

Adopted Levels

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	12-Apr-2010

$Q(\beta^-)=1.38\times 10^4$  syst;  $S(n)=1.0\times 10^3$  syst;  $S(p)=2.21\times 10^4$  syst;  $Q(\alpha)=-1.61\times 10^4$  syst [2012Wa38](#)

Note: Current evaluation has used the following Q record 13570 syst 1750 syst 21500 calc -14150 syst  
[2009AuZZ,2003Au03](#).

$\Delta Q(\beta^-)=1220$ ,  $\Delta S(n)=1350$ ,  $\Delta S(p)=1310$ ,  $\Delta Q(\alpha)=1410$  (syst,[2009AuZZ,2003Au03](#)).

$Q(\beta^-n)=10080$  1220,  $S(2n)=5150$  1220 ([2009AuZZ,2003Au03](#)).

$S(p)$  from [1997Mo25](#).

[2009Ta24](#), [2009Ta05](#):  $^{57}\text{Ca}$  identified by fragmentation of  $^{76}\text{Ge}$  beam at 132 MeV/nucleon at NSCL facility using A1900 fragment separator combined with S800 analysis beam line to form a two stage separator system. The transmitted fragments were analyzed event-by-event in momentum and particle identification. The nuclei of interest were stopped in eight Si diodes which provided measurement of energy loss, nuclear charge and total kinetic energy. The time-of-flight of each particle that reached the detector stack was measured in four different ways using plastic scintillators, Si detectors, and parallel-plate avalanche counters. The simultaneous measurement of  $\Delta E$  signals, the magnetic rigidity, total kinetic energy and the time-of-flight (tof) provided unambiguous identification of the atomic number, charge state and mass number.

Theoretical calculations: [1998Br30](#) (levels, binding energy); [1995Ri05](#) (binding energy, mass defect); [1990Su06](#) (pygmy dipole resonances); [1976Da02](#) (mass excess); [2010Ta07](#) (calculated proton and neutron single-particle spectrum, neutron separation energies, rms charge radii).

 $^{57}\text{Ca}$  Levels

E(level)	$T_{1/2}$	Comments
0	>620 ns	<p><math>\% \beta^- = ?</math>; <math>\% \beta^- n = ?</math>; <math>\% \beta^- 2n = ?</math>  <math>\% \beta^- n = 22</math>, <math>\% \beta^- 2n = 1.8</math> (calculated, <a href="#">1997Mo25</a>).  Measured cross section=47 fb +34-23 (e-mail reply of Nov 11, 2009 from O. Tarasov, first author of <a href="#">2009Ta24</a>).  E(level): fragment observed by <a href="#">2009Ta24</a> (also <a href="#">2009Ta05</a>) is assumed to correspond to the ground state of <math>^{57}\text{Ca}</math>.  <math>J^\pi</math>: <math>5/2^-</math> proposed from systematics (<a href="#">2003Au02</a>), <math>3/2^-</math> from calculations (<a href="#">1997Mo25</a>).  <math>T_{1/2}</math>: time-of-flight=620-650 ns (e-mail reply of Sept 23, 2009 from O. Tarasov). Actual half-life is expected to be much longer as suggested by systematics value of 5 ms (<a href="#">2003Au02</a>) and calculated value of 7.7 ms (<a href="#">1997Mo25</a>).  Calculated (<a href="#">1997Mo25</a>) populations of daughter nuclides: 76% for <math>^{57}\text{Sc}</math>, 22% for <math>^{56}\text{Sc}</math> through <math>\beta^- n</math> decay and 1.8% for <math>^{55}\text{Sc}</math> through <math>\beta^- 2n</math> decay.</p>