

potential drop in the balance of the circuit which included the milliammeter, the connecting wires, and the spark gap. As the resistance of the connecting wires and of the milliammeter was small the drop of potential corresponding to these would be negligible, and consequently the differences in the potential readings mentioned would represent the potential required to maintain the current selected in the spark gap.

A few results bearing on this point have been calculated from the measurements of this investigation and are collected in Table IV.

The first of these corresponds to a pressure of 9 mm. in the discharge chamber and two others to pressures of 1.5 and 2 mm., respectively.

As the critical pressure in hydrogen with a spark gap of 3.3 mm. was between 3 and 4 mm. of mercury, the first of the pressures selected was therefore in the region below and the other two in the region above the critical pressure.

Column I of Table IV contains the pressures, Column II the corresponding sparking potentials, column III current readings deduced from the Weston voltmeter readings, and Column IV the observed potential differences which were found to maintain the currents between the electrodes in the spark gap recorded in the table.

From the numbers given it will be seen that in the region above the critical pressure a slight fall occurred in the potential between the electrodes when the current increased. In the region of pressures below the critical one, however, the opposite occurred, and the larger current intensities required the higher potential differences to maintain them.

These results are in keeping with those of Mr. Brown, who found that above the critical pressure the potential required to maintain a current dropped below the sparking potential and tended towards a limiting value which appeared to be independent of the current, while below the critical pressure the maintaining potential rose more or less rapidly above the sparking potential as the current increased in intensity.

In conclusion it is my pleasure to thank Professor J. C. McLennan for his kindly interest and valuable advice throughout the investigation.