

April 22, 1875.

JOHN EVANS, Esq., Vice-President, in the Chair.

The Right Hon. Russell Gurney, Q.C., whose certificate had been suspended, as prescribed by the Statutes, was elected a Fellow of the Society.

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

The following Papers were read :—

- I. "On the Action of Heat on the Absorption-Spectra and Chemical Constitution of Saline Solutions." By WALTER NOEL HARTLEY, F.C.S., Demonstrator of Chemistry, King's College, London. Communicated by Prof. STOKES, Sec. R.S. Received March 10, 1875.

(Abstract.)

The effects of heat on absorption-spectra were recorded in the preliminary notice of this paper, published in the 'Proceedings of the Royal Society' for 1874 (vol. xxii. p. 241).

The contents of the present communication consist of :—1st, historical notes ; 2nd, method of working ; 3rd, the spectrum-measurements of different solutions ; 4th, conclusions as to the effect of heat on coloured liquids, and the following deductions as to the constitution of salts when dissolved in water :—

I.

When a simple metallic salt is dissolved in water, it is not decomposed in such a way that an oxide and an acid is produced, nor does a compound of the metallic oxide with the acid result.

II.

When a metallic salt is dissolved in water to form a saturated solution, it does not necessarily attain its maximum state of hydration.

III.

When a simple hydrated metallic salt is dissolved in water to form a saturated solution, the crystalline molecule remains chemically intact, except in the case of certain compounds which readily part with their water of crystallization, when dehydration takes place to form a molecule of greater stability ; or, in other words, solution facilitates chemical change in this as in most other cases.

IV.

When a simple salt assumes one or more definite states of hydration at different temperatures below 100°C. , the hydrated compounds A and B will be successively produced in the liquid state if a saturated solution of the original salt be heated to 100°C. ; or, in other words, the chemical constitution of the liquid is altered so that, as higher temperatures are attained, it becomes a solution of substance A or of substance B, at intermediate temperatures mixtures of these.

V.

The action of heat on the violet hydrated compounds of chromium is not simply a dissociation of water-molecules or of acid from base, but a true decomposition, resulting in the production of a different class of salts with different generic properties.

Many new salts were prepared for this work, and others were examined with greater care than had previously been bestowed on them; from these substances, indeed, the most important part of the results were derived.

II. "On Attraction and Repulsion resulting from Radiation."—

Part II. By WILLIAM CROOKES, F.R.S. &c. Received March 20, 1875.

(Abstract.)

This is the second part of a paper which the author sent to the Royal Society in August 1873. The author commences by describing improvements which he has made in the Sprengel pump, and in various accessories which are necessary when working at the highest rarefactions.

Continuing the description of apparatus, the author describes different new forms which enable the phenomena of repulsion by radiation to be observed and illustrated. A bulb 3 inches in diameter is blown at the end of a glass tube 18 inches long. In this bulb a fine glass stem, with a sphere or disk of pith &c. at each end, is suspended by means of a cocoon-fibre. The whole is attached to the Sprengel pump in such a way that it can be perfectly exhausted and then hermetically sealed. Besides pith, the terminals may be made of cork, ivory, metal, or other substance. During exhaustion several precautions have to be taken, which are fully entered into in the paper. To get the greatest delicacy in an apparatus of this kind, there is required large surface with a minimum of weight. An apparatus constructed with the proper precautions is so sensitive to heat, that a touch with the finger on a part of the globe near one extremity of the pith will drive the index round over 90° , whilst it follows a