

C(²⁷Na, ²⁴Fγ) 2015Ca09

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

²⁴O was produced in a two step reaction. Primary beam of ³⁶S, E=77.6 MeV/nucleon, bombarded a C target (thickness 398 mg/cm²) placed between two superconducting solenoids of SISSI device. Reaction products were separated and selected through α spectrometer by means of Bρ-ΔE-Bρ method at GANIL. Cocktail beam of ^{25,26}Ne, ^{27,28}Na, ^{29,30}Mg nuclei, E=54-65 MeV/nucleon, was transmitted. identification was performed by time-of-flight and energy loss in a plastic scintillator (thickness 103.5 mg/cm²). ²⁴F produced from fragmentation of ²⁷Na on secondary target of two carbon foils, placed before and after the plastic scintillator. Isotope identification was performed on an event-by-event basis from time-of-flight using a plastic scintillator, and their energy loss (ΔE) and position in an ionization and two drift chambers, respectively. 74 BaF₂ detectors of the Chateau de Cristal array. Detected prompt γ, measured E_γ, I_γ, particle-γ, particle-γγ coincidences, deduced level scheme. Also studied ²⁴O β- decay.

²⁴F Levels

E(level) [†]	J ^π [‡]	Comments
0.0 [#]	3 ⁺	
521 [#] 1	2 ⁺	
1828 10	1 ⁺	Suggested dominant configuration: πs _{1/2} ⊗νs _{1/2} . E(level): 2015Ca09 list 1829 26.
2384? [@] 64	(4 ⁺ ,3 ⁺)	
2739 [@] 14	(3 ⁺ ,4 ⁺)	
3562 22	(2 ⁺ ,4 ⁺)	
3639 33	(1 ⁺ ,2 ⁺)	E(level): 2015Ca09 list 3639 42.

[†] From a least-squares fit to E_γ data.

[‡] Assignment from 2015Ca09, based on ²⁴O β- decay, ²⁴F β- decay, γ ray feeding, and shell model calculations. In Adopted Levels spin-parity is considered as tentative in the absence of strong argument.

[#] Suggested dominant configuration: πd_{5/2}⊗νs_{1/2} (>70%).

[@] Suggested dominant configuration: πd_{5/2}⊗ ν[(d_{5/2})⁻¹(s_{1/2})²].

γ(²⁴F)

E _γ	I _γ	E _i (level)	J _i ^π	E _f	J _f ^π	Comments
521 1	71 3	521	2 ⁺	0.0	3 ⁺	E _γ : From β decay work in this study. E _γ =527 10 from in-beam γ-ray data.
1309 22	5 1	1828	1 ⁺	521	2 ⁺	I _γ : γ branching ratio=23 5 (2015Ca09).
1827 11	17 2	1828	1 ⁺	0.0	3 ⁺	I _γ : γ branching ratio=77 10 (2015Ca09).
2384 [†] 64	7 3	2384?	(4 ⁺ ,3 ⁺)	0.0	3 ⁺	
2739 14	100 5	2739	(3 ⁺ ,4 ⁺)	0.0	3 ⁺	
3118 33	34 3	3639	(1 ⁺ ,2 ⁺)	521	2 ⁺	
3562 22	47 5	3562	(2 ⁺ ,4 ⁺)	0.0	3 ⁺	

[†] Placement of transition in the level scheme is uncertain.

$\text{C}({}^{27}\text{Na}, {}^{24}\text{F}\gamma)$ 2015Ca09

Level Scheme

Intensities: Relative I_γ

Legend

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$
- - - - -→ γ Decay (Uncertain)
- Coincidence

