A New Modification of the Cloud Method of Measuring the Elementary Electrical Charge, and the Most Probable Value of that Charge.[1]

By R. A. Millikan.

THIS modification of the cloud method of determining e consists:

1. In making observations, not upon the surface of a cloud, but upon single isolated drops carrying multiple charges.

2. In exactly balancing gravity upon these single charged drops by an electrical field.

3. In observing the rate of fall of these same drops under gravity after the electrical field has been thrown off.

4. In eliminating any possible error due to evaporation by first obtaining stationary, *i. e.*, balanced, drops, and then measuring the times of passage of these same drops across equal spaces in the field of the reading telescope.

5. In directly measuring the temperature of the cloud chamber instead of computing it. (It is this computation which was found to have introduced the chief error into preceding determinations of e by the cloud method.[2]

In obtaining the results herewith reported the distances through which the falling drops were timed varied from 1 mm. to 1.55 mm.; the times of fall through these spaces from 3 to 5 seconds: the distances between the plates to which the potentials were applied from 4.63 to 5.45 mm.: the intensities of the electrical fields from 14 to 17 absolute electrostatic units: the liquids used for forming drops were alcohol and water.

The method compares favorably in directness and precision with any which has thus far been used for determining e. The results of 7 very concordant observations on water drops carrying triple positive charges gave $e = 4.59 \times 10^{-10}$: of 11 concordant observations on alcohol drops carrying double positive charges gave $e = 4.64 \times 10^{-10}$: of 10 observations on water drops carrying quadruple positive charges gave $e = 4.56 \times 10^{-10}$: of 5 observations on water drops carrying quintuple positive charges gave $e = 4.83 \times 10^{-10}$: of three observations on water drops carrying sextuple positive charges gave $e = 4.69 \times 10^{-10}$: of two observations on water drops carrying double positive charges gave $e = 4.87 \times 10^{-10}$. The weighted mean of these results is 4.65×10^{-10}. The error in this determination is estimated as not more than 2 per cent. Mr. Begeman has just completed in this laboratory a very long and careful series of observations by the regular Wilson method timing however the layers corresponding to multiple charges, and obtains as his final mean $e = 4.66 \times 10^{-10}$.

[1] Abstract of a paper presented at the Princeton meeting of the Physical Society, October 23, 1909.

[2] Millikan and Begeman, Phys. Rev., 26, p. 197, 1908.

The mean of all the recent determinations of e by methods which seem least open to question is given below.

Planck	4.69
Rutherford and Geiger	4.65
Regener	4.79
Millikan	4.65
Begeman	4.66
	Mean $e = 4.69 \times 10^{-10}$

A Thermoluminescent Glass.[1]

By Wm. W. Coblentz.

An experimental demonstration of a thermoluminescent glass made of feldspar, formed into a perfectly transparent rod which was heated electrically. The luminiscence appears as a faint white cloud, at a temperature of about 800° C., which increases in intensity with rise in temperature. The important point illustrated was that the light is white at all temperatures, *i. e.*, it does not pass through the usual chromatic changes found in the radiation from opaque substances which would appear red at these temperatures. The absorption and behavior in a magnetic field will require further investigation.

The Dependence of Photo-Electric Current on Wave-Length of Incident Light.[1]

By F. K. Richtmyer.

Using the apparatus previously described[2] the author has investigated the relation between wave-length of the incident light and the resulting photo-electric current from a sensitive sodium surface. The spectrum of a Nernst glower was thrown on the sensitive surface by means of a spectrometer with a slit substituted for the eyepiece and the resulting photo-electric currents measured by the rate of drift of an electrometer from $\lambda = .65\,\mu$ to $\lambda = .42\,\mu$.

More satisfactory results were obtained by use of the spectrum of acetylene. In this case the observed currents were corrected for (1) variable dispersion of the prism and (2) energy distribution in the spectrum of acetylene. The curve plotted between corrected photo-electric currents and wave-lengths is similar to the visibility curve but has a maximum at $\lambda = .46\,\mu$, suggesting resonance in some form with the free period of the electrons in the atom of sodium in its solid state corresponding to the period of $\lambda = .46\,\mu$.

[1] Abstract of a paper presented at the Princeton meeting of the Physical Society, October 23, 1909.

[2] Phys. Rev., Vol. XXIX., pp. 71–80.