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The integrals $x = 1 + \frac{\tau^2}{4}$ and $y = e^{1 + \frac{\tau^2}{4}}$ are both even functions of τ .

By polarisation with respect to the conic

$$x^2 - y^2 = c$$

the curve $y = e^x$ passes into the curve:

$$\eta = \xi e^{-\frac{\xi+1}{\xi}},$$

which is, as could be expected, not equivalent to $y = e^x$.

Here holds;

$$\varphi = \xi e^{-\frac{\xi+1}{\xi}}, \quad \varphi_{\xi} = \frac{\xi+1}{\xi} e^{-\frac{\xi+1}{\xi}}, \quad \varphi_{\xi\xi} = \frac{1}{\xi^2} e^{-\frac{\xi+1}{\xi}}, \quad \xi\varphi_{\xi} - \varphi = e^{-\frac{\xi+1}{\xi}}.$$

$$\psi = \frac{1}{\xi^3}; \quad \tau = -\frac{2}{\sqrt{\xi}}, \quad \xi = \frac{4}{\tau^2};$$

$$I = \frac{\psi_{\xi} - 2\xi\psi^2}{\psi^{3/2}} = -\frac{3\xi+2}{\sqrt{\xi}} = +\frac{\tau^2+6}{\tau}.$$

Hence too the integrals $\xi = \frac{4}{\tau^2}$ and $\eta = \frac{4}{\tau^2} e^{-\left(\frac{2+\tau^2}{4}\right)}$ are both even functions of τ .

As an example of case (γ) we give

$$x^6 + y^6 = 1.$$

The calculation shows us

$$x = \sqrt[3]{\sin \frac{3\tau}{\sqrt{5}}}, \quad y = \sqrt[3]{\cos \frac{3\tau}{\sqrt{5}}}, \quad I = \frac{8}{5} \cotg \frac{3\tau}{\sqrt{5}};$$

I is odd, x is odd, y is even.

Physics. — “*Determinations of refractive indices of gases under high pressures*”. First paper. *The dispersion of hydrogen*. By L. H. SIERTSEMA and M. DE HAAS. (Communicated by Prof. H. KAMERLINGH ONNES).

(Communicated in the meeting of November 25, 1911).

1. The modern theories of light which have been developed from the theory of electrons lead to many relations that can be tested experimentally in various ways. One of us¹⁾, for instance, has endeavoured to obtain from his experiments upon the magnetic

¹⁾ These Proc. V. 1902/03 p. 413. Comm. phys. lab. Leiden N^o. 82.

rotational dispersion of gases values of e/m for the electrons which participate in the light vibration. For this deduction values of $dn/d\lambda$ ($n =$ refractive index, $\lambda =$ wave length) for those gases at high pressure were needed, while only determinations made at atmospheric or, at least, at low pressure were available. It is doubtful whether it is justifiable to apply to high pressure the values thus obtained.

The few measurements which have hitherto been made upon the refractive indices of gases at high pressures have all had the object to obtain the relationship between the index of refraction and the density of the gas. The question as to whether the dispersion varies with the pressure or not has not yet been made the subject of an experimental investigation. We have therefore undertaken a more complete investigation, which includes a determination of refractive indices at high pressures for various wave-lengths.

The high degree of accuracy attainable by the use of an interference method renders it highly advantageous to use such a method for the determination of the refractive indices of gases. Many experimenters have used interference methods for obtaining such measurements. In our experiments we used a JAMIN interferential refractometer. In the path of one of the interfering rays a tube containing the experimental gas is placed, and, by using monochromatic light, the number of bands passing the cross-wire of a telescope can be counted when the quantity of gas contained in the tube is varied. The dispersion is evaluated by counting the bands crossing the field when different wave-lengths are successively employed. For if k_1 and k_2 represent the number of bands crossing the field for light of wave-lengths λ_1 and λ_2 respectively when the density of the gas varies from 0 to a given value, then

