## $^{27}$Al($^{18}$O,$\alpha$2n$\gamma$),($^{14}$N,np$\gamma$) 1975Ol01,1977Wa14

| Type | Author | History Citation | Literature Cutoff Date |
|---|---|---|---|
| Full Evaluation | Jun Chen | NDS 149, 1 (2018) | 1-Jan-2018 |

Also includes reactions: $^{12}$C($^{32}$S,$\alpha$p$\gamma$), $^{28}$Si($^{14}$N,2np$\gamma$).

1975Ol01: $^{27}$Al($^{18}$O,np$\alpha\gamma$) E=40 MeV $^{18}$O beam was produced from the Brookhaven National Laboratory MP tandem Van de Graaff. Targets were isotopically enriched $^{27}$Al with thickness of 250 $\mu$g/cm$^2$ evaporated onto thick W backings. $\gamma$ rays were detected with the Johns Hopkins University Compton polarimeter consisting of two true coaxial Ge(Li) detectors. Measured E$\gamma$, I$\gamma$, $\gamma\gamma$-coin, $\gamma(\theta$,linear pol). Deduced levels, J, $\pi$, $\gamma$-ray multipolarities. Comparisons with theoretical predictions. 1975Ol01 also report results from the re-analysis of the data on $^{24}$Mg($^{18}$O,2np$\gamma$)$^{39}$K in 1974Ko04.

1977Wa14: $^{27}$Al($^{14}$N,np$\gamma$) E=40 MeV. Measured $\gamma\gamma$, branching ratios, lifetimes by recoil-distance method.

1975Ol01, 1977Wa14 and 1974Ko04 are from the same laboratory and share several authors. See also 1974Wa07 for the compilation of their (HI,xn$\gamma$) measurements.

Other reactions:

1975Bo44: $^{28}$Si($^{14}$N,2np$\gamma$) E=30-35 MeV. Measured $\gamma(\theta$,H). Deduced hyperfine fields; study of 2814 level.

1992Pa01: $^{12}$C($^{32}$S,$\alpha$p$\gamma$) E=115 MeV. Measured E$\gamma$, I$\gamma$, $\gamma\gamma(\theta$,H). Deduced g factor of 19/2$^-$ state by transient field method.

### $^{39}$K Levels

| E(level)[†] | J$^\pi$[‡] | $T_{1/2}$ | Comments |
|---|---|---|---|
| 0 | 3/2$^+$ | | |
| 2814.22 *17* | 7/2$^-$ | | g=1.5 *3* (1975Bo44) |
| 3597.62 *17* | 9/2$^-$ | | |
| 3944.29 *18* | 11/2$^-$ | | |
| 5354.11 *21* | 11/2$^-$ | | |
| 5718.41 *22* | 13/2$^-$ | | |
| 6475.60 *25* | 15/2$^+$ | 11.8 ps *21* | $T_{1/2}$: from RDM in 1977Wa14; this value replaces authors' previous result of 0.7 ps≤$T_{1/2}$≤2.1 ps from the measurement of $^{24}$Mg($^{18}$O,2np$\gamma$) in 1974Ko04, with the latter found to be in error due to the presence of contaminant $\gamma$ rays. |
| 7141.8 *4* | 15/2$^-$ | | |
| 8028.3 *11* | 19/2$^-$ | 13.9 ps *10* | g=0.35 *3* (1992Pa01)<br>$T_{1/2}$: from average of values for 887$\gamma$ and 3197$\gamma$ in cascade (1977Wa14). The 7142 level is expected to be of short half-life (see Adopted Levels).<br>g: relative to g factor of 15/2$^+$ state in $^{41}$Ca measured in the same experiment (1992Pa01). |

[†] From $\gamma$-ray energies.
[‡] From Adopted Levels.

