Adopted Levels

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

Q(β^-)=−5600 *SY*; S(n)=7520 *SY*; S(p)=3650 *SY*; Q(α)=9070 *40* 2017Wa10
Estimated uncertainties (2017Wa10): ΔQ(β^-)=300, ΔS(n)=280, ΔS(p)=450.
S(2n)=13860 *380*, S(2p)=6270 *530* (syst, 2017Wa10).
2006Dv01, 2008Dv02: ^{270}Hs produced and first identified in ^{248}Cm(^{26}Mg,4n),E=193,185 MeV reaction at GSI, and assignment to the isotope made through the observation of four correlated (α-SF) decay chains in 2006Dv01, and two in 2008Dv02 which were attributed to ^{270}Hs on the basis of α particle decay to ^{266}Sg, which decays by SF mode. Rapid chemical separation and on-line detection method used for isolation of Hs. Detection system was a linear array of Passivated Implanted Planar Silicon (PIPS) detectors. In this experiment eight other correlated chains were assigned to ^{269}Hs, one tentatively to ^{271}Hs, and two were unassigned, one of which could possibly belong to ^{270}Hs.
The following α-SF correlated decay chains were assigned to ^{270}Hs (2006Dv01):
Event #1: E(^{26}Mg)=145 MeV.
E_α=8.85 MeV, assigned to ^{270}Hs.
E_{SF}=100 and 74 MeV, Δt_2=1.62 s, assigned to ^{266}Sg.

Event #2: E(^{26}Mg)=136 MeV.
E_α=8.90 MeV, assigned to ^{270}Hs.
E_{SF}=89 and 55 MeV, Δt_2=49.6 ms, assigned to ^{266}Sg.

Event #3: E(^{26}Mg)=136 MeV.
E_α=8.92 MeV, assigned to ^{270}Hs.
E_{SF}=106 and 82 MeV, Δt_2=449 ms, assigned to ^{266}Sg.

Event #4: E(^{26}Mg)=136 MeV.
E_α=8.88 MeV, assigned to ^{270}Hs.
E_{SF}=96 and 110 MeV, Δt_2=444 ms, assigned to ^{266}Sg.

The following α-SF correlated decay chains were assigned to ^{270}Hs (2008Dv02):
Event #1: E(^{26}Mg)=140 MeV.
E_α=8.76 MeV *20*, assigned to ^{270}Hs.
E_{SF}=58 and 61 MeV, Δt_2=275 ms, assigned to ^{266}Sg.

Event #2: E(^{26}Mg)=140 MeV.
E_α=8.81 MeV *16*, assigned to ^{270}Hs.
E_{SF}=92 and 111 MeV, Δt_2=271 ms, assigned to ^{266}Sg.

2010Gr04: ^{270}Hs produced in ^{238}U(^{36}S,4n),E=175-197 MeV in mid-target corresponding to excitation energy of E*=39 MeV *4*, close to the predicted maxima of the 4n- and 5n-evaporation channels. Experiments carried out using UNILAC and highly efficient chemical separation and detection system COMPACT connected to a recoil chamber at GSI. One decay chain ^{270}Hs → ^{266}Sg was assigned to ^{270}Hs with a production σ=0.8 pb +*26*−*7*, half-life of ^{270}Hs=23 s, and Eα=8.88 MeV. See also 2012Tu01.

2013Og03: ^{270}Hs isotope produced in ^{226}Ra(^{48}Ca,4n) reaction.
E(^{48}Ca)=229, 234, 241 MeV provided by the U400 cyclotron of the FLNR-JINR facility. Targets=0.12 and 0.18 mg/cm^2 ^{226}Ra. Separation of evaporation residues (EVR) and beam particles using Dubna gas-filled recoil separator (DGFRS). Measured Eα, Iα, fission fragments, EVR-α and EVR-SF correlated events, time-of-flight, $T_{1/2}$, production σ. Particle and α detected by an array of semiconductor detectors.