$$k_1 \lambda_1 = (n_1 - 1) e \quad , \quad k_2 \lambda_2 = (n_2 - 1) e$$

where n_1 and n_2 are the refractive indices at that particular density for the two colours, and e is the length of the tube. Furthermore in the ratio

$$\frac{n_1 - 1}{n_2 - 1} = \frac{\lambda_2 k_1}{\lambda_1 k_2} = c_{12}$$

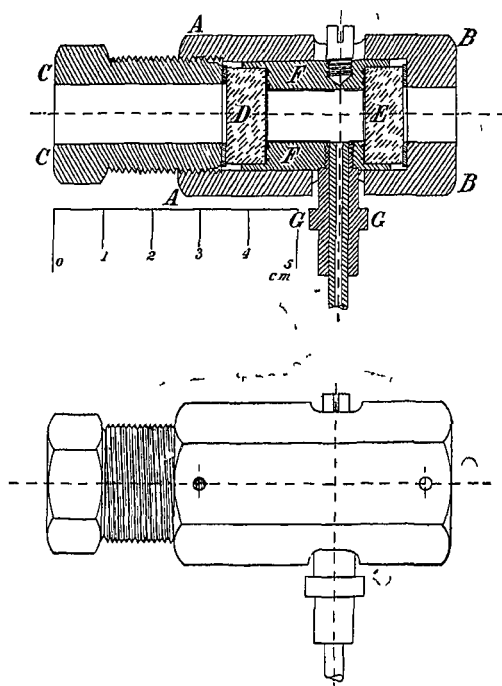
we obtain a quantity which expresses the dispersion of the gas, and which we shall call a dispersion constant.

We may remark that the values of these dispersion constants may be obtained without knowing the length of the tube, e ; this is necessary only for evaluating the refractive indices n_1 and n_2 . A high degree of accuracy can be reached in determining the numbers k_1, k_2, \dots , for the whole numbers involved can be obtained by direct

counting, and fractional portions can be determined from the position of the telescope cross-wire between two successive bands. When the number of bands crossing the field reaches some hundreds, it is obvious that the numbers k can be evaluated to a degree of accuracy far in excess of that possible in the measurement of e . It follows, too, that in measuring refractive indices the temperature and the pressure of the gas must also be known to a corresponding degree of accuracy, while the dispersion constants will vary but little with the density of the gas.

This led us to divide our research into two portions, one involving a determination of dispersion constants, the second a determination of refractive indices. The measurements described in the present paper relate to the first branch of the investigation.

2. A diagram is here given of the tube containing the experimental gas which was placed in the path of one of the interfering light rays.



A B. steel tube, with cylindrical boring, externally hexagonal.

C, nut tightening *D, E,* and *F.*

D and *E,* glass plates 8 mm. thick,

F, steel cylinder about 2 cm. long with projecting rims surrounding the glass plates.

Between *F* and the glass plates are washers of klingerit, a packing which is

used for steam joints and which suited the present purpose admirably. Brass rings prevented the squeezing of the packing into the tube. Outside the glass plates and the metal on either side are a brass ring and some paper washers F is coupled to the high pressure system by the screw connection G .

This coupling leads to a manometer and to a reservoir filled with the experimental gas under high pressure, while through it connection can also be made with an airpump, GAEDÉ's rotatory pump ("Kapselpumpe").

The circular scale of the metallic manometer has a diameter of 16 cm., and on it pressures up to about 150 atmospheres can be read to $\frac{1}{10}$ of an atmosphere.

Mr. KOHNSTAMM kindly afforded us an opportunity of comparing this manometer before and after the measurements with the STRUCKRATH manometer which he has fitted in the Amsterdam Physical Laboratory. We found that the manometer readings remained practically the same, the difference being, at the most, not more than $\frac{1}{10}$ of an atmosphere.

