TABLE X. Temperature derivatives of the adiabatic elastic constants (in units of 10^7 dyn/cm² °K) of RbBr at room temperature.

	Temperature (°K)	C_{11}	C_{12}	C_{44}	Bulk modulus
Present work	300	−28.18	3.55	−0.817	−7.03

temperature at which the $(\partial C_{ij}/\partial T)_{P\to 0}$ is not necessarily the same for all the elastic constants, in relation to Debye temperatures at 0°K, the value of $(\partial C_{12}/\partial T)_P$ of RbCl as obtained by Marshall *et al.*[9] goes to 0 at a temperature rather higher than that found for other halides. Thus, it seems that the behavior of the C_{12} with temperature as obtained by Marshall *et al.*[9] is not in agreement with the results obtained on the other alkali halides. Moreover, the plausibility of the results of the present investigation may be further illustrated by a comparison of the temperature derivatives of C_{ij} obtained here, and in Refs. 9 and 10 (Table IV). The derivatives of our C_{ij}'s are in excellent agreement with those of Haussühl.[10]

The variation of the elastic constants of RbCl as a function of pressure has been investigated on a single crystal by Voronov *et al.*[14] at 298°K, and on a polycrystalline specimen of RbCl by Voronov and Goncharova[15] to 20 kbar. In the present work we report the pressure dependence of single-crystal elastic constants of RbCl to 4 kbar at 304°, 260°, 222°, and 180°K. Tables V–VIII give the values of these elastic constants, and the parameters $\Delta(P, T)$ and $\lambda(P, T)$ of RbCl as a function of pressure at each of the four temperatures mentioned.

A comparison with the results of Voronov *et al.*[14] reveals that the pressure derivative of C_{11} and C_{44} as obtained by them are 12.52 and −0.602 against our values of 13.74 and −0.613 for C_{11} and C_{44} respectively.

TABLE XI. Adiabatic elastic constants (in units of 10^{11} dyn/cm²) isothermal pressure derivatives of the adiabatic elastic constants of RbBr at 300°K.

	Present work	Reddy and Ruoff
Elastic constants		
C_{11}	3.152	3.155
C_{12}	0.500	0.493
C_{44}	0.380	0.380
Pressure derivative		
C_{11}	13.63	13.52
C_{12}	1.46	3.049
C_{44}	−0.587	−0.362

These two sets of values are in good agreement. We have not compared the values of the pressure derivatives of C_{12} because Voronov *et al.*[14] base their estimate of the same on the value of bulk modulus obtained by Voronov and Goncharova[15] on a polycrystalline specimen of RbCl.

RUBIDIUM BROMIDE

The temperature dependence of the elastic constants of rubidium bromide at one atmosphere has been studied by Lewis *et al.*[16] between 4.2° and 300°K and by Haüssubl[10] at higher temperatures. The results of the present investigation are compared with those of Lewis *et al.* in Table IX.

TABLE XII. Isothermal pressure derivatives of the adiabatic elastic constants of alkali halides with NaCl structure at room temperature.

	F	Cl	Br	I
C_{11}				
Li	9.97[d]	10.43[c]	10.43[c]	
Na	11.77[d]	11.66[a]	11.50[b]	13.99
K	11.74[b]	12.82[a]	12.96[f]	14.56[f]
Rb		13.73[e]	13.62[e]	13.39[e]
C_{12}				
Li	2.73[d]	2.89[c]	2.83[c]	
Na	2.19[d]	2.08[a]	1.68[b]	2.421
K	1.66[b]	1.60[a]	1.59[f]	2.45[f]
Rb		1.34[e]	1.46[e]	1.307[e]
C_{44}				
Li	1.38[d]	1.68[c]	1.71[c]	
Na	0.205[d]	0.37[a]	0.423[b]	−0.241
K	−0.452[b]	−0.39[a]	−0.328[f]	−0.237[f]
Rb		−0.61[e]	−0.587[e]	−0.522[e]

[a] R. A. Bartels and D. S. Schuele, J. Phys. Chem. Solids **26**, 537 (1965).
[b] Reference 1.
[c] Li-Shiu Ching, Ph.D. thesis, Cornell University, Ithaca, N. Y., 1968.
[d] R. A. Miller and C. S. Smith, J. Phys. Chem. Solids **25**, 1279 (1964).
[e] Present work.
[f] Reference 4.

In the calculation of the elastic constants, the density of RbBr at 300°K is assumed to be 3.4498 g/cm³. The values of volume thermal-expansion coefficients are obtained from the paper of James and Yates.[17] The values at 260° and 300°K are extrapolated from these low-temperature values. The low-temperature specific-heat values are taken from Clusius *et al.*[18]

The values of the elastic constants of RbBr thus obtained are in good agreement with those obtained in Ref. 16, as are the temperature derivatives of these constants. The temperature derivatives of the present investigation are given in Table X.

