

Remarks on the Isotopic Volume Effect in Superconductors

著者	NAKAJIMA Tetsuo
journal or publication title	Science reports of the Research Institutes, Tohoku University. Ser. A, Physics, chemistry and metallurgy
volume	23
page range	215-215
year	1971
URL	http://hdl.handle.net/10097/27626

Remarks on the Isotopic Volume Effect in Superconductors*

Tetsuo NAKAJIMA

*The Research Institute for Iron, Steel and Other Metals***Abstract**

One possible manner in which the change in isotopic volume contributes to the isotope effect in superconductors is discussed with relation to the empirical formula of Olsen *et al.*, $\alpha=0.25+0.1\phi$, which represents a relation between the exponent α in $T_c \propto M^{-\alpha}$ and the volume dependence of the transition temperature, $\phi = \partial \ln[T_c/\theta] / \partial \ln V \cdot \{\ln(0.85\theta/T_c)\}^{-1}$. Here, the volume effect being taken into consideration, α is expressed in terms of the mass and volume effects of the Debye temperature θ and those of the phonon mediated electron-electron interaction $N(0)J$ in the BCS relation. In addition to this, the limitations of the argument concerning the relation between the isotope effect and the volume dependence of the transition temperature are briefly examined in connection with the isotopic volume in some isotopic compounds.

* The 1548th report of the Research Institute for Iron, Steel and Other Metals. Published in the Journal of the Physical Society of Japan, **30** (1971), 932.