^{73}As ε decay (80.30 d)   1970Ky01

History

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

Parent: ^{73}As: E=0.0; J$^{\pi}$=3/2$^-$; T$_{1/2}$=80.30 d *6*; Q(ε)=345 *4*; %ε decay=100.0

^{73}As-J$^{\pi}$,T$_{1/2}$: From Adopted Levels of ^{73}As.

^{73}As-Q(ε): From 2017Wa10.

1970Ky01: ^{73}As source was produced by evaporating a drop of active sodium arsenate onto a 1 mg/cm^2 melinex sheet. γ and x rays were detected with a NaI(Tl) crystal and conversion electrons were detected with a CH$_4$ proportional counter. Measured Eγ, Iγ, E(x ray), I(x ray), E(ce), I(ce), delayed coincidences between K x-rays, γ rays and conversion electrons. Deduced levels, T$_{1/2}$, conversion coefficients, γ-ray multipolarity. Comparisons with available data.

1969Do14: ^{73}As source was produced via ^{74}Ge(p,2n) and ^{73}Ge(p,n) reactions with a 28 MeV proton beam provided from the University of Manitoba cyclotron on a target of high-purity finely-pulverized Ge crystal. γ and x rays were detected with a Si(Li) detector. Measured Eγ, Iγ, E(x ray), I(x ray). Deduced levels, conversion coefficients, γ-ray multipolarity.

1970Do01: Measured $\gamma\gamma$-coin, γ-(x ray)-coin using a Si(Li) and a Na(Tl) detector. Deduced T$_{1/2}$ of the 13.3 level, conversion coefficient of 13.3γ. (same author as 1969Do14).

1971Ra10: Measured $\gamma\gamma$-coin, γ-(x ray)-coin using a Si(Li) and a Na(Tl) detector. Deduced T$_{1/2}$ of the 13.3 level, conversion coefficient of 13.3γ.

1971Ri01: ^{73}As source was produced via ^{72}Ge(d,n) with E$_d$=5.9 MeV. Measured Eγ, Iγ, E(x ray), I(x ray) using a Si-diode. Deduced conversion coefficient of 13.3γ.

1971Ve04: ^{73}As source was produced via ^{72}Ge(d,n) with E$_d$=5 MeV. Measured Eγ, Iγ, E(x ray), I(x ray), γ-(x ray)-coin using NaI crystals. Deduced T$_{1/2}$ of the 13.3 level, conversion coefficients.

2002Mo46: Measured delayed-coincidence using a high-sensitivity four-dimensional triple-coincidence spectrometer (efficiency=100%). Deduced T$_{1/2}$ of the 13.3 level.

2000KoZU: Measured improved energy of 13.2γ from L- and M- subshell conversion lines using an electrostatic spectrometer with FWHM=7 eV.

2000KoZW, 2000KoZV (also 2000KoZQ): Measured energies and intensities of K-, L- and M- shell Auger transitions in ^{73}Ge.

Other measurements:

Conversion coefficients: 1958Gr06, 1953We45, 1953Ba75, 1952Jo21.

$\gamma\gamma(\theta)$: 1974KaYA, 1974KaYX.

$\gamma\gamma$ perturbed angular correlation: 1974KaYA, 1975Ha37.

γ-electron and electron-electron perturbed angular correlation: 1993Co17.

^{73}Ge Levels

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$	Comments
0.0	9/2$^+$		
13.2845 *15*	5/2$^+$	2.92 μs *3*	μ=−1.08 *3* (1993Co17) Q=0.70 *8* (1993Co17) T$_{1/2}$: weighted average of 2.94 μs *3* (2002Mo46), 2.86 μs *3* (1993Co17), 2.96 μs *9* (1970Ky01), 2.95 μs *5* (1970Do01), 2.98 μs *5* (1971Ra10), 2.95 μs *5* (1971Ve04). All values are obtained from measurements of 53.4γ-(K x-ray)(t). Note: 2.96 μs *9* from 1970Ky01 is deduced by the evaluators from the average of several measurements with a 3% uncertainty included due to calibration of the delay as indicated by the authors; 1970Ky01 give a weighted average of 2.94 μs *3* without taking into account the 3% uncertainty. Additional information 1. μ,Q: from γ-electron and electron-electron perturbed angular correlation (PAC) in 1993Co17. Other: −0.94 *3* from $\gamma\gamma$ PAC in 1975Ha37.
66.722 *10*	1/2$^-$	0.499 s *11*	T$_{1/2}$: from Adopted Levels. Values from ε decay measurements: 0.57 s *10* (1970Ky01); 0.54 s *11*, 0.58 s *5*, 0.66 s *12* in Fig.7 of 2008Li25.

