

¹⁵⁰Sm(n,2n γ) 2010Da13

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen		NDS 185, 2 (2022)	23-Aug-2022

2010Da13: Target: 1550 mg/cm² of Sm₂O₃ in the form of disks, enriched to 95.6% in ¹⁵⁰Sm. E(n)=1-35 MeV (LANSCE facility). The energetic neutrons were produced by bombarding a natural W target with an 800-MeV pulsed proton beam from the LANSCE Linac. The prompt γ -rays were detected using the Compton suppressed GEANIE array consisting of 11 planar Ge detectors and fifteen 25% coaxial HPGe detectors. Incident neutron energies were determined by the time-of-flight technique. Measured E γ , excitation functions and γ -ray yields; deduced partial γ -ray cross sections as a function of neutron energy, and total cross sections for E(n)=8.66-33.11 MeV. Comparisons of measured cross sections with Hauser-Feshbach type calculations (GNASH-FKK reaction model code), ENDF/B-VII evaluations, and earlier measurements.

Partial γ -ray cross section as function of neutron energy for 550.3 γ , in ¹⁴⁸Sm, and total cross section in ¹⁵⁰Sm(n,3n) reaction were also measured in this work.

The level scheme in figure 1 of **2010Da13** is consistent with that in the Adopted dataset, except for the placement of a 504 transition from 790 level, which is newly assigned in **2010Da13**.

¹⁴⁹Sm Levels

E(level) [†]	J π [‡]	Comments
0	7/2 ⁻	
22.9 8	5/2 ⁻	
277.1 5	5/2 ⁻	
285.8 5	9/2 ⁻	
350.0	3/2 ⁻	E(level): level from the Adopted Levels.
558.4 7	5/2 ⁻	
590.7 7	9/2 ⁻	
636.4 5	7/2 ⁻	
664.0 5	11/2 ⁻	
747.7 7	13/2 ⁻	
789.4 8	11/2 ⁺	
878.8 7	13/2 ⁺	
1239.4 13	(15/2) ⁺	
1362.8 13	17/2 ⁺	

[†] From least-squares fit to E γ data, $\Delta E\gamma=0.5$ keV assumed when E γ stated to tenth of a keV, 1 keV otherwise.

[‡] From the Adopted Levels.

$\gamma(^{149}\text{Sm})$

E γ [†]	E _i (level)	J π _i [‡]	E _f	J π _f [‡]	Partial γ -ray σ (mb) [@]
198.6	789.4	11/2 ⁺	590.7	9/2 ⁻	95 10
214.8	878.8	13/2 ⁺	664.0	11/2 ⁻	90 10
254 [#]	277.1	5/2 ⁻	22.9	5/2 ⁻	
277.1	277.1	5/2 ⁻	0	7/2 ⁻	85 10
281.3	558.4	5/2 ⁻	277.1	5/2 ⁻	10 2
285.9	285.8	9/2 ⁻	0	7/2 ⁻	400 40
327 [#]	350.0	3/2 ⁻	22.9	5/2 ⁻	
350 [#]	350.0	3/2 ⁻	0	7/2 ⁻	
450 [‡]	1239.4	(15/2) ⁺	789.4	11/2 ⁺	
461.9	747.7	13/2 ⁻	285.8	9/2 ⁻	195 20
484 [‡]	1362.8	17/2 ⁺	878.8	13/2 ⁺	
504 [‡]	789.4	11/2 ⁺	285.8	9/2 ⁻	

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$^{150}\text{Sm}(n,2n\gamma)$ 2010Da13 (continued) $\gamma(^{149}\text{Sm})$ (continued)

E_γ [†]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Partial γ -ray σ (mb) [@]	Comments
568 [‡]	590.7	9/2 ⁻	22.9	5/2 ⁻		
590 [#]	590.7	9/2 ⁻	0	7/2 ⁻		
636.4	636.4	7/2 ⁻	0	7/2 ⁻	25 3	E_γ : γ from Fig. 3 and text in 2010Da13, not shown in level-scheme Fig. 1 of 2010Da13.
664.0	664.0	11/2 ⁻	0	7/2 ⁻	245 25	

[†] From excitation functions figures 2 and 3 and text in 2010Da13, unless otherwise stated. These are consistent within 0.1 keV to those in adopted gamma rays.

[‡] From level-scheme Fig. 1 in 2010Da13.

[#] From text in section 4.2 of 2010Da13, for which cross section has been measured. This γ ray is not shown in level-scheme figure 1 of 2010Da13.

[@] Partial γ -ray cross section at $E(n)=15.04$ MeV read by the compilers from excitation function figures 2 and 3 of 2010Da13. Correction for internal conversion is included by 2010Da13. Consult authors' Figs. 2 and 3 for cross section data at 16 other neutron energies from ≈ 8.5 MeV to 35 MeV.

$^{150}\text{Sm}(n,2n\gamma)$ 2010Da13Level Scheme