brass connecting wire at the top of the ionization-chamber, which junction was the only one that could possibly serve as a hot junction, was heated with a small flame, the flame was removed, and the earth connexion to the quadrants of the electrometer broken, but no change could be detected in the normal ionization current flowing to the electrometer. It seems likely though that the rise in current sometimes noted at temperatures of about 100° was due to small quantities of emanation being driven off from the walls of the chamber.

It might be interesting to see if the proposed formula for N agrees at all with the results of the temperature experiments. The experiments on pressure show that the number of ions produced per c.c. per second in carbon dioxide at 20° C. and 760 mm. pressure is probably less than four. In the expression for N we have then to assign values to u and v so that the following conditions may be fulfilled:

(1) N must be about 4 at 20° C. and 760 mm. pressure.

(2) N must change slowly with the temperature, at least in the region of 20°.

The only physical condition suggesting itself which will fulfil the above requirement is that, for a collision to produce ionization, it must be almost perfectly tangential (this will make the total number of such collisions small), and that the arbitrary minimum tangential velocity of each of the colliding molecules must be about equal to the most probable velocity for a temperature of 20° (this ensures that N shall change slowly with the temperature in this region). Then for carbon dioxide, if we put the minimum relative tangential velocity $u = 2\alpha = 2 \times 3{\cdot}43 \times 10^4$ cm. per second, and the maximum relative normal velocity $v = 8{\cdot}97 \times 10^{-10}$ cm. per second, we find that at 20° C., N = 4, and at 100°, N = 5·1. That is, N changes very slowly as the temperature is raised, which is in qualitative agreement with the experimental results. A more exact application of the formula for N does not seem worth while at the present time, since, for the reasons stated above, the accuracy of the readings does not warrant it. It may, however, be of interest to note that using the above values for u and v, and making changes in h, p, and η to correspond to the rise in temperature, at 302° C. the value for N is 6·4.

Summary.

(1) It has been shown that the high residual ionization in acetylene prepared from calcium carbide is due to the presence of slight traces of radium emanation.