Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 201,1 (2025)	31-Oct-2024

Q(β^-)=19470 *40*; S(n)=1680 *40*; S(p)=1.983×10^4 *27*; Q(α)=−1.719×10^4 *13* 2021Wa16
S(2n)=5980 *40*, S(2p)=44900 *500* (syst), Q(β^-n)=13690 *40* (2021Wa16).
Mass measurements: 2017Ga20, 2007Ju03, 2001Sa72, 2000Sa21, 1991Or01, 1991Zh24, 1987Gi05, 1975Th08.
Other measurements:
1972Kl04 (also 1972RiZJ thesis): first identification and production of ^{32}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, 1993Kl02.
2007Ma04: The ^{32}Na beam produced by Ta(p,X) at E=500 MeV at ISAC-TRIUMF facility. Measured Eγ, Iγ, $\gamma\gamma$ and $\beta\gamma\gamma$ coin.
2008Tr04: ^{32}Na parent produced in reaction ^{9}Be(^{48}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 β-counting system. Measured half-lives using time-of-flight.
Additional information 1.
Measurements of charge radii using ^{32}Na beam: 1995Su18, 1997Su04, 1998Su07, 2006Kh08.
Structure calculations:
2013Li13: calculated $T_{1/2}$, β-delayed neutron emission probabilities, log *ft*, branching ratios.
1994Po05: calculated levels, binding energies.
1975Ca27: calculated single-particle energies, quadrupole moment, deformation parameter.
No details are available about the decay of ^{32}Ne to ^{32}Na.
The existence of ^{33}Ne nuclide, which can possibly decay to ^{32}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 ^{33}Ne is unstable towards particle emission.
This nuclide is of possible relevance to "island of inversion" near N=20.

^{32}Na Levels

Cross Reference (XREF) Flags

A ^{32}Ne β^- decay (4.1 ms)
B ^{9}Be(^{48}Ca,x$'\gamma$)
C ^{12}C(^{32}Na,^{32}Na$'\gamma$)

E(level)†	J$^\pi$	$T_{1/2}$	XREF	Comments
0	(3$^-$)	13.2 ms *4*	ABC	%β^-=100; %β^-n=24 *7* (1993Kl02); %β^-2n=8.3 *21* (1993Kl02) J$^\pi$: (3$^-$,4$^-$) from shell-model predictions and comparisons with experimental data for delayed-neutron decay of ^{32}Na to ^{31}Mg (1993Kl02); (0$^-$,3$^-$) from theoretical predictions in 2023Gr04. $T_{1/2}$: weighted average of 13.1 ms *5* (2008Tr04) and 13.2 ms *4* (1984La03). Others: 14.5 ms *30* (1972Kl04, same lab as 1984La03), 11.5 ms *8* (1998NoZW, tentative result), 14.0 ms *5* (1981ThZV, same lab as 1984La03). %β^-n: others: %β^-n=39 *6* (total delayed-neutron decay,1984La03). %β^-1n=21 *8* (1984La03), 32 *13* (1980De26,1984Gu19); %β^-2n=9.4 *25* (1984La03), 8 *3* (1980De26,1984Gu19). Mean square strong absorption radius=1.29 fm^2 *5* (2006Kh08 in Si(^{32}Na,X) reaction at E=35.98 and 41.27 MeV/nucleon), also measured energy-integrated cross sections. Configuration=π3/2$^+$[211]⊗ν3/2$^-$[321] (2023Gr04).
401	(2$^-$,4$^-$)		B	J$^\pi$: from theoretical predictions in 2023Gr04: (4$^-$) if 625 level is a spherical shape isomer, (2$^-$) if a deformed spin isomer (2023Gr04).
569 *12*			C	
625	(0$^+$,6$^-$)	24 μs *2*	B	J$^\pi$: (6$^-$) proposed if 625 level is a spherical shape isomer, (0$^+$) if a deformed spin

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Adopted Levels, Gammas (continued)

^{32}Na Levels (continued)

E(level)[†]	J^π	$T_{1/2}$	XREF	Comments
				isomer (2023Gr04). $T_{1/2}$: from implant-(sum of 224γ and 401γ)(t) with exponential maximum likelihood fit (2023Gr04). Configuration=$\pi d_{5/2}\otimes\nu f_{7/2}$ if spherical isomer, $\pi 3/2^+[211]\otimes\nu 3/2^+[202]$ if deformed spin isomer (2023Gr04).

[†] From Eγ data.

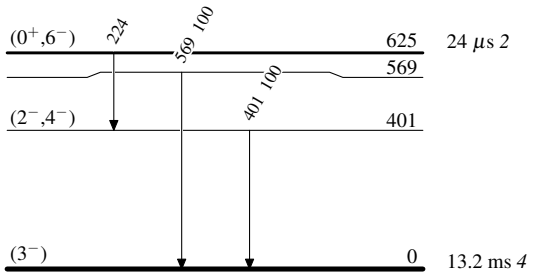
$\gamma(^{32}Na)$

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Comments
401	$(2^-,4^-)$	401	100	0	(3^-)	E_γ: from (^{48}Ca,X′γ) (2023Gr04).
569		569 *12*	100	0	(3^-)	E_γ: from (^{32}Na,^{32}Na′γ) (2010Do05).
625	$(0^+,6^-)$	224		401	$(2^-,4^-)$	E_γ: from (^{48}Ca,X′γ) (2023Gr04).

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{32}_{11}Na_{21}$