The mean of seven determinations is 19.945, referred to O = 16. Hence A = 39.89.

Ramsay and Gray,[1] by means of the microbalance, have been able to weigh the gaseous emanation of radium, for which they propose the name *niton*. The values thus found for its molecular weight are 222, 216, 227, 218, 217, in mean 220. The same value was also found by Debierne[2] by a different method.

Miscellaneous Notes.—Richards and Baxter[3] have investigated the subject of density corrections, or in other words the reduction of weights to a vacuum. They regard the validity of the corrections, as applied at Harvard, as well established. Relations between the atomic weights have been studied by Howard.[4] Dubreuil[5] has continued his recalculation of the determinations of Stas.

[CONTRIBUTIONS FROM THE CHEMICAL LABORATORY OF HARVARD COLLEGE.]

THE ULTRAVIOLET ABSORPTION SPECTRUM OF AQUEOUS SOLUTIONS OF NEODYMIUM CHLORIDE.

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Received December 22, 1910.

In a recent paper upon the atomic weight of neodymium[6] the absorption spectrum of aqueous solutions of neodymium salts from λ 7000 to λ 4000 is described. After the earlier measurements were made a large quartz spectrograph became available, and with this instrument the ultraviolet absorption spectrum of aqueous neodymium chloride has been examined.

The spectrograph was constructed by R. Fuess, Berlin. It has lenses 5 cm. in diameter, provided with diaphragms, and of about 80 cm. focal length, while the 60° Cornu prism is of 5 cm. base and 4.5 cm. high. In order to avoid as far as possible difficulty from double refraction the diameter of the lenses was diminished one-half with the diaphragms. By means of a series of trial negatives, with the spark of a cadmium alloy for illumination, the prism was set in the position of minimum deviation for approximately λ 3400, and the positions of the collimating and camera lenses were so adjusted that the region λ2500 to λ7500 was in fair focus throughout. Owing to the curvature of the spectrum image, it was not possible to have a wider range in focus at any one time. However, this range included the whole of the best continuous spectrum which we were able to produce.

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[1] *Compt. rend.*, 151, 126.

[2] *Ibid.*, 150, 1740.

[3] THIS JOURNAL, 32, 507.

[4] *Chem. News*, 101, 181, 265.

[5] *Bull. soc. chim.*, [4] 7, 119.

[6] Baxter and Chapin, *Proc. Am. Acad.*, 46, 215 (1910); THIS JOURNAL, 33, 13.

Comparative exposures with an incandescent Welsbach mantle, an acetylene flame, and a Nernst glower showed the last to be relatively richer in the shorter wave lengths, while the acetylene flame, although better in this respect than the Welsbach mantle, gives a slightly discontinuous spectrum in certain regions of short wave length. The foregoing experience is in accord with that of many previous investigators. All subsequent experiments were therefore carried out with the Nernst glower as the source of illumination. The light of the glower as well as that of the metallic spark used in the comparison spectra was condensed on the slit by means of a large quartz lens of 20 cm. focal length.

Measurements of wave length were made by comparison with the spectrum of an iron spark. The absorption spectrum and the iron spectrum were produced through adjoining portions of the slit by means of diaphragms. Since it was unnecessary to alter the position of the plate holder between the exposure of the plate to the absorption spectrum and to the iron spectrum, there was no possibility of error from lateral motion of the plate. The computation of wave lengths was made by means of a comparator and wave length curve, while the identification of the prominent iron lines was facilitated by comparison with a cadmium spectrum.

The neodymium chloride solution was contained in a tube of clear fused quartz 20 mm. in diameter placed close to the slit. Exposures of from one minute to one hour were made, first with a saturated solution of the salt, then with solutions of one-half, one-quarter and one-eighth the original concentration. Although the first two dilutions effected the resolution of the broad absorption band $\lambda 3450$–$\lambda 3580$ into four narrower ones, the third dilution produced no further effect of this sort. Since the absorption bands of the last solution were already faint, no further dilution was considered necessary.

The material examined was Fraction 2931, the purification of which has already been described in detail in the earlier paper upon the atomic weight of neodymium.[1] This specimen is one of those used in the measurements of the absorption spectrum of neodymium salts in the visible region. Previous examination has indicated that this fraction is very pure except for a trace, less than 0.05 per cent., of praseodymium salts. Since praseodymium salts have no narrow absorption bands in the ultraviolet region, no complications are introduced by this impurity. In preparing the chloride, the neodymium was precipitated as oxalate, the oxalate was ignited to carbonate and oxide, the product was dissolved in hydrochloric acid and the chloride was once crystallized from concentrated hydrochloric acid solution. Although the crystals were centrifugally drained, they undoubtedly retained a small amount of mother

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[1] *Loc. cit.*, 221.

liquor. Hence the solution of the chloride contained a slight excess of hydrochloric acid.

In the first column of the following table are given the wave lengths of the central portions of all the absorption bands observed either in concentrated or in dilute solutions. In each case the measurement was made in the most dilute solution in which the band was observed. The second column contains a description of the character of the bands. The remaining columns give the results obtained by other recent investigators. Of the latter, only Holmberg employed material of a high degree of purity.

Baxter and Woodward.		Holmberg.[1]	Uhler and Wood.[2]	Jones and Anderson.[3]
4327	weak, narrow	4330	433	4330
4290	very weak, narrow	....	..	4290
4274	very strong, narrow, sharp	4271	427.5	4275
4180	weak, narrow	4183	418	4180
3801	weak, very narrow	3802–3806	381	..
3556	strong, narrow	3555–3565	355	3560
3540	very strong, narrow	3530–3545	..	3540
3507	strong, narrow	3490–3510	350	3505
3465	very strong, narrow	3455–3480	347	3465
3399	weak, narrow	3410–3430	..	3390
3288	strong, very broad, diffuse	....	..	3225
3231	weak, narrow	....	..	..
3144	weak, broad, diffuse	....	..	..
3067	very weak, narrow	....	..	..
3047	very weak, narrow	....	..	..
3030	very weak, narrow	....	..	..
3015	very weak, narrow	....	..	..
2998	medium, narrow	....	..	..
2983	strong, narrow, sharp	....	..	2985 double
2937	very weak, diffuse	....	..	..
2913	medium, narrow	....	..	..
2902	medium, narrow	....	..	2900

The comparator could be read with certainty to 0.05 mm. while this quantity corresponded to one unit in the fourth figure of the wave length at λ3700. Still, since it is difficult to be sure of the exact position of the center of even a narrow absorption band, some uncertainty undoubtedly exists in the fourth figure of our results. The numerical agreement of our figures with those of the other experimenters is very satisfactory.

It is worth noting that all the bands previously observed by others were found in the spectrum of our preparation, while the bands which we observed and which are lacking in the older results are in most cases so weak that they can be observed only under the most favorable conditions.

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[1] *Z. anorg. Chem.*, 53, 113 (1907).

[2] "Atlas of Absorption Spectra," *Pub. Car. Inst.*, 71, 54 (1907).

[3] "Absorption Spectra of Solutions," *Ibid.*, 110, 76 (1909).