^{16}O(n,γ):E=thermal 2016Fi04

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. G. Sheu, J. H. Kelley, J. Purcell	ENSDF	5-Aug-2021

1979Wu05: ^{16}O(n,γ), E=thermal; measured σ for double-photon emission, $\sigma\gamma$.
2008FiZZ: ^{16}O(n,γ), E=thermal; measured cross sections; compared experimental and calculated depopulation.
1977Mc05: ^{16}O(n,γ), E=th; measured σ(Eγ); deduced upper limit for $\sigma(2\gamma)$. ^{17}O levels deduced γ-branching. Enriched target. Target J$^{\pi}$=0^{+}. Measured Eγ and Iγ, γ-production. They reported Iγ(1088)=82 *3* and Iγ(3271)=18 *3*. Evaluated S(n)=4143.33 keV *21* (1995Au04).
2016Fi04: XUNDL datasetbcompiled by TUNL, 2016 ENSDF formatted tables provided by R.B. Firestone (LBNL).
The authors measured thermal neutron capture reactions on several natural and enriched isotopic targets, normalized to a limited set of standard targets, with the aim of improving absolute capture cross sections and transition probabilities.
In separate measurements beams of $E_{thermal}$ neutrons, from the 10-MW Budapest Reactor or the Forschungs-Neutronenquelle Heinz Maier-Leibnitz reactor, impinged on 99.9% deuteron enriched D_2O targets with natural, 50.1% ^{16}O and 58.5% ^{16}O abundances. The capture γ rays were measured using a single Compton suppressed HPGe detector that was 60% efficient relative to a 3 inch×3 inch NaI detector. The relative intensities of the capture γ rays were determined and normalized primarily to the known capture cross sections of ^{16}O(n,$\gamma_{870.67}$) (σ_{γ}=0.164±0.003 mb), which was cross referenced to other secondary cross sections determined for capture reactions on ^{1}H, ^{12}C or ^{14}N.
The observed γ-ray transitions were analyzed by deducing a level scheme and performing a least-squares fit to obtain precise level energies. The transition probabilities and cross sections were deduced by balancing the intensity feeding and deexciting each state.
Lastly, the present results are compared with literature results, particularly for the capture cross section and the neutron separation energy. S_n=4143.27 keV *13* is deduced.
σ=170 μb *3*, χ^2/f=0.741, 5 γ-rays.

Theory:
^{16}O(n,γ).
1976Le27: ^{16}O(n,γ), E=thermal; calculated $\sigma(2\gamma)$, $\sigma(2\gamma)/\sigma(\gamma)$.
2002Re13: ^{16}O(n,γ), E=thermal; compiled, analyzed prompt Eγ, Iγ.
2011Sl01: ^{16}O(n,γ), E=thermal; compiled, evaluated σ, σ(Eγ), γ decay schemes, levels, J, π using ENDF, DICEBOX.

^{17}O Levels

E(level)†	J$^{\pi}$‡	T$_{1/2}$‡
0.0	5/2^{+}	stable
870.78 *8*	1/2^{+}	180 ps
3055.37 *12*	1/2^{-}	0.08 ps
(4143.27 *13*)	1/2^{+}	

† Reported in (2016Fi04).
‡ From Adopted Levels.

γ(^{17}O)

E$_{\gamma}$†	I$_{\gamma}$†‡	E$_i$(level)	J$^{\pi}_i$	E$_f$	J$^{\pi}_f$	Mult.	α#
870.76 *4*	96.6 *5*	870.78	1/2^{+}	0.0	5/2^{+}	E2	8.85×10^{-6} *13*
1087.89 *4*	80.4 *5*	(4143.27)	1/2^{+}	3055.37	1/2^{-}	E1	2.31×10^{-6} *4*
2184.49 *5*	80.4 *5*	3055.37	1/2^{-}	870.78	1/2^{+}	E1	0.00077 *1*
3272.02 *8*	16.2 *4*	(4143.27)	1/2^{+}	870.78	1/2^{+}	M1	0.00076 *1*
4142.6 *6*	3.36 *24*	(4143.27)	1/2^{+}	0.0	5/2^{+}	E2	0.00122 *2*

† The measured γ-ray energies and the observed γ-ray intensities. In (2016Fi04), the figures show the experimental γ-ray energies

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γ(^{17}O) (continued)

and the transition probabilities (accounting for internal conversion). Similarly, the tables show γ-ray energies associated with the level scheme deduced from a least-squares fit to the measured transition energies along with the measured γ-ray transition intensities.

‡ Intensity per 100 neutron captures.

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