TABLE II. Comparison of Grüneisen constants obtained by different investigators.

Metal	Grüneisen[a]	Slater[a]	Benedek[b]	Cook[c,d]	This study[e] a_T
Copper	1.96	1.63	1.9	1.94	1.92
Silver	2.40	2.2	2.5	2.40	2.74
Sodium	1.25	1.50	···	···	1.78
Potassium	1.34	2.52	···	···	2.35
Aluminum	2.17	2.32	···	···	1.44
Manganese	2.42	5.5	···	1.63	2.4
Iron	1.60	1.4	1.68	···	1.99
Cobalt	1.87	1.8	2.1	···	1.90
Nickel	1.88	1.9	2.2	···	1.90
Platinum	2.54	3.0	3.3	···	3.74
Palladium	···	···	2.5	···	3.20
Tungsten	···	···	1.7	···	2.48

[a] See Ref. 18.
[b] See Ref. 19.
[c] See Ref. 1.
[d] Using computed ϕ's and Eq. (15).
[e] From Eq. (18) and a_T data taken from the log–log plots.

Compressibilities

Table III presents a comparison of observed compressibilities with those obtained from the slopes of the log–log plots and the equation

$$\beta_0 = v_0/a\epsilon_0 \tag{21}$$

obtained by combining Eqs. (10) and (11). The agreement is quite good. Elements such as sodium in which $\Delta v'$ is appreciable were not included in this comparison, since a direct comparison is possible only when the log–log plots extrapolate to $v/v_0=1$ at $p=0$.

ALLOYS

Figure 7 presents $\log v/v_0$ against $\log(1+p/p_i)$ plots for the Cu–Ni and Ag–Pd alloys. The internal pressure was calculated from the relation

$$p_i = (\textstyle\sum_i \epsilon_{0i} + \Delta\epsilon)/v_0, \tag{22}$$

where $\Delta\epsilon$ is the energy of solution or reaction, and v_0 is the molar volume of the alloy. For the Cu–Ni system,

TABLE III. Theoretical vs observed β_0's for metals.

Metal	β_0 (calc.)[a]	β_0 (obs.)[a]	Metal	β_0 (calc)[a]	β_0 (obs.)[a]
Be	8.72	8.55	Pd	5.50	5.28
Mg	25.6	29.5	Pt	3.78	3.60
La	33.7	35.1	Cu	7.22	7.19
Ti	10.5	7.97	Ag	9.62	9.87
Zr	11.6	11.0	Au	6.00	5.77
Nb	5.66	5.7	Cd	21.	18.
Ta	4.90	4.97	Al	13.2	13.4
Mo	3.81	3.61	In	22.4	25.0
W	3.28	3.18	Tl	19.7	27.7
Fe	5.94	5.87	Si	8.6	3.1
Ru	3.46	3.72	Ge	11.6	13.8
Co	5.32	5.39	Pb	23.1	23.7
Rh	3.84	3.72	Bi	27.2	29.2
Ir	2.80	2.68			
Ni	5.42	5.29			

[a] Expressed in units of $\text{kbars}^{-1}\times10^4$.

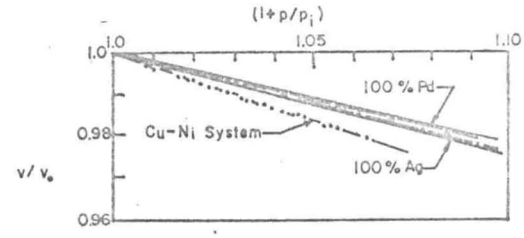

FIG. 7. Log–log plot for isothermal compression of the Cu–Ni and Ag–Pd alloy systems. Data from Ref. 6.

the slopes of the log–log plots were essentially equal for the pure metals with $\Delta\epsilon$ and the change in molar volumes being negligible. Thus, all the data from the Cu–Ni system fell, as expected, on the same $\log(v/v_0)$ against $\log(1+p/p_i)$ plot.

For the Ag–Pd system, log–log plots for the pure metals were different, and the log–log plots for the alloys thus fell between those for the pure metals, and an approximate linear relationship was found between the value of a and the composition. For ideal alloys a linear relationship between composition and a would be expected, but systems where $\Delta\epsilon$ and changes in molar volume are appreciable should exhibit a more complicated relation between a and composition.

HALIDES

Figures 8 and 9 present log–log plots for some halides. While in the silver halides these plots were linear all the way, with discontinuities due to phase changes, in the alkali halides the linearity criterion was not observed in all cases.

LIQUIDS

Figure 10 presents the log–log plot for water using shock-loading data. The log–log plot is nonlinear in the region $0<p/p_i<0.5$, and linear for $p/p_i>0.5$. The extrapolation of the straight line section to zero pressure yielded a $\Delta v'/v$ contribution of 0.14. This volume frac-

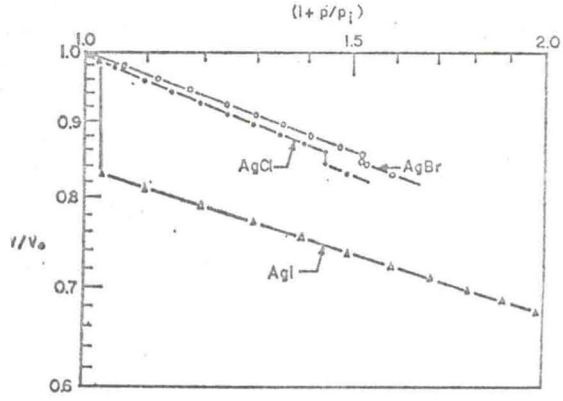

FIG. 8. Log–log plot for isothermal compression of some silver halides. Data from Ref. 6.