^{78}As β^- decay (90.7 min) 1982Si07,1970Pa05,1970Mc01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Ameenah R. Farhan, Balraj Singh	NDS 110, 1917 (2009)	30-Jun-2009

Parent: ^{78}As: E=0.0; $J^\pi=2^-$; $T_{1/2}$=90.7 min *2*; Q(β^-)=4209 *10*; %β^- decay=100.0

^{78}As-Q(β^-): from 2009AuZZ, 2003Au03.

Others: 1972PeZZ, 1972Fe10, 1971Mo20, 1968MaZW, 1958Ne18.

Measured Eγ, Iγ, $\gamma\gamma$;Ge(Li) detectors; 1982Si07 use enriched target.

The decay scheme is mainly from 1982Si07. IT agrees well with that of 1971Mo20, 1970Pa05, and 1970Mc01.

Total decay energy of 4245 keV *260* calculated (by RADLIST code) from level scheme is consistent with the expected value of 4209 keV *10*.

^{78}Se Levels

E(level)†	J^π‡	E(level)†	J^π‡	E(level)†	J^π‡	E(level)†	J^π‡
0.0	0^+	1854.00 *9*	3^+	2647.68 *22*	$(1,2)^+$	3372.7 *3*	3^-
613.84 *7*	2^+	1995.78 *10*	2^+	2682.09 *9*	4^+	3411.46 *20*	3^-
1308.66 *7*	2^+	2327.34 *13*	2^+	2838.58 *9*	(2^+)	3496.43 *13*	
1498.76 *18*	0^+	2334.87 *19*	0^+	3144.52 *13*	3^-	3711.4 *5*	(1,2,3)
1502.64 *11*	4^+	2507.72 *10*	3^-	3229.80 *14*	$(1^-,2,3)$		
1758.91 *11*	0^+	2537.41 *15*	2^+	3294.73 *13*	4^+		

† From least-squares fit to Eγ's.

‡ See Adopted Levels.

β^- radiations

E(decay)†	E(level)	Iβ^-‡	Log *ft*	Comments
(498 *10*)	3711.4	0.065 *18*	6.99 *13*	av Eβ=158.0 *37*
(713 *10*)	3496.43	1.41 *18*	6.21 *6*	av Eβ=240.6 *40*
(798 *10*)	3411.46	0.29 *5*	7.07 *8*	av Eβ=274.7 *41*
(836 *10*)	3372.7	0.23 *5*	7.25 *10*	av Eβ=290.5 *41*
(914 *10*)	3294.73	3.5 *5*	6.21 *7*	av Eβ=322.7 *42*
(979 *10*)	3229.80	1.66 *24*	6.65 *7*	av Eβ=349.9 *43*
(1064 *10*)	3144.52	2.5 *3*	6.61 *6*	av Eβ=386.1 *43*
(1370 *10*)	2838.58	6.4 *8*	6.62 *6*	av Eβ=519.4 *45*
(1527 *10*)	2682.09	15.9 *19*	7.29[1u] *6*	av Eβ=606.9 *44* E(decay): 1700 *100* from 1971Mo20. Iβ^-: log $f^{1u}t$ is inconsistent with the transition being first-forbidden unique.
(1561 *10*)	2647.68	0.39 *7*	8.06 *8*	av Eβ=604.7 *45*
(1672 *10*)	2537.41	0.31 *14*	8.28 *20*	av Eβ=654.6 *46*
(1701 *10*)	2507.72	0.61 *12*	8.02 *9*	av Eβ=668.1 *46*
(1882 *10*)	2327.34	<0.2	>8.7	av Eβ=750.7 *46*
(2213 *10*)	1995.78	0.9 *3*	8.32 *15*	av Eβ=904.3 *47*
(2355 *10*)	1854.00	<1.4	>8.2	av Eβ=970.7 *47* E(decay): 2500 *100* from $\beta\gamma$ (1971Mo20). 1970Mc01 give 2.4×10^3.
(2450 *10*)	1758.91	<0.2	>9.2	av Eβ=1015.3 *47*
(2706 *10*)	1502.64	0.50 *21*	10.26[1u] *19*	av Eβ=1144.1 *47*
(2710 *10*)	1498.76	0.28 *6*	10.51[1u] *10*	av Eβ=1146.0 *47*
(2900 *10*)	1308.66	14.6 *23*	7.61 *7*	av Eβ=1228.2 *48* E(decay): 3000 *100* from 1971Mo20.
(3595 *10*)	613.84	18.5 *25*	7.91 *6*	av Eβ=1560.1 *48* E(decay): 3700 *150* from 1971Mo20 and 1970Mc01.
(4209 *10*)	0.0	32 *8*	9.64[1u] *11*	av Eβ=1855.9 *48*