[†] From Eγ.

[‡] From Adopted Levels.

^{73}As ε decay (80.30 d)　　**1970Ky01** (continued)

ε radiations

E(decay)	E(level)	I$\varepsilon^{\dagger}$	Log ft	Comments
(278 *4*)	66.722	100	5.4	εK=0.8754 *2*; εL=0.1048 *1*; εM+=0.019793 *21* measured K-capture fraction is 0.85 *5* (1970Ky01).

† Absolute intensity per 100 decays.

$\gamma(^{73}$Ge)

I(γ+ce) normalization: the γ and K x-ray measurements indicate that the ε decay feeds only the 66.7 level.

E$_\gamma$	I$_\gamma^{\ddagger\#}$	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.†	$\alpha^{@}$	I$_{(\gamma+ce)}^{\#}$	Comments
13.2845 *15*	0.094 *CA*	13.2845	5/2$^+$	0.0	9/2$^+$	E2	1063	100	ce(K)/(γ+ce)=0.281 *5*; ce(L)/(γ+ce)=0.626 *8*; ce(M)/(γ+ce)=0.0907 *18* ce(N)/(γ+ce)=0.00144 *3* α(K)=299 *5*; α(L)=666 *10*; α(M)=96.5 *14* α(N)=1.529 *22* E$_\gamma$: from 2000KoZU. Others: 13.263 *15* (1969Do14), 13.29 *4* (1971Ra10), 13.34 *4* (1971Ri01), 13.5 (1970Ky01). Mult.: from measured conversion coefficients below: $\alpha_{\rm T}$: 1095 *55* (1971Ra10), 1310 *60* (1971Ri01), >1300 (1953We45). Additional information 2. $\alpha_{\rm K}$: 312 *30* (1971Ra10), 325 *37* (1970Do01), 376 *90* (1969Do14). K/L: 0.47 *1* (1970Ky01), 0.63 *22* (1953We45), K/L<0.5 (1952Jo21). K/(L+M): 0.36 *3* (1971Ve04), 0.57 *23* (1969Do14). L/(L+M): 5.4 *5* (1952Jo21), 6.6 *16* (1958Gr06).
53.437 *9*	10.6 *CA*	66.722	1/2$^-$	13.2845	5/2$^+$	M2	8.42	100	ce(K)/(γ+ce)=0.764 *6*; ce(L)/(γ+ce)=0.1119 *20*; ce(M)/(γ+ce)=0.0170 *4* ce(N)/(γ+ce)=0.000983 *19* α(K)=7.20 *10*; α(L)=1.054 *15*; α(M)=0.1601 *23* α(N)=0.00926 *13* E$_\gamma$: from 1969Do14. Mult.: from measured conversion coefficients below: $\alpha_{\rm T}$: 9.1 *6* (1970Ky01), 8.1 *22* (1958Gr06), 4.7 *6* (1953We45), 8 +4−2 (1953Ba75). $\alpha_{\rm K}$: 7.2 *6* (1969Do14), 7.8 *5* (1970Ky01), 7.1 *6* (1971Ve04). Additional

^{73}As ε decay (80.30 d)   **1970Ky01 (continued)**

$\gamma(^{73}$Ge) (continued)

E$_\gamma$	E$_i$(level)	Comments

information 3.
K/(L+M+N): 6.2 *2* (1958Gr06), 5.6 *3* (1952Jo21).
K/(L+M): 7.1 *14* (1970Ky01).
δ: +0.35 *11* from $\gamma\gamma(\theta)$ (1974KaYX) is in disagreement with the very small value obtained from ce data (δ<0.1).

† Same assignments in Adopted Gammas.
‡ From I(γ+ce)=100 and calculated total conversion coefficients.
# Absolute intensity per 100 decays.
@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$

$3/2^-$ 0.0   80.30 d 6

Q_ε=345 4

$%\varepsilon$=100.0

$^{73}_{33}As_{40}$

53.437 M2 102

$I\varepsilon$ Log ft

$1/2^-$ 66.722   0.499 s 11 100   5.4

13.2845 E2 102

$5/2^+$ 13.2845   2.92 μs 3

$9/2^+$ 0.0

$^{73}_{32}Ge_{41}$