of the Simon equation assumes that this term is constant; thus he obtains the correct form of the exponent b' of Eq. (27) in terms of $\gamma_{m,0}$ but fails to obtain the analog of the expression a/B corresponding to the Simon coefficient.

Simon[1] has shown that the coefficient A of Eq. (2) is of the order of the internal pressure of the solid. Approximate numerical consistency of this result with the evaluation of the Simon coefficient given here can be shown by means of Grüneisen's law and an expression[7] for the internal pressure from the Grüneisen theory of solids.

III. COMPARISON WITH EXPERIMENT

In this section, the preceding theory will be compared with Bridgman's experimental results[17] on the fusion

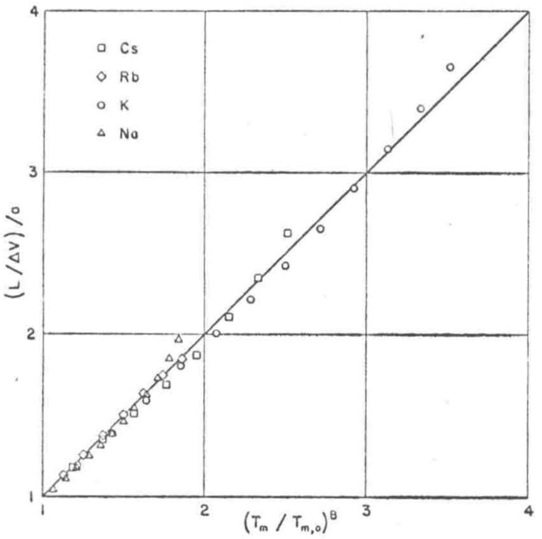

FIG. 1. Comparison of the law of reduced states (straight line) for the ratio $L/\Delta V$ in terms of the fusion temperature, against Bridgman's experimental data for four alkali metals. Values of the Simon exponent B (tabulated in the fourth column of Table I) selected in each case for best over-all fit to the data.

curves of the alkali metals Cs, Rb, K, and Na, extending over pressure ranges up to 12 kilobars; the element Li will be ignored, since Bridgman's measurements were made on a somewhat impure sample.[18] To make a comparison of Eq. (20) and of Eq. (31) with the data, values of $\kappa_{m,0}$ entering the reducing parameter a are available from Table I of I. Values of $\gamma_{m,0}$ from Eq. (12), and of q_0 from Eq. (31) of I, are shown in Table I, as evaluated to correspond to Bridgman's experimental values of L and ΔV at the normal melting point; the values of $\gamma_{m,0}$ given for the alkali metals in Table V of I correspond to data for L and ΔV from other sources. The third entry of Table I is the parameter a of Eq. (17).

Equation (20) states that the ordinate $(L/\Delta V)/a$, when plotted against $(T_m/T_{m,0})^B$, should yield a

[17] P. W. Bridgman, Phys. Rev. 3, 153 (1914); 27, 68 (1926).
[18] P. W. Bridgman, Proc. Am. Acad. Arts. Sci. 56, 59 (1921).

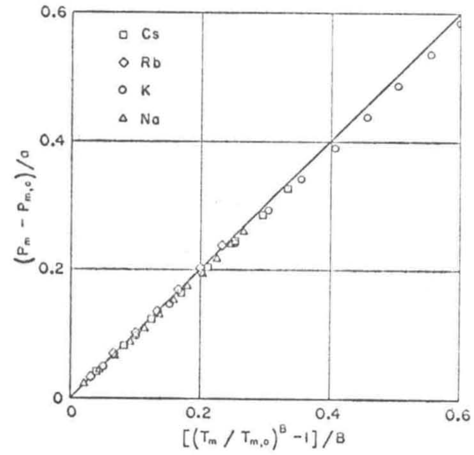

FIG. 2. Comparison of the Simon equation (straight line), with values of B tabulated in the fourth column of Table I, against Bridgman's experimental data for four alkali metals.

straight line of inclination 45°. In Fig. 1, this ordinate from Bridgman's experimental values of L and ΔV and values of a from Table I is shown as a function of $(T_m/T_{m,0})^B$ for the alkali metals, where the Simon exponent B has been selected by trial in each case to yield the best over-all fit to the data. For the same value of B in each case, the values of $(P_m - P_{m,0})/a$ corresponding to Bridgman's pressure-temperature data at fusion are shown in Fig. 2 as a function of $B^{-1}[(T_m/T_{m,0})^B - 1]$; the data yield closely the straight line of inclination 45° demanded by Eq. (31). The maximum error indicated at the highest ordinate on Fig. 2 for any element does not exceed 3%, which may be within the experimental error. The values of the Simon exponent B obtained for each element are shown in Table I, with values, for comparison, as determined by others from essentially the same data. The disparities are explainable on two counts: the election in this paper to obtain the Simon exponent by a best fit corresponding to Eq. (20), rather than to the Simon equation (31) directly, and the requirement of this theory that the Simon coefficient A be a/B, with a given by Eq. (17), which insures that Clapeyron's equation is satisfied at the origin of the fusion curve.

The question at issue is to show that the values of the Simon exponent obtained are compatible with the theory given. Since experimental data on the volumes of the alkali metals along the fusion curve are not available, the values of the Murnaghan parameter η,

TABLE I. Parameters of the Simon equation.

	$\gamma_{m,0}$	q_0	$10^{-6}a$ bars	B Eq. (20)	B
Cs	1.34	1.18	0.0119	4.50	4.75[a]
Rb	1.6_4	1.22	0.0146	3.70	4.2
K	1.20	1.15	0.0202	4.21	4.53
Na	1.13	1.13	0.0454	3.15	3.56

[a] Value for Cs from Simon and Glatzel (reference 5); values for Rb, K, Na from J. A. W. Huggill, as quoted by Salter (reference 11).