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^{78}As β^- decay (90.7 min) 1982Si07,1970Pa05,1970Mc01 (continued)

β^- radiations (continued)

E(decay)†	E(level)	Comments
		E(decay): 4270 *100* from β spectrum (1970Mc01). $\beta\gamma$ study of 1971Mo20 give 4420 *150*.

† 1970Mc01 and 1971Mo20 report β and $\beta\gamma$ data using a superconducting spectrometer and Si(Li)-NaI(Tl) detector system.
‡ Absolute intensity per 100 decays.

$\gamma(^{78}Se)$

Iγ normalization: from absolute intensity (613γ)=54% 6 measured by 1972Fe10.

E_γ†	I_γ†‡	E_i(level)	J_i^π	E_f	J_f^π
156.6 *3*	0.17 *4*	2838.58	(2^+)	2682.09	4^+
174.2 *3*	0.33 *7*	2682.09	4^+	2507.72	3^-
351.1 *2*	0.30 *3*	1854.00	3^+	1502.64	4^+
354.3 *2*	3.5 *4*	2682.09	4^+	2327.34	2^+
x391.0 *3*	0.23 *3*				
449.8 *4*	0.15 *5*	1758.91	0^+	1308.66	2^+
462.2 *2*	1.1 *1*	3144.52	3^-	2682.09	4^+
x468.8 *3*	0.18 *3*				
497.0 *3*	0.34 *4*	1995.78	2^+	1498.76	0^+
503.7 *2*	0.77 *7*	2838.58	(2^+)	2334.87	0^+
545.3 *1*	5.6 *2*	1854.00	3^+	1308.66	2^+
x551.8 *3*	0.31 *6*				
613.8 *1*	100	613.84	2^+	0.0	0^+
637.1 *2*	0.38 *4*	3144.52	3^-	2507.72	3^-
657.9 *2*	0.50 *5*	3496.43		2838.58	(2^+)
686.3 *2*	1.7 *2*	2682.09	4^+	1995.78	2^+
687.5 *4*	1.2 *2*	1995.78	2^+	1308.66	2^+
694.9 *1*	31 *2*	1308.66	2^+	613.84	2^+
722.4 *2*	0.27 *3*	3229.80	$(1^-,2,3)$	2507.72	3^-
756.9 *3*	0.16 *4*	3294.73	4^+	2537.41	2^+
828.1 *1*	15 *1*	2682.09	4^+	1854.00	3^+
x841.5 *10*	0.3 *2*				
842.6 *1*	2.0 *2*	2838.58	(2^+)	1995.78	2^+
x882.0 *2*	0.35 *6*				
884.9 *2*	0.86 *8*	1498.76	0^+	613.84	2^+
888.7 *1*	3.9 *3*	1502.64	4^+	613.84	2^+
903.6 *4*	0.15 *5*	3411.46	3^-	2507.72	3^-
959.0 *2*	0.86 *8*	3496.43		2537.41	2^+
968.2 *4*	0.3 *1*	3294.73	4^+	2327.34	2^+
988.2 *4*	0.17 *4*	3496.43		2507.72	3^-
1005.1 *2*	0.59 *7*	2507.72	3^-	1502.64	4^+
1018.7 *3*	0.26 *4*	2327.34	2^+	1308.66	2^+
1079.8 *2*	3.0 *2*	2838.58	(2^+)	1758.91	0^+
1145.1 *1*	3.1 *2*	1758.91	0^+	613.84	2^+
1169.5 *4*	0.22 *6*	3496.43		2327.34	2^+
1199.1 *1*	1.3 *1*	2507.72	3^-	1308.66	2^+
1228.1 *4*	0.20 *10*	2537.41	2^+	1308.66	2^+
1240.3 *1*	11 *1*	1854.00	3^+	613.84	2^+
1290.6 *6*	0.19 *6*	3144.52	3^-	1854.00	3^+
1308.7 *1*	24 *2*	1308.66	2^+	0.0	0^+
1339.0 *2*	0.73 *10*	2647.68	$(1,2)^+$	1308.66	2^+