Beside the tube traversed by one of the interfering rays and in the path of the other ray are placed two glass plates identical with those in the experimental tube. By means of three adjusting screws these plates can be moved a little, and the breadth and the direction of the interference bands so regulated that they are in the best position for observation. For this purpose the adjusting screws of one of the glass plates of the interferometer can, of course, also be used. A wide slit in front of the first glass plate of the interferometer was found necessary in order to obtain clearly defined bands. The whole apparatus was enclosed in a sheet-iron case, which in the later experiments was filled with cotton wool leaving free only the paths of the light rays. The openings in this case were closed by glass plates. The high pressure connection and the manometer were also wrapped in cotton wool as far as the first regulating tap. Beside the experimental tube was placed the reservoir of a thermometer whose scale projected outside the case.

3. The measurements discussed in the present paper were made with pure hydrogen which we obtained through the kindness of Prof. KAMERLINGH ONNES from the Leiden laboratory, where it had been prepared from impure hydrogen by freezing out the impurities at a very low temperature¹⁾.

In the first series of measurements the source of light was a

¹⁾ KAMERLINGH ONNES, These Proc. XI. 1908/09, p. 883, Comm. phys. lab. Leiden, No. 109b.

HERAEUS quartz mercury lamp, and the light was concentrated through a lens upon the slit already mentioned in front of the interferometer. By means of light-filters the three wave-lengths (yellow, green and blue) of which the light emitted by this lamp chiefly consists, were isolated ¹⁾:

The interference bands were observed through a telescope provided with cross-wires, and the number of bands was determined that passed the point of intersection of the cross fibres as the density of the gas in the experimental tube was altered; to evaluate fractions a JAMIN compensator was used.

The accuracy attained in these measurements was not so great as that of later experiments; we shall not, therefore, describe them in detail but shall content ourselves with communicating the results.

In the accompanying table are given the numbers k_1 , k_2 and k_3 of the bands crossing the field while the density of the gas changed from that determined by the pressures and temperatures given below to zero, for each of the three colours $\lambda_1 = 0,578 \mu$, $\lambda_2 = 0,546 \mu$ and $\lambda_3 = 0,436 \mu$. The table also includes the dispersion constants

$$c_{12} = \frac{n_1 - 1}{n_2 - 1} = \frac{k_1 \lambda_1}{k_2 \lambda_2}; \quad c_{32} = \frac{n_3 - 1}{n_2 - 1} = \frac{k_3 \lambda_3}{k_2 \lambda_2}.$$

k_1	k_2	k_3	c_{12}	c_{32}	Press. atm.	Temp.
190.28	201.98	256.98	0.99713	1.01546	81.7	18.0° C
182.45	193.69	246.31	0.99701	1.01495	76.8	14.0 „
172.48	183.08	232.81	0.99716	1.01492	73.5	16.0 „
164.86	174.99	222.62	0.99716	1.01537	69.6	14.2 „
152.17	161.51	205.38	0.99723	1.01492	64.2	14.1 „
—	114.20	145.20	—	1.01478	44.9	11.0 „
90.07	95.64	121.62	0.99679	1.01493	37.4	11.3 „
Mean.....			0.99708 ± 0.00007	1.01505 ± 0.00010		

¹⁾ We used a solution of eosin which transmits only yellow, and a concentrated solution of didymium nitrate, which absorbs the yellow. In the latter case the other two colours were isolated by using green or blue glass. For the blue one of the newer glasses of SCHOTT and GEN. No. 3086, was used with excellent results. These glasses are described in detail by ZSIGMONDY, Z. f. Instrumentenk. 21 p. 97.

In the more recent experiments a HERAEUS quartz amalgam lamp (220 volt, 5 to 6 amp.) was used as a source of light. The spectrum of this light consists of a number of lines among which those of *Hg*, *Zn* and *Cd* are particularly bright. Owing to a copious formation of ozone it was found necessary to put the lamp in a fume cupboard.

