## $^{26}$Mg($^{16}$O,np$\gamma$),$^{27}$Al($^{19}$F,$\alpha$pn$\gamma$) 1977Eg01,1981He20,1991Ja11

| Type | Author | History Citation | Literature Cutoff Date |
|---|---|---|---|
| Full Evaluation | Jun Chen | NDS 140, 1 (2017) | 30-Sep-2015 |

Also include $^{27}$Al($^{16}$O,n2p$\gamma$), $^{27}$Al($^{13}$C,$\gamma$), $^{27}$Al($^{13}$C,$\gamma$)), $^{24}$Mg($^{18}$O,np$\gamma$), $^{24}$Mg($^{19}$F,n2p$\gamma$), $^{28}$Si($^{14}$N,2p$\gamma$).

1977Eg01: $^{26}$Mg($^{16}$O,np$\gamma$) E=34 MeV $^{16}$O beam was produced from the Utrecht EN tandem accelerator. Targets were about 400 $\mu$g/cm$^2$ 99.42% enriched $^{26}$Mg on 30 $\mu$m Au backings. $\gamma$ rays were detected with a large-volume Ge(Li)-NaI(Tl) Compton-suppression spectrometer and a Ge(Li) detector. Measured E$\gamma$, I$\gamma$, $\gamma\gamma$-coin, $\gamma(\theta)$, $\gamma$(lin pol), Doppler-shift attenuation. Deduced levels, J, $\pi$, $\gamma$-ray branching ratios, multipolarities, mixing ratios, transition strengths. Comparisons with shell-model calculations.

1981He20: $^{27}$Al($^{19}$F,$\alpha$pn$\gamma$) E=47-108 MeV $^{19}$F beams were produced from the MP-Tandem at the MPI in Heidelberg. Targets were 1 mg/cm$^2$ Al on thick Au backings. $\gamma$ rays were detected with two Ge(Li) detectors (FWHM=1.9 keV and 2.1 keV) and a NaI(Tl) detector. Measured E$\gamma$, I$\gamma$, $\gamma\gamma$-coin, $\gamma(\theta)$. Deduced levels, J, $\pi$, mixing ratios. Comparisons with shell-model calculations.

1991Ja11: $^{27}$Al($^{16}$O,n2p$\gamma$) E=60 MeV. Measured lifetime of 892, 2543 and 4366 levels by Recoil-Distance Method (RDM).

Others:

1990Ki04: $^{27}$Al($^{13}$C,$\gamma$) E=39.7 MeV. Measured continuum $\gamma$, $\gamma(\theta)$; Deduced GDR parameters and strength function.

1981Le19: $^{24}$Mg($^{18}$O,np$\gamma$) E=36 MeV. Measured $\gamma(\theta$,H) by recoil into gas. Deduced g-factor of 2543 level.

1976Bo21, 1975Bo44: $^{27}$Al($^{16}$O,n2p$\gamma$) E=30-35 MeV; $^{28}$Si($^{14}$N,2p$\gamma$) E=38 MeV; $^{24}$Mg($^{19}$F,n2p$\gamma$) E=42 MeV. Measured $\gamma(\theta$,H). Deduced g-factor of 2543 level and hyperfine perturbations.

1976Ra05: $^{27}$Al($^{16}$O,n2p$\gamma$) E=32.5 MeV. Measured $\gamma(\theta)$, recoil distance in vacuum. Deduced lifetime of 2543 level and hyperfine deorientation.

1976Ke02: $^{27}$Al($^{16}$O,n2p$\gamma$) E=32.5-44 MeV. Measured E$\gamma$, lifetimes by Recoil-Distance Method.

1976Po03: $^{27}$Al($^{19}$F,$\alpha$pn$\gamma$) E=40 MeV. This study is mainly for $^{43}$Ca and $^{43}$Sc.