### $\gamma$($^{39}$K)

| E$_\gamma$[†] | I$_\gamma$[†] | E$_i$(level) | J$_i^\pi$ | E$_f$ | J$_f^\pi$ | Mult.[#] | $\delta$[@] | Comments |
|---|---|---|---|---|---|---|---|---|
| 346.69 *10* | 12.6 | 3944.29 | 11/2$^-$ | 3597.62 | 9/2$^-$ | M1+E2 | −0.16 *2* | $A_2$=−0.26 *2*, $A_4$=−0.06 *2*, POL=−0.22 *9* (1975Ol01). |
| 757.19 *12* | 6.4 | 6475.60 | 15/2$^+$ | 5718.41 | 13/2$^-$ | E1(+M2) | +0.08 *19* | $A_2$=−0.21 *3*, $A_4$=−0.05 *3*, POL=+0.09 *21* (1975Ol01). |
| 783.50 *15* | 10.3 | 3597.62 | 9/2$^-$ | 2814.22 | 7/2$^-$ | M1+E2 | +1.5 *8* | $A_2$=+0.32 *3*, $A_4$=−0.05 *3*, POL=−0.40 *12* (1975Ol01). |
| 886.81[‡] *20* | | 8028.3 | 19/2$^-$ | 7141.8 | 15/2$^-$ | | | E$\gamma$: from 1974Wa07. Other: 886.5 in 1974Ko04, unassigned. |
| 1130.03 *12* | 21.8 | 3944.29 | 11/2$^-$ | 2814.22 | 7/2$^-$ | E2 | | $A_2$=+0.20 *2*, $A_4$=−0.13 *2*, POL=+0.28 *10* (1975Ol01). |
| 1787.7 *5* | | 7141.8 | 15/2$^-$ | 5354.11 | 11/2$^-$ | | | I$\gamma$: I$\gamma$(1788)/I$\gamma$(3197)=38 *4*/62 *4* (1977Wa14).<br>E$\gamma$: from 1977Wa14. Other: 1788.0 in 1974Ko04, unassigned. |

Continued on next page (footnotes at end of table)

## $^{27}$Al($^{18}$O,$\alpha$2n$\gamma$),($^{14}$N,np$\gamma$) 1975Ol01,1977Wa14 (continued)

### $\gamma(^{39}K)$ (continued)

| $E_\gamma$ [†] | $I_\gamma$ [†] | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult.[#] | $\delta$[@] | Comments |
|---|---|---|---|---|---|---|---|---|
| 2814.24 *20* | 45.8 | 2814.22 | 7/2$^-$ | 0 | 3/2$^+$ | M2+E3 | +0.24 *5* | $A_2$=+0.30 *2*, $A_4$=−0.08 *2*, POL=−0.4 *3* (1975Ol01). |
| 3197.3[‡] *3* | 4.5 | 7141.8 | 15/2$^-$ | 3944.29 | 11/2$^-$ | E2 | | $A_2$=+0.42 *7*, $A_4$=−0.10 *8*, POL=+0.8 *12* (1975Ol01). |

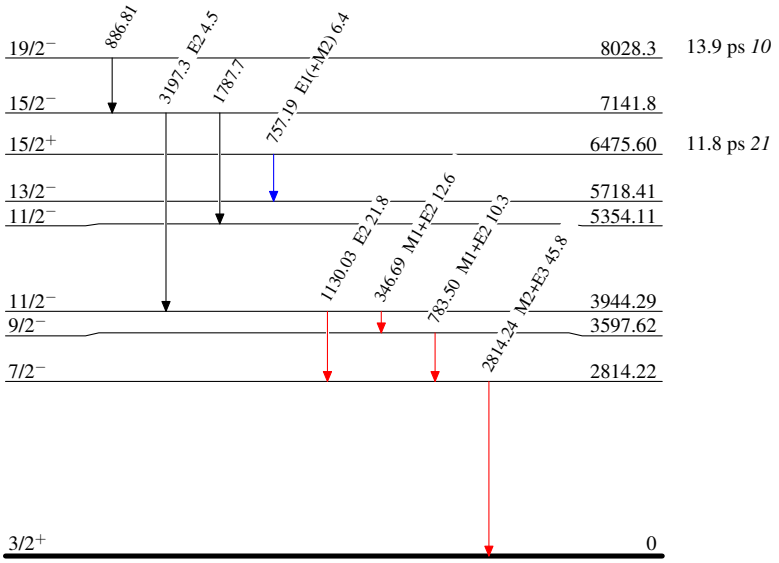
[†] From 1975Ol01, unless otherwise noted. Note that 1975Ol01 take E$\gamma$ values from the measurement of $^{24}$Mg($^{18}$O,2np$\gamma$) by 1974Ko04 from the same laboratory. Quoted values of intensities here are the original values in 1975Ol01 divided by 1000.
[‡] The ordering of the 887-3198 cascade is from 1977Wa14 and also in Adopted Gammas. It was reversed in the result of $^{24}$Mg($^{18}$O,2np$\gamma$) in 1975Ol01.
[#] From $\gamma$(linear pol) in 1975Ol01.
[@] Taken from 1974Ko04 based on $\gamma(\theta)$ data of $^{24}$Mg($^{18}$O,2np$\gamma$).

## $^{27}$Al($^{18}$O,$\alpha$2n$\gamma$),($^{14}$N,np$\gamma$) 1975Ol01,1977Wa14

Level Scheme

Intensities: Relative $I_\gamma$

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




$^{39}_{19}K_{20}$