A collimator with a rather wide slit was placed close to the lamp, but outside the fume cupboard. The light beam emerging from the collimator passed through the interferometer from which the JAMIN compensator had been removed and then fell upon the prism of a HILGER constant deviation spectroscope. In the field of the telescope we thus obtained a series of images of the slit, each corresponding to one of the wave-lengths emitted by the amalgam lamp. The collimator slit was made so wide that some of its images partially overlapped. Each image of the slit was crossed by a system of interference bands, horizontal in the green, but slightly sloping in the blue and violet. About 3 bands were visible in the red, and about 5 in the violet. It appeared that the bands in any one slit image did not all lie in the same plane, so that they were not all quite in focus at the same time in the telescope. Even their apparent position in the field altered slightly when the density of the gas in the experimental tube varied. The telescope was so adjusted that for all the densities of the gas, occurring during the experiments, one of the bands not far from the central band could be brought into sharp focus.

In these experiments measurements were made upon six different images of the slit; these were:

a. The image of the red cadmium line $\lambda_a = 0.644 \mu$. This image was partially covered by that of the zinc line 0.636μ . The uncovered part, however, was of sufficient width to allow the interference bands in it to be brought under proper observation.

b. The image of the green mercury line $\lambda_b = 0.546 \mu$. This image was very bright. The interference bands were also easily observed, but still they were not so clearly defined as one would expect from their great intensity. Possibly satellites exert here a disturbing influence.

c. The image of the green cadmium line $\lambda_c = 0.509 \mu$. The bands in this case were perfectly dark throughout.

d. The image of the blue zinc line $\lambda_d = 0.472 \mu$. This image was situated amongst a number of others in such a way that only a portion of it was free, in which the bands, which were very well defined, could be examined.

e. The image of the blue mercury line $\lambda_e = 0.436 \mu$. This image was very bright with well defined bands.

f. The image of the violet mercury line $\lambda_f = 0.405 \mu$. The brightness of this band was much less.

These images of the slit, or rather their uncovered portions, were brought in succession into the centre of the field of vision by a rotation of the spectroscope prism. The spectroscope telescope had a micrometer eye piece with a vertical screw. The movable wire could be made to coincide with the bands. In our measurements the difference of phase between the interfering rays was determined in each case for a fixed point in each image of the slit. We tried to do this first by measuring the distances between the fixed point and each of the two bands immediately above and below it. This was done for the six images a , b , c , d , e and f in succession, and then again in the reverse order f , e , d , c , b and a . Some time elapsed before this could be completed and it was found that during that period the bands did not remain sufficiently stationary to obtain accurate results. Another method was therefore adopted in which we were more independent of this disturbance. In this method the distance of only one band from the fixed point was determined, and from that measurement the phase difference at the fixed point was obtained. From separate measurements the variation of the required phase difference with the distance of the bands from the fixed point was determined.¹⁾ By now focussing with the movable wire several times alternately a band in the image a , and then a band in the image b , the difference (ab) between the phase differences at the fixed points in the images a and b was obtained, and then in the same way, the differences (cb), (db), (eb) and (fb). The measurements from which these data were obtained could follow each other in rapid succession, so that sufficient accuracy could be reached even though the bands did not remain absolutely stationary.

Properly speaking only the fractional parts of the differences (ab), (cb) etc. could be evaluated in this way; the whole numbers were obtained afterwards, by the method indicated below.

These measurements were first made at the highest pressure available; a small quantity of the gas was then allowed to escape while the number of bands was counted which crossed the fixed point in the green image b ; another series of measurements of differences of phase-difference was then made, and so on until the last series which

¹⁾ From these measurements it was found that the distance between the bands in any one image was not constant, and consequently the desired phase difference could not be represented by a linear function of the distance z of the point under examination from the fixed point. For this difference, therefore, we assumed a quadratic law of variation $\varphi = az + bz^2$, the coefficients of which we calculated by the method of least squares from several measurements made upon various bands in the same image.

was made with the tube completely evacuated. The reverse order of operations with rising pressure was not so successful, as during the admission of the gas, the bands became confused and disappeared, which probably resulted from the difference of temperature between the gas in the tube and that in the reservoir.

