IX.—*On the Preparation of Strontium and Magnesium.*

By A. Matthiessen, Ph.D.

In my paper on the preparation of calcium, I confirmed Bunsen's statement concerning the action of the density of the current employed in the electrolytic decomposition of metallic salts. Since then, in pursuing the research further in the Heidelberg Laboratory, I have found that the same conditions are necessary for the preparation of metallic strontium.

The best method, by which pieces weighing half a gramme are sometimes obtained, is as follows:—A small crucible, with a porous cell, is filled with the anhydrous chloride of strontium mixed with some chloride of ammonium, so that the level of the fused chloride in the cell is much higher than in the crucible. The negative pole placed in the cell consists of a very fine iron wire, wound round a thicker one, and then covered with a piece of tobacco-pipe stem, so that only about the one-sixteenth part of an inch appears below; the positive is an iron cylinder placed in the crucible round the cell. It is easy to regulate the heat during the experiment, so that a crust may form in the cell; the metal will then collect under this crust without coming in contact with the sides. I have found this method very advantageous also for the preparation of calcium.

Strontium resembles calcium in colour, being only a shade darker. It oxidises much more quickly than that metal. The specific gravity of the metal obtained from pure chloride of strontium gave in two experiments 2·5041 and 2·5796, the mean of which is 2·5418. Its atomic volume is 216, being $1\frac{1}{2}$ greater than that of calcium. The specific gravity of calcium from pure chloride of calcium gave in three experiments 1·5843, 1·5656, and 1·5835, the mean of which is 1·5778. The atomic volume is 158. The place of strontium in the electrical series, water being used as the exciting liquid, is not the same as has hitherto been supposed, but is as follows:—

$$\overset{+}{\mathrm{K}}\ \mathrm{Na},\ \mathrm{Li},\ \mathrm{Ca},\ \mathrm{Sr},\ \overset{-}{\mathrm{Mg}},\ \&c.$$

Strontium burns like calcium, and also acts similarly to it when heated in chlorine, oxygen, bromine, or iodine, or on boiling sulphur, or when thrown into water or acids.

I next proceed to describe a method of preparing magnesium without the necessity of making the anhydrous chloride, out of which

Bunsen reduces it.* Instead of the anhydrous chloride, the preparation of which is so very difficult, it is simpler to use a mixture of the chlorides of potassium and magnesium in nearly equal proportions: viz. three equivalents of chloride of potassium to four of chloride of magnesium. The solution of the chloride of magnesium can be evaporated almost to dryness and analysed, to find the amount of anhydrous salt present. After having mixed the two salts in the proper proportions with some chloride of ammonium, the mixture may be fused and electrolysed by Bunsen's method, the pockets not being required, as the metal is specifically heavier than the fused mixture. A very simple and convenient way of reducing the metal, especially for the lecture table, is in a common clay tobacco-pipe, over a Berzelius' spirit-lamp, the negative pole being an iron wire put up the pipe-stem, and the positive being a piece of gas-coke just touching the surface of the fused chlorides.

* Ann. Ch. Pharm. lxxxii. 137.