## $^{122}$Te($^{3}$He,d) 1977Li10,1977Sz01,1979Sz05

| Type | Author | History Citation | Literature Cutoff Date |
|---|---|---|---|
| Full Evaluation | Jun Chen | NDS 174, 1 (2021) | 15-Apr-2021 |

$J^{\pi}(^{122}Te\ g.s.)=0^{+}$.

1977Li10: E=24 MeV $^{3}$He beam was produced from the McMaster University tandem accelerator. Target was 94.8% enriched $^{122}$Te on a thin formvar backing. Reaction products were momentum-analyzed with an Enge split-pole magnetic spectrograph (FWHM=25 keV) and detected with nuclear emulsions. Measured $\sigma(E_d,\theta)$, from 5° to 55°. Deduced levels, J, $\pi$, L-transfers, spectroscopic factors from DWBA analysis. Comparisons with theoretical calculations. Report 56 levels up to 3309.

1977Sz01: E=19.52 MeV $^{3}$He beam was produced from the Pelletron 8UD accelerator of the University of Sao Paulo. Targets were 100-150 $\mu$g/cm$^2$ enriched (>96%) metallic $^{122}$Te on 20 $\mu$g/cm$^2$ carbon foils. Reaction products were detected with two ΔE-E solid state detector telescopes (FWHM=35 keV). Measured $\sigma(E_d,\theta)$ from 10° to 90°. Deduced levels, J, $\pi$, L-transfers, spectroscopic factors from DWBA analysis. Comparisons with theoretical calculations. Report 20 levels up to 2270.

1979Sz05: E=36 MeV $^{3}$He beam was produced from the MP Tandem Van de Graaff accelerator of the MPI Heidelberg. Target was ≈100 $\mu$g/cm$^2$ enriched $^{122}$Te on a 15 $\mu$g/cm$^2$ carbon backing. Reaction products were momentum analyzed with a Q3D magnetic spectrograph (FWHM=13 keV) and detected with a three-wire (ΔE, E, veto) position-sensitive proportional counter. Measured $\sigma(E_d,\theta)$. Deduced levels, J, $\pi$, L-transfers, relative spectroscopic factors from DWBA analysis. Report 18 levels up to 1658.

Other: 1978Sz04 (measured mass excess).

### $^{123}$I Levels

Spectroscopic factor here is defined by $(2J+1)C^2S'=(2j+1)/N\times(d\sigma/d\Omega_{exp})/(d\sigma/d\Omega_{DWBA})$, with normalization factor N=4.42 (1977Li10, 1977Sz01, 1979Sz05), J and j the spins of the final level and the transferred particle, respectively.

