^{14}N(d,α) 1965Sc12,1976Va07,1985Aj01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. H. Kelley, J. E. Purcell and C. G. Sheu	NP A968,71 (2017)	1-Jan-2017

1953Du23: ^{14}N(d,α) E=620 keV, Measured E_α; deduced level energies, Γ.
1956Ah32. Deduced level energies.
1963Se23: E=1.8 MeV; Measured E_α, ^{12}C-α coin. Deduced radiative width.
1964Ma53: ^{14}N(d,α) E_d=1.1-2.5 MeV, measured α-spectrum, σ(E,θ).
1965Br08: ^{14}N(d,α) E=5.93,7.17 MeV, measured $\sigma(E_\alpha,\theta)$. ^{14}N(d,$\alpha\gamma$) E=3-12 MeV, measured σ(E).
1965St02: ^{14}N(d,α) E=0.9-1.2 MeV, measured $\sigma(E_\alpha)$, $\sigma(E,E_\alpha,\theta)$.
1965Wi11: ^{14}N(d,α) E=0.717-1.740 MeV, measured $\sigma(E,\theta)$. ^{12}C deduced L, J, π, level density.
1969Cu08: ^{14}N(d,α) E=10-12 MeV, measured $\sigma(E_\alpha,\theta)$. ^{12}C levels deduced L, J. Zero-range DWBA.
1969Go14: ^{14}N(d,α) E=1-3.1 MeV, measured $\sigma(E,\theta)$, $\sigma(E,E_\alpha,\theta)$.
1970Sc02: ^{14}N(d,α) E=15,20 MeV, measured $\sigma(E_\alpha,\theta)$. Deduced optical model parameters. ^{12}C deduced levels, J, π, S.
1971Ar41: ^{14}N(d,α) E=1.7,2.3,2.9 MeV, measured $\sigma(E_\alpha,\theta)$.
1972Fa07: ^{14}N(d,α') E=52,90 MeV, measured $\sigma(E_\alpha,\theta)$, $\alpha'\alpha$-coin. ^{12}C deduced levels, level-width, J, π.
1972Ne10: ^{14}N(d,α) E=2.25-2.35 MeV, measured σ(E).
1974Ba32: ^{14}N(d,α) E=350,510,640 keV, measured $\sigma(E,E_\alpha,\theta)$. Deduced reaciton mechanism. ^{12}C levels deduced relative σ.
1974Va15,1976Va07: ^{14}N(d,α) E=40 MeV, measured $\sigma(E_\alpha,\theta)$. ^{12}C deduced upper limit for isospin mixing, deduced levels, J, π.
1977Ko33: ^{14}N(d,α) E=0.5-5.0 MeV, measured $\sigma(E,\theta)$.
1979De45: ^{14}N(pol. d,α) E=1.5-3.0 MeV, measured A(E,θ).
1982KaZS: ^{14}N(d,α) E=18 MeV, measured $\sigma(E_\alpha)$, (particle)(particle)-coin, $\sigma(\theta)$. ^{12}C deduced resonances, J, π, T, decay mode. DWBA analysis.
1995Hu15: ^{14}N(d,α) E=2 MeV, measured E_α, I_α.
1999Ig03: ^{14}N(d,$\alpha\gamma$) E=15.4 MeV, measured E_γ, $\sigma(\theta)$, spin tensor density matrix.
2004Pe10: ^{14}N(d,α) E=0.5-2 MeV, measured E_α, σ(E,θ).
2008Gu08: ^{14}N(d,α) E=0.7-2.2 keV, measured excitation functions.
2017De25: XUNDL dataset Compiled by TUNL, 2018.

A beam of 10.5 MeV deuterons, from the INFN-LNS/Catania tandem, impinged on a ≈40 μg/cm^2 melamine ($C_3H_6N_6$) layer that was deposited on a ≈10 μg/cm^2 carbon backing (private communication). A ΔE-E telescope was positioned to measure and identify the α particles resulting from ^{14}N(d,α) reactions. On the opposite side of the beam, an 8 strip×8 strip 2D position sensitive Si strip detector was positioned to effectively detect the 3α particles resulting from breakup of ^{12}C*(7654); hence a quadruple coincidence identified events of interest. A relatively background free peak was observed corresponding to ^{12}C*(7654). An evaluation of the ^{12}C*(7.65 MeV) events using a Dailitz plot analysis and comparison with Monte Carlo simulations revealed the branching ratio for 3α Direct Decay is <0.043%. The direct 3α decay branch can be related to the astrophysical triple α capture rate.

^{12}C Levels

E(level)	J^π	$T_{1/2}$	Comments
0			
4.4×10^3	2$^+$		J^π: From α-γ studies.
7.65×10^3			$\Gamma_{rad}/\Gamma=(\Gamma_\gamma+\Gamma_\pi)/\Gamma=2.8\times10^{-4}$ *3* (1963Se23). E(level): Also see E_x=7690 keV *33* from ΔE($0^+\geq2^+$)=3251 keV *33* (1953Du23). E(level): In (2017De25), the branching ratio for 3α Direct Decay is found as <0.043%, this can be related to the astrophysical triple α capture rate.
9642 *14*		30 keV *8*	E(level): From (1956Do41). Γ: From (1953Du23,1956Ah32).
10.84×10^3			E(level): See (1965Br08,1970Sc02).
11.83×10^3			E(level): See (1965Br08,1970Sc02).
12700 *70*			E(level): From (1965Pe17).
13.29×10^3		355 keV *50*	E(level),Γ: From (1965Sc12).
14.08×10^3			

Continued on next page (footnotes at end of table)

^{14}N(d,α) 1965Sc12,1976Va07,1985Aj01 (continued)

^{12}C Levels (continued)

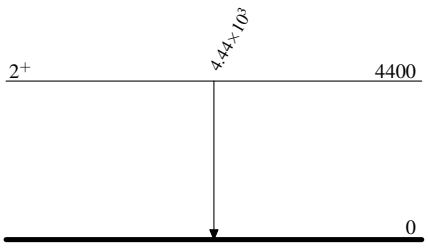
E(level)	J^{π}	$T_{1/2}$	Comments
15.11×10^{3}			E(level): See (1965Br08).
19.50×10^{3} *10*	$(1,2,3)^{+}$	≈250 keV	T=0 E(level),J^{π},Γ: From (1976Va07).
20.55×10^{3} *10*	$(2,3)^{+}$	≈200 keV	T=0 E(level),J^{π},Γ: From (1976Va07).
22.5×10^{3} *1*	$(2,3)^{+}$	≈750 keV	E(level),J^{π},Γ: From (1976Va07). Possibly unresolved states.
23.9×10^{3} *1*		≈400 keV	E(level),Γ: From (1976Va07).

$\gamma(^{12}C)$

E_{γ}	E_i(level)	J_i^{π}	E_f
4.44×10^{3}	4.4×10^{3}	2^{+}	0

^{14}N(d,α) 1965Sc12,1976Va07,1985Aj01

Level Scheme



$^{12}_{6}C_{6}$