TABLE XIII. Adiabatic and isothermal elastic constants (in units of 10^{11} dyn/cm²) and the parameters Δ and λ of RbBr as a function of pressure (in kilobars) at 300°K.

Pressure	C_{11}^S	C_{11}^T	C_{12}^S	C_{12}^T	C_{44}	B^S	B^T	Δ	λ
0.001	3.151	3.086	0.500	0.434	0.380	1.383	1.318	0.0497	1.00000
0.600	3.234	3.169	0.508	0.443	0.377	1.416	1.352	0.0479	1.00150
1.200	3.318	3.254	0.516	0.452	0.373	1.450	1.386	0.0461	1.00296
1.800	3.402	3.339	0.526	0.463	0.370	1.485	1.422	0.0443	1.00439
2.400	3.484	3.422	0.533	0.471	0.366	1.517	1.455	0.0425	1.00579
2.600	3.512	3.450	0.536	0.475	0.365	1.528	1.467	0.0419	1.00625
2.800	3.539	3.478	0.538	0.478	0.364	1.539	1.478	0.0413	1.00671
3.015	3.566	3.505	0.542	0.481	0.362	1.550	1.489	0.0406	1.00719
3.220	3.590	3.530	0.546	0.486	0.361	1.561	1.501	0.0400	1.00765
3.400	3.617	3.557	0.550	0.489	0.360	1.572	1.512	0.0395	1.00806
3.610	3.646	3.586	0.551	0.491	0.359	1.583	1.523	0.0388	1.00852
3.800	3.670	3.611	0.555	0.497	0.358	1.594	1.535	0.0382	1.00894
4.010	3.697	3.639	0.558	0.499	0.356	1.604	1.546	0.0376	1.00940

The pressure dependence of the elastic constants of rubidium bromide has been investigated only by Reddy and Ruoff[4] and only at 300°K. The present work extends the measurement of the pressure dependence of the elastic constants down to 180°K. Since the present investigation and that of Ref. 4 have been conducted in the same laboratory by the identical method, a comparison of results obtained in these investigations is of added interest. The values of the elastic constants and their pressure derivatives at 300°K as obtained in these two works are displayed in Table XI. It shows that the agreement between these two sets of values of the C_{ij} of RbBr at 300°K is excellent. However, this kind of agreement is not present when one compares the values of the pressure derivatives of these constants. The discrepancy is at its worst in the case

TABLE XIV. Adiabatic and isothermal elastic constants (in units of 10^{11} dyn/cm²) and the parameters Δ and λ of RbBr 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	3.257	3.201	0.482	0.426	0.383	1.407	1.351	0.0417	1.00000
0.210	3.286	3.230	0.486	0.429	0.382	1.419	1.363	0.0412	1.00052
0.400	3.310	3.254	0.488	0.432	0.381	1.429	1.373	0.0407	1.00098
0.600	3.338	3.283	0.494	0.437	0.380	1.442	1.386	0.0402	1.00146
0.800	3.365	3.310	0.496	0.440	0.379	1.452	1.397	0.0397	1.00194
1.000	3.395	3.340	0.499	0.443	0.377	1.464	1.409	0.0392	1.00242
1.200	3.421	3.366	0.502	0.447	0.376	1.475	1.420	0.0387	1.00289
1.400	3.450	3.395	0.505	0.450	0.375	1.487	1.432	0.0382	1.00336
1.600	3.477	3.422	0.508	0.453	0.374	1.498	1.443	0.0378	1.00383
1.800	3.503	3.449	0.511	0.456	0.373	1.509	1.454	0.0373	1.00429
2.000	3.531	3.477	0.515	0.460	0.371	1.520	1.466	0.0368	1.00475
2.200	3.558	3.504	0.518	0.463	0.370	1.531	1.477	0.0363	1.00520
2.400	3.584	3.531	0.521	0.468	0.369	1.542	1.489	0.0358	1.00565
2.600	3.612	3.559	0.524	0.470	0.368	1.553	1.500	0.0353	1.00610
2.800	3.639	3.587	0.527	0.474	0.367	1.565	1.512	0.0348	1.00655
3.000	3.665	3.613	0.530	0.478	0.365	1.575	1.523	0.0344	1.00699
3.200	3.687	3.635	0.534	0.482	0.364	1.585	1.533	0.0338	1.00743
3.400	3.714	3.662	0.537	0.485	0.363	1.596	1.544	0.0334	1.00787
3.600	3.741	3.690	0.540	0.489	0.362	1.607	1.556	0.0329	1.00830
3.800	3.768	3.717	0.542	0.492	0.360	1.617	1.567	0.0324	1.00873