

**Adopted Levels, Gammas**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Christian Ouellet, Balraj Singh		NDS 112,2199 (2011)	24-Aug-2011

Q( $\beta^-$ )=1.964×10<sup>4</sup> 12; S(n)=1.52×10<sup>3</sup> 13; S(p)=1.93×10<sup>4</sup> 17; Q( $\alpha$ )=-1.654×10<sup>4</sup> 23 2012Wa38

Note: Current evaluation has used the following Q record 1.972E4 12 1.80E3 16 19.3E3 16-16730 syst 2011AuZZ.

Estimated uncertainty:  $\Delta Q(\alpha)$ =530 (2011AuZZ).

Q( $\beta^-$ n)=13930 120, S(2n)=5710 120, S(2p)=44170 610 (syst) (2011AuZZ).

Values in 2003Au03: Q( $\beta^-$ )=20020 360, S(n)=1660 410, S(p)=19070 970 (syst), Q( $\alpha$ )=-16590 620 (syst), Q( $\beta^-$ n)=14210 360, S(2n)=5440 360, S(2p)=44420 690 (syst).

1972K104 (also 1972RiZJ thesis): first identification and production of <sup>32</sup>Na nuclide in U(p,X) reaction at E=24 GeV,

CERN-ISOLDE facility. Measured isotopic half-life. Later publications from the same laboratory dealing with spectroscopic measurements: 1975Th08, 1978De39, 1979De02, 1980De26, 1983De04, 1984La03, 1984Gu19, 1993K102.

Other papers for production and cross section data: 1979We10, 1987Gi05, 1991Zh24, 1991Or01, 1997Ha11, 2007No13, 2007Ma04.

Mass measurements: 2007Ju03, 2001Sa72, 2000Sa21, 1991Or01, 1991Zh24, 1987Gi05, 1975Th08.

Measurements of mean square radii using <sup>32</sup>Na beam: 1995Su18, 1997Su04, 1998Su07, 2006Kh08.

Structure calculations (binding energies, deformation, quadrupole moments, radii, levels,  $J^\pi$ , etc.): 2004Ge02, 2004Kh16, 2004Lu10, 2004La24, 1996Br15, 1994Po05, 1991Pa19, 1981Wa12, 1975Ca27.

Additional information 1.

No details are available about the decay of <sup>32</sup>Ne to <sup>32</sup>Na.

The existence of <sup>33</sup>Ne nuclide, which can possibly decay to <sup>32</sup>Na by neutron emission, has been searched (2007Ba71, 2002No11, 2002Lu09, 2002Lu19, 1997Sa14) but no events have been associated with this nuclide, estimated half-life < 180 ns, suggesting that <sup>33</sup>Ne is unstable towards particle emission.

This nuclide is of possible relevance to "island of inversion" near N=20.

2007Ma04: The <sup>32</sup>Na beam produced by Ta(p,X) at E=500 MeV at ISAC-TRIUMF facility. Measured E $\gamma$ , I $\gamma$ ,  $\gamma\gamma$ ,  $\beta\gamma\gamma$  coin.

2008Tr04: <sup>32</sup>Na parent produced in reaction 9Be(<sup>48</sup>Ca,X) with E=140 MeV/nucleon beam provided by NSCL at Michigan University. A1900 spectrometer. Products implanted in double-sided silicon strip detector as part of  $\beta$ -counting system. Measured half-lives using time-of-flight.

<sup>32</sup>Na Levels

Cross Reference (XREF) Flags

- A <sup>32</sup>Ne  $\beta^-$  decay (3.5 ms)
- B <sup>12</sup>C(<sup>32</sup>Na, <sup>32</sup>Na' $\gamma$ )

E(level)	$J^\pi$	T <sub>1/2</sub>	XREF	Comments
0	(3 <sup>-</sup> , 4 <sup>-</sup> )	13.2 ms 4	AB	$\% \beta^- = 100$ ; $\% \beta^- n = 24$ 7 (1993K102); $\% \beta^- 2n = 8.3$ 21 (1993K102) Others: $\% \beta^- n = 39$ 6 (total delayed-neutron decay, 1984La03). $\% \beta^- 1n = 21$ 8 (1984La03), 32 13 (1980De26, 1984Gu19); $\% \beta^- 2n = 5.1$ 18, 8 3, 9.4 25 (1980De26, 1984Gu19). $J^\pi$ : from shell-model predictions and comparisons with experimental data for delayed-neutron decay of <sup>32</sup> Na to <sup>31</sup> Mg (1993K102). T <sub>1/2</sub> : weighted average of 13.1 ms 5 (2008Tr04) and 13.2 ms 4 (1984La03). Others: 14.5 ms 30 (1972K104, same lab as 1984La03), 11.5 ms 8 (1998NoZW, tentative result). Mean square radius=1.29 fm <sup>2</sup> 5 (2006Kh08 in Si( <sup>32</sup> Na,X) reaction at E=35.98 and 41.27 MeV/nucleon, also measured energy-integrated cross sections.
569 12			B	

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**Adopted Levels, Gammas (continued)** $\gamma({}^{32}\text{Na})$ 

$E_i(\text{level})$	$E_\gamma$	$E_f$	$J_f^\pi$
569	569 12	0	(3 <sup>-</sup> ,4 <sup>-</sup> )

**Adopted Levels, Gammas**Level Scheme