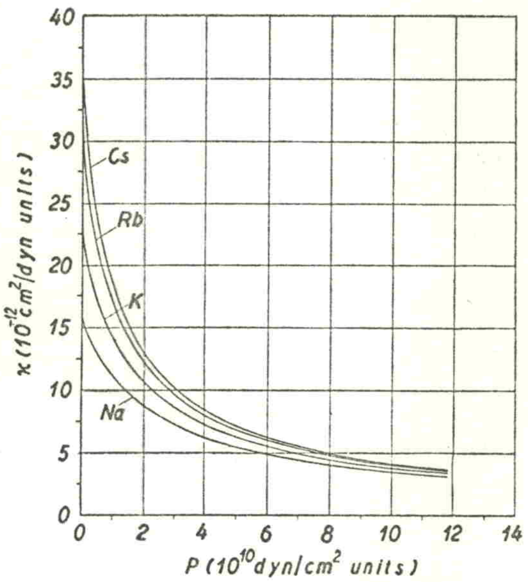

FIG. 2. Pressure-compressibility relations for Cs, Rb, and K.

ions from the more accurate self-consistent field, in the case of alkali and alkaline earth metals, the overlapping of the electron clouds of neighboring ions is negligibly small. It follows, therefore, that the formulae (1) and (2) are applicable even to these high pressures.

For the sake of comparison with the recent experimental results of Bridgman, I calculated the pressure-volume relation for the alkali metals Na, K, and Rb. Since the theory refers to the absolute zero point of temperature, for the purpose of comparison, the theoretical results had to be corrected for the temperature $T=296°$K with Bardeen's formula.[4] Theoretical results as well as those obtained experimentally by Bridgman are graphically recorded in Fig. 1.

The agreement between the theoretical and experimental curves is quite satisfactory, especially if we consider that neither empirical nor semi-empirical parameters were applied in the theory.

With the help of the theoretical explanations given above, the pressure-compressibility relation at the absolute zero point of temperature can be calculated too. The definition of the compressibility κ is as follows:

$$\frac{1}{\kappa}=\frac{1}{12\pi R}\frac{d^2U}{dR^2}.$$

By inserting expression (1) of the lattice energy in this formula, κ appears as the function of R. Connecting that with the expression (2) which gives the relation between R and P, we get the pressure-compressibility relation. That has been calculated for the alkali metals Na, K, Rb, and Cs as well as for the alkaline earths Mg, Ca, Sr, and Ba. The results are graphically recorded in Figs. 2 and 3.

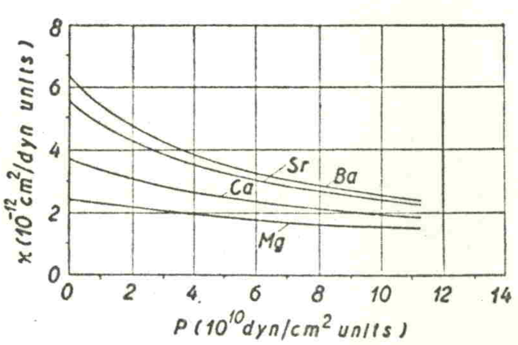

FIG. 3. Pressure-compressibility relations for Ba, Sr, Ca, and Mg.

I wish to thank Dr. A. Kónya for performing the calculations.

[1] P. Gombás, Nature 157, 668 (1946).
[2] A detailed presentation of this theory is given in the author's monography, "Die statistische Theorie des Atoms und ihre Anwendungen," Hungarica Acta Physica 1, No. 2 (in print); also in book form (Julius Springer Verlag, Vienna, in press).
[3] P. W. Bridgman, Phys. Rev. 60, 351 (1941). These results of Bridgman are somewhat divergent from his earlier ones and—because of war conditions—became known here only a year ago.
[4] J. Bardeen, J. Chem. Phys. 6, 372 (1938).

The β-Radiations of Antimony^{124}, Tantalum^{182}, Tungsten^{185}, and Iridium^{192}

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An investigation of the distribution with momentum of the β-rays of ${}_{51}Sb^{124}$, ${}_{73}Ta^{182}$, ${}_{74}W^{185}$, and ${}_{77}Ir^{192}$ has been made by analyzing them with a magnetic-lens spectrometer. The results were obtained by an electrical counter with automatic registration in the range between $B\rho=560$ and $B\rho=3750$ gauss-centimeters, the lower value being limited by the window of the detecting device.

The spectrometer used in these experiments is based on the selective focusing action of a magnetic lens on β-rays of heterogeneous velocity. The design admits a transmission factor which corresponds to 0.7 percent of 4π in solid angle of β-particles from the source into the field of selective focusing action. From the size of the solid angle used, the chosen focal length, and the magnitude of the linear spread of the focus along the axis, it can be seen that the resolving power $R=\Delta B\rho/B\rho=\pm 0.37$ percent. This resolution value, however, is influenced by the form, size, thickness, and the percental inactive isotopic content of the source.

An electrical counter of the self-quenching type, with Neher-Pickering circuit, is used to detect the β-spectra. The detecting device is further provided with an amplifier, a scale of 64, and an electronic operated mechanical recorder for registration of the impulse frequency.

The spectrometer lens being air-core type, the relation between magnetizing current and $B\rho$ gauss-centimeters is linear. Because of this unique linear relation, the magnetizing current is calibrated once for all in terms of the $B\rho$-value of the well-known and accurately measured F-line of thorium B. ($B\rho=1385.8$ gauss-centimeters[1].)