TABLE XX. Adiabatic and isothermal elastic constants (in units of 10^{11} dyn/cm^2) and the parameters Δ and λ of RbI as a function of pressure (in kilobars) at 260°K.

Pressure	C_{11}^S	C_{11}^T	C_{12}^S	C_{12}^T	C_{44}	B^S	B^T	Δ	λ
0.001	2.650	2.598	0.368	0.316	0.279	1.128	1.077	0.0474	1.00000
0.200	2.677	2.626	0.369	0.319	0.278	1.138	1.088	0.0468	1.00062
0.400	2.705	2.655	0.371	0.321	0.277	1.149	1.099	0.0461	1.00123
0.600	2.734	2.683	0.373	0.322	0.276	1.160	1.109	0.0454	1.00183
0.800	2.762	2.712	0.376	0.325	0.275	1.171	1.121	0.0447	1.00243
1.000	2.791	2.741	0.378	0.327	0.274	1.182	1.132	0.0440	1.00302
1.250	2.824	2.775	0.381	0.331	0.273	1.196	1.146	0.0432	1.00376
1.500	2.861	2.812	0.384	0.334	0.271	1.210	1.160	0.0423	1.00448
1.750	2.894	2.846	0.386	0.338	0.270	1.222	1.174	0.0414	1.00520
2.000	2.929	2.880	0.390	0.342	0.269	1.236	1.188	0.0406	1.00591
2.250	2.963	2.915	0.392	0.344	0.268	1.249	1.201	0.0397	1.00661
2.500	2.996	2.949	0.395	0.348	0.266	1.262	1.215	0.0388	1.00731
2.750	3.031	2.984	0.397	0.350	0.265	1.275	1.228	0.0380	1.00799
2.990	3.062	3.015	0.401	0.355	0.264	1.288	1.242	0.0372	1.00865
3.250	3.096	3.050	0.404	0.359	0.262	1.301	1.256	0.0363	1.00935
3.500	3.129	3.084	0.407	0.361	0.261	1.314	1.269	0.0354	1.01001
3.750	3.162	3.118	0.409	0.364	0.259	1.326	1.282	0.0346	1.01067

It may be seen that the value of the pressure derivative of C_{12} as obtained by Reddy and Ruoff[4] is not consistent with the trend in the values of the pressure derivatives of C_{12} of other halides or other alkali bromides. The other pressure derivatives obtained by Reddy and Ruoff are, however, consistent. On the other hand all the pressure derivatives obtained by us are consistent with the results of the other alkali halides. In the light of the above and due to this single disagreement between the results of these two works, we suspect that Reddy and Ruoff just missed a factor of 2 somewhere in the computation of the pressure derivative of C_{12}. This is suggested because where an adjustment is accordingly made in the estimated value of the pressure derivative of C_{12} given in Ref. 4, the single discrepancy in the two sets of data on RbBr disappears. This adjusted value of the pressure derivative of C_{12} turns out to be 1.52, which agrees well with our value of 1.46 for the same.

In Tables XIII–XVI we present the values of the elastic constants of rubidium bromide as a function of pressure at 300°, 260°, 220°, and 180°K, respectively.

RUBIDIUM IODIDE

The variation in the elastic constants of rubidium iodide as a function of temperature has been investigated by Haussühl[10] between approximately 250° and 373°K. We have investigated this variation of the elastic constants from 120° to 300°K and Lewis *et al.*[16] have done so from 4.2° to 300°K. In the computation of the elastic constants, presented in Table XVII we have assumed a value of 3.551 g/cm^3 as the density of RbI at 300°K. The values of volume thermal expansion coefficients at low temperatures are obtained from the work of Schuele and Smith.[19] Since they report the values of the linear thermal expansion coefficient only to 235°K, we had to extrapolate the values of these coefficients to estimate their values in the temperature interval 235° to 300°K. The values of the specific heat are obtained from Ref. 18. The elastic constants thus obtained are given in Table XVII. The values of the elastic constants and their temperature derivatives at 300°K are in good agreement with the results obtained by Haussühl but not with those of Lewis *et al.* with respect to the temperature derivatives of C_{11} and C_{12} (Table XVIII). The variation of the elastic constants of RbI is smooth and linear with temperature down to 120°K.