By a separate investigation we ascertained that the admission of gas at a high pressure occasioned no change of shape in the experimental tube sufficient to influence the values of the dispersion constants.

For the b image, the integral part of the phase differences at the fixed point can be evaluated by the direct counting of the number of bands crossing the field; for this purpose one can give the value zero to the phase-difference at one of the bands in the final state (vacuum). Similarly in the other images the value zero can be assigned to one of the bands in the final state (vacuum), and we then obtain for that state the integral parts of the differences (ab), . . . It is then ascertained from a separate experiment how much these values change if one band is allowed to cross the field in b , and as these changes will be less than one band it is easy to determine them completely. From this follows how many units (ab), (cb) etc. will change when a larger number of bands, e.g. 10, is allowed to cross the field, and in this way we can soon find how great these changes will be for 50 or 100 bands, which were the numbers allowed to cross the field in our series of observations. Finally, if these differences (ab) etc. are completely known for all densities, one can easily find the number of bands that cross the field in each image in passing from any one density to vacuum. We shall represent these numbers by k_a , k_b , k_c , k_d , k_e and k_f . The ratios

$$\frac{k_a}{k_b}, \frac{k_c}{k_b}, \text{ etc.}$$

are then calculated.

As an example we give a series of results for the density determined by a pressure of 71.8 atm. and a temperature of 19,49° C.

$k_b = 367.067$	$k_a = 309.073$	$k_a / k_b = 0.84201$
$k_b = 367.050$	$k_c = 395.687$	$k_c / k_b = 1.07802$
$k_b = 367.023$	$k_d = 428.186$	$k_d / k_b = 1.16665$
$k_b = 366.986$	$k_e = 466.758$	$k_e / k_b = 1.27187$
$k_b = 366.942$	$k_f = 506.037$	$k_f / k_b = 1.37907$

In this way the following results were obtained:

Pressure in atm.	Temperature.	k_b (mean)	$\lambda_b = 0.546$ $\lambda_a = 0.644$	$\lambda_c = 0.509$	$\lambda_d = 0.472$	$\lambda_e = 0.436$	$\lambda_f = 0.405$
			$\frac{k_a}{k_b}$	$\frac{k_c}{k_b}$	$\frac{k_d}{k_b}$	$\frac{k_e}{k_b}$	$\frac{k_f}{k_b}$
71.8	19.49	367.014	0.84201	1.07802	1.16665	1.27187	1.37907
62.0	19.77	317.160	0.84199	1.07798	1.16667	1.27179	1.37902
52.1	19.95	267.315	0.84203	1.07799	1.16667	1.27183	1.37897
42.3	19.95	217.264	0.84202	1.07807	1.16666	1.27178	1.37897
32.2	20.01	167.118	0.84206	1.07796	1.16659	1.27170	1.37883
68.5	19.15	345.631	0.84201	1.07803	1.16673	1.27207	1.37925
68.1	19.33	343.616	0.84200	1.07806	1.16680	1.27205	1.37927
58.0	19.49	293.244	0.84202	1.07805	1.16672	1.27208	1.37930
47.8	19.65	243.198	0.84205	1.07807	1.16669	1.27205	1.37923
38.0	19.75	193.451	0.84206	1.07809	1.16668	1.27201	1.37921
27.9	19.85	143.354	0.84212	1.07805	1.16670	1.27192	1.37899
65.4	20.35	336.393	0.84203	1.07799	1.16662	1.27176	1.37882
65.2	20.52	335.013	0.84203	1.07798	1.16669	1.27177	1.37886
63.9	20.67	327.868	0.84203	1.07800	1.16659	1.27181	1.37892
58.8	20.85	302.103	0.84207	1.07798	1.16662	1.27218	1.37891
39.0	20.94	202.607	0.84210	1.07796	1.16667	1.27179	1.37902

