^{2}H(^{30}P,^{31}Sγ) 2017Ka25

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 184,29 (2022)	24-Jun-2022

^{30}P(d,n) reaction in inverse kinematics.

$J^{\pi}(^{30}\text{P g.s.})=1^{+}$.

2017Ka25: beam=^{30}P 30 MeV/nucleon from ^{9}Be(^{36}Ar,X), E=150 MeV/nucleon primary reaction, followed by separation of ^{30}P fragments by A1900 fragment separator at NSCL-MSU facility. Target=deuterated polyethylene Cd_n. In order to account for contribution from carbon, polyethylene target CH_n was also used. Measured Eγ, Iγ, (^{31}S)γ-coin, angle-integrated cross sections using Gretina array for γ detection and S800 spectrograph for particle analysis. Deduced levels above the proton-separation energy relevant to astrophysics applications, σ, spectroscopic factors, resonance strengths, and astrophysical reaction rates.

^{31}S Levels

E(res) given under comments is deduced proton-resonance energy above S(p)=6130.65 *24* (2021Wa16).

E(level)†	J$^{\pi}$†	L@	Comments
0			
1249#			
2234#			
3350#			
4450#			
(6138.6‡ *6*)	(3/2^{+},7/2^{+})	[0]	C^{2}S=0.23 *LE*. E(res)=8.0 keV *6*. $\sigma\leq$0.030 mb. C^{2}S$\leq$0.16 *7*.
6158.5 *5*	7/2$^{(-)}$	[3]	C^{2}S=0.036 *13*. E(res)=27.9 keV *6*. σ=0.177 mb *33*.
(6255.3‡ *5*)	1/2^{+}	[0]	C^{2}S=0.19 *LE*. E(res)=124.7 keV *6*. $\sigma\leq$0.019 mb.
(6279.0‡ *6*)	3/2^{+}	[0]	T=3/2 C^{2}S=0.16 *LE*. E(res)=148.4 keV *6*. $\sigma\leq$0.029 mb.
6327.0 *5*	3/2^{-}	[1]	C^{2}S=0.023 *12*. E(res)=196.4 keV *6*. σ=0.025 mb *10*.
(6357.3‡ *2*)	5/2$^{(-)}$	[1]	C^{2}S=0.011 *LE*. E(res)=226.7 keV *3*. $\sigma\leq$0.017 mb.
6376.9 *4*	9/2^{-}	[3]	C^{2}S=0.051 *17*. E(res)=246.3 keV *5*. σ=0.32 mb *5*.
(6390.2‡ *7*)	3/2^{+}	[0]	C^{2}S=0.22 *LE*. E(res)=259.6 keV *7*. $\sigma\leq$0.042 mb.
6392.5 *2*	5/2$^{(+)}$	[2]	C^{2}S=0.007 *3*. E(res)=261.9 keV *3*. σ=0.034 mb *9*.
(6394.2‡ *2*)	11/2^{+}	[4]	C^{2}S=0.002 *LE*. E(res)=263.6 keV *3*. $\sigma\leq$0.018 mb.

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$^{2}H(^{30}P,^{31}S\gamma)$ 2017Ka25 (continued)

^{31}S Levels (continued)

E(level)[†]	J^{π}[†]	L[@]	Comments
(6541.9[‡] *4*)	$7/2^{+}$	[2]	C^2S=0.0059 *LE*. E(res)=411.3 keV *5*. $\sigma \leq 0.037$ mb.
(6583.1[‡] *20*)	(7/2)	[3]	C^2S=0.007 *LE*. E(res)=452.5 keV *20*. $\sigma \leq 0.027$ mb.

[†] 2017Ka25 take values from literature.
[‡] Level not observed in the present work as no γ-ray was seen from this level. Only upper limits of cross section and spectroscopic factor are given by 2017Ka25.
[#] Rounded energy from Adopted Levels.
[@] Implied value for $^{30}P(d,n)$ reaction, and used for theoretical cross sections.

$\gamma(^{31}S)$

E_i(level)	J_i^{π}	E_γ	I_γ	E_f	Comments
6158.5	$7/2^{(-)}$	1706.5 *13*	100	4450	
		3922 *4*	98	2234	
6327.0	$3/2^{-}$	6330 *5*		0	New γ transition observed in the present work.
6376.9	$9/2^{-}$	1926.4 *9*	100	4450	
		3022.3 *15*	69	3350	
6392.5	$5/2^{(+)}$	5145 *3*		1249	

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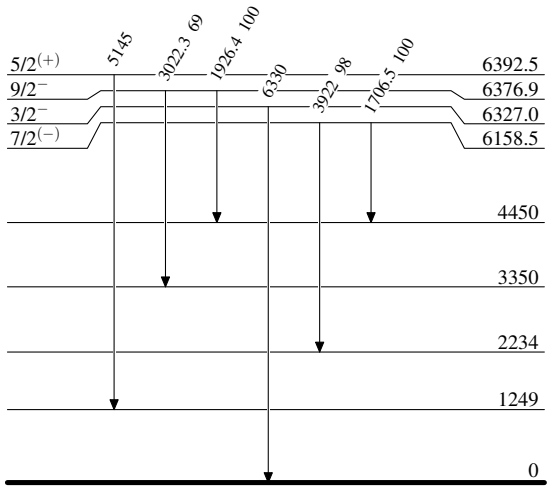
Level Scheme

Intensities: Relative photon branching from each level



$^{31}_{16}S_{15}$