Adopted Levels

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 158, 1 (2019)	16-May-2019

Q(β^-)=12690 *SY*; S(n)=5290 *SY*; S(p)=16280 *SY*; Q(α)=−15070 *SY* 2017Wa10

Estimated uncertainties (2017Wa10): 400 for Q(β^-), 570 for S(n) and Q(α), and 640 for S(p).

S(2n)=9190 *610*, S(2p)=36430 *640*, Q(β^-n)=8740 *400* (syst, 2017Wa10). Q(β^-2n)=1845 *400* (syst, deduced by evaluators from Q(β^-) and S(2n) values in 2017Wa10).

1995En07, 1997Be70: ^{73}Co identified in ^{9}Be(^{238}U,F) E=750 MeV/nucleon reaction; measured production cross section, residuals fission yields. Fully-stripped fission product separation, magnetic rigidity, trajectory, energy deposit, tof method.

2010Ho12: ^{9}Be(^{86}Kr,X) E=140 MeV/nucleon; fully-ionized ^{86}Kr beam, A1900 fragment separator at NSCL facility using Bρ-ΔE-Bρ method. After separation, the mixed beam was implanted into the NSCL β-counting system (BCS) consisting of stacks of Si PIN detectors, a double-sided Si strip detector (DSSD) for implantation of ions, and six single-sided Si strip detectors (SSSD) followed by two Si PIN diodes. The identification of each implanted event was made from energy loss, time-of-flight information and magnetic rigidity. The implantation detector measured time and position of ion implantations and β decays. Neutrons were detected with NERO detector. Measured β- and βn-correlated events with ion implants; half-life of ^{73}Co and delayed-neutron emission probability. A total of 420 implants were detected, and four correlated βn coincidences were observed.

2011Da08: ^{73}Co produced in the fragmentation of 57.8 MeV/nucleon ^{86}Kr beam impinged on 50 mg/cm^2 thick tantalum target using LISE-2000 spectrometer at GANIL facility. Detector system included a three-element Si-detector telescope containing a double-sided silicon-strip detector (DSSSD) backed by a Si(Li) detector and surrounded by four clover type EXOGAM Ge detectors. Reaction products identified by mass, atomic number, charge, energy loss and time of flight. Measured half-life of ^{73}Co decay.

2012Ra10 (also 2005Ma95): ^{73}Co produced by fragmentation of ^{86}Kr beam at 140 MeV/nucleon with a ^{9}Be target at NSCL facility followed by fragment separation using A1900 fragment separator. Particle identification by energy loss and time-of-flight techniques. The ions were implanted in double-sided silicon strip (DSSD) detectors for fragment β detection. SeGA gamma-detector array containing 16 HPGe detectors was used for Eγ, Iγ, $\gamma\gamma$, $\beta\gamma$ coin, ion-β correlations and isotopic half-life measurements. Detailed shell-model calculations using NR78 residual interaction.

Additional information 1.

2014Xu07 (also 2014XuZZ thesis): ^{73}Co nuclide produced in ^{9}Be(^{238}U,F) reaction with ^{238}U^{86+} beam of 345 MeV/nucleon produced at the RIKEN accelerator complex. Identification of ^{73}Co nuclei was made on the basis of magnetic rigidity, time-of-flight and energy loss of the fragments (ΔE-Bρ-tof method) using BigRIPS fragment separator and ZeroDegree Spectrometer (ZDS) at RIBF-RIKEN facility. Isotopic yield measured based on A/Q spectrum and Z versus A/Q plot. Measured heavy fragments, β and γ spectra using wide-range active silicon strip stopper array (WAS3ABi) for beta and ion detection, and EUROBALL-RIKEN Cluster array for γ detection. Decay curves were obtained from time differences between implantation and correlated β decays. See also 2015BeZR conference report for production of ^{73}Co.

^{73}Co Levels

E(level)	$T_{1/2}$	Comments
0	40.7 ms *13*	%β^-=100; %β^-n<22 *8* (2012Ra10); %β^-2n=? %β^-n: measured value is <22 *8* (2012Ra10) based on absolute intensity of 1095γ in ^{72}Ni from the beta-delayed neutron decay of ^{73}Co; earlier value from this group was >9 *4* (2005Ma95). Other measurement: %β^-n<7.9 (2010Ho12). In a recent study carried out at RIBF-RIKEN by 2016Mo07, eight γ rays from the β^-n decay of ^{73}Co to ^{72}Ni were detected in coincidence mode (see Fig. 4 in the paper). Theoretical $T_{1/2}$=19.0 ms, %β^-n=9, %β^-2n=0 (2019Mo01). Theoretical $T_{1/2}$=97.5 ms, %β^-n=5.8, %β^-2n=0.1 (2016Ma12). The observed 40.7-ms activity is assumed to correspond to the ground state of ^{73}Co. J$^\pi$: 7/2$^-$ from systematic trend (2017Au03). Also Ω_{proton}=7/2$^-$ in theoretical calculations (2019Mo01). $T_{1/2}$: weighted average of 40.4 ms *13* (2014Xu07), 42 ms *3* (2012Ra10), 41 ms *4* (2011Da08,2004Sa59), and 41 ms *6* (2010Ho12). 2014Xu07 (also 2014XuZZ) $T_{1/2}$ measurement: $\beta\gamma$-coin decay curve from time difference between implantation and correlated β decays.

Continued on next page (footnotes at end of table)

Adopted Levels (continued)

^{73}Co Levels (continued)

E(level)	$T_{1/2}$	Comments
		2012Ra10 $T_{1/2}$ measurement: time distribution of all β-gated γ events. Other values: 40 ms *9* and 54 ms *9* from γ decay curves for 239.2γ and 774.7γ, respectively. 2011Da08, 2004Sa59 $T_{1/2}$ measurement: time correlation between implantation and β-ray events in the DSSSD. Fitting procedure included five parameters: β-detection efficiency, background rate, mother, daughter and granddaughter half-lives. 2010Ho12 $T_{1/2}$ measurement: time sequence of decay type events correlated with the implanted nuclei of ^{73}Co in Si detectors. The authors used method of maximum likelihood analysis which required, as input parameters, values of β-detection efficiency, background, half-lives of daughter and granddaughter nuclei and experimental or theoretical values of $\%\beta^-$n of all nuclei involved.