Adopted Levels

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

Q(β^-)=10.96×10^3 *19*; S(n)=4.19×10^3 *20*; S(p)=2.551×10^3 *45*; Q(α)=−21.43×10^3 *28* 2021Wa16
S(2n)=6930 *170*, S(2p)=49690 *280*, Q(β^-n)=7140 *170* (2021Wa16).

1970Ar09: ^{24}O produced and identified in ^{232}Th(^{22}Ne,X) reaction at 174 MeV, measured yield. A total of ≈30 events were assigned to ^{24}O.

1990Mu06 (also 1990Gu02): ^{181}Ta(^{48}Ca,x) E=2100 MeV. Mass separation, semiconductor telescope, 4π neutron detector, measured half-life and delayed neutron emission probability.

1999Re16 (also 2001Pe14): Be(^{36}S,x) E=78 MeV. GANIL, mass separation, tof. Measured half-life and delayed neutron emission probability.

2003Th07 (also 2003Th10): ^{12}C(^{25}F,^{24}O) E=50 MeV/nucleon. Secondary beam from ^{48}Ca(Be,x) E=110 MeV/nucleon fragmentation. Mass separation, E-ΔE Si surface barrier detectors. Measured production cross section σ=3.8 mb *6*.

2004St08, 2004St10: C(^{36}S,X) E=77.5 MeV/nucleon. Mass separation, tof, 74 BaF_2 γ-ray detectors. No gammas observed suggesting that first 2$^+$ level is unbound to particle emission.

2009Ka14 propose doubly-closed shell nature of ^{24}O from experimental study of neutron knockout from ^{24}O in C(^{24}O,^{23}O) reaction.

Other references of yield measurements in fragmentation reactions: 2012Kw02, 2007No13, 2004Th15, 2003Oz01, 2000Oz01.

Additional information 1.

Precise mass measurement: 2007Ju03. Others: 1991Or01, 1988Wo09, 1987Gi05.

^{24}O Levels

Cross Reference (XREF) Flags

A	^{25}O N decay (2.7×10^{-9} ps)	E	^{2}H(^{24}O,2n^{22}O)
B	^{26}O 2n decay (4.5 ps)	F	^{9}Be(^{26}F,nX)
C	^{1}H(^{24}O,p′)	G	^{9}Be(^{26}Ne,2pX)
D	^{1}H(^{25}F,2p)		

E(level)	J$^\pi$	T$_{1/2}$ or Γ	XREF	Comments
0.0	0$^+$	72 ms *5*	ABCD FG	%β^-=100; %β^-n=42 *5* Measured absorption mean radius: r_0^2=1.213 fm^2 *47* (2006Kh08) in Si(^{24}O,X) at GANIL facility. Measured mean matter radius=3.19 fm *13* (2001Oz03) in C(^{24}O,X) reaction at GSI facility. T$_{1/2}$ or Γ: Weighted average of 65 ms *5* (1999Re16 γ(t) (also reported as 67 ms *10* in 2001Pe14)), 61 ms *+32−19* (1990Mu06) and 80 ms *5* (2015Ca09 − from summed intensity time distribution of 521γ, 1309γ, and 1830γ). %β^-n: Weighted average of 58 *12* (1990Mu06) and 40 *4* (from g.s. feeding of %Iγ=39 *4* (1830γ) and %Iγ=21 *2* (521γ) 2015Ca09). 2015Ca09 report 43 *4* considering 1305γ (not feeding g.s.) %Iγ=18 *3* instead of 521γ %Iγ. 2015Bi05 (evaluation) gives 41 *4*, considering 1.0(4)% g.s. feeding of 1$^+$ states above 1830 keV level (unknown feeding to the g.s.). Other values: 18 *6* (1999Re16; also reported as 12 *6* in 2001Pe14).
4.76×10^3 *21*	2$^+$	0.05‡ MeV *+21−5*	C F	%n≈100 β_2=0.15 *4* E(level): Weighted average of 4.75 MeV *21* (^{24}O,p′) and 4.77 MeV *21* (^{26}F,nX). J$^\pi$: From $\sigma(\theta)$ distribution and DWBA analysis (2012Ts03); also in agreement with theoretical predictions (2012Br14, 2012Ha19,

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Adopted Levels (continued)

^{24}O Levels (continued)

E(level)	J$^{\pi}$	T$_{1/2}$ or Γ	XREF	Comments
				2006Vo14). β_2 from (p,p′) (2012Ts03). Possible configuration: $\nu 1s^{-1}_{1/2} \otimes \nu 0d^{1}_{3/2}$. No γ rays observed in the work of 2004St08 (also 2004St10), suggesting that this state is unbound to particle emission.
5.33×10^3 *21*	(1$^+$)	0.03‡ MeV *+12−3*	C F	%n≈100 E(level): Weighted average of 5.25 MeV *22* (2012Ts03) and 5.41 MeV *21* (2009Ho01). Uncertainty − lower input value. J$^{\pi}$: From $\sigma(\theta)$ distribution and DWBA analysis (2012Ts03); also in agreement with theoretical prediction (2012Br14, 2012Ha19, 2006Vo14). Possible configuration: $\nu 1s^{-1}_{1/2} \otimes \nu 0d^{1}_{3/2}$.
≈7.4×10^3†	(−)		C	%n≈100 (2012Ts03) E(level): group of states from decay energy (resonance) of ≈3.2 MeV (2012Ts03). 2012Ts03 report only one-neutron decay channel. J$^{\pi}$: possible configuration: $\nu 1s^{-1}_{1/2} \otimes \nu(fp)^1$.
7.65×10^3† *21*	(+)	0.1 MeV	EF	%2n≈100 (2011Ho05) E(level): From observed resonance at 715 keV *110* (stat) *45* (sys) ((^{24}O,2n^{22}O) − 2015Jo14) and S(2n)=6.93 MeV *17* in AME-2020 (2021Wa16). Other: ≈ 0.6 MeV ((^{26}F,nX) − 2011Ho05). J$^{\pi}$: From Monte-Carlo simulations, both resonances (0.6 MeV in ^{24}O and 45 keV in ^{23}O) have L=2 ($0d_{3/2}$ neutron decay) (2011Ho05). Γ from 2011Ho05 (^{26}F,nX). Other: < 2 MeV (2015Jo14 − (^{24}O,2n^{22}O)). Decays by a two-neutron sequential cascade to ^{22}O g.s.

† The 7.4-MeV group reported in ^{1}H(^{24}O,p′) (2012Ts03) and 7.6-MeV group seen in ^{9}Be(^{26}F,nX) (2011Ho05) are considered as separate states here since the former is observed to decay by only one neutron emission to ^{23}O, while the latter is observed to decay by two sequential neutrons to ^{22}O. Based on assigned configurations, the 7.4-MeV group is tentatively assigned a negative parity while possible positive parity is assigned to the 7.6-MeV group. However, the possibility still remains that there is only one state near this energy, which decays by the one-, and two-neutron channels, and that the ratio of the two decay modes is yet to be determined.

‡ From 2009Ho01 for decay to 1/2$^+$ g.s. in ^{23}O from Breit-Wigner line-shape analysis of ^{23}O-neutron coincidence spectrum.