

THE ELECTROLYTIC METHOD APPLIED TO RHODIUM.

BY EDGAR F. SMITH.

[Read at the stated meeting, held February 17, 1891.]

So far as I have been able to learn, the salts of rhodium have never been subjected to the action of the electric current. I, therefore, made experiments in this direction and obtained results indicating the possibility of employing the electrolytic method in the estimation of this metal. The various texts consulted led me to believe that in all likelihood a solution of the double cyanide of rhodium and an alkali metal would best answer my purposes. Precipitation did not occur upon mixing solutions of potassium cyanide and rhodio-sodium chloride. The liquid remained clear. As soon, however, as a comparatively feeble current acted upon the double cyanide, a reddish yellow colored compound appeared, and remained suspended in the liquid. It was probably a cyanide which sustained no change. I did not attempt a repetition of this experiment.

From my experience in the electrolysis of gold, platinum and palladium solutions containing alkaline phosphates and free phosphoric acid, I concluded to try rhodium under similar conditions. Sodium rhodium chloride, $\text{Na}_6\text{Rh}_2\text{Cl}_6 + 24\text{H}_2\text{O}$, was the salt used by me. A sufficient quantity of it was dissolved so that 10 cc. of liquid contained, by calculation, 0.0980 gram of metallic rhodium.

Experiments.—(1) To 10 cc. of the rhodium solution were added 30 cc. of sodium phosphate, Na_2HPO_4 (sp. gr. 1.0358), and 3 cc. of phosphoric acid (sp. gr. 1.347). The total dilution of the electrolyte was 180 cc. The current gave 1.8 cc. OH gas per minute. In seven hours the deposition of metal was finished.

$$\begin{array}{rcl}
 \text{Weight of crucible + rhodium} & = & 63.4765 \\
 \text{" " " alone,} & = & 63.3783 \\
 \hline
 \text{Rhodium} & = & 0.0982
 \end{array}$$

The deposition of metal occurred at the ordinary temperature. At the beginning of the decomposition the liquid showed a beautiful deep purple color, but as the metal separated, it rapidly became lighter and finally colorless. Upon inclining the dish in which the precipitation was made, thus exposing a fresh metal surface, the latter remained perfectly clear. The precipitation of metal was completed.

(2) The conditions here were nearly the same as in the preceding trial. The total dilution of liquid equalled 200 cc. while the current gave 1.6 cc. of OH gas per minute.

The metallic rhodium was precipitated upon copper-plated platinum dishes. It was rather black in color, very compact and perfectly adherent. It was washed without any difficulty. Hot water was used for this purpose. The drying was done upon a warm iron plate.

The results obtained accord so well with the theory that the accuracy of the method cannot be questioned. The rapidity with which the metal is deposited, and the ease with which it may be handled also recommend this method of estimation.

CHEMICAL LABORATORY OF THE UNIV. OF PA.,
PHILADELPHIA, February 13, 1891.

THE ELECTROLYTIC DETERMINATION OF MERCURY.

BY EDGAR F. SMITH.

[*Read at the stated meeting, held February 17, 1891.*]

In gravimetric analysis mercury is frequently obtained as sulphide. To weigh it as such, or to convert it into some form suitable for weighing, requires much time and close attention to insure results that will be at all satisfactory. It is, therefore, better to have recourse to the electrolytic method of determination. As mercury sulphide dissolves quite readily in the fixed alkaline sulphides, I electrolyzed such solutions. The results show that this