IV.—*On a peculiar Efflorescence of the Chloride of Potassium.*

By ROBERT WARINGTON.

As the chloride of potassium is not usually classed among the efflorescent salts in any of the numerous systems or manuals of chemistry, the following observations may not be without interest to some of the members of the Chemical Society.

This subject was first brought under my notice, some few years since, by a gentleman in the establishment at the Apothecaries' Hall, who had been endeavouring at his own lodgings to manufacture artificial ultramarine, in the course of which he had attempted (I believe in a common stove) to fuse silica with carbonate of potash : the fusion, however, had evidently, from the appearance of the substance obtained, been imperfectly effected,—from the want, I presume, of sufficient heat ; and the resulting mass had been afterwards treated with hydrochloric acid. Not having obtained the kind of material that had been anticipated, owing to the incomplete manner in which the operation had been conducted, the whole was set aside for some time, when attention was again attracted to it by the appearance of an efflorescent growth which had taken place in the mass, and which had ruptured it into fissures in various directions, these fissures being filled with bands of a fibrous saline growth, very similar in appearance to the well-known double sulphate of iron and alumina, or hair salt of the disintegrated alum shale of Hurlet and Campsie.

It was in this state when it was placed in my hands, and being anxious as a preliminary to ascertain to what extent this efflorescence would go on, it was placed in a shallow dish loosely covered with a small cone of paper, to keep off the dust, and set aside in a closet. Under these circumstances, the beautiful silky growth continued gradually to increase, until the crystals had reached a very considerable length, and presented an appearance very similar to the tufts of the cotton grass, or the long cellular filaments of the thistle down, projecting in all directions from the porous matrix of the partially hydrated silica. These filamentous crystals were readily soluble in distilled water, yielding a clear and perfectly neutral solution ; and on submitting them to analysis, they proved to be entirely composed of chloride of potassium.

Thus : 2 grs. of these effloresced filaments were dissolved in water, and the solution evaporated to dryness, to ascertain that no trace of silica was present, redissolved in water acidulated by nitric acid, and precipitated by a solution of nitrate of silver : this precipitate, collected and well washed, weighed, after drying, 3.78 grs. of chloride of silver.

The filtered solution and washings were then treated with hydrochloric acid to throw down the excess of silver salt, which precipitate was separated by a filter, and the clear liquor evaporated to dryness to decompose all the nitrates. The dry salt was next redissolved in water, a little hydrochloric acid added, and then precipitated by a solution of bichloride of platinum in excess, and the whole again

evaporated carefully to dryness. The crystalline product was then washed with ether-alcohol to remove all excess of the test, and the double chloride of platinum and potassium thus obtained dried: it weighed 6·4 grs. We have, therefore:—

Chloride of silver	3·78 = 0·932 chlorine.
Chloride of platinum and potassium .	6·40 = 1·028 potassium.
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	1·960

Or,	Theory.
	0·9491
	1·0509
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	2·0000

When this efflorescent salt is submitted to examination by the microscope, it presents many very interesting phenomena: each apparently single thread is then found to be built up, as it were, of an aggregation of smaller filaments, intimately united together, and, as I shall presently show, having a cubic structure.

Viewed by a high magnifying power, a very curious appearance is exhibited. The single filaments are seen to be dotted along their whole length with slight depressions, and these depressions are found to be perfectly equidistant the one from the other over certain given lengths; thus, they are most widely separated at the lower part of the thread, or its base, and become more approximated, for certain intervals of distance, as the fibre elongates and gradually becomes smaller in its transverse dimensions. This phenomenon, I am induced to believe, indicates the step or point at which the growth of each individual crystal has originated, and therefore marks its point of attachment with the one previously formed, so that the filament ultimately resulting may be considered as a series of microscopically minute cubic crystals growing one upon the other continuously, and that the intervals of distance by which these depressions are separated from each other will indicate the diameter of the single cubic needle at that particular spot. These intervals of distance, measured by a micrometer in the field of the microscope, were found to range from $\frac{1}{100000}$ th to $\frac{1}{200000}$ th of an inch.

Again, when these filaments are fractured, they present a cleavage plane at right angles to the length of the fibre. They also prove to be single refractors, or equiaxial crystals,—that is, when viewed by polarised light in the field of the microscope, placed between the polarising and analysing plates or prisms, they exhibit no depolarising

power, nor allow the least ray of light to pass through them in the dark field, thus again confirming their structure as being cubical. I may mention here, also, that Gmelin, in his excellent "Manual of Chemistry," observes that the chloride of potassium frequently crystallises from its solutions in cubes prismatically elongated.

This appears, then, to be another instance of the peculiar crystalline growth, under the same cubic form, which sometimes occurs in solutions of the iodide of potassium, and a memorandum of which I laid before the Society on the evening of May 3, 1852.*

The remaining point which presented itself to my attention was to ascertain in what manner I could best preserve this beautiful efflorescent growth permanently, so as at the same time to admit of its transport without injury to the delicate silky fibres, which I had found were liable to fracture by the slightest touch. After some preliminary trials, I at last adopted the plan exhibited in the specimen before you, in which a thick cream of plaster of Paris and water was first carefully introduced into the interior of the specimen jar, so as to cover the bottom to the depth of about half an inch, without soiling the sides; and while this was still in its semi-fluid state, the mass of silica, with its impregnating saline matter, was carefully imbedded in it, and the vessel, being loosely covered, was set aside. I should state also, that the crop of the efflorescent salt which existed on the surface of the mass was first moistened with water, in order that it might be dissolved and reabsorbed by the porous matrix before being cemented in the bottom of the jar. After a short time the efflorescence gradually commenced anew, the crystals slowly rising in tufts of beautiful silky fibres, and filling the whole of the lower part of the jar, until the filaments had many of them reached the length of from four to five inches.