Rate of Dissociation of Nitrogen Peroxide

CO2	7.55
N ₂ O	7.95
H ₂ O	6.65
SO ₂	7.88
H_2S	6.27
CS_2	9.93

Average, 7.70

If in these calculations the value -12900 cal., calculated by van't Hoff from Deville and Troost's measurements is used for the heat of dissociation instead of -13132 cal., calculated by Schreber from Natanson's experiments, the values for $c_v^{"}$ and $c_v^{'}$ would come out about 12 percent greate:, say 12.8 and 6.4. Van't Hoff¹ mentions the value 16.86 for 92 grams of nitrogen peroxide "at high temperatures where dccomposition can be neglected," but does not say how he obtained it. This would give 16.86/2 - 1.985 = 6.45 for $c_v^{"}$. Because of this agreement with van't Hoff's value, and the higher values for other gases, the values

 $c''_{v} = 12.8$ and $c'_{v} = 6.4$

have been used in the calculations. Fortunately the effect of errors in the specific heats on the values $\left(\frac{d\rho}{dp}\right)_{\rm A}$ and $\left(\frac{d\rho}{dp}\right)_{\rm B}$ are relatively small. (See p. 444.)

Comparison of Calculated and Observed Values of $\begin{pmatrix} d\rho \\ d\rho \end{pmatrix}$

The following table shows the calculated values of $\left(\frac{d\rho}{dp}\right)_{\rm A}$, and $\left(\frac{d\rho}{dp}\right)_{\rm B}$, and the values of $\left(\frac{d\rho}{dp}\right)_{\rm exp.}$ obtained from four sets of the sound wave measurements of E. and U. Natanson:²

ł	р mm	d (meas- ured)	λ _ι mm	λ mm	$\left(\frac{d\rho}{d\dot{p}}\right)_{\rm A}^{ imes100}$	$\begin{pmatrix} d ho \\ dp \end{pmatrix}_{ m B}^{ imes 10^6}$	$ \begin{pmatrix} d\rho \\ dp \end{pmatrix}_{\exp}^{\times 10^{\circ}} $
21.72°C	230.59	2.486	42.09	23.64	3.659	3.275	3 · 558
21.25	367.08	2.599	42.05	23.08	3.833	3.452	3 · 733
21.81	617.63	2.709	41.80	22.27	3.987	3.619	3 · 953
19.96	640.76	2.762	41.98	22.19	4.092	3.718	4 · 042

¹ Van't Hoff-Cohen: Studien zur chem. Dynamik, p. 158 (1896).

² Wied Ann., 24, 454 (1885).

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