

$^{28}\text{Mg} \beta^-$  decay [1979A117](#),[1969A107](#)

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia		NDS 114, 1189 (2013)	1-Apr-2013

Parent:  $^{28}\text{Mg}$ :  $E=0.0$ ;  $J^\pi=0^+$ ;  $T_{1/2}=20.915$  h 9;  $Q(\beta^-)=1831.8$  20;  $\% \beta^-$  decay=100.0

Other: [1978Di05](#).

Sum of decay energies of this dataset is 1833 keV 4 cf. 1831.8 keV 20 obtained from  $^{28}\text{Mg} \beta^-$  decay  $Q(\text{g.s.})$  and branching.

[1969A107](#):  $^{28}\text{Mg}$  produced from  $^{26}\text{Mg}(\text{t,p})^{28}\text{Mg}$  reaction; 99.77% enriched  $^{26}\text{Mg}$ ,  $E=3.4$  MeV; several Ge(Li) detectors were used for  $\gamma$ -ray detection and  $\gamma$ - $\gamma$  coin using Ge(Li) and NaI(Tl) detectors. Deduced level scheme.

[1979A117](#):  $^{28}\text{Mg}$  produced from  $^{26}\text{Mg}(\text{t,p})^{28}\text{Mg}$  reaction; 99.77% enriched  $^{26}\text{Mg}$ ,  $E=3.4$  MeV; measured  $\beta^- \gamma$  coin using anthracene crystal and NaI(Tl) detectors. Deduced the isospin-forbidden beta-decay branching ratio of the  $0^+$ ,  $T=2$  mg ground state to the 972-keV  $0^+$ ,  $T=1$  level of Al.

 $^{28}\text{Al}$  Levels

E(level) <sup>†</sup>	$J^\pi$ <sup>‡</sup>	$T_{1/2}$	Comments
0.0	$3^+$	2.245 min 2	$T_{1/2}$ : From Adopted Levels.
30.6383 7	$2^+$		
972.24 20	$0^+$		
1372.85 14	$1^+$		
1620.1 3	$1^+$		

<sup>†</sup> From a least-squares fit to  $\gamma$ -ray energies.

<sup>‡</sup> From Adopted Levels.

 $\beta^-$  radiations

E(decay)	E(level)	$I\beta^-$ <sup>†#</sup>	$\log ft$	Comments
(211.7 20)	1620.1	4.9 10	4.57 9	av $E\beta=65.19$ 70
(459.0 20)	1372.85	94.8 10	4.453 9	av $E\beta=155.95$ 78
(859.6 20)	972.24	0.31 <sup>‡</sup> 4	7.96 6	av $E\beta=319.23$ 86 $I\beta^-$ : 0.21% 12 ( <a href="#">1978Di05</a> ).

<sup>†</sup> In [1969A107](#), 95% 1 and 5% 1 b- feeding branch is reported for the 1372.8 keV state  $J^\pi=1^+$  and 1620.0 keV state  $J^\pi=1^+$ , respectively. Later in [1979A117](#) a weak  $\beta^-$  feed branch of 0.31% 4 to the 972-keV state  $J^\pi=0^+$  is reported. Based on the latest result,  $\beta^-$  feeding branches are adjusted for 100% by the evaluator, consistent with the  $\gamma$ -ray intensity balance at the levels.

<sup>‡</sup> From [1979A117](#).

<sup>#</sup> Absolute intensity per 100 decays.

 $\gamma(^{28}\text{Al})$ 

$I_\gamma$  normalization: from  $\Sigma I_\gamma(\text{g.s.} + 30.6 \text{ level})=100$ . Based on  $\log ft > 11.0$  for a second forbidden  $\beta$  branch,  $I(\beta^- \text{ to } 30.6 \text{ level}) < 0.0063\%$ .

$E_\gamma$ <sup>†</sup>	$I_\gamma$ <sup>†#</sup>	$E_i(\text{level})$	$J^\pi_i$	$E_f$	$J^\pi_f$	Mult.	$\delta$ <sup>‡</sup>	$\alpha$ <sup>@</sup>	Comments
30.6383 <sup>‡</sup> 7	89	30.6383	$2^+$	0.0	$3^+$	M1+E2	+0.001 6	0.0644 11	$\alpha(\text{K})=0.0600$ 10; $\alpha(\text{L})=0.00420$ 7; $\alpha(\text{M})=0.000220$ 4 $I_\gamma$ : Deduced by the evaluator from a total

Continued on next page (footnotes at end of table)

**$^{28}\text{Mg}\beta^-$  decay** [1979Al17,1969Al07](#) (continued) $\gamma(^{28}\text{Al})$  (continued)

$E_\gamma$ <sup>†</sup>	$I_\gamma$ <sup>†#</sup>	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Comments
						transition intensity of 95.0 ( <a href="#">1969Al17</a> ), consistent with the intensity balance at this level. Based on $\log ft > 11$ for a second forbidden transition, $I(\beta^- \text{ to } 30.64 \text{ level}) < 0.0063\%$ .
400.6 2	35.9	1372.85	1 <sup>+</sup>	972.24	0 <sup>+</sup>	
648.1 5	0.085	1620.1	1 <sup>+</sup>	972.24	0 <sup>+</sup>	
941.7 4	36.3	972.24	0 <sup>+</sup>	30.6383	2 <sup>+</sup>	$I_\gamma$ : From intensity balance at this level by the evaluator. $I_\gamma=35.9$ in <a href="#">1969Al07</a> .
972.24	<0.2	972.24	0 <sup>+</sup>	0.0	3 <sup>+</sup>	$E_\gamma, I_\gamma$ : $E_\gamma$ from level-energy differences. Fractional branching <0.5% from 972 keV level ( <a href="#">1969Al17</a> ). 972 $\gamma$ not adopted, $\gamma$ -ray transition 0 <sup>+</sup> to 3 <sup>+</sup> .
1342.2 2	54.0	1372.85	1 <sup>+</sup>	30.6383	2 <sup>+</sup>	
1372.8 2	4.7	1372.85	1 <sup>+</sup>	0.0	3 <sup>+</sup>	
1589.4 4	4.7	1620.1	1 <sup>+</sup>	30.6383	2 <sup>+</sup>	
1620.0 4	0.3	1620.1	1 <sup>+</sup>	0.0	3 <sup>+</sup>	

<sup>†</sup> From [1969Al07](#), except otherwise noted.<sup>‡</sup> From Adopted Gammas.

# Absolute intensity per 100 decays.

@ Total theoretical internal conversion coefficients, calculated using the BrIcc code ([2008Ki07](#)) with Frozen orbital approximation based on  $\gamma$ -ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

$^{28}\text{Mg} \beta^-$  decay 1979Al17,1969Al07

## Decay Scheme

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

Legend

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