### $^{40}$K Levels

| E(level)[†] | J$^\pi$[‡] | T$_{1/2}$[#] | Comments |
|---|---|---|---|
| 0.0 | 4$^-$[&] | | |
| 30 | 3$^-$[&] | | |
| 891.45 *15* | 5$^-$ | 2.3 ps *10* | |
| 2542.77 *17* | 7$^+$ | 1.10 ns *7* | T$_{1/2}$: others: 1.10 ns *8* (1976Ke02, RDM); 1.10 ns *8*, 1.06 ns *7* (apparent half-lives At 55° and 0°, respectively, 1976Ra05 using RDM).<br>g-factor=0.63 *15* (1981Le19), +0.59 *10* (1976Bo21), +0.49 *10* (1975Bo44). |
| 2879.01 *22* | 6$^+$ | | |
| 4365.6 *4* | 8$^+$ | 0.36 ps *14* | T$_{1/2}$: the uncertainty may be larger since lifetime of the 4366 level is comparable to the stopping time in the tantalum stopper (1991Ja11). Other:<0.7 ps (1977Eg01). |
| 4875.6 *4* | 9$^+$ | <0.7[@] ps | |
| 6227.0 *5* | (8,10)$^-$ | <1.4[@] ps | |
| 7472.4 *5* | (9$^-$,11$^-$) | | E(level): from 1981He20 only. |

[†] From a least-squares fit to $\gamma$-ray energies.

[‡] Based on measured $\gamma(\theta)$ and $\gamma$(lin pol) in 1977Eg01, $\gamma(\theta)$ in 1981He20, and measured half-lives combined with RUL, unless otherwise noted..

[#] From 1991Ja11 using RDM, unless otherwise noted.

[@] From 1977Eg01 using DSAM.

[&] From Adopted Levels.

