^{16}O(n,α),(n,$\alpha\gamma$)

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. H. Kelley, C. G. Sheu and J. E. Purcell	NDS 198,1 (2024)	1-Aug-2024

1952Li24: ^{16}O(n,α) E=14.1 MeV; measured products, ^{4}He; deduced σ, σ(E). ^{13}C*(3.0,3.7 MeV) states are found.
1961Ci01: ^{16}O(n,α_0) E=14.4 MeV; measured angular distributions.
1963Da12: ^{16}O(n,α_0) E=5.0-8.8 MeV; ^{16}O(n,α_1) E=7.6-8.7 MeV; ^{16}O(n,$\alpha_{2,3}$) E=8.1-8.7 MeV; measured σ(E).
1963Se08: ^{16}O(n,α) E=14 MeV; measured α-particle angular distributions σ(E,θ).
1965Ch13: ^{16}O(n,α) E=14.5 MeV; measured σ(E$_\alpha$,θ). This reaction leading to about 4 MeV excitation of ^{13}C has been studied.
1966Mc14: ^{16}O(n,α_0) E=14.1 MeV; measured σ(E$_\alpha$,θ), the absolute differential cross sections for the transitions to the ^{13}C$_{g.s.}$. Natural targets.
1967Hs04: ^{16}O(n,α) E=14.1 MeV; measured σ(E$_\alpha$,θ). The angular distributions of the α-particle groups leading to ^{13}C*(0,3.08 and 3.68+3.85 MeV) are observed. Natural target.
1968Le11: ^{16}O(n,α) E=14.9 MeV; measured σ(E$_\alpha$,θ). The angular distributions have been obtained from 20° to 160° for the transitions ^{16}O(n,α_0)^{13}C and are compared to the predictions of direct interaction mechanisms. Natural targets.
1968Ma10: ^{16}O(n,α) E=14.1 MeV; measured σ(E$_\alpha$,θ). Absolute differential cross sections were measured for the (n,α) transitions to the ground state of ^{13}C and to an unresolved triplet of known levels at E$_x$=3.09, 3.68 and 3.86 MeV. Natural target.
1968Si06: The differential cross section of ^{16}O(n,α_0) and ^{16}O(n,α_{1+2+3}) has been measured at 28 E$_n$ energies between 14.8 and 18.8 MeV with 60 keV energy spread at θ=0°−156°.
1969AjZZ,1970Aj03: ^{16}O(n,α) E=14 MeV; measured σ(E$_\alpha$,θ). Angular distributions of the unresolved group of α-particles corresponding to three levels of ^{13}C at E$_x$=3.09, 3.68 and 3.86 MeV were measured.
1970Br17,1971Br33,1972Br50: ^{16}O(n,α) E=13.9 MeV; measured σ(E$_n$;θ=0°).
1971Ny03: ^{16}O(n,$\alpha\gamma$) E=15 MeV; measured E$_\gamma$, σ(E$_\gamma$). ^{13}C, deduced levels from E$_\gamma$=3.685 MeV *3* and 3.855 MeV *3*.
1972Ki12: ^{16}O(n,α) E=4.9 MeV; measured σ(θ).
1973Bo26: ^{16}O(n,α) E=14.1 MeV; measured σ(E$_\alpha$,θ). The angular distributions of the α_0 and α_{1+2+3} groups for this reactions have been measured.
1978No04: ^{16}O(n,$\alpha\gamma$) E=7-10.5 MeV; measured σ(E,E$_\gamma$). The production of 3.09 and 3.68+3.85−MeV gamma rays has been studied.
2008GiZY: ^{16}O(n,α_0) E=3.95-9 MeV; measured E$_\alpha$, I$_\alpha$; deduced σ(E*).
2001Ne09: ^{16}O(n,$\alpha\gamma$) E=4-200 MeV; measured E$_\gamma$, I$_\gamma$, photon production σ(E), σ(θ). Comparison with model calculations, previous measurements.
2011KhZW: ^{16}O(n,α_0) E=5.2-6.2 MeV; deduced σ.
2023PaZV: Description of the GELINA NTOF facility at Geel.