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^{78}As β^- decay (90.7 min) 1982Si07,1970Pa05,1970Mc01 (continued)

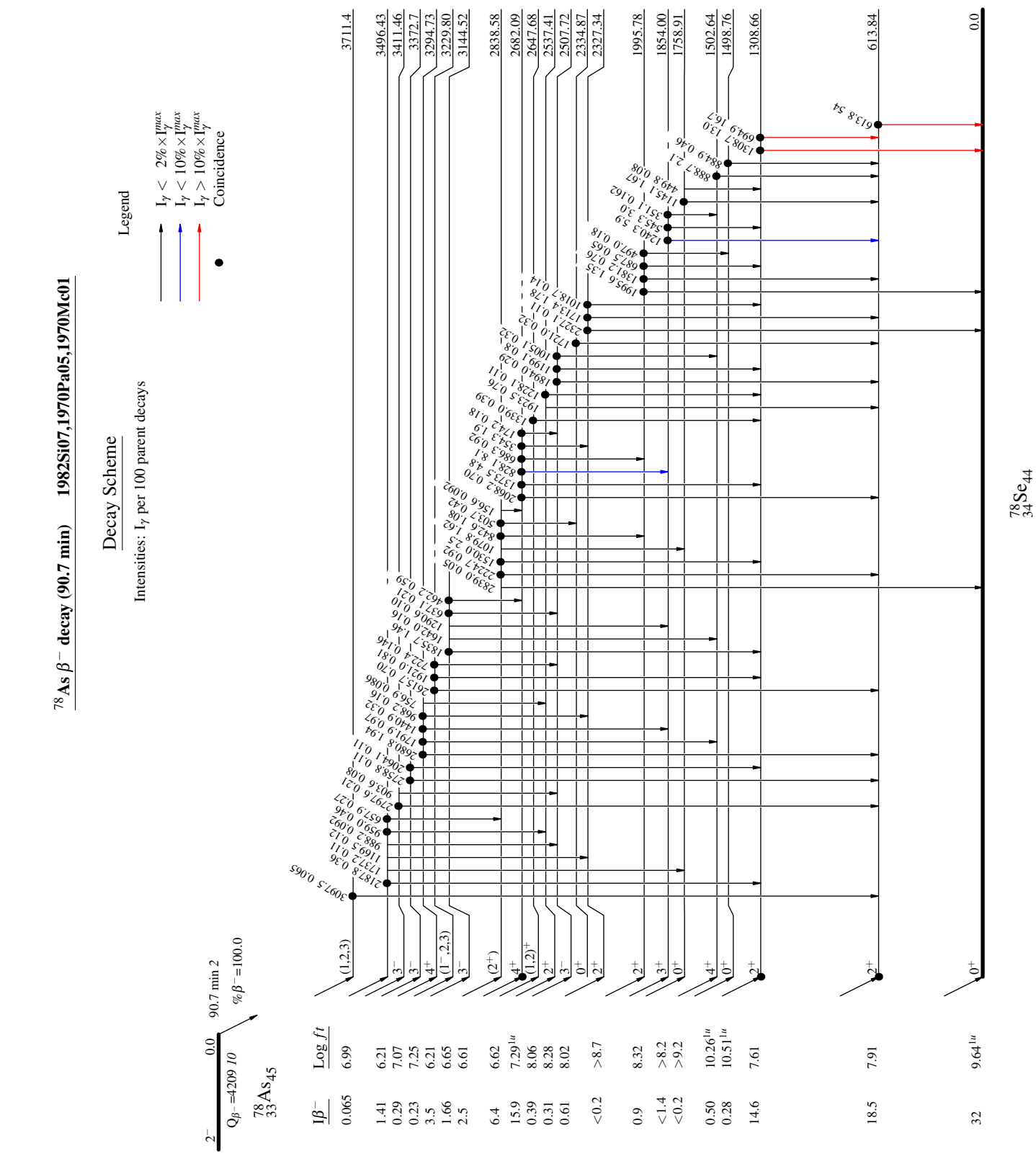
$\gamma(^{78}Se)$ (continued)