## $^{26}$Mg($^{16}$O,np$\gamma$),$^{27}$Al($^{19}$F,$\alpha$pn$\gamma$) 1977Eg01,1981He20,1991Ja11 (continued)

### $\gamma(^{40}K)$

| $E_\gamma$[†] | $I_\gamma$[†] | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult.[‡] | $\delta$[‡] | Comments |
|---|---|---|---|---|---|---|---|---|
| 336.18 *16* | 10.5 *3* | 2879.01 | $6^+$ | 2542.77 | $7^+$ | M1(+E2) | +0.01 *2* | $\delta$: from 1977Eg01. Other: −0.015 *20* (1981He20). $A_2$=−0.19 *3*, $A_4$=0, POL=−0.22 *3* (1977Eg01); $A_2$=−0.21 *3*, $A_4$=0 (1981He20). |
| 509.4 *10* | 10 *3* | 4875.6 | $9^+$ | 4365.6 | $8^+$ | | | |
| [x]810.3 *3* | | | | | | | | |
| 861 | <1 | 891.45 | $5^-$ | 30 | $3^-$ | | | $E_\gamma$: Not seen. Value is from the level-energy difference. |
| 891.46 *16* | 100 *3* | 891.45 | $5^-$ | 0.0 | $4^-$ | M1+E2 | +0.085 *15* | $\delta$: unweighted average of +0.099 *8* (1977Eg01) and +0.070 *10* (1981He20). $A_2$=−0.091 *9*, $A_4$=0, POL=−0.43 *3* (1977Eg01); $A_2$=−0.096 *10*, $A_4$=0 (1981He20); $A_2$=−0.12 *5* (1976Ra05). |
| [x]916.5 *6* | | | | | | | | |
| [x]939.9 *5* | | | | | | | | |
| 1245.42 *22* | | 7472.4 | $(9^-,11^-)$ | 6227.0 | $(8,10)^-$ | D+Q | +0.13 *7* | $E_\gamma$: from 1981He20 only. $\delta$: from 1981He20 for J=9. $A_2$=−0.08 *5*, $A_4$=0 (1981He20). |
| [x]1329.1 *14* | | | | | | | | |
| 1351.37 *18* | 12.0 *10* | 6227.0 | $(8,10)^-$ | 4875.6 | $9^+$ | E1(+M2) | −0.07 *5* | $\delta$: from 1981He20 for J=10. Other: −0.01 *3* for J=8 (1977Eg01). $A_2$=−0.19 *3*, $A_4$=0, POL=+0.29 *5* (1977Eg01); $A_2$=−0.20 *3*, $A_4$=0 (1981He20). |
| 1486.3 *5* | 3.5 *11* | 4365.6 | $8^+$ | 2879.01 | $6^+$ | E2 | | $A_2$=+0.9 *5*, $A_4$=−0.5 *4* (1977Eg01). |
| [x]1526.9 *4* | | | | | | | | |
| 1651.29 *12* | 78.0 *18* | 2542.77 | $7^+$ | 891.45 | $5^-$ | M2(+E3) | −0.02 *3* | $\delta$: weighted average of −0.01 *3* (1977Eg01) and −0.3 *2* (1981He20). $A_2$=+0.301 *13*, $A_4$=−0.105 *15*, POL=−0.52 *5* (1977Eg01); $A_2$=+0.26 *3*, $A_4$=−0.045 *30* (1981He20). |
| 1822.9 *3* | 19 *4* | 4365.6 | $8^+$ | 2542.77 | $7^+$ | | | |
| 1861.3[#] *6* | <0.7 | 6227.0 | $(8,10)^-$ | 4365.6 | $8^+$ | | | $I_\gamma$: from I$\gamma$(1861.3$\gamma$)/I$\gamma$(1351.4$\gamma$)<5/100 (1977Eg01). |
| 1987.8 *6* | 5.4 *7* | 2879.01 | $6^+$ | 891.45 | $5^-$ | E1(+M2) | −0.05 *4* | $\delta$: from 1977Eg01. $A_2$=−0.34 *5*, $A_4$=0, POL=+0.4 *3* (1977Eg01). |
| [x]2267.9 *8* | | | | | | | | |
| 2332.8 *4* | 18.0 *20* | 4875.6 | $9^+$ | 2542.77 | $7^+$ | E2 | | $A_2$=+0.35 *5*, $A_4$=−0.19 *5*, POL=+0.51 *7* (1977Eg01); $A_2$=+0.28 *4*, $A_4$=−0.05 *4* (1981He20). |
| 2542.6 *3* | 9.8 *3* | 2542.77 | $7^+$ | 0.0 | $4^-$ | E3(+M4) | +0.10 *7* | $\delta$: from 1981He20. Data of 1977Eg01 is consistent with pure E3. $A_2$=+0.46 *3*, $A_4$=0, POL=+0.83 *19* (1977Eg01); $A_2$=+0.50 *4*, $A_4$=+0.06 *4* (1981He20). |
| [x]2790.4 *9* | | | | | | | | |
| 3684[#] | <0.26 | 6227.0 | $(8,10)^-$ | 2542.77 | $7^+$ | | | $E_\gamma$: reported in 1977Eg01, energy value is from level-energy difference. $I_\gamma$: from I$\gamma$(3684$\gamma$)/I$\gamma$(1351.4$\gamma$)<2/100 (1977Eg01). |

Continued on next page (footnotes at end of table)

## $^{26}$Mg($^{16}$O,np$\gamma$),$^{27}$Al($^{19}$F,$\alpha$pn$\gamma$) 1977Eg01,1981He20,1991Ja11 (continued)

### $\gamma$($^{40}$K) (continued)

† From 1977Eg01, unless otherwise noted.
‡ Based on measured $\gamma(\theta)$ and $\gamma$(lin pol) in 1977Eg01, $\gamma(\theta)$ in 1981He20, and measured half-lives combined with RUL, unless otherwise noted.
# Placement of transition in the level scheme is uncertain.
x $\gamma$ ray not placed in level scheme.

