$^{12}C(^{9}Be,\alpha),(^{11}B,^{6}Li)$

History

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

1974Ha25: An 11-MeV ^{12}C beam impinged on a 23 $\mu g/cm^2$ ^{9}Be target. Alpha particles were detected in four Si surface-barrier detectors positioned at θ_{lab}=23°, 37°, 67° and 97°. Cross sections were measured for the population of $^{17}O*$(0,0.871,3.06,3.85 MeV) for E($^{12}C)_{cm}$=2.40 to 6.34 MeV.

1975Ve10: A beam of ^{9}Be ions at E≈26 MeV impinged on a ^{12}C foil (0.1-0.2 mg/cm²) located at the center of an evacuated scattering chamber. The charged particles were detected by a telescope consisting of an ionization chamber (ΔE detector) and a Si(Li) counter (E detector). The detected particles were separated in mass and measurement of the energy spectra by two multidimensional AI-4096 analyzers. Spectra of α particles were measured at θ=10°−100°. Excitation levels of $^{17}O*$(0,0.87,3.06,3.85,4.55,5.08,7.5,8.4,9.8,11.0,11.8,13.6 MeV) were observed and authors concluded that the five-nucleon cluster ^{5}He direct transfer plays a definite role in the $^{12}C(^{9}Be,\alpha)$ reaction mechanism.

1978Ma44: The $^{12}C(^{9}Be,\alpha)$ reaction was studied at θ_{cm}≈19°−70° and E_{cm}=10-15 MeV by a ^{9}Be ion beam bombardment of a 139 $\mu g/cm^2$ thick, self-supporting ^{12}C target. Four Si surface barrier detectors were positioned at θ_{lab}=14.6°, 24.6°, 44.6°, and 54.6°. Resonances at E_{cm}=11.2, 11.5, 12.6, 13.8, and 14.5 MeV were identified with widths of ≈800 keV which deduced excitation functions for the ^{17}O levels at E_x=0, 0.871, 3.058, and 3.846 MeV.

See also (1979Bo06).

1979Ja22: A 20-MeV $^{9}Be^{3+}$ ion beam, from the ETH tandem Van de Graaff accelerator, impinged on a ≈40 $\mu g/cm^2$ self-supporting ^{nat}C target. The reaction products were detected by two ΔE-E telescopes consisting of surface-barrier Si detectors. Angular distributions were measured in steps of 5° at θ_{lab}=15°−160° with an overall errors ≈±10%. The ground state and the first four low-lying states of ^{17}O were observed.

1980Br05: $^{12}C(^{9}Be,\alpha)$, E=27,40 MeV; measured $\sigma(\theta)$; deduced cluster transfer effects. Optical model analysis.

1981De09: Excitation functions were measured by bombarding a ^{nat}C target (≈20 $\mu g/cm^2$) with a ^{9}Be beam from the Oak Ridge E(n) tandem Van de Graaff accelerator from E_{cm}=5.1-11.4 MeV at θ_{lab}=7°. The emitted α-particles were momentum analyzed in an Enge split-pole magnetic spectrometer with energy resolution ≈70 keV. Fifteen states of ^{17}O were populated, $^{17}O*$(0, 0.871, 3.055, 3.837, 4.551, 5.068, 5.176, 5.213, 5.382, 5.883, 6.366, 6.873, 6.986, 7.184, 7.400 MeV).

1981Hu12: $^{9}Be(^{12}C,\alpha)$, E(cm)=6-15 MeV; measured $\sigma(\theta,E)$; deduced deviation function confidence limits.

1981Ja09: The experiment was performed at the ETH tandem Van de Graaff accelerator/Zurich from E(^{9}Be)=12-30 MeV ion beam bombardment of a self-supporting, ≈40 $\mu g/cm^2$ thick ^{nat}C target. The emitted particles were identified with ΔE-E counter telescopes consisting of a thin surface-barrier Si detector and a thick Li-drifted Si detector. Angular distributions for transitions to different states of the final nuclei were measured at θ=5°−160° in steps of 5°. The ground state and the first four states of ^{17}O were identified.

1982Hu06: Cross Sections of $^{9}Be+^{12}C$ reaction were measured at the ETH tandem Van de Graaff accelerator/Zurich by a ^{9}Be (and ^{12}C) ion beam impinging on a self-supporting 40 $\mu g/cm^2$ C target (and 60 $\mu g/cm^2$ Be target). Data were taken in the energy range E_{cm}=5.9-15.4 MeV in steps of 107 keV at several angles between 5° and 175°. 266 excitation curves for the protons, deuterons, tritons, and α particles emission were observed including the energy levels of $^{17}O*$(0, 0.871, 3.055 and 3.841 MeV).

1996Ja12: $^{12}C(^{11}B,^{6}Li)$, E=28-40 MeV; measured $\sigma(\theta)$, $\sigma(\theta,E(^{6}Li))$. Exact finite-range DWBA analysis.

Theory:

1981La15: $^{9}Be(^{12}C,\alpha)$, E(cm)=6-15 MeV; calculated $\sigma(E)$; deduced resonance structure. Statistical model, energy-dependent deviation function.

1983Ja09: $^{12}C(^{9}Be,\alpha)$, E(cm)=5.9-15.4 MeV; calculated $\sigma(\theta)$ vs E; deduced nonstatistical contribution reaction mechanism. DWBA, coupled-channels model analyses, one-, two-step transfer processes.

1986Be19: $^{12}C(^{9}Be,\alpha)$, E not given; calculated $\sigma(\theta)$ asymmetry parameter; deduced parameter statistical significance.

^{12}C(^{9}Be,α),(^{11}B,^{6}Li) (continued)

^{17}O Levels

E(level)	J$^{\pi a}$	Comments
0$^{\dagger\&}$	5/2$^+$	
871$^{\dagger\&}$	1/2$^+$	
3060†	1/2$^-$	
3840$^{\dagger\&}$	5/2$^-$	J$^{\pi}$: 7/2$^-$ (1978Ma44).
4550‡	3/2$^-$	
5080$^{\#@}$	3/2$^+$	E(level): 5.068-MeV (1981De09).
5176?$^{@}$		E(level): This level is not supported by any other results.
5213$^{@\&}$		
5382$^{@}$		
5883$^{@}$		
6366$^{@}$		
6873$^{@}$		
6986$^{@}$		
7184$^{@}$		
7400$^{@}$		
7500$^{\#}$		E(level): measured. May correspond to the known levels of ^{17}O*(7.29-MeV:J$^{\pi}$=3/2$^+$ and 7.38-MeV:J$^{\pi}$=5/2$^+$)) (1975Ve10).
8400$^{\#}$	7/2$^+$	J$^{\pi}$: from (1975Ve10).
9800$^{\#}$	9/2$^+$	J$^{\pi}$: from (1975Ve10).
11000$^{\#}$		
11800$^{\#}$		
13600$^{\#}$		

† Observed in (1974Ha25, 1975Ve10, 1978Ma44, 1979Ja22, 1981De09, 1981Ja09, 1982Hu06).
‡ Observed in (1975Ve10, 1979Ja22, 1981De09, 1981Ja09).
$^{\#}$ Observed in (1975Ve10).
$^{@}$ Observed in (1981De09).
$^{\&}$ Observed in (1996Ja12: ^{12}C(^{11}B,^{6}Li)).
^{a} Known levels except where noted.