

Adopted Levels

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh		NDS 177, 1 (2021)	3-Sep-2021

S(n)=11390 30; S(p)=1497 27; Q( $\alpha$ )=7862 10 (2021Wa16)

S(2p)=787 20, Q( $\epsilon$ )=6441 29, Q( $\epsilon\text{p}$ )=6761 22 (2021Wa16) S(2n)=20380 (theory,2019Mo01).

2006An36 (also 2007An19):  $^{194}\text{Rn}$  produced and identified in  $^{144}\text{Sm}(^{52}\text{Cr},2\text{n})$  reaction at E=236 MeV, using  $^{144}\text{SmF}_3$  rotating target onto a carbon backing at the UNILAC heavy-ion facility at GSI, with SHIP velocity filter for separating evaporation residues. Detector system consisted of different types of detectors. 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  $\approx$  20 keV for  $\alpha$  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  $\alpha$ ,  $\beta$  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  $\alpha$  particles produced in the reactions on the carbon backing). For  $\gamma$  rays, a four-fold segmented 'Clover' Ge detector was used behind the PSSD detectors for prompt and delayed  $\gamma$ (residues) coin and/or  $\alpha\gamma$  coin measurements. Identification of the isotope by time and position correlation of  $\alpha$  decays from  $^{194}\text{Rn}$  with the known  $\alpha$  decays from daughter isotope  $^{190}\text{Po}$  and grand-daughter  $^{186}\text{Pb}$ . Measured  $\alpha$ ,  $\gamma$ ,  $\alpha\gamma$  coin,  $\alpha$ (residues) coin,  $\gamma$ (residues) coin.

Theoretical references: consult the NSR database (www.nndc.bnl.gov/nsr/) for 18 primary references dealing with decay modes and structure calculations.

 $^{194}\text{Rn}$  Levels

E(level)	$J^\pi$	$T_{1/2}$	Comments
0	$0^+$	0.78 ms 16	<p><math>\% \alpha \approx 100</math> (2006An36)</p> <p>Theoretical <math>T_{1/2}(\beta \text{ decay})=2.55</math> s and <math>T_{1/2}(\alpha \text{ decay})=0.87</math> ms (2019Mo01) suggests negligible <math>\epsilon+\beta^+</math> decay mode.</p> <p>Energy of <math>\alpha</math> particles emitted: 7700 10, <math>I_\alpha=100\%</math> (2006An36). Search for fine structure in <math>\alpha</math> decay revealed only one event at <math>E_\alpha=7624</math> which is either from <math>^{194}\text{Rn}</math> decay or from an escape event (2006An36).</p> <p>Production cross section (at E(<math>^{52}\text{Cr}</math>)=232 MeV)=120 pb 50 (2006An36).</p> <p>E(level): the observed activity is assumed to correspond to the ground state of <math>^{194}\text{Rn}</math>.</p> <p><math>J^\pi</math>: from hindrance factor <math>\approx 1.7</math> 7, assumed for a <math>0^+</math> g.s. to <math>0^+</math> g.s. <math>\alpha</math> transition.</p> <p><math>T_{1/2}</math>: from analysis of 26 full-energy correlated (recoil)(7700<math>\alpha</math>) decays (2006An36).</p>