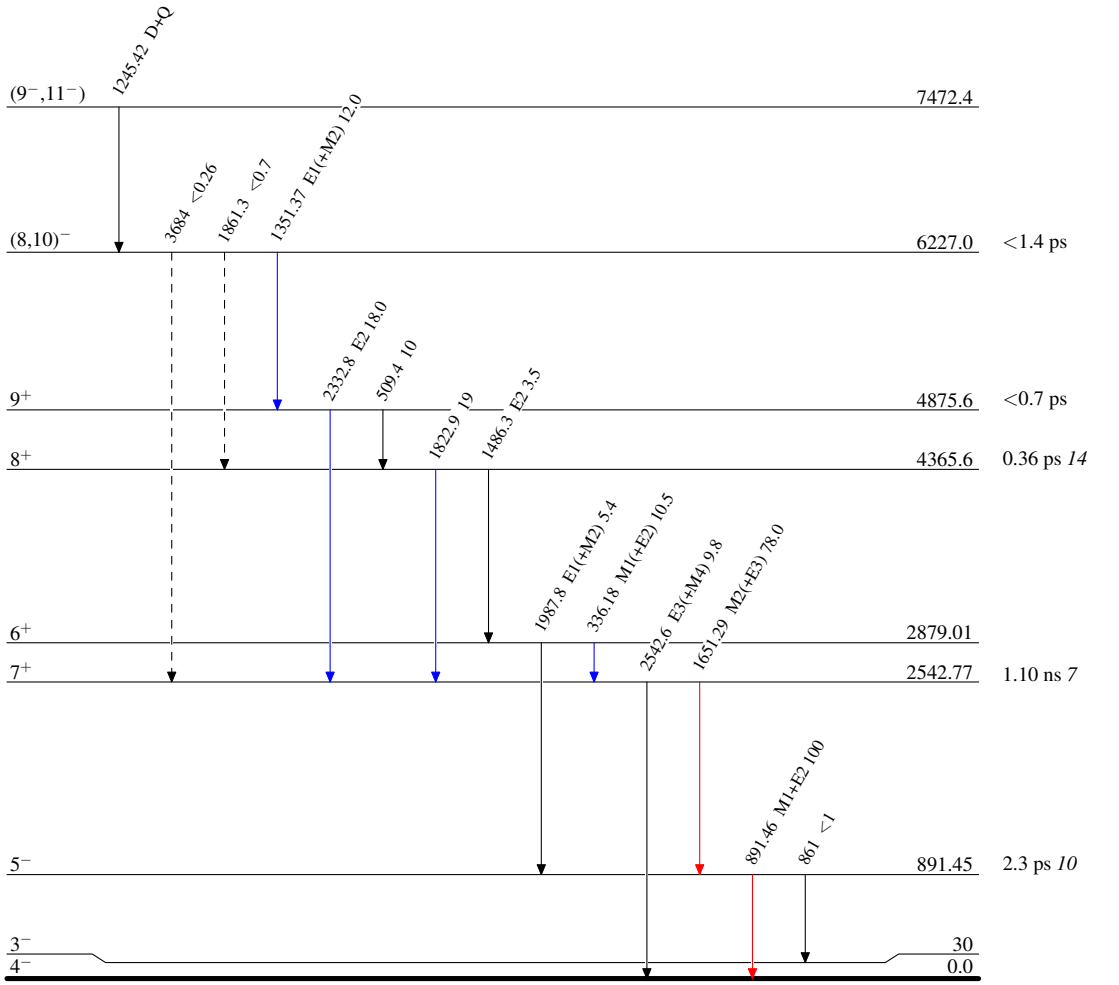
**$^{26}$Mg($^{16}$O,npγ),$^{27}$Al($^{19}$F,αpnγ) 1977Eg01,1981He20,1991Ja11**

Legend

Level Scheme

Intensities: Relative $I_\gamma$

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)




$^{40}_{19}K_{21}$