but the first two collisions rigorously etc. Evidently the above method will give more accurate results in the neighborhood of the source than the straight application of the diffusion theory. It will be seen, however, that no matter how many collisions one takes into account rigorously, the asymptotic behavior remains the same as in the straight diffusion theory, i.e. does not contain the factor I of (10). Of course, one can obtain a very good expression for the density at any point by taking into account sufficiently many collisions rigorously, but no matter how many collisions one treats this way, there is always a distance where the result becomes inaccurate. Let us consider the case of a point source of unit strength. The density before the first collision is, evidently

$$N_{b_1} = \frac{1}{4\pi r^2 v} e^{-\sigma r} = \int_{\sigma}^{\infty} \frac{e^{-\xi r}}{4\pi r v} d\xi \qquad (13)$$

The density, after the first collision N_{a_1} will be assumed to obey the equation

$$\frac{\sigma_a}{\varkappa^2} \Delta N_{a_1} - \sigma_a N_{a_1} + \frac{\sigma_a}{\sigma} N_{b_1} = 0 \qquad (14)$$

One may be tempted to introduce a factor I into the last term of (14) (which would give the correct asymptotic behavior to N_{a_1}) but this is not justifiable since, evidently, the integral of $\sigma_a N_{a_1}$ must be equal to the integral of the production $(\sigma_a/\sigma)N_{b_1}$. One can solve (14) most easily by using for N_{b_1} the last expression in (13) and writing for N_{a_1}

$$N_{a_1} = \int a(\xi) \frac{e^{-\xi r}}{4\pi r v} d\xi + a \frac{e^{-\varkappa r}}{4\pi r v}. \qquad (14a)$$