

Adopted Levels

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 156, 70 (2019)	31-Jan-2019

$Q(\beta^-)=820$ SY; $S(n)=4910$ SY; $S(p)=4230$ CA; $Q(\alpha)=8260$ SY [2017Wa10,1997Mo25](#)

Estimated uncertainties ([2017Wa10](#)): $\Delta Q(\beta^-)=830$, $\Delta S(n)=880$, $\Delta Q(\alpha)=200$.

$S(p)$ from theory ([1997Mo25](#)); other values from [2017Wa10](#).

$S(2n)=10900$ 810 (syst, [2017Wa10](#)). $S(2p)=10250$ ([1997Mo25](#), theory).

[2010Og01](#), [2011Og04](#): ^{274}Bh from α decay chain: $^{294}\text{Ts} \rightarrow ^{290}\text{Mc} \rightarrow ^{286}\text{Nh} \rightarrow ^{282}\text{Rg} \rightarrow ^{278}\text{Mt} \rightarrow ^{274}\text{Bh} \rightarrow ^{270}\text{Db}$, ^{294}Ts formed and identified in reaction $^{249}\text{Bk}(^{48}\text{Ca},3n)$, $E=247$ MeV at FLNR-JINR-Dubna using Dubna gas-filled recoil separator (DGFRS). Measured $E\alpha$, half-lives, α - α correlations. One decay chain was assigned to the decay of ^{294}Ts . See details in ^{294}Ts Adopted Levels.

[2012Og06](#), [2013Og04](#), [2013Og01](#): ^{274}Bh formed in the decay chain of ^{294}Ts as above in [2011Og04](#). See details in ^{294}Ts Adopted Levels. Two decay chains were reported.

[2014Kh04](#): ^{274}Bh from α decay chain: $^{294}\text{Ts} \rightarrow ^{290}\text{Mc} \rightarrow ^{286}\text{Nh} \rightarrow ^{282}\text{Rg} \rightarrow ^{278}\text{Mt} \rightarrow ^{274}\text{Bh} \rightarrow ^{270}\text{Db}$; ^{294}Ts formed and identified in reaction $^{249}\text{Bk}(^{48}\text{Ca},3n)$, $E=252.1, 254.0, 258.0$ MeV at GSI using Gas-filled Trans-Actinide Separator and Chemistry Apparatus (TASCA). Four decay chains were assigned to the decay of ^{294}Ts , but only two were reported in [2014Kh04](#), while the other two were relegated to a future detailed publication as per reference 36 in the paper, however no further publication seems to have appeared since the [2014Kh04](#) paper. See details for ^{294}Ts Adopted Levels.

One EVR- α -SF correlated decay chain reported by [2011Og04](#), three by [2013Og04](#) and [2012Og06](#), and two by [2014Kh04](#), all starting with the decay of ^{294}Ts and ending in SF-decaying ^{270}Db nuclide in Dubna work ([2013Og04](#), [2011Og04](#)) and in SF-decaying ^{266}Lr in GSI work ([2014Kh04](#)). [2011Og07](#) and [2012OgZZ](#) are also related reports for the Dubna work. See Adopted Levels for ^{294}Ts for details of above three studies.

For theoretical studies, consult Nuclear Science References (NSR) database at NNDC, BNL for 47 primary references dealing with the half-lives and other aspects of nuclear structure in this mass region.

 ^{270}Db LevelsCross Reference (XREF) Flags

A ^{274}Bh α decay (44 s)

E(level)	$T_{1/2}$	XREF	Comments
0	15 h +10-4	A	%SF$\approx$100; %α=? By combining the data from Dubna work (2013Og04,2011Og04), 2014Kh04 assigned α decay of ^{270}Db to five decay chains to α decay and only one decay chain to SF decay, based on which the authors assigned $\approx 17\%$ decay branch to SF decay mode, which is in disagreement with the Dubna work (2013Og04, 2011Og04 and 2015Og05, 2017Og01 reviews) where dominant decay mode is assigned as SF decay, while not excluding α or ε decay mode entirely. See detailed discussion in section IV of 2013Og04, where comparison is made between decay modes of ^{270}Db and ^{268}Db, with a conclusion that α decay mode of ^{270}Db is unlikely. Considering the following statement in 2015Og05 review about the two events in 2014Kh04 where α decay of ^{270}Db is reported, the evaluator adopts the half-life and decay mode from 2015Og05 based on Dubna work reported in 2013Og04 and 2011Og04: "However, the probability of a random origin for both of these events, which can be extracted from the data given in [89], is rather large and reaches 0.5 (see discussion in [29]). We do not include these results for ^{270}Db in Table 1 and Figs. 5 and 8 below because detailed analysis of data is not complete (reference [36]in [89])". Reference [89] is 2014Kh04, reference [29] is 2015Og01. E(level): the observed SF or α activity is assumed to correspond to the ground state of ^{270}Db. J^π: $1^-, 4^-$ from $\Omega(\text{proton})=5/2^-, \Omega(\text{neutron})=3/2^+$ (1997Mo25, theory). $T_{1/2}$: from 2017Og01 and 2015Og05 reviews. Measurements: 1.0 h +19-4 for α decay mode from two decay chains, also $T_{1/2}=1.1$ h +15-4 (2014Kh04) by combining their data with those

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Adopted Levels (continued) ^{270}Db Levels (continued)

<u>E(level)</u>	<u>T_{1/2}</u>	<u>XREF</u>	<u>Comments</u>
			from 2013Og04; 17 h +15-6 (2013Og04, 2012Og06 from a total of four correlated decay chains, all assigned as SF decay of ^{270}Db in contrast to the work of 2014Kh04 where dominant α decay mode is assigned); 23 h +110-10 (2010Og01,2011Og04, from one correlated event, with assigned SF decay mode of ^{270}Db). Note that in one correlated decay event reported in 2013Og04, short interval of 1.156 h was recorded between the α decay of ^{274}Bh and SF decay of ^{270}Db, but this was not correlated with any α decay. Note that in 2017Au03 (NUBASE-2016), T_{1/2} is adopted as 2.0 h 13 by symmetrization of T_{1/2}=1.0 h +19-4, determined by 2014Kh04 from dominant α decay mode of ^{270}Db, yet the decay mode in 2017Au03 is assigned as 100% SF taken from Dubna work, which in evaluator's opinion presents an inconsistent scenario. Eα=7.90 MeV 3 from decay of ^{270}Db (2014Kh04); the α decay mode reported only by 2014Kh04. 2015Og05 review article discusses the works from Dubna (2013Og04, 2011Og04) and GSI (2014Kh04), and concludes the SF decay of ^{270}Db as a dominant mode.