Theory:
1989Br05: ^{16}O(n,α) E=15-60 MeV; calculated σ(θ1,E1).
1995Ch84: ^{16}O(n,α) E=6.2-10.5 MeV; analyzed σ, σ(θ).
2008VaZT: ^{16}O(n,α) E≈3-10 MeV; calculated σ; evaluated σ.
2020FlZY: ^{16}O(n,α) E<20 MeV; analyzed available data; deduced recommended σ.
2021Pr01, 2022Pr01: Deduced ^{16}O(n,α_0) by analyzing ^{13}C(α,n) for E$_\alpha$=2.0-6.2 MeV.
2022Ab20: ^{16}O(n,α); analyzed (n,α) data from reactions on 133 targets listed in EXFOR; developed semi-emperical formula for cross sections. Compared with other σ models.
2023Pa09: Global analysis on (n,α) systematics and reaction mechanism.

^{13}C Levels

E(level)	J$^\pi$[†]	T$_{1/2}$ or Γ[‡]	Comments
0	1/2$^-$		E(level): Reported in (1961Ci01, 1966Mc14, 1967Hs04, 1968Le11, 1968Ma10, 1968Si06, 1971Br33, 1973Bo26, 2008GiZY, 2011KhZW, 2012Kh05).
3090[#]	1/2$^+$	1.07 fs	E(level): Reported in (1952Li24, 1967Hs04, 1971Br33).
3686[#@] *3*	3/2$^-$	1.10 fs	E(level): Derived from γ-ray measurements (1971Ny03); also reported in (1952Li24).

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^{16}O(n,α),(n,$\alpha\gamma$) (continued)

^{13}C Levels (continued)

E(level)	J$^{\pi}$[†]	$T_{1/2}$ or Γ[‡]	Comments
3856[#@] *3*	5/2$^+$	8.60 ps	E(level): Derived from γ-ray measurements (1971Ny03).
8860	1/2$^-$	150 keV	E(level): Reported in (2001Ne09).

[†] From Adopted Levels.
[‡] Listed in (2001Ne09).
[#] Also reported in (1968Ma10, 1968Si06, 1970Aj03, 1973Bo26: unresolved triplet).
[@] Also reported in (1967Hs04, 1971Br33: unresolved doublet).

γ(^{13}C)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Comments
169	58.4 *12*	3856	5/2$^+$	3686	3/2$^-$	E_γ: Measured in (2001Ne09). I_γ: From (2001Ne09).
764	1.4 *4*	3856	5/2$^+$	3090	1/2$^+$	E_γ: Measured in (2001Ne09). I_γ: From (2001Ne09).
3090		3090	1/2$^+$	0	1/2$^-$	E_γ: Measured in (2001Ne09); observed in (1978No04).
3685 *3*		3686	3/2$^-$	0	1/2$^-$	E_γ: Measured in (1971Ny03); see also (2001Ne09).
3855 *3*	100.0 *15*	3856	5/2$^+$	0	1/2$^-$	E_γ: Measured in (1971Ny03); see also (2001Ne09). I_γ: From (2001Ne09).
8857		8860	1/2$^-$	0	1/2$^-$	E_γ: Measured in (2001Ne09).

[†] Relative intensities.

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Level Scheme

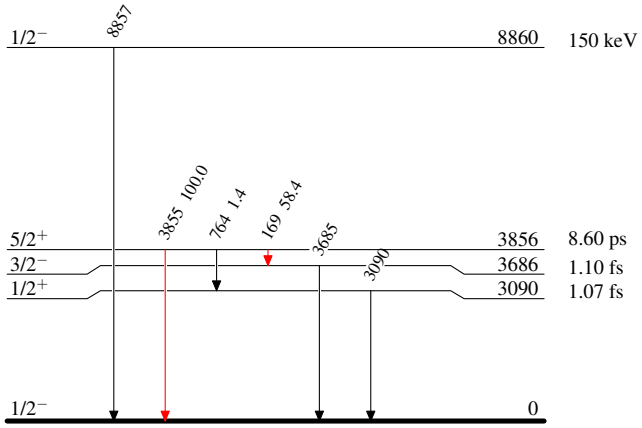
Intensities: Relative I_γ

Legend

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

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

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



$^{13}_{6}C_{7}$