

VIII. "On the Length of the Spark between two Spherical Surfaces of the Chloride-of-Silver Battery." By WARREN DE LA RUE, M.A., D.C.L., F.R.S., and HUGO W. MÜLLER, Ph.D., F.R.S. Received June 14, 1877.

In anticipation of a detailed account of our researches in voltaic electricity, which have engaged our attention for nearly three years, we venture to publish, as of interest to the electrician, an account of the results obtained with two spherical surfaces of 3 inches radius and 1·5 inch diameter. It will be seen that they differ materially from those which occur from the employment of a point for one terminal and a flat disk for the other, with which the striking-distance is in the ratio of the square of the number of cells up to 8040, as has already been stated to be the case up to 2400 cells (Proc. Roy. Soc. no. 166, 1876).

The Ag Cl cell is taken as equal to 1·03 volt in the calculations from which the following numbers are derived :—

| Difference of potential in volts. | Length of spark in air at the atmospheric pressure. | Additional length of spark for 1000 additional volts. |         |
|-----------------------------------|---|---|---------|
|                                   | in.   |   | in.     |
| 250 .....                         | 0·00100 }   | ..... between 0 and 1000 .....                        | 0·00482 |
| 500 .....                         | 0·00225 }   |   |         |
| 750 .....                         | 0·00350 }   |   |         |
| 1000 .....                        | 0·00482 }   | ..... „ 1000 „ 2000 .....                             | 0·00751 |
| 1500 .....                        | 0·00820 }   |   |         |
| 2000 .....                        | 0·01233 }   | ..... „ 2000 „ 3000 .....                             | 0·00967 |
| 2500 .....                        | 0·01700 }   |   |         |
| 3000 .....                        | 0·02200 }   | ..... „ 3000 „ 4000 .....                             | 0·01025 |
| 3500 .....                        | 0·02700 }   |   |         |
| 4000 .....                        | 0·03225 }   | ..... „ 4000 „ 5000 .....                             | 0·01100 |
| 4500 .....                        | 0·03775 }   |   |         |
| 5000 .....                        | 0·04325 }   | ..... „ 5000 „ 6000 .....                             | 0·01135 |
| 5500 .....                        | 0·04900 }   |   |         |
| 6000 .....                        | 0·05460 }   | ..... „ 6000 „ 7000 .....                             | 0·01190 |
| 6500 .....                        | 0·06070 }   |   |         |
| 7000 .....                        | 0·06650 }   | ..... „ 7000 „ 8000 .....                             | 0·01200 |
| 7500 .....                        | 0·07250 }   |   |         |
| 8000 .....                        | 0·07850 }   |   |         |

It is evident that, for small distances between the terminals, a higher difference of potential is necessary to cause the spark to jump than when they are at greater distance. This agrees with Sir William Thomson's experience.

We avail ourselves of this opportunity to state that, when observed with the microscope, the voltaic arc, at ordinary atmospheric pressures, is seen to be stratified, though with some difficulty.

Also that the origin of all strata in exhausted tubes is at the positive pole. At certain pressures there is only one stratum, then, as the pressure is diminished, two, three, and so on, each being added on from the positive pole. We succeed easily in obtaining photographs of the phenomena, as the strata can generally be made to remain stationary for some time. Several of the photographs are in the hands of the engraver to be copied, and we hope to be able to show the history of several tubes in a communication we are now drawing up.

June 21, 1877.

Sir JOSEPH HOOKER, C.B., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

The Right Hon. John Duke Lord Coleridge and Dr. Thomas Richard Fraser were admitted into the Society.

The President announced that Section V. Chapter III. of the Statutes, under which a Fellow whose paper had been printed in the Philosophical Transactions could claim to pay, in lieu of the annual contribution, a Life Composition of £40 instead of £60, had been repealed by the Council.

The following Papers were read:—

- I. "On the Normal Paraffins." Part II.—By C. S. SCHORLEMMER, F.R.S., Professor of Organic Chemistry in Owens College, Manchester. Received June 5, 1877.

(Abstract.)

In the first paper of this subject it was shown that by the action of chlorine on a normal paraffin a primary chloride and a secondary one of the general formula  $\left. \begin{matrix} C_nH_{2n+1} \\ CH_3 \end{matrix} \right\} CHCl$  are formed simultaneously\*. It appeared of interest also to examine the action of bromine on the paraffins. The present paper contains the first results of this research.

I. *Normal Hexane*.—When bromine vapour is passed into the vapour of the boiling hydrocarbon, in the daylight, its colour disappears quickly and substitution products are formed which are partly decomposed by distillation. The portion distilling without decomposition consists of a

\* Phil. Trans. vol. 162, part i. p. 111.