TABLE 4

CALCULATED HUGONIOT COMPRESSIONS FOR NORMAL AND PRECOMPRESSED LJD LIQUIDS, STARTING FROM $T^*=0\cdot 75$

The symbols are defined in Section II

Starting Pressure	V_1^*:	1·0503	0·9899	0·8485	0·7071	0·6364	0·5657
$P^*=0$	P_1^*	0	3·007	22·32	123·7	371	1546
	T_1^*	0·750	0·881	1·605	7·202	26·31	144·9
	U_1^*	6·47	7·41	11·04	19·94	31·44	59·3
	w_1^*	0	0·426	2·122	6·51	12·39	27·4
$P^*=2\cdot 042$	P_1^*		2·042	19·30	101·0	267	964
	T_1^*		0·750	1·238	4·57	14·75	72·0
	U_1^*		7·64	10·93	18·25	27·1	49·5
	w_1^*		0	1·562	5·29	9·68	20·2
$P^*=15\cdot 15$	P_1^*			15·15	72·8	167	446
	T_1^*			0·750	1·594	4·07	16·20
	U_1^*			N.D.	17·13	22·7	34·3
	w_1^*			0	2·855	5·67	11·42

the shock temperature independently of the pressure (cf. Section IV (*d*)). In practice the experiments would be difficult, although not impossible. We have considered it worthwhile to attempt to predict the effects of precompression on the properties of shock waves generated in argon by the explosion of a charge of 60/40 RDX/TNT. Because the behaviour of this explosive is known only under normal conditions, we are forced to consider a hypothetical experiment in which the explosive remains at normal temperature and pressure although it is in

TABLE 5

CALCULATED PROPERTIES OF SHOCK WAVES IN PRECOMPRESSED ARGON IN CONTACT WITH 60/40 RDX/TNT

Initial temperature: 90 °K

Initial Conditions			Shock Conditions		
Pressure, P (atm)	Volume, $\hat{V}$ (cm^3/g)	Temperature, T (°K)	Pressure, P_1 (atm)	Volume, $\hat{V}_1$ (cm^3/g)	Temperature, T_1 (°K)
0	0·633	90	236 000	0·368	5240
850†	0·597	90	247 000	0·356	4150
6300†	0·512	90	270 000	0·331	3300

† Argon is actually solid at these pressures at 90 °K (Robinson 1954). But the results are still significant because the LJD model is a good one for solids (Barker 1961*b*).

contact with cold argon at a high pressure. However, our calculations should have some bearing on more realistic experiments.

The curves (*b*) and (*c*) in Figure 5 are the P/w relations for argon, precompressed to 850 and 6500 atm, respectively, at 90 °K. Their points of intersection with the P/w curve for the explosive products correspond to the conditions listed in Table 5. It will be seen that the precompression has a much greater effect on the shock temperature than on the pressure and volume. It could be a useful way of altering experimental shock conditions and so obtaining more extensive information about the equations of state of real substances.

V. Conclusions

We regard the results of these calculations as being qualitatively correct. But it is too soon to judge how well they describe the quantitative properties of shock waves in real materials. Perhaps the main value of the calculations lies in the fact that they have enabled us to predict some effects which have not been studied experimentally, and which could be useful in extending the scope of shock-wave techniques.

VI. References

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