| E(level)[†] | dσ/dΩ(max)[‡] | L[#] | $(2J+1)C^2S'$[#] | Comments |
|---|---|---|---|---|
| 0.0 | 0.95 | 2 | 2.4[&] | Other: $(2J+1)C^2S'$=2.22, dσ/dΩ(25.5°)=0.253 μb/sr (1977Sz01). |
| 144 *3* | 0.77 | 0+4 | 0.3+4.7 | E(level): doublet. 1977Sz01 report an unsolved triplet of 138+148+178; 1979Sz05 report a 138+149 doublet.<br>Other: $(2J+1)C^2S'$=0.16, dσ/dΩ(35.7°)=0.049 μb/sr for J=1/2 (1977Sz01). |
| 175 *4* | 0.083 | 2 | 0.37[@] | E(level): from 1979Sz05. other: 176 *10* (1977Li10).<br>Other: $(2J+1)C^2S'$=0.20, dσ/dΩ(35.7°)=0.046 μb/sr (1977Sz01). |
| 328 *4* | 0.017 | | | E(level): weighted average of 327 *4* (1979Sz05), 332 *10* (1977Li10), and 330 *10* (1977Sz01).<br>Other: dσ/dΩ(35.7°)=0.006 μb/sr (1977Sz01). |
| 941 *4* | 0.18 | 5 | 4.7 | E(level): from 1979Sz05. Others: 942 *10* (1977Li10), 940 *10* (1977Sz01).<br>Other: $(2J+1)C^2S'$=4.2, dσ/dΩ(51.0°)=0.078 μb/sr (1977Sz01). |
| 1010 *3* | 0.74 | 2 | 1.6[&] | E(level): others: 1010 *6* (1979Sz05), 1010 *10* (1977Sz01).<br>Other: $(2J+1)C^2S'$=1.32, dσ/dΩ(35.7°)=0.233 μb/sr (1977Sz01). |
| 1046 *3* | 1.1 | 0 | 0.38 | E(level): others: 1046 *6* (1979Sz05), 1050 *10* (1977Sz01).<br>Other: $(2J+1)C^2S'$=0.34, dσ/dΩ(46.0°)=0.135 μb/sr (1977Sz01). |
| 1152 *3* | 0.43 | 2 | 1.5[@] | E(level): others: 1152 *6* (1979Sz05), 1150 *10* (1977Sz01).<br>Other: $(2J+1)C^2S'$=1.1, dσ/dΩ(35.7°)=0.148 μb/sr (1977Sz01). |
| 1241 *6* | 0.19 | 0 | 0.07 | E(level): from 1979Sz05. Others: 1240 *10* (1977Sz01, 1977Li10).<br>Other: $(2J+1)C^2S'$=0.10, dσ/dΩ(41.0°)=0.04 μb/sr (1977Sz01). |
| 1271 *10* | 0.040 | | | |
| 1307 *6* | 0.066 | 2 | 0.18[@] | E(level): from 1979Sz05. Others: 1307 *10* (1977Li10), 1310 *10* (1977Sz01).<br>Other: $(2J+1)C^2S'$=0.16, dσ/dΩ(41.0°)=0.029 μb/sr (1977Sz01). |
| 1335 *6* | 0.048 | 0 | | E(level): weighted average of 1338 *10* (1977Li10) and 1334 *6* (1979Sz05). |
| 1370 *6* | 0.050 | 2 | 0.11[&] | E(level): from 1979Sz05. Others: 1368 *10* (1977Li10), 1370 *10* (1977Sz01).<br>L: other: (0) from 1977Sz01.<br>Other: $(2J+1)C^2S'$=0.08, dσ/dΩ(35.7°)=0.029 μb/sr (1977Sz01). |

Continued on next page (footnotes at end of table)