The pressure dependence of the elastic constants of RbI has been investigated at 300°, 260°, 220°, and 180°K and the results are presented in Tables XIX–XXII. The variation of elastic constants of RbI as a function of temperature and pressure are plotted in Figs. 1 and 2. The variation for RbCl and RbBr are similar. The only available information about the pressure dependence of the elastic constants are given in terms of γ_i.[19] We have calculated the values of γ_i from our data. These γ_i have been calculated from the relation

$$\gamma_i = -\tfrac{1}{6} + (B^T/2C_i)(\partial C_i/\partial P)_T,$$

where B^T is isothermal bulk modulus and C_i is the

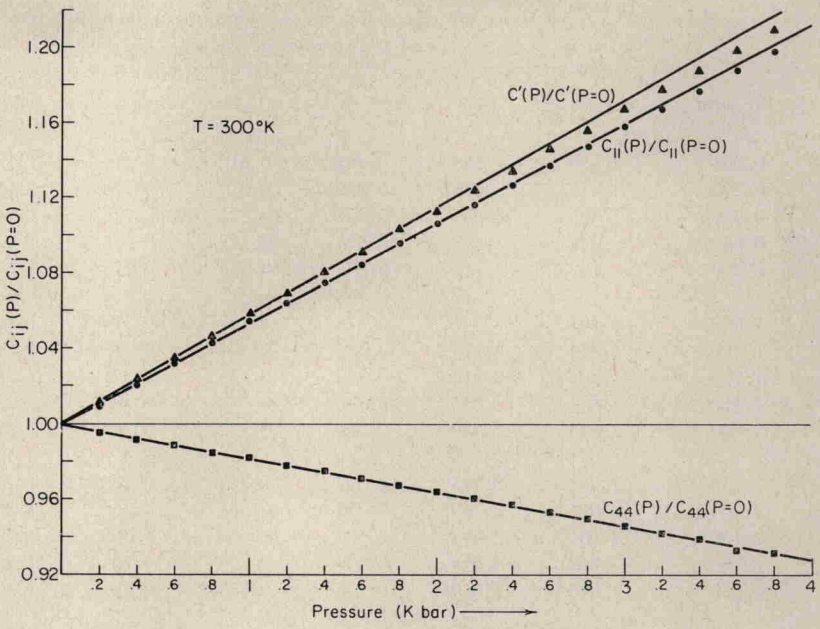

FIG. 1. Relative variation of the adiabatic elastic constants of RbI as a function of hydrostatic pressure at $T=300°K$.

elastic constant associated with the ith branch of the vibrational spectrum. Table XXIII indicates that the values of γ_i as obtained here and by Schuele and Smith[19] are in good agreement.

PRESSURE DERIVATIVES

Tables XXIV–XXVI give the values of dC_{ij}/dP for different thermodynamic conditions (see Ref. 20) and for the three rubidium halides at four different temperatures.

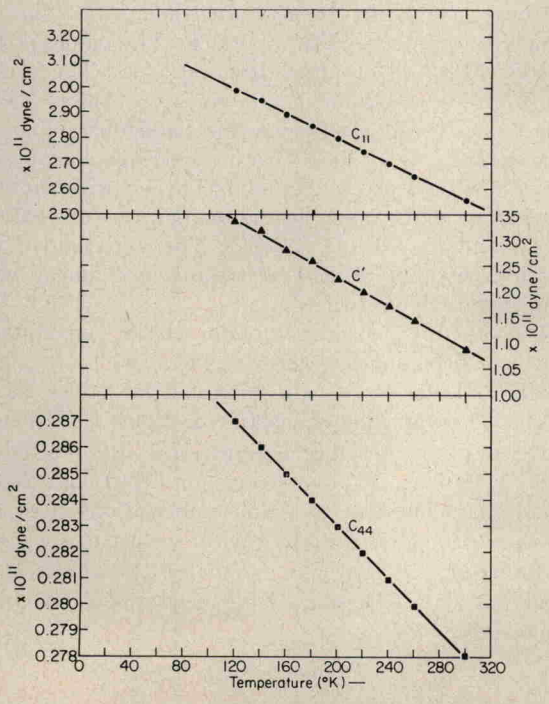

FIG. 2. Adiabatic elastic constants of RbI as a function of temperature.

Anisotropy

We will use our results to consider how the anisotropy ratio

$$A=2C_{44}/(C_{11}-C_{12})$$

varies with temperatures and pressure. These results are shown in Table XXVII.

The anisotropy ratio is unity for isotropic solids. Hence a value of other than one is indicative of the anisotropy of the material. Reinitz,[21] while discussing the anisotropy of alkali halides at room temperature concluded that (i) the anisotropy is influenced by the alkali ion, and (ii) the nature of the halide ion has more effect on the anisotropy as the size of the alkali ion increases. Table XXVII presents the values of A of the three rubidium halides as a function of pressure and temperature. It shows that the anisotropy of the rubidium halides increases with a decrease in temperature and/or with an increase in pressure. The temperature dependence of the aniostropy seems to be independent of pressure and does not seem to be affected by the nature of the halide ion in the rubidium halides. But the pressure dependence of this factor in the rubidium halides is dependent on both the temperature and the nature of the halide ion in these salts. The temperature dependence of A's in these halides is not weakly dependent on temperature as stated by Nikanorov *et al.*[22,23] in their paper dealing with the temperature dependence of the anisotropy of alkali halides with NaCl structure. Our results show A to be strongly temperature dependent.