

TABLE I

Point No.	D, km/sec	U, km/sec	P_H , 10^{10} bars	v_0/v	δ	Plate material	U_p , km/sec
1	4.16	0.59	5.3	1.16	1.14	Copper	0.37
2	4.73	0.98	10.0	1.26	1.24	Aluminum	0.70
3	5.29	1.33	15.2	1.34	1.32	Aluminum	1.10
4	5.41	1.55	18.2	1.39	1.36	Iron	1.03
5	5.59	1.59	19.3	1.40	1.37	Aluminum	1.32
6	5.66	1.71	20.9	1.43	1.40	Aluminum	1.42
7	5.96	1.85	23.6	1.45	1.42	Aluminum	1.54
8	6.18	2.07	27.6	1.50	1.47	Aluminum	1.74
9	7.85	3.24	54.7	1.70	1.67	Aluminum	2.80
10	8.91	4.10	79.0	1.85	1.82	Iron	2.80

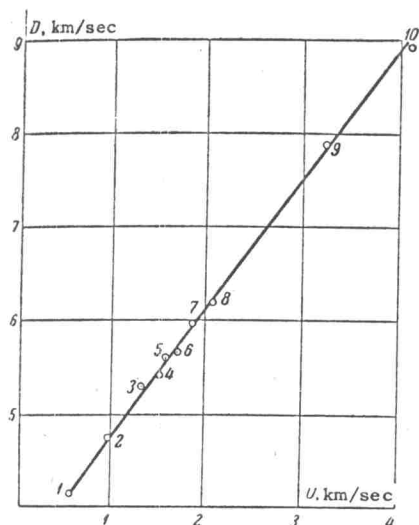


FIG. 1. D-U diagram of the shock adiabat of sodium chloride (the points are numbered to correspond to Table I).

Table I shows the parameters for the experimental points for the shock adiabats of sodium chloride. The wave, D, and mass, U, velocities of the shock waves are given for each point and also the shock compression pressure P_H , the relative compression v_0/v and $\delta = v_0K/v$ (where v , v_0 and v_0K are the corresponding specific volumes behind the shock front, in the initial state and for $P = 0$, $T = 0^\circ K$). The mass velocities in the plates, U_p , are given in the last column. The parameters of the points were determined by using a $P-U$ diagram. The $D-U$ relation for copper, aluminum and iron, given previously⁶ was used. In the first eight series of experiments the pressure in the specimens was produced by reflection of the detonation wave from the barrier plate, and in the final two by impact from aluminum and iron discs, driven by the explosion products.⁶ The measurements cover the pressure range from 50×10^3 to 790×10^3 atm. At the highest pressure the density of the crystal is increased 1.85 times. The dynamic adiabats of sodium chloride are shown graphically in $D-U$ coordinates in Fig. 1 and in $P-\delta$ coordinates in Figs. 2 and 3.

We express the equation of state of sodium chloride by the Debye formula:

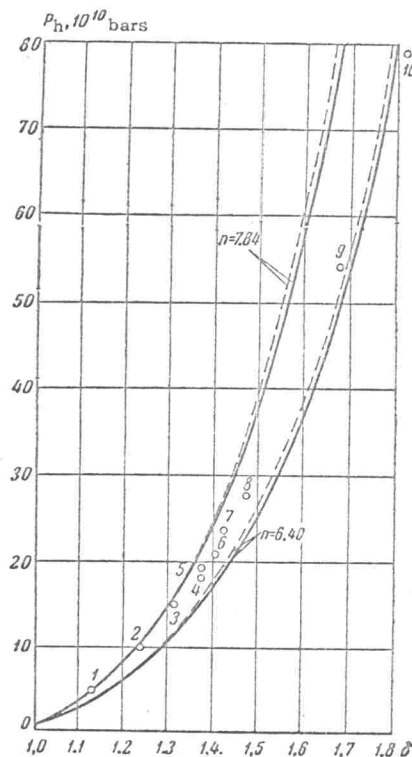


FIG. 2. Experimental data and calculated shock adiabats (with a power law for the repulsive forces): dashed curve is calculated according to Eq. (7a), the continuous curve according to (7b).

$$P = P_c + (\gamma/v)E_t \quad (1)$$

where P is the pressure, P_c the pressure at absolute zero, v the specific volume, γ the Grüneisen constant, determining the ratio of thermal pressure to the thermal energy density and E_t is the thermal energy of the lattice.

On the assumption that the atoms of the lattice undergo harmonic oscillations, Slater⁷ and Landau⁸ derived the following relation for $\gamma(v)$

$$\gamma = -\frac{2}{3} - \frac{v}{2} \frac{d^2 P_c / dv^2}{dP_c / dv} \quad (2a)$$

There is another expression for $\gamma(v)$, derived by Dugdale and MacDonald⁹ from the theory of finite deformations:

$$\gamma = -\frac{1}{3} - \frac{v}{2} \frac{d^2 (P_c v^{2/3}) / dv^2}{d(P_c v^{2/3}) / dv} \quad (2b)$$

The system (1), (2a) and (2b) is usually used to