

less than l_0 , evaporation will occur. Hence the smallest crystal which can grow by this mechanism must have a face of width greater than $2l_0$. This is also the critical size for three-dimensional nuclei in the classical theory. Two screw dislocations terminating in one crystal face give rise to the situation shown in Fig. 3b. Growth takes place freely if the distance apart of the dislocations and the distance of either of them from the edge of the face exceed l_0 . The criterion $l > l_0$ for growth can be shown to be a sharp one, despite thermal fluctuations.

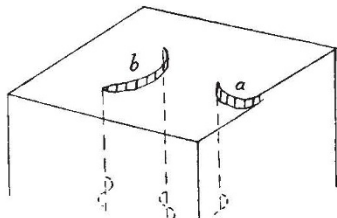


Fig. 3

We conclude that crystals do not grow at low supersaturations unless they contain dislocations. On the other hand, an excessive density of dislocations also inhibits growth, particularly at very low supersaturations: hence under these conditions we get the most nearly perfect, and yet never truly perfect, crystals. The growth of 'unsaturated' faces (for example, (111) faces of sodium chloride, or any faces of high index) is independent of dislocations or two-dimensional nucleation; but in the case of a crystal which has more than one family of relatively 'saturated' faces, which would need two-dimensional nucleation if it were perfect, it may be the dislocation structure which determines which are the slowest growing, that is, the habit faces.

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Velocity of Sound in Liquid Hydrogen

IN continuation of our previous measurements on the velocity of ultrasonics (frequency 523 kc.) in condensed gases at low temperatures¹, we have now measured the velocity of sound in liquid hydrogen under its saturated pressure as a function of temperature between 21° and 14° K. The experimental results are given in the accompanying table, and graphically in Fig. 1.

During the measurements, we observed a pronounced increase of the velocity of sound as a function of time. Those observations were followed specially at the boiling point, and are represented in Fig. 2. This phenomenon is not due to a temperature drift, but probably to a transformation of the normal hydrogen to para-hydrogen in the liquid phase. In

Date	T(°K)	v(m./sec.)
Nov. 23, 1948	21.0	1150
" 23, "	20.8	1173
" 26, "	20.4	1229
" 23, "	20.4	1190
" 23, "	18.2	1251
" 12, "	18.0	1260
" 26, "	17.4	1278
" 23, "	16.7	1271
" 23, "	16.5	1265
" 12, "	16.3	1274
" 26, "	14.8	1340

connexion with this phenomenon, we observed that the values which were obtained on November 26 are larger than the earlier ones, so that we are of opinion that the later measurements correspond to a more complete transformation into para-hydrogen.

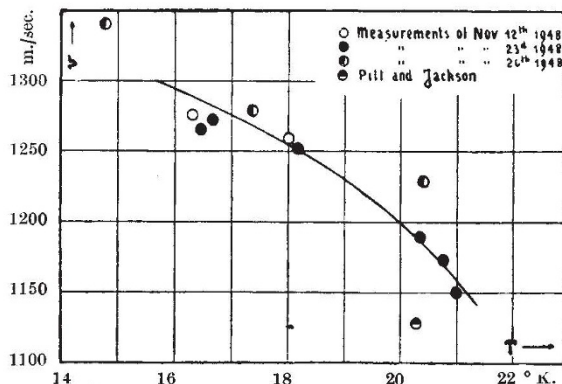


Fig. 1

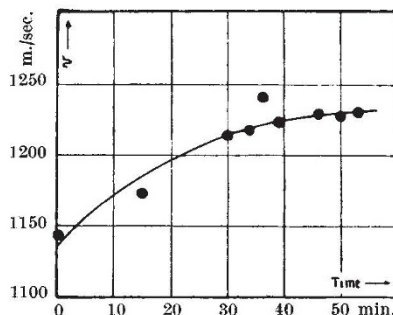


Fig. 2

Recently, one measurement at $17 \pm 1^\circ$ K. on the velocity of sound by using the pulse technique has been published by Galt². He found at this temperature, $v = 1,187$ m./sec., which is smaller than our values, so that we suppose that his measurements correspond to normal hydrogen. Pitt and Jackson³ measured the velocity of sound at the boiling point of hydrogen; their value is also indicated in Fig. 1.

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