Thus suspend the siphon apparatus to the water supply, having the dropping tube inside the test tube. When the water is allowed to drop the test tube slowly fills, until the water, rising in the siphon's short arm, passes beyond the bend and siphons over. The operation then repeats itself.

The speed of dropping from the reservoir must be such as to allow each siphoned portion to pass completely through the filter before the next flows on. And the quantity which siphons over each time is to be regulated by varying the length of the rubber tube which extends from the short limb of the siphon. The lower end of this rubber tube is cut off diagonally to ensure complete emptying of the siphon at each delivery.

These things once arranged, they need little attention afterwards.

Only a moment is required to fill the bottle, attach the siphon tube, and hang the inverted bottle in its rack with the filter containing the fertilizer below it in a funnel resting in a flask.

The washing is done regularly, without attention and without loss of time. A few supplementary washings by hand may be well to get the material all into the point of the filter, although experiments have shown that the mechanical washing is thorough and gives results identical with the tedious hand method.

THE ACTION OF GASEOUS HYDROCHLORIC ACID AND OXYGEN ON THE PLATINUM METALS.[1]

BY WM. L. DUDLEY.

HENRY (*Trans. Roy. Soc.*, *1800*, 188) discovered that hydrochloric acid gas, mixed with one-fourth its volume of oxygen, passed over platinum black, was decomposed and water formed: $4HCl + O_2