$^{2}H(^{23}Al,n\gamma)$ 2019Wo01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia, Anagha Chakraborty	NDS 186, 2 (2022)	31-Mar-2022

Adapted from XUNDL dataset compiled by J. Chen (NSCL, MSU), July 2, 2019.

2019Wo01: E=48 MeV/nucleon ^{23}Al secondary beam was produced by projectile fragmentation on a 1904 mg/cm^2 ^{9}Be target with a 170 MeV/nucleon ^{24}Mg primary beam from the Coupled Cyclotron Facility at NSCL and selected with the A1900 fragment separator. The reaction target was 110(5) mg/cm^2 Cd_2. γ rays were detected with the GRETINA array of 8 detector modules in one of the hemispheres and low-energy neutrons were detected with the LENDA array of 24 plastic scintillators; reaction residues entering the focal plane of S800 spectrograph were analyzed and identified event by event from energy loss and time of flight. Measured Eγ, Iγ, $\gamma\gamma$-coin, nγ-coin, residue-γ-coin, $\sigma(E_n,\theta)$. Deduced levels, J, π, cross-sections, proton resonance parameters, spectroscopic factors from the analysis using the adiabatic wave approximation (ADWA). Comparisons with theoretical calculations. Discussed implications on astrophysical reaction rates of ^{23}Al(p,γ)^{24}Si.

^{24}Si Levels

Integral cross section σ=563 μb *67* at E(beam)=48 MeV/nucleon, obtained from γ-ray intensities by 2019Wo01. Experimental partial σ and spectroscopic factors C^{2}S of different proton orbitals for each level are given under comments.

E(level)†	J$^\pi$‡	C^{2}S	Comments
0	0$^+$#	≤2.8	σ≤281 μb. C^{2}S: For 1d$_{5/2}$.
1874 *3*	2$^+$#		σ=0.263 mb *83*. C^{2}S: 0.6 *2* for 2s$_{1/2}$, 0.07 *2* for 1d$_{3/2}$, 0.04 *1* for 1d$_{5/2}$.
3449 *5*	(2$^+$)		σ=0.078 mb *41*. C^{2}S: 0.7 *4* for 2s$_{1/2}$, 0.002 *1* for 1d$_{3/2}$, 0.3 *2* for 1d$_{5/2}$.
3471 *6*	(4$^+$,0$^+$)		σ=0.054 mb *30*. C^{2}S: 0.07 *4* for 1d$_{3/2}$ and 0.004 *3* for 1d$_{5/2}$ if J=4; 0.8 *4* for 1d$_{5/2}$ if J=0.

† From Eγ.
‡ Proposed by 2019Wo01 (based on shell model calculations, spectroscopic factor and comparison with the states of mirror nuclide ^{24}Ne), except where otherwise noted.
# From Adopted Levels.

$\gamma(^{24}Si)$

E$_\gamma$†	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$
1575‡ *3*	3449	(2$^+$)	1874	2$^+$
1597‡ *5*	3471	(4$^+$,0$^+$)	1874	2$^+$
1874 *3*	1874	2$^+$	0	0$^+$

† From 2019Wo01.
‡ Obtained by fitting a broad structure at 1590 keV (2019Wo01).

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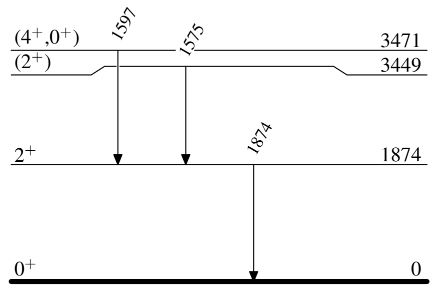
Level Scheme



$^{24}_{14}Si_{10}$