Adopted Levels

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 144, 297 (2017)	25-Aug-2017

Q(β^-)=−5460 *SY*; S(n)=7600 *30*; S(p)=3610 *SY*; Q(α)=9190 *30* 2017Wa10
Estimated uncertainties (2017Wa10): 310 for Q(β^-), 60 for S(p).
S(2n)=14020 *40*, S(2p)=6060 *30* (2017Wa10).
1969Gh01: ^{258}Rf produced and identified in ^{249}Cf(^{12}C,3n) and ^{249}Cf(^{13}C,4n) reactions through measurement of excitation functions and half-life for fission and alpha decays.
1984Og03: ^{258}Rf produced in ^{208}Pb(^{50}Ti,γ) and identified as parent of ^{246}Cf in the α-decay chain.
1985So03: ^{258}Rf produced in ^{246}Cm(^{16}O,4n),E=95 MeV and measured production cross section.
2008Ga08: ^{258}Rf produced in ^{238}U(^{26}Mg^{6+},6n) reaction at E=4.9-6.0 MeV/nucleon; $^{238}UF_4$ rotating target at 88-Inch cyclotron facility at LBNL and with Berkeley gas-filled recoil separator (BGS) of the LBNL. Evaporation residues recoiling from the target were separated by the BGS from the beam and other reaction products on the basis of magnetic rigidities in He gas. Measured (evaporation residues)α and (evaporation residues)$\alpha\alpha$ correlations, α decay, SF decay, half-life, excitation functions.
2016He15: ^{258}Rf obtained as daughter of ^{258}Db, which was produced in ^{209}Bi(^{50}Ti,n),E=236 MeV, with ^{50}Ti beam from the ECR source of the UNILAC at GSI. The Evaporation residues (ERs) were separated by the velocity filter SHIP and implanted into a position-sensitive 16-strip Si PIPS detector for detecting ERs, conversion electrons, and subsequent α-decays or spontaneous fission (SF) events. Escaped products into the backward hemisphere were detected by a box of six Si wafers. Measured correlations between ERs, x rays, ce, α-decay and SF events, half-life of ^{258}Rf decay from various correlations, and %α decay mode of ^{258}Rf.
Theoretical studies: consult the NSR database at www.nndc.bnl.gov for about 105 references dealing with theoretical calculations of half-lives for different decay modes, binding energies, fission characteristics, and other nuclear structure aspects.
Additional information 1.
The decay schemes of ^{258}Db activities are tentative according to 2016He15.

^{258}Rf Levels

Cross Reference (XREF) Flags

A ^{258}Db ε decay (4.3 s)
B ^{258}Db ε decay (1.9 s)

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0	0$^+$	12.0 ms *12*	AB	%SF=95.1 *16*; %α=4.9 *16* (2016He15) %α from the number of SF and α decays correlated to ce events (2016He15). Others: 31% *11* (2008Ga08, from four α-decay events, and 54 SF events, EVR-$\alpha\alpha$ and EVR-SF correlation); indirect value of %α=13 determined by 1984Og03 from ratio of fission events to ^{246}Cf α counts (α-daughter of ^{258}Rf). T$_{1/2}$: unweighted average of 9.4 ms *+10−6* (2016He15, weighted average of several correlated decay curves); 14.7 ms *+12−10* (2008Ga08); 13 ms *3* (1985So03) and 11 ms *2* (1969Gh01). Weighted average is 11.3 ms *14*, but with a reduced χ^2 of 5.1 as compared with critical χ^2=2.6. T$_{1/2}$: 2016He15 give the following half-lives from different sets of correlated decay curves and also photons: 10.0 ms *11*, 10.1 ms *30*, 10.9 ms *+66−30*, 13.3 ms *+58−31*, 6.2 ms *31*, 4.7 ms *+47−16*, 9.3 ms *+26−17*; the last from photon decay curve. Weighted average of all these values is 9.4 ms *+10−6*, and unweighted average is 9.2 ms *11*. 78 EVR-SF correlation events were observed at three highest beam energies. Four α decay chains: ^{258}Rf α decay to ^{254}No α decay to ^{250}Fm were identified and are listed in table II of 2008Ga08. Average Eα=9.05 MeV *3* for decay of ^{258}Rf to the g.s. of ^{254}No. One event had Eα lower by 90 keV which was interpreted as transition to an excited state in ^{254}No (2008Ga08). Measured cross sections: 0.31 nb *+16−12* at 138.5 MeV, 0.77 nb *+20−18* at 144.5 MeV, 0.43 nb *+13−11* at 151.4 MeV (2008Ga08). 1985He22, 1994Hu18, 1994Wi17: measurements of mass and total kinetic energy

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Adopted Levels (continued)

^{258}Rf Levels (continued)

E(level)	J^{π}	$T_{1/2}$	XREF	Comments
				distributions of fission fragments. Additional information 2.
0+x?	(2^+)		B	E(level),J^{π}: tentatively proposed by 2016He15. This level may be the first excited 2^+ state in ^{258}Rf.
0+y		2.4 ms *+24−8*	A	%SF=?; %α=?; %IT=? $T_{1/2}$: from the time distribution of correlations between x-ray events (no coincident ce) and subsequent ce or x-ray events that could be from the decay of this state (2016He15).
0+z		15 μs *10*	A	%SF=?; %α=?; %IT=? $T_{1/2}$: from the time distribution of correlations between two consecutive ce events (2016He15).