E_γ [†]	I_γ [†‡]	E_i(level)	J_i^π	E_f	J_f^π	E_γ [†]	I_γ [†‡]	E_i(level)	J_i^π	E_f	J_f^π
1373.5 *1*	8.9 *6*	2682.09	4^+	1308.66	2^+	1995.6 *2*	2.5 *2*	1995.78	2^+	0.0	0^+
1381.2 *2*	1.4 *1*	1995.78	2^+	613.84	2^+	2064.1 *5*	0.21 *7*	3372.7	3^-	1308.66	2^+
1440.9 *2*	0.6 *2*	3294.73	4^+	1854.00	3^+	2068.2 *2*	1.3 *2*	2682.09	4^+	613.84	2^+
1530.0 *1*	4.6 *3*	2838.58	(2^+)	1308.66	2^+	2187.8 *2*	0.67 *7*	3496.43		1308.66	2^+
1642.0 *4*	0.29 *7*	3144.52	3^-	1502.64	4^+	2224.7 *3*	1.7 *2*	2838.58	(2^+)	613.84	2^+
1713.4 *2*	3.3 *2*	2327.34	2^+	613.84	2^+	2327.1 *3*	0.2 *1*	2327.34	2^+	0.0	0^+
1721.0 *3*	0.59 *7*	2334.87	0^+	613.84	2^+	2615.7 *2*	1.3 *2*	3229.80	$(1^-,2,3)$	613.84	2^+
1737.2 *4*	0.20 *5*	3496.43		1758.91	0^+	[x]2628.4 *4*	0.15 *4*				
1791.9 *2*	1.8 *2*	3294.73	4^+	1502.64	4^+	2680.8 *2*	3.6 *2*	3294.73	4^+	613.84	2^+
1835.7 *2*	2.7 *2*	3144.52	3^-	1308.66	2^+	2758.8 *3*	0.21 *4*	3372.7	3^-	613.84	2^+
1894.0 *2*	0.54 *6*	2507.72	3^-	613.84	2^+	2797.6 *2*	0.38 *5*	3411.46	3^-	613.84	2^+
1921.0 *2*	1.5 *2*	3229.80	$(1^-,2,3)$	1308.66	2^+	2839.0 *3*	0.10 *5*	2838.58	(2^+)	0.0	0^+
1923.5 *2*	1.4 *2*	2537.41	2^+	613.84	2^+	3097.5 *5*	0.12 *3*	3711.4	(1,2,3)	613.84	2^+

[†] From 1982Si07. Others: 1972Fe10, 1970Pa05, and 1970Mc01. Also 1971Mo20 and 1972PeZZ, but No uncertainties are quoted by these authors. Transitions with energies 786.2, 848.7, 1301.1, 1475.9, 1634.9, 1956.0, 2095.3, and 2613.4 reported by 1971Mo20, and 841.5 and 2610.0 reported by 1970Mc01 are not confirmed by 1982Si07 ($I\gamma<0.1$).

[‡] For absolute intensity per 100 decays, multiply by 0.54 *6*.

[x] γ ray not placed in level scheme.


^{78}As β^- decay (90.7 min) 1982Si07,1970Pa05,1970Mc01
Decay Scheme
Intensities: I_γ per 100 parent decays
Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
Coincidence
$^{78}_{33}As_{45}$
Q_{β^-}=4209 10
90.7 min 2
%β^-=100.0
$^{78}_{34}Se_{44}$
Iβ⁻ Log ft
0.065 6.99
1.41 6.21
0.29 7.07
0.23 7.25
3.5 6.21
1.66 6.65
2.5 6.61
6.4 6.62
15.9 7.29
0.39 8.06
0.31 8.28
0.61 8.02
<0.2 >8.7
0.9 8.32
<1.4 >8.2
<0.2 >9.2
0.50 10.26
0.28 10.51
14.6 7.61
18.5 7.91
32 9.64
3711.4
3496.43
3411.46
3372.7
3294.73
3229.80
3144.52
2838.58
2682.09
2647.68
2537.41
2507.72
2334.87
2327.34
1995.78
1854.00
1758.91
1502.64
1498.76
1308.66
613.84
0.0