density is now connected to the electrostatic potential by the relation [6]

$$\rho_e = \frac{8\pi}{3h^3}\left\{\frac{2e^2 m}{h} + \left[\frac{4e^2 m^2}{h^2} + 2m(E_0 - eV_0)\right]^{\frac{1}{2}}\right\}^3$$

In order to get the numerical integration of Eq. (7) started, $\underline{\psi}$ is first expanded into a semi-convergent power series about the origin. The form of this series is identical with that of Eq. (4). For convenience, we list the corresponding coefficients up to $\underline{a}_9$ in Table 4. Again we introduce a change in independent variable $x = w^2/2$ and use the same numerical integration procedure beginning at $w = 0.92$.

Slater and Krutter [2] have carried through numerical integrations for $Z = 3, 11, 29$ and Jensen [4] for $Z = 18, 36, 54$. We have obtained a family of six solutions for $Z = 6$ and of ten for $Z = 92$. The initial slopes and boundary values are shown in Tables 5 and 6 for $Z = 6$ and 92 respectively. Values for the two sets of $\psi$ functions are listed in Tables 7 and 8 at intervals of $\Delta w = 0.08$. Here again quadratic interpolation is adequate to obtain $\underline{\psi}$ for intermediate w-values.

From these results one may obtain a relation between pressure and density (or volume) for various elements at $T = 0$. The pressure depends only on the minimum of the potential, $Ze\psi/r$, which is attained at the boundary of the atom. On that boundary no average force acts on the electrons, and the pressure is the same as would be caused by a density of free electrons equal to the electron density at the boundary. This electron density is in turn determined by the potential at the boundary, and one obtains for the pressure

(6) cf. e.g., J. C. Slater and H. M. Krutter, loc. cit.