^{6}Li(^{13}C,d) 2015Av02

History

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

1987Ca30: ^{6}Li(^{13}C,d)^{17}O*→α+^{13}C, E=34 MeV; measured $\sigma(\theta_d,\theta_\alpha)$; deduced reaction mechanism. ^{17}O deduced levels, Additional information 1.

2006Jo11: A beam of E(^{13}C)=8.0, 8.5 MeV impinged on a 50 μg/cm^2 thick, 98% enriched ^{6}Li target at the Florida State University Tandem-LINAC facility. Four Si ΔE-E telescopes were used to identify deuterons at forward angles with thicknesses from 15 to 25 μm. The energy resolution FWHM in the c.m. system was ≈250 keV. The code FRESCO was used to calculate the reaction angular distribution in the DWBA approach. The low-energy astrophysical S-factor was determined using the indirect asymptotic normalization (ANC) technique. Coulomb-modified ANC^2 for ^{13}C+α→^{17}O*(6.356 MeV:1/2$^+$)=0.89 fm^{-1} *23* and the S(0) of this ^{17}O state is (2.5±0.7)×10^6 MeV·b.

2015Av02: XUNDL dataset compiled by TUNL, 2015.

An 8 MeV beam of ^{13}C ions, from the John D. Fox Accelerator Lab at FSU, impinged on 35 μg/cm^2 (±10%) ^{6}Li targets. The reaction products were detected using a pair of ΔE-E (position sensitive proportional counter/Si pin diode) detectors. The effective energy, corresponding to the energy where half the yield has been produced, was determined as 7.72 MeV. Many states, including an unresolved multiplet of states near 5.9 MeV were populated in the reaction.

The authors deduced the ^{17}O*(6356) asymptotic normalization coefficient (ANC) and analyzed its impact on the ^{13}C(α,n)^{16}O reaction rate at astrophysical energies. This reaction is thought to be the main source of *s*-process neutrons, and existing information in the literature provides an inconsistent description. The value ANC^2=3.6 fm^{-1} *7* was deduced. See also (2018Ke03: theory).

^{17}O Levels

E(level)†	J$^\pi$†	Comments
0		
871		
3055		
3843		
4552		
5085‡		
5216‡		
5379‡		
5700#		
5730#		
5870#		
5940#		
6356		ANC^2=3.6 fm^{-1} *7* is deduced by (2015Av02). See also ANC^2=0.89 fm^{-1} *23* (2006Jo11).
13.6×10^3	(11/2,13/2)	E(level),J$^\pi$: Analysis of the angular distributions in (1987Ca30) concluded this peak corresponds to an unresolved doublet with (11/2,13/2).
16.1×10^3	(7/2,11/2)	E(level),J$^\pi$: Analysis of the angular distributions in (1987Ca30) concluded this peak corresponds to an unresolved doublet with (7/2,11/2).

† Nominal values listed in (2015Av02) except where noted.

‡ Unresolved group of levels includes ^{17}O*(5085,5216,5379) (2015Av02).

Unresolved group of levels includes ^{17}O*(5700,5730,5870,5940) (2015Av02).