

Adopted Levels

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	G. C. Sheu, J. H. Kelley		ENSDF	27-Jan-2020

S(p)=-131 25; Q(α)=-10350 30 2017Wa10
 S(2p)=-1401 20; ΔM=23987 keV 20 (2017Wa10).

¹⁶Ne was first reported in ¹⁶O(π⁺,π⁻) by (1977Ho13; see 2012Th01). It is bound with respect to decay into ¹⁵F+p by 131 keV and unbound with respect to ¹⁴O+2p by 1.40 MeV. An earlier search for 2p decay radiation from ¹⁶Ne (1964Ka28) failed to find evidence of any states.

Theory:

Predictions, calculations and analyses for ground-state and excited-state parameters of ¹⁶Ne: 1972Wa07, 1975Be31, 1983Ma35, 1984An18, 1996Gr21, 1997Pa38, 1999Og11, 2002Fo11, 2004Ge02, 2006Fo16, 2006Sa29, 2009Ok01, 2009Ok03, 2010Fo06, 2010Ti02, 2011Ok01, 2011Ro50, 2012Ok03, 2013Xu15, 2015Wu07, 2016Fo09, 2016Fo11, 2016Pr01, 2018Fo04, 2019Sr02. Few-body interactions and decays: 1962Go28, 1990Ko45, 2001Gr29, 2002Gr03, 2002Gr25, 2006Xu15, 2012Ok03, 2014Fo15, 2015Gr04, 2016Fo09, 2017Fo23, 2017Go17, 2019Ka50.

¹⁶Ne Levels

Cross Reference (XREF) Flags

- A ⁹Be(¹⁷Ne,¹⁶Ne)
- B ¹²C(¹⁷Ne,¹⁶Ne)
- C ¹⁶O(π⁺,π⁻)
- D ²⁰Ne(α,⁸He)

E(level) [†]	J ^π	T _{1/2}	E(¹⁴ O+2p) (MeV)	XREF	Comments
0	0 ⁺ #&	<80 keV	1.401 20	ABCD	%2p=100 Decays 100% by 2p decay mode to ¹⁴ O (2008Mu13). E(¹⁴ O+2p) (MeV): We used S _{2p} =-1401 keV 20 from (2017Wa10: AME-2016).The weighted average of all measured S _{2p} values is -1413 keV 17 (external errors) based on -1350 keV 80 (2008Mu13, 2009Mu09, 2009Mu17, 2010Mu12), -1466 keV 20 (2014Br19, 2015Br11), -1388 keV 15 (2014Wa09,2015Ma09), -1463 keV 45 (1980Bu15), -1399 keV 24 (1983Wo01) and -1330 keV 80 (1978Ke06). See also S _{2p} =-1476 keV (2016ChZV). Direct measurements of reaction Q(β ⁻)values to obtain the ΔM are given in (1983Wo01: ΔM=23.984 MeV 24), (1980Bu15: 24.051 MeV 45) and (1978Ke06: 23.92 MeV 8). In this evaluation we accept ΔM=23987 keV 20 from (2017Wa10: AME-2016). See also (1977Ho13,1978Bu09: 24.4 MeV 5) and (1966Ke16, 1978Gu10, 1988Co15, 2013Xu15, 2018Fo04: theory). T _{1/2} : The expected width is ≈0.8-3.1 keV (2002Gr03, 2015Br11), but the experimental resolution limits observations. In (2014Br19) Γ<80 keV was determined from the best fit to the ¹⁴ O+p+p excitation function using a Breit-Wigner line shape. Similarly, in (2014Wa09) a resolution folded Breit-Wigner line shape is fit to the ¹⁴ O+p+p excitation function resulting in Γ=82 keV 15. Early measurements of ²⁰ Ne(α, ⁸ He) reported Γ=110 keV 40 (1983Wo01) and Γ _{exp} =200 keV 100 (1978Ke06). In (1978Ke06) a detailed discussion on the total decay width is

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Adopted Levels (continued) ^{16}Ne Levels (continued)

<u>E(level)[†]</u>	<u>J^π</u>	<u>T_{1/2}</u>	<u>E(¹⁴O+2p) (MeV)</u>	<u>XREF</u>	<u>Comments</u>
1.77×10 ³ ‡ 3	2 ⁺ #	≤50 keV	3.17 2	ABCD	given where proton and diproton penetrabilities are taken into account; the authors suggested a total decay width of 20 keV (ranging between 5-100 keV) and a diproton branching ratio of 10-90%. J ^π : See also 0 ⁺ (1997Fo09). E(¹⁴ O+2p) (MeV): from the weighted average of 3.16 MeV 2 (2014Br19, 2015Br11) and 3.22 MeV 5 (2014Wa09, 2015Ma09). See also 3.56 MeV 21 (1980Bu15) and 3.02 MeV 11 (1978Ke06). T _{1/2} : from (2014Wa09,2015Ma09). See also 200 keV 200 (2010Mu12) and 150 keV 50 (2015Br11), which may be influenced by other nearby states. Unusual correlations amongst the ¹⁴ O+2p ejectiles indicate a complex interplay between direct 2p decay and sequential decay via ¹⁵ F*+p (2015Br11). See also (2010Mu12).
6.19×10 ³ 4	2 ⁺ @&	≤100 keV	7.59 3	AB	%p=100 E(¹⁴ O+2p) (MeV): from the weighted average of 7.60 MeV 4 (2014Br19,2015Br11) and 7.57 MeV 6 (2014Wa09,2015Ma09). T _{1/2} : from (2014Wa09,2015Ma09). See also ≤0.5 MeV (2015Br11) and 0.8 MeV +8-4 (2009Mu09,2010Mu12).
8.44×10 ³ ‡ 10		0.32 ^a MeV 10	9.84 10	A	E(¹⁴ O+2p) (MeV): deduced from E(¹³ N+3p)=5.21 MeV 10 (2015Br11).
10.83×10 ³ ‡ 20		0.51 ^a MeV 23	12.23 20	A	E(¹⁴ O+2p) (MeV): deduced from E(¹³ N+3p)=7.60 MeV 20 (2015Br11).

[†] Level energies are deduced using ¹⁴O, ¹⁶Ne and p mass excesses from (2017Wa10: AME-2016). The literature reports a sizeable spread in measured values for the g.s. E(¹⁴O+2p) resonance energy, and use of any different g.s. energy would change the excitation energy scale.

‡ Decay mode not specified.

From (2010Mu12,2014Br19,2015Br11).

@ From (2009Mu09,2010Mu12).

& See also (2014Wa09,2015Ma09).

^a From (2015Br11).