

^{202}Ra α decay [2014Ka23,2005Uu02](#)

Type	Author	History	Citation	Literature Cutoff Date
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Parent: ^{202}Ra : $E=0$; $J^\pi=0^+$; $T_{1/2}=3.8\text{ ms} +13-8$; $Q(\alpha)=7897\text{ 20}$; $\% \alpha$ decay ≈ 100.0

^{202}Ra - $T_{1/2}$: Measured by [2014Ka23](#). Others: $16\text{ ms} +30-7$ ([2005Uu02](#)), $0.7\text{ ms} +3.3-0.3$ ([1996Le09](#)).

^{202}Ra - $E\alpha=7722\text{ keV } 7$ ([2014Ka23](#)), $7740\text{ keV } 20$, $7860\text{ keV } 60$ ([1996Le09](#)).

[2014Ka23](#): ^{202}Ra produced in $^{149}\text{Sm}(^{56}\text{Fe},3n)$ at $E(^{56}\text{Fe})=244-275\text{ MeV}$ beam from GSI accelerator facility. Target= $370\text{ }\mu\text{g/cm}^2$ thick enriched to 96.9% in ^{149}Sm , and backed with $40\text{ }\mu\text{g/cm}^2$ thick carbon backing and covered with a $10\text{ }\mu\text{g/cm}^2$ layer of carbon. It was mounted on a rotating wheel. Evaporation residues were separated using SHIP facility at GSI, and implanted into the detection system consisting of 16-strip position sensitive Si detectors (PSSD), a pack of six Si strip detectors (BOX) at the back to detect escaping α particles, and three time-of-flight detectors in front of PSSDs. Measured position and time correlations between evaporation residues (Er) and α events, $E\alpha$, half-lives of ground states of ^{202}Ra and ^{198}Rn , Er- α - α correlations.

Comparison with previous experimental results.

Cross section for production of $^{202}\text{Ra}=0.2\text{ nb}$ I at 244 MeV incident beam energy ([2014Ka23](#)).

A total of 16 (Er) $\alpha\alpha$ correlated events were assigned to $^{202}\text{Ra}\rightarrow^{198}\text{Rn}\rightarrow^{194}\text{Po}\rightarrow^{190}\text{Pb}$ decay chain ([2014Ka23](#)).

The Gross Theory of β decay calculations of [1973Ta30](#) predict the partial β half-life to be $\approx 50\text{ s}$. Any β branch (calculated to be $<0.008\%$) is, therefore, ignored in the calculations, and $\% \alpha(^{202}\text{Ra})=100$ is taken.

Added-in-Proof: [1997Mo25](#) obtain $T_{1/2}(\varepsilon+\beta^+)=1.9605\text{ s}$ from their calculations. This partial half-life gives $\% \varepsilon+\beta^+=0.036$.

No calculation for $T_{1/2}(\beta^+)$ of ^{202}Ra is given In [1997MoZW](#).

 ^{198}Rn Levels

E(level)	J^π	$T_{1/2}$	Comments
0	0^+	$3.8\text{ ms} +13-8$	$\% \alpha=?$ $T_{1/2}$: Measured by 2014Ka23 . $E\alpha=7198\text{ 6}$ from α decay of ^{198}Rn to ^{194}Po (2014Ka23).

 α radiations

$E\alpha$	E(level)	HF [†]	Comments
7722 7	0	1.0	$E\alpha$: From 2014Ka23 . Others: $7740\text{ keV } 20$ (2005Uu02), $7860\text{ keV } 60$ (1996Le09). $I\alpha$: Only one α group has been observed. $I\alpha=100\%$ is assumed. Reduced α width $\delta_\alpha^2=210\text{ keV} +70-50$ (2014Ka23), $44\text{ keV} +83-20$ (2005Uu02), $430\text{ keV} +2020-260$ (1996Le09).

[†] Requirement of $\text{HF}(7860\alpha)=1.0$ gives $r_0(^{198}\text{Rn})=1.569 +20-14$ ([1996Le09](#)).