THE DETERMINATION OF V AND E/M FOR CATHODE RAYS AS A LABORATORY EXPERIMENT IN PHYSICS

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The writer has endeavored during the past two years to devise a method and apparatus[1] for the determination of v and e/m for cathode rays with sufficient accuracy to make it a desirable experiment for undergraduates in electrical measurements.

The parallel field method of J. J. Thomson has been simplified by using slow velocity cathode rays, such as are obtained from a Wehnelt or hot lime cathode.[2] These slow moving rays make it possible to use the earth's field for the magnetic deflection in place of the ordinary electro-magnet. This simplifies the formula and does away with the end corrections due to the spreading field at the edge of the magnet. The electrostatic deflection of the rays is obtained by the usual method of placing two parallel plates within the discharge tube.

With a beam 30 cm. long the magnetic deflections are of the order of one centimeter. This may be increased or diminished by using a *low* or a *high* potential in operating the Weh-

[1]Knipp, School Science and Mathematics, Vol. 14, 1914.
[2]Knipp and Welo, Terrestrial Magnetism and Atmospheric Electricity, June, 1915.

nelt cathode. The following table exhibits data obtained on succeeding days and over a wide range of conditions. The tube was operated by the instructor before the section. There were four sections.

Section	Discharge Potential	Pd. in Volts	y= Electric Deflection	z= Magnetic Deflection	v in cm /sec	e /m
K	1000 volts	27.0	1.3 cm.	0.65 cm.	8.9×10^9	2.16×10^7
L	800 volts	13.5	1.5 cm.	0.82 cm.	1.5×10^9	1. 4r10^7
M	800 volts	13.5	1.5 cm.	1.00 cm.	1.9×10^9	2. 1×10^7
N	1000 volts	13.5	0.97 cm.	0.82 cm.	2.4×10^9	2. 2×10^7