn with the known α decays from daughter isotope ^{190}Po and grand-daughter ^{186}Pb. Measured α, γ, $\alpha\gamma$ coin, α(residues) coin, γ(residues) coin. Deduced evidence and $T_{1/2}$ of ^{194}Rn parent.

^{190}Po Levels

E(level)	J^π
0	0$^+$

α radiations

Eα	E(level)	Iα[‡]	HF[†]	Comments
7624				Search for fine structure in α decay revealed only one event Eα=7624 which is either from ^{194}Rn decay or from an escape event.
7700 *10*	0	100	1	Reduced α-decay width δ_α^2=267 keV *58* (2006An36).

[†] Deduced r$_0$(^{190}Po)=1.590 fm *11*, assuming 100% g.s. to g.s. decay, and HF=1 for this transition.

[‡] Absolute intensity per 100 decays.