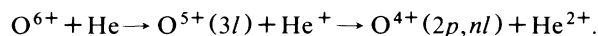


Comment on "Evidence for Correlated Double-Electron Capture in Low-Energy Collisions of O^{6+} with He"

Stolterfoht *et al.*¹ have recently claimed that in O^{6+} (60 keV)-He collisions correlated double-electron capture (CDC) is of similar importance as uncorrelated double-electron capture. This claim has been based on a comparison of electron emission from $O^{4+}(2p, nl)$ states ($n \geq 6$) and $O^{4+}(3l, n'l')$ states ($n' \geq 3$), respectively, the former being assumed to result from CDC only. Our recent studies on total double-electron capture to bound O^{4+} states² and on electron emission from the above mentioned autoionizing states³ show that the conclusions of Stolterfoht *et al.*¹ on the importance of CDC are probably not fully justified.

First, double-electron capture into bound states has been neglected entirely, but at 60 keV impact energy involves a cross section^{2,4} of about $1.6 \times 10^{-16} \text{ cm}^2$. With the data of Stolterfoht *et al.*¹ for double-electron capture into autoionizing states a CDC fraction of not more than 15% would be concluded. Second, the CDC processes invoked by Stolterfoht *et al.*¹ are probably not exclusively responsible for production of autoionizing $O^{4+}(2p, nl)$ states, which could, e.g., also result from sequential single-electron capture events during one single collision



The first step has been shown⁵ to account almost exclusively for a total single-electron capture cross section^{2,4} of about $1.3 \times 10^{-15} \text{ cm}^2$. The second step involves a correlated two-electron transition which at a crossing distance of less than about $3a_0$ can populate bound $O^{4+}(2p, nl)$ states with $n \leq 5$, whereas for a larger crossing distance unbound states as observed by Stolterfoht *et al.*¹ may result. Such correlated transitions or configuration interactions are rather commonly observed for electron capture from He, e.g., by C^{3+} (Ref. 6) or N^{4+} .⁷

Finally, our studies on electron emission from autoionizing O^{4+} states³ seem to indicate that the fraction from $O^{4+}(2p, n \geq 6, l)$ states is considerably less important than that from $O^{4+}(3l, n \geq 3, l')$, and therefore quite unimportant for the total double-electron capture.

Consequently, there is some doubt about the importance of CDC in O^{6+} -He collisions. Note also that recently more general arguments have been published⁸ for the dominance of uncorrelated double-electron capture in collisions of highly charged ($q \geq 7$) ions with He.

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