

The results of the above comparison may be taken therefore as conclusive evidence that *Assumption B* is not in accordance with the facts.

It may be noted in connection with this conclusion that it is clearly impracticable to use sound velocity as a means of measuring the ratio $\frac{c_p}{c_v}$ for nitrogen peroxide.

New Experiments

Natanson's determinations involved the use of a mercury manometer and stop-cocks. The stop-cock lubricant is readily attacked by the nitrogen peroxide, and as a result water vapor in slight traces may have reached the gas and catalysed the reaction. In order to check the above conclusion with a carefully dried gas and, at the same time, to investigate the effect of water vapor, added in known quantity, the following experiments were carried out.

The apparatus finally designed had neither stop-cocks nor manometer. The stop-cocks were eliminated because it was found that even metaphosphoric acid used as lubricant allowed leaks. As the use of a manometer would require stop-cocks to protect the mercury from the peroxide, the pressure of the gas was calculated from measurements of its volume and weight by the use of the Gibbs' equation (see page 441).

The sound-producing apparatus was somewhat different from the Natanson type. The sounding tube AB, 120 cm long and 1.0 cm cross section, with a flattened bulb at each

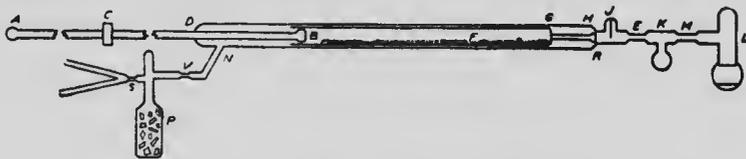


Fig. 1

end, is clamped at its middle, C. It is sealed into the gas chamber DF at D, so that DB is 20 cm long. As this is equivalent to a second clamp at D the sounding tube is damped at