

A COMPARISON OF THE SEMIEMPIRICAL
FORMULAE FOR DETERMINATION OF THE
 α -DECAY CONSTANTS FOR HEAVY NUCLEI

D. I. Sikora, S. I. Sychov

Institute of Electron Physics,
Nat. Acad. of Sci. of Ukraine
(21, Universitetska Str., Uzhgorod 88016, Ukraine)

S u m m a r y

The semiempirical formulae used to determine the α -decay constants for heavy nuclei - the linear dependence of the α -decay constant logarithm, $\ln \lambda$, on the α -particle energy E , the dependence of $\ln \lambda$ on E obtained in the theory of α -particle penetration through a potential barrier, and the inversely proportional dependence of $\ln \lambda$ on \sqrt{E} are analysed. It is shown that, within the nuclei charge interval $84 \leq Z \leq 90$, the linear dependence of $\ln \lambda$ on E is the most precise, although, for the neutron numbers $N = 124 \div 128$ in compound nuclei, it requires corrections on a decrease of the α -decay energy, while, for $N - Z = 47$, on its increase. For $92 \leq Z \leq 100$, the α -decay constants λ for even-even compound nuclei are determined most precisely by formulae taken from the theory of α -particle penetration through a potential barrier. But for even-odd nuclei, all the formulae require corrections on an increase of the α -decay energy at $N - Z = 47$ and 53, and on its decrease at $N = 152$. The constants of spontaneous fission of nuclei with $90 \leq Z \leq 100$, which is competitive to α -decay, are characterized by a minimum at $N - Z = 52$.