$$I_{\Psi} = k \left(\frac{2\beta - 1}{(2\beta - 1)^2(1 + \cos \Psi) + (1 - \cos \Psi)} \right)^2,$$

where

$$\beta = \frac{V\rho}{E},$$

V being the potential drop through which the bombarding electrons have acquired their speed.

ρ , the radius of the shell.

and

E , the nuclear charge.

$\Psi = 0$ is the direction back along the path of the incident electrons.

An examination of this expression shows that for all values of $\beta < 1$, I_{Ψ} has its maximum value in the direction $\Psi = 0$. This feature is a direct result of the limitation of the field of the nucleus and is not present when the field is unlimited as in the case of the scattering of alpha particles. In this case all appreciable deflections occur inside the innermost shell of electrons. For the system equivalent to a nucleus of eight electronic charge surrounded by a shell of eight electrons and of radius 5×10^{-9} cm. $\beta = 1$ corresponds to a bombarding potential of 229 volts, so that, for such a system there should be a maximum in the intensity of scattering in the direction $\Psi = 0$ for all lower values of this potential.

The main features of the distribution curves for nickel, including the lateral maximum of variable position, are to be expected if the nickel atom has its electrons arranged in two shells. Such an arrangement is incompatible with chemical and other data which require the 28 electrons of nickel to be arranged in either three or four shells. It is not to be expected, however, that the innermost shell of two electrons will contribute any prominent feature to the distribution of scattered electrons. It is also possible that when nickel is in the solid state the outer shell of electrons is more or less completely dispersed, as has recently been suggested by Broglie and Dauvillier. On the other hand, minor details due to other shells may be found when the distribution curves are studied with greater resolving power, and other features may appear in as yet unexplored ranges of bombarding potential.

RESEARCH LABORATORIES OF THE
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WIDTH OF SPECTRAL LINES OF HELIUM AS A FUNCTION OF PRESSURE IN THE SOURCE.

BY LLOYD W. TAYLOR.

THE method of visibility-curve analysis is applied to a study of some of the more prominent lines in the visible spectrum of helium. Report is made on the width of the 5876 line as a function of pressure in the discharge tube.

Between pressures of 1 and 16 centimeters the half-width of this line is found to increase from 0.021 Å. at the lower to 0.041 Å. at the higher pressure, at a rate which is very nearly linear. This is in accordance with a law announced by Michelson in 1896.

The investigation is still under way for the purpose of measuring the width of other lines of the same gas and of extending the upper limit of pressure.

THE UNIVERSITY OF CHICAGO.

ON THE VACUUM SPARK SPECTRUM OF SILICON.

By R. A. SAWYER AND R. F. PATON.

WAVE-LENGTH measurements on silicon have been published by Rowland, Lockyer, Exner and Haschek, Eder and Valenta, Crookes and one or two other observers. Inspection of their data shows that the various observers agree on but few lines. Even on these few lines discrepancies in wave-length occur.

Wave-lengths in the Visible Part of the Spectrum of Silicon.

Intensity.	Wave-length I.Å.	Mean Wave- length by Other Observers.	Intensity.	Wave-length I.Å.	Mean Wave- length by Other Observers.
1	4085.25	—	0	4673.27	—
3	4088.86	4088.86	2	4682.99	—
3	4116.16	4116.05	0	4709.03	—
3	4128.18	4128.00	3	4716.68	—
3	4131.05	4130.99	1	4733.35	—
1	4150.26	—	1	4800.37	—
0	4153.25	—	2	4813.21	4812
1	4190.96	4190.0	2	4819.54	4819
1	4198.25	4198.0	3	4828.81	4829
1	4212.64	—	0	4907.23	—
1	4215.58	—	0	4922.28	—
0	4254.42	—	0	4933.97	—
0	4257.66	—	3	5041.28	5043.2 ± 1.5
0	4259.21	—	4	5055.96	5058.0 ± 1.5
0	4262.29	—	0	5182.32	—
1	4267.19	—	0	5186.36	—
1	4277.91	—	0	5192.66	—
0	4314.26	—	1	5202.98	—
1	4328.31	—	0	5669.8	—
2	4338.54	—	0	5689.9	—
10	4552.52	4552.57 ± .25	2	5740.2	5740.4
8	4767.59	4767.65 ± .5	0	5868.4	—
7	4574.67	4574.64 ± .2	0	5889.7	—
1	4619.45	—	1	5957.8	5960.6 ± .8
2	4631.15	—	1	5979.4	5980.3 ± 1.5
1	4638.23	—	2	6347.9	6346.8
2	4654.07	—	1	6372.2	6370.1 ± .7
1	4665.54	—			