The values obtained for the various densities are fairly constant, and the deviations are in no definite direction. As means we obtain

$$\begin{array}{cccccc}
 0,84204 & 1,07802 & 1,16667 & 1,27190 & 1,37904 \\
 \pm 0,9 & \pm 1,1 & \pm 1,3 & \pm 3,7 & \pm 4,0
 \end{array}$$

If these ratios are constant, so also are the dispersion constants

$$c_{ab} = \frac{n_a - 1}{n_b - 1} = \frac{k_a \lambda_a}{k_b \lambda_b}, \quad c_{cb} = \frac{n_c - 1}{n_b - 1} = \frac{k_c \lambda_c}{k_b \lambda_b}, \quad \text{etc.}$$

in which the refractive index for all wave-lengths in the final state is taken as unity.

We thus find as the result of our experiments that the dispersion constant of hydrogen is the same at all densities used, and we obtain for it the following values:

	λ (vac.)	$c = \frac{n-1}{nb-1}$
<i>a</i>	0.64403	0.99280 ± 0.000011
<i>b</i>	0.54623	1
<i>c</i>	0.50873	1.00401 ± 0.000010
<i>d</i>	0.47234	1.00885 ± 0.000011
<i>e</i>	0.43597	1.01516 ± 0.000030
<i>f</i>	0.40478	1.02193 ± 0.000030

We can compare our results with those obtained by other experimenters, especially with those of MASCART ¹⁾, PERREAU ²⁾, SCHEEL ³⁾, HERMANN ⁴⁾, KOCH ⁵⁾ and CUTHBERSON ⁶⁾. To make comparison possible, the values of the dispersion constant for the wave-lengths we used are deduced from their results by graphical interpolation (MASCART, PERREAU, KOCH, CUTHBERSON) or from the dispersion formula given (SCHEEL), while from HERMANN'S observations they were calculated directly. In this way we obtain

λ	MASCART.	PERREAU.	SCHEEL.	HERMANN.	KOCH.	CUTHBERSON.	SIERTSEMA DE HAAS.
0.644	0.9962	0.9927	0.9939	0.9924	0.9934	0.9930	0.9928
0.546	1	1	1	1	1	1	1
0.509	1.0030	1.0041	1.0034		1.0038	1.0037	1.0040
0.472		1.0090	1.0074		1.0085		1.0088
0.436			1.0125	1.0114	1.0152		1.0152
0.405							1.0219

An interpolation formula can be obtained from our values of the dispersion constant. We will take the ordinary form

$$n-1 = a \left(1 + \frac{b_1}{\lambda^2} + \frac{b_2}{\lambda^4} \right)$$

in which λ is the wave length in air; we then get

¹⁾ MASCART, Ann. de l'éc. norm. (2) 6 p. 61 (1877).

²⁾ PERREAU, Ann. de ch. et de phys. (7) 7 p. 335 (1896).

³⁾ SCHEEL, Verh. d. D. phys. Ges. 9 p. 28 (1907).

⁴⁾ HERMANN, " " " " " 10 p. 477 (1908).

⁵⁾ KOCH, Nova acta regiae soc. scient. Upsaliensis (4) 2 No. 5 (1909).

⁶⁾ CUTHBERSON, Proc. R. S. (A) 83 p. 151, 1910.

$$c = \frac{n-1}{n_b-1} = \frac{1 + \frac{b_1}{\lambda^2} + \frac{b_2}{\lambda^4}}{1 + \frac{b_1}{\lambda_b^2} + \frac{b_2}{\lambda_b^4}}$$

The coefficients b_1 and b_2 were calculated by least squares valuing each observation according to the mean error. We thus obtained

$$b_1 = 0.007337, \quad b_2 = 0.000089$$

and hence,

$$c = \frac{n-1}{n_b-1} = 0,97504 \left(1 + \frac{0.007337}{\lambda^2} + \frac{0.000089}{\lambda^4} \right)$$

The following table shows the accuracy with which this formula represents the dispersion constants:

