

$^{12}\text{C}(^{34}\text{Na}, ^{33}\text{Na}\gamma)$ **2010Do05**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh		NDS 112, 1393 (2011)	31-Mar-2011

Includes $^{12}\text{C}(^{33}\text{Na}, ^{33}\text{Na}'\gamma)$.

2010Do05: Isotopes of interest produced by projectile fragmentation of $^{48}\text{Ca}^{18+}$ primary beam at $E=345$ MeV/u on a 20 mm thick rotating Be target at the Radioactive Ion beam Factory (RIBF) at RIKEN. Fragmentation products selected and separated using the $B\rho-\Delta E-b\rho$ method and incident on a 2.54 g/cm² carbon target at $E=230-250$ MeV/u. A NaI(Tl) based array (DALI2) with a efficiency of 15% at $E\gamma=1332.5$ keV, for detecting the γ -rays and a spectrometer (ZeroDegree) for detecting and identifying the reaction products. Measured $E\gamma$, $p\gamma$ -coincidence. Deduced level energy for an excited state in ^{33}Na for the first time. Also includes $^{12}\text{C}(^{33}\text{Na}, ^{33}\text{Na}'\gamma)$.

 ^{33}Na Levels

E(level)	J^π [†]	Comments
0	(3/2 ⁺ , 5/2 ⁺)	J^π : (3/2 ⁺) in Adopted Levels.
467 13	(3/2 ⁺ , 5/2 ⁺)	J^π : (5/2 ⁺) in Adopted Levels.

[†] From systematics of odd-A Na nuclides (**2010Do05**). Comparison with shell-model calculations, which predict 3/2⁺ for g.s. and 5/2⁺ for almost a degenerate state at 59 keV. The next 3/2⁺ and 7/2⁺ states are around 1 MeV. Experimental energy of 467 keV is not in agreement with excited state energies and spins from shell model calculations.

 $\gamma(^{33}\text{Na})$

E_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
467 13	467	(3/2 ⁺ , 5/2 ⁺)	0	(3/2 ⁺ , 5/2 ⁺)	E_γ : average of 476 12 in ($^{33}\text{Na}, ^{33}\text{Na}'\gamma$) and 447 13 in ($^{34}\text{Na}, ^{33}\text{Na}\gamma$).

 $^{12}\text{C}(^{34}\text{Na}, ^{33}\text{Na}\gamma)$ **2010Do05**Level Scheme