History of six correlated decay chains of EVR-α-SF type (2013Og03):
Event #1: E(EVR)=11.537 MeV.
E_α=8.923 MeV, Δt_α=1.8537 s, assigned to ^{270}Hs.

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E_{SF}=165.2 MeV, Δt_{SF}=0.9196 s, assigned to ^{266}Sg.

Event #2: E(EVR)=11.356 MeV.
E_α=9.133 MeV, Δt_α=31.9395 s, assigned to ^{270}Hs.
E_{SF}=148.7 MeV, Δt_{SF}=0.7517 s, assigned to ^{266}Sg.

Event #3: E(EVR)=11.461 MeV.
E_α=9.024 MeV, Δt_α=9.7087 s, assigned to ^{270}Hs.
E_{SF}=>187.9 MeV, Δt_{SF}=0.0708 s, assigned to ^{266}Sg.

Event #4: E(EVR)=13.864 MeV.
E_α=8.991 MeV, Δt_α=7.3538 s, assigned to ^{270}Hs.
E_{SF}=196.3 MeV, Δt_{SF}=0.3081 s, assigned to ^{266}Sg.

Event #5: E(EVR)=13.812 MeV.
E_α=9.009 MeV, Δt_α=8.1642 s, assigned to ^{270}Hs.
E_{SF}=168.6 MeV, Δt_{SF}=0.2450 s, assigned to ^{266}Sg.

Event #6: E(EVR)=15.993 MeV.
E_α=8.940 MeV, Δt_α=6.4194 s, assigned to ^{270}Hs.
E_{SF}=193.9 MeV, Δt_{SF}=0.1629 s, assigned to ^{266}Sg.

Earlier studies where production of ^{270}Hs was claimed in experiments at GSI, but later reassigned to ^{269}Hs in further experiments at GSI (2006Dv01, 2008Dv02), later confirmed by 2013Og03 in experiments at Dubna:

2002Du21, 2003Tu05, 2003Du27 (also 2003Kr24 review): production of ^{270}Hs reported in ^{248}Cm(^{26}Mg,4n),E=143.7-146.8 MeV followed by chemical procedures employing gas chromatography undertaken at GSI using the UNILAC facility. Two correlated decay chains were tentatively assigned to ^{270}Hs, with a production cross-section of 4 pb for ^{270}Hs. Measured Eα=9.16 MeV *+7−3*, and α-decay half-life=3.6 s *+8−14* for the decay of ^{270}Hs. In later experiments by 2006Dv01, the two chains reported by 2003Tu05 were reassigned to ^{269}Hs, instead.

Additional information 1.

2004Ga18: measured yield.

2004Vo24: this experiment reports mainly the chemistry of Z=108 (Hs) element through the formation of ^{269}Hs or ^{270}Hs in ^{248}Cm(^{26}Mg,4n) at GSI. Three α-α-SF correlated events were assigned to the decay of ^{269}Hs or ^{270}Hs.

For theoretical studies, consult Nuclear Science References (NSR) database at NNDC, BNL for 122 primary references dealing with the half-lives and other aspects of nuclear structure in this mass region.

^{270}Hs Levels

E(level)	J^π	$T_{1/2}$	Comments
0	0^+	7.6 s *+49−22*	%α>50; %SF<50 (2013Og03) E(level): the observed α activity is assumed to correspond to the ground state of ^{270}Hs. $T_{1/2}$: α-decay half-life (2013Og03,2011Og07) from six correlated events. Other: 7.6 s *+52−22* (2012Tu01, analysis of events from different studies). Average production σ=16 pb *+13−7* (2013Og03) at 41-MeV excitation energy. Production cross section (at E(^{26}Mg)=136 MeV)=3 pb (2006Dv01). Measured Eα=9020 *80* (2013Og03) from α decay of ^{270}Hs. Other: 8.93 MeV *10* (2012Tu01).