	λ (air)	c (cal)	c (obs)	Δ	weight	$\Sigma [p \Delta^2]$
<i>a</i>	0.64385 μ	0.99281	0.99280	$-10^5 \times 1$	8	8
<i>b</i>	0.54608 „	1	1			
<i>c</i>	0.50859 „	1.00399	1.00401	+ 2	9	36
<i>d</i>	0.47221 „	1.00886	1.00885	- 1	8	8
<i>e</i>	0.43585 „	1.01510	1.01516	+ 6	1	36
<i>f</i>	0.40467 „	1.02196	1.02193	- 3	1	9

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Good agreement is also obtained between experimental and calculated values by using the dispersion formula ¹⁾

$$\frac{n^2-1}{n^2+2} = \frac{Ne_1^2}{3 m_1 (v_1^2 - v^2)} + \frac{Ne_2^2}{3 m_2 (v_2^2 - v^2)} + \dots$$

of the theory of electrons, in which v , v_1 and v_2 are frequencies and e , N , m_1 , m_2, \dots are the known constants in that theory. Even with *one* term on the right-hand side we obtain a good agreement. We then get the formula

$$c = \frac{n-1}{n_b-1} = \frac{n_b+1}{n+1} \cdot \frac{n^2+2}{n_b^2+2} \times \frac{\frac{1}{\lambda_1^2} - \frac{1}{\lambda_b^2}}{\frac{1}{\lambda_1^2} - \frac{1}{\lambda^2}}$$

in which λ , λ_1 , and λ_b now represent wave-lengths in vacuo. An examination of the factor

$$\frac{n_b+1}{n+1} \cdot \frac{n^2+2}{n_b^2+2}$$

¹⁾ See e.g. LORENTZ, The theory of electrons, p. 144.

shows that its value may be taken as unity without appreciable error. We then get

$$c = \frac{\frac{1}{\lambda_1^2} - \frac{1}{\lambda_b^2}}{\frac{1}{\lambda_1^2} - \frac{1}{\lambda^2}}$$

An evaluation of λ_1 by the method of least squares valuing the observations on the plan already mentioned gives

$$\lambda_1 (\text{vac.}) = 0.08703 \mu$$

while the following table shows the agreement obtained.

	λ (vac)	c cal)	c (obs)	Δ	weight	$\Sigma [p \Delta^2]$
<i>a</i>	0.64403 μ	0.99274	0.99280	— 6	8	288
<i>b</i>	0.54623 „	1	1			
<i>c</i>	0.50873 „	1.00400	1.00401	— 1	9	9
<i>d</i>	0.47234 „	1.00886	1.00885	1	8	8
<i>e</i>	0.43597 „	1.01506	1.01516	— 10	1	100
<i>f</i>	0.40478 „	1.02185	1.02193	— 8	1	64

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We thus find that the natural vibration of hydrogen corresponds to a wave-length of 0,08703 μ , a value that agrees quite well with that determined by KOCH, 0,0880 μ , from dispersion measurements extending to the ultra-red, and still better with the value 0,087 μ deduced by NATANSON¹⁾ from PERRÉAU's experiments. It differs somewhat from CUTHBERSON's value, 0.08516 μ .

A calculation of the absolute values of the refractive indices is postponed until the completion, in a subsequent part of this research, of the investigation of the refractive index for the wave-length $\lambda = 0,546$ with special reference to its dependence upon the pressure. We also intend if possible to extend these measurements to higher pressures, and to other gases. In the meantime we may remark that, assuming $n-1$ to be proportional to the density of the gas, and that $n = 0,000139$ at 0° C. and 1 atm., the calculation of e/m by the method given by one of us in a previous paper²⁾ leads to the value 1.70×10^7 .

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¹⁾ NATANSON, Bulletin de l'Ac. des sc. de Cracovie 1907, p. 336.

²⁾ SIERTSEMA, These Proc. V. 1902,03 p. 413. Comm. phys. lab. Leiden N^o. 82.