J.J. Thomson, *Cathode Rays*. Philos. Mag. 44, 293. 1897

[…] I shall describe another method of measuring the quantities **m/e** and **v** of an entirely different kind from the preceding[1]; this method is based upon the deflexion of the cathode rays in an electrostatic field. If we measure the deflexion experienced by the rays when traversing a given length under a uniform electric intensity, and the deflexion of the rays when they traverse a given distance under a uniform magnetic field, we can find the values of m/e and v in the following way. Let the space passed over by the rays under a uniform electric intensity **F**[2] be **l**, the time taken for the rays to traverse this space is **l/v**, the velocity in the direction of F is therefore $\frac{Fe}{m}\frac{l}{v}$

so that θ, the angle through which the rays are deflected when they leave the electric field and enter a region free from electric force, is given by the equation $\theta = \frac{Fe}{m}\frac{l}{v^2}$

If, instead of the electric intensity, the rays are acted on by a magnetic force **H**[3] at right angles to the rays, and extending across the distance **l**, the velocity at right angles to the original path of the rays is $\frac{Hev}{m}\frac{l}{v}$

so that ϕ, the angle through which the rays are deflected when they leave the magnetic field, is given by the equation $\phi = \frac{He}{m}\frac{l}{v}$. From these equations we get $v = \frac{\phi}{\theta}\frac{F}{H}$ and $\frac{m}{e} = \frac{\theta l H^2}{F \phi^2}$

In the actual experiments H was adjusted so that ϕ = θ; in this case the equations become:

$$v = \frac{F}{H} \qquad \frac{m}{e} = \frac{l H^2}{F\theta}$$

[…]

Gas	θ	H	F	l	m/e	v
Air	8/110	5.5	1.5×10^{10}	5	1.3×10^{-7}	2.8×10^{9}
Air	9.5/110	5.4	1.5×10^{10}	5	1.1×10^{-7}	2.8×10^{9}
Air	13/110	6.6	1.5×10^{10}	5	1.2×10^{-7}	2.3×10^{9}
Hydrogen	9/110	6.3	1.5×10^{10}	5	1.5×10^{-7}	2.5×10^{9}
Carbonic acid	11/110	6.9	1.5×10^{10}	5	1.5×10^{-7}	2.2×10^{9}
Air	6/110	5	1.8×10^{10}	5	1.3×10^{-7}	3.6×10^{9}
Air	7/110	3.6	1×10^{10}	5	1.1×10^{-7}	2.8×10^{9}

[…] From these determinations we see that the value of m/e is independent of the nature of the gas, and that its value **10^{-7}** is very small compared with **the value 10^{-4}**, which is the smallest value of this quantity previously known, and which is the value **for the hydrogen** ion in electrolysis. Thus for the carriers of the electricity in the cathode rays m/e is very small compared with its value in electrolysis. **The smallness of m/e may be due to the smallness of m or the largeness of e, or to a combination of these two**.

[…] Experiments with Electrodes of Different Materials.

In the experiments described in this paper the electrodes were generally made of aluminium. Some experiments, however, were made with iron and platinum electrodes. Though the value of m/e came out the same whatever the material of the electrode, the appearance of the discharge varied greatly; and as the measurements showed, the potential-difference between the cathode and anode depended greatly upon the metal used for the electrode; the pressure being the same in all cases.

[1] Thomson a décrit au préalable ses expériences de déflexion magnétique.

[2] F pour Field (champ), notation actuelle **: E** (champ électrique)

[3] Notation actuelle : **B** (champ magnétique)