## $^{122}$Te($^{3}$He,d) 1977Li10,1977Sz01,1979Sz05 (continued)

### $^{123}$I Levels (continued)

| E(level)[†] | dσ/dΩ(max)[‡] | L[#] | (2J+1)C$^2$S′[#] | Comments |
|---|---|---|---|---|
| 1394 *6* | 0.041 | | | E(level): from 1979Sz05. Other: 1394 *10* (1977Li10). |
| 1440 *10* | 0.028 | | | |
| 1493 *3* | 0.35 | 0 | 0.11 | E(level): others: 1493 *6* (1979Sz05), 1490 *10* (1977Sz01).<br>L: other: 2 from 1977Sz01.<br>Other: (2J+1)C$^2$S′=0.28, dσ/dΩ(41.0°)=0.045 μb/sr (1977Sz01). |
| 1582 *6* | 0.053 | 2 | 0.11[&] | E(level): from 1979Sz05. Others: 1583 *10* (1977Li10); 1570+1630 unresolved doublet in 1977Sz01, with dσ/dΩ(46.0°)=0.028 μb/sr. |
| 1623 *6* | 0.029 | | | E(level): weighted average of 1629 *10* (1977Li10) and 1635 *6* (1979Sz05). |
| 1657 *6* | 0.049 | 2 | 0.14[@] | E(level): weighted average of 1653 *10* (1977Li10) and 1658 *6* (1979Sz05). |
| 1714 *10* | 0.12 | 2 | 0.26[&] | E(level): weighted average of 1718 *10* (1977Li10) and 1710 *10* (1977Sz01).<br>Other: (2J+1)C$^2$S′=0.28, dσ/dΩ(41.0°)=0.049 μb/sr (1977Sz01). |
| 1744 *10* | 0.025 | | | |
| 1808 *10* | 0.014 | | | |
| 1862 *3* | 0.67 | 0 | 0.22 | E(level): other: 1870 *10* (1977Sz01).<br>Other: (2J+1)C$^2$S′=0.34, dσ/dΩ(41.0°)=0.17 μb/sr (1977Sz01). |
| 1929 *10* | 0.14 | (0)+(2) | 0.03+0.14[&] | E(level): weighted average of 1928 *10* (1977Li10) and 1930 *10* (1977Sz01).<br>L: not reported in 1977Sz01.<br>Other: dσ/dΩ(41.0°)=0.025 μb/sr (1977Sz01). |
| 1951 *10* | 0.042 | 2 | 0.10[@] | E(level): other: 1950 *10* (1977Sz01).<br>L: other: 0 from 1977Sz01.<br>Other: (2J+1)C$^2$S′=0.08, dσ/dΩ(46.0°)=0.042 μb/sr (1977Sz01). |
| 1983 *10* | 0.074 | 2 | 0.14[&] | |
| 2012 *10* | 0.043 | | | |
| 2048 *10* | 0.058 | 0 | 0.02 | |
| 2083 *10* | 0.032 | | | |
| 2110 *10* | 0.032 | | | |
| 2140 *10* | 0.053 | (0)+(2) | 0.01+0.07[&] | |
| 2215 *10* | 0.035 | | | |
| 2247 *10* | 0.043 | 2 | 0.10[@] | |
| 2276 *10* | 0.16 | 0 | 0.09 | E(level): weighted average of 2282 *10* (1977Li10) and 2270 *10* (1977Sz01).<br>Other: (2J+1)C$^2$S′=0.10, dσ/dΩ(41.0°)=0.056 μb/sr (1977Sz01). |
| 2325 *10* | 0.048 | | | |
| 2360 *10* | 0.057 | | | |
| 2385 *10* | 0.080 | 2 | 0.19[@] | |
| 2421 *10* | 0.041 | (2) | 0.08[&] | |
| 2445 *10* | 0.062 | (0) | 0.05 | |
| 2477 *10* | 0.074 | 2 | 0.14[&] | |
| 2515 *10* | 0.068 | 0 | 0.04 | |
| 2542 *10* | 0.093 | 2 | 0.23,0.18 | |
| 2732 *10* | 0.085 | | | |
| 2766 *10* | 0.073 | (0) | 0.04 | |
| 2807 *10* | 0.087 | 2 | 0.18,0.13 | |
| 2846 *10* | 0.059 | | | |
| 2880 *10* | 0.19 | 0 | 0.04 | |
| 2963 *10* | 0.11 | 2 | 0.25,0.18 | |
| 3001 *10* | 0.10 | | | |
| 3032 *10* | 0.064 | | | |
| 3059 *10* | 0.11 | 0 | 0.02 | |
| 3145 *10* | 0.052 | | | |
| 3178 *10* | 0.167 | 0 | 0.03 | |
| 3207 *10* | 0.211 | 0 | 0.05 | |
| 3255 *10* | 0.037 | | | |

Continued on next page (footnotes at end of table)

## $^{122}$Te($^{3}$He,d) 1977Li10,1977Sz01,1979Sz05 (continued)

### $^{123}$I Levels (continued)

| E(level)[†] | dσ/dΩ(max)[‡] | L[#] | (2J+1)C$^2$S′[#] |
|---|---|---|---|
| 3286 *10* | 0.041 | | |
| 3309 *10* | 0.18 | (0) | 0.10 |

[†] From 1977Li10, unless noted otherwise. Uncertainties are 2-3 keV for strong levels, increasing to 10 keV for weak levels from a general statement in 1977Li10. Based on that and the deuteron spectrum in Fig.1 of 1977Li10, the evaluator has assigned 3 keV for levels with dσ/dΩ(max)>0.3 mb/sr and 10 keV for the rest.

[‡] Maximum differential cross sections from 1977Li10, in units of mb/sr and with an uncertainty of about 15%. Values from 1977Sz01 are given under comments.

[#] From DWBA fit to measured differential cross sections (1977Li10), unless otherwise noted. Uncertainties in spectroscopic factors are ≈15% (1977Li10, 1977Sz01) and DWBA calculations by 1977Li10 assume $1g_{7/2}$ and $1h_{11/2}$ single-particle orbits for L=4 and 5 transfers respectively, unless noted otherwise. Spectroscopic factors from 1977Sz01 are given under comments. L-transfers from 1977Sz01 and 1979Sz05 are mostly the same where available and given under comments if different.

[@] Assumed $2d_{3/2}$ for L=2 (1977Li10).

[&] Assumed $2d_{5/2}$ for L=2 (1977Li10).