Memorandum to File
E. P. Wigner

April 25, 1951

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The value of k must be inserted in ev/°C which is $k = .856 \times 10^{-4}$. Hence we have

$$(7a) \quad \frac{1}{\eta}\frac{d\eta}{dT} = -\frac{1}{1+\alpha}\frac{d\alpha}{dT} - 1.58\times10^{-4}(1 - .75\times10^{-3}T).$$

At 300°k at which the measurements of CP-1381 were made, this is -12×10^{-5}/°C, i.e. more than twice greater than the measured value if one neglects $d\alpha/dT$.

It is possible to blame the above discrepancy on a temperature variation of α. If one does this, one has to assume $d\alpha/dT = -22\times10^{-5}$/°C and obtains a positive $d\eta/dT = 6.4 \times 10^{-5}$/°C. Actually, it is more than doubtful that such an interpretation is correct: a positive temperature coefficient of η instead of the anticipated negative one would surely have been noticed at Hanford or at Oak Ridge. In addition, the $-d\alpha/dT$ is hardly likely to be quite as large as 22×10^{-5}. The fact remains, however, that the assumption $d\alpha/dT = 0$ leads to a discrepancy between two measurements, one of which seems to be quite good. Hence, the value of $d\eta/dT$ cannot be considered to be established but may be anywhere between -12 and 6×10^{-5}.

Direct and accurate measurements of σ_f(U-233) would yield a value for $d\alpha/dT$ and hence also for $d\eta/dT$. The only remaining assumption would then be that ν does not depend on the energy of the neutron inducing fission.

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EPW:s

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