

²⁰⁴Pb(¹⁵N,4n γ) 1983De08

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation		NDS 114, 2023 (2013)	23-Sep-2013

1983De08: target: 99.7% enriched ²⁰⁴Pb, E(¹⁵N)=84 MeV. Measured E γ , I γ , $\gamma\gamma$ coin. Measured γ -ray differential perturbed angular distributions (TDPAD), level half-lives, and g-factors. Measured γ rays in coincidence with delayed α particles. Deduced transition multipolarities.

Others:

2006Po01: measured yield of 330-ns isomer of ²¹⁵Ac in ⁹Be(²³⁸U,X) reaction at E=900 MeV/nucleon. Experiment performed at GSI facility using the FRS fragment separator. Measured experimental ratio (R_{exp})=4.8 12, where R_{exp}=Y/(N_{imp}FG), where N_{imp} is number of implanted ions, Y is the isomeric yield, F and G are correction factors for in-flight isomer decay losses and the finite detection time of the γ radiation, respectively. Comparison of measured yields with theoretical yields calculated by ABRABLA Monte-Carlo code. Using similar experimental arrangement, **2013Ba29** measured R_{exp}=20 4 for (29/2⁺) isomer at 2438+x, and 20 5 for 21/2⁻ isomer at 1796 keV.

2005Li17: measured yield of ²¹⁵Ac in ⁹Be(²³⁸U,X) reaction at E=1 GeV/nucleon. Experiment performed at GSI facility using the FRS fragment separator.

2000He17: observed $\gamma\alpha$ coincidences from ²¹⁵Ac at GSI facility by using UNILAC accelerator beams of ⁵¹V, ⁵⁰Ti, ²²Ne, and ¹²C with targets of ¹⁷⁰Er, ²⁰⁸Pb, and ²⁰⁹Bi.

²¹⁵Ac Levels

The g-factors given from **1983De08** are uncorrected for diamagnetism and Knight shift. From similar systems, the authors estimate this correction as 0 \pm 1%.

E(level) [†]	J π [‡]	T _{1/2} [#]	Comments
0.0	9/2 ⁻		
1317.0 5	13/2 ⁻		
1621.0 7	17/2 ⁻	30 ns 10	g=0.910 10 (1983De08)
1796.0 @ 9	21/2 ⁻	185 ns 30	g=0.910 10 (1983De08)
1796.0+x	(23/2 ⁻)		E(level): x=50 50, extrapolated from E γ =511 keV in ²¹¹ At, and E γ =265 keV in ²¹³ Fr.
2438+x @	(29/2 ⁺)	335 ns 10	g=1.033 10 (1983De08)

[†] From γ -ray energies; x=50 keV 50, extrapolated from E γ =511 keV in ²¹¹At, and E γ =265 keV in ²¹³Fr.

[‡] From **1983De08**.

[#] From $\gamma(t)$ (**1983De08**) unless otherwise noted.

@ Measured isomer yield ratio: R_{exp}=20 4 for 1796, 21/2⁻ level and 20 5 for 2438+x, (29/2⁺) level (**2013Ba29**) in ⁹Be(²³⁸U,X) reaction at 1 GeV/nucleon, where R_{exp}=Y/(N_{imp}FG), N_{imp} is number of implanted ions, Y is the isomeric yield, F and G are correction factors for in-flight isomer decay losses and the finite detection time of the γ radiation, respectively. Comparison of measured yield ratios with theoretical values calculated by using ABRABLA Monte-Carlo code.

γ (²¹⁵Ac)

The assignment of γ rays to ²¹⁵Ac was based on the measurement of coincident Ac x rays, of delayed α particles (from ²¹⁵Ac and ²¹⁶Ac, with a ratio of 2:1), and on the level systematics of analogous levels in the lighter isotones ²¹¹At and ²¹³Fr.

E γ	E _i (level)	J π _i	E _f	J π _f	Mult. [†]	α [‡]	Comments
x	1796.0+x	(23/2 ⁻)	1796.0	21/2 ⁻			E γ : x=50 50 (1983De08).
175.0 5	1796.0	21/2 ⁻	1621.0	17/2 ⁻	(E2)	1.021 19	A ₂ =+0.31 10 $\alpha(K)=0.202$ 3; $\alpha(L)=0.601$ 12; $\alpha(M)=0.164$ 3

Continued on next page (footnotes at end of table)

$^{204}\text{Pb}(^{15}\text{N},4n\gamma)$ **1983De08** (continued) $\gamma(^{215}\text{Ac})$ (continued)

E_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [†]	α^\ddagger	Comments
304.0 5	1621.0	17/2 ⁻	1317.0	13/2 ⁻	(E2)	0.1538	$\alpha(\text{N})=0.0435$ 9; $\alpha(\text{O})=0.00953$ 18; $\alpha(\text{P})=0.00151$ 3; $\alpha(\text{Q})=1.397\times 10^{-5}$ 23 $A_2=+0.33$ 10 $\alpha(\text{K})=0.0700$ 10; $\alpha(\text{L})=0.0618$ 10; $\alpha(\text{M})=0.0165$ 3
642.0 5	2438+x	(29/2 ⁺)	1796.0+x	(23/2 ⁻)	(E3)	0.0702	$\alpha(\text{N})=0.00438$ 7; $\alpha(\text{O})=0.000970$ 15; $\alpha(\text{P})=0.0001585$ 25; $\alpha(\text{Q})=3.59\times 10^{-6}$ 6 $A_2=+0.52$ 3 $\alpha(\text{K})=0.0389$ 6; $\alpha(\text{L})=0.0231$ 4; $\alpha(\text{M})=0.00613$ 9 $\alpha(\text{N})=0.001637$ 24; $\alpha(\text{O})=0.000367$ 6; $\alpha(\text{P})=6.23\times 10^{-5}$ 9; $\alpha(\text{Q})=2.43\times 10^{-6}$ 4
1317.0 5	1317.0	13/2 ⁻	0.0	9/2 ⁻	(E2)	0.00567	$A_2=+0.31$ 10 $\alpha(\text{K})=0.00446$ 7; $\alpha(\text{L})=0.000895$ 13; $\alpha(\text{M})=0.000217$ 3 $\alpha(\text{N})=5.74\times 10^{-5}$ 8; $\alpha(\text{O})=1.321\times 10^{-5}$ 19; $\alpha(\text{P})=2.39\times 10^{-6}$ 4; $\alpha(\text{Q})=1.86\times 10^{-7}$ 3; $\alpha(\text{IPF})=1.647\times 10^{-5}$ 25

[†] From $\gamma(\theta)$, and comparison with the corresponding transitions in ^{211}At and ^{213}Fr . All multiplicities are assumed as stretched.

[‡] [Additional information 1.](#)

 $^{204}\text{Pb}(^{15}\text{N},4n\gamma)$ **1983De08**

Level Scheme

