

12 Arundel Gardens W.

20th March 1891.

My dear Fitzguald

This doesn't mean that you are a foreigner, though you do live in an "island" of the sea; it simply is that I have the paper handy.

I want to tell you that I have found that $\frac{\text{Velocity}^2}{\text{volume}^2}$ varies with absolute temperature according to a law like $V^2 = aT - b$ provided volume is kept constant. Now $V^2 = \frac{c}{\alpha} \cdot v$

or $\frac{V^2}{v} = e \frac{c}{\alpha}$, where e is isothermal

elasticity, i.e. $v \frac{dp}{dv} \frac{c}{\alpha}$ is it not? For

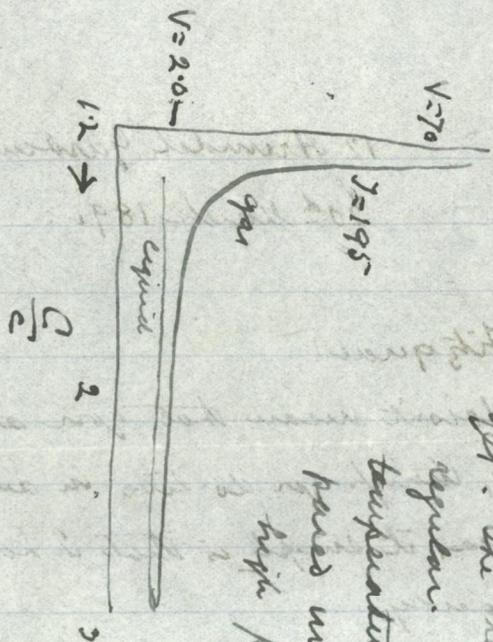
$$\frac{c}{\alpha} = \frac{V^2}{v^2} \cdot \frac{dv}{dp} \text{ so that } \frac{V^2}{v^2} = \frac{dp}{-dv} \cdot \frac{d}{c}$$

And in words, rate of increase of pressure per unit decrease of volume has, provided volume be kept constant, a linear relation to temperature. Am I right? Please tell me. If this is so, then I have

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a means of determining, by arbitrarily finding the variation of $\frac{dV^2}{V^2}$ with volume, of getting at the continuous passage from liquid to gas; because these lines, if straight (and the numerical results are wonderfully even), can be extrapolated; and tangents to the continuous lines can be found from Young's or my old diagrams. So it would be possible to calculate the specific heats in the unmeasurable space, or also to draw tangents to isentropic lines. I should say that these results we got from the liquid; or that they also hold for the gas. There can be no possible doubt as to the correctness of the relations with the liquid.

But at low temperatures it is extremely difficult to get tangents to the isothermal compressibility curves. Still we have got approximate ones



for $t = 100^\circ$ or $t = 100^\circ$. and they give ratios varying from 1.2 to 1.4 for $\frac{C}{C}$. would you prefer this? It is about the same as the previous ratios. The curves are going to be like this, I think; but we have hardly got as far as yet. The results with the liquid are splendidly regular. I have got many more at the ordinary temperature, of huge lengths - 6 cm. I saw papers with curves as smooth as to curves - at high pressures with previous other

Please let us know what you think. Lord's papers have gone in & will be considered. This report from Lord's & Lord's are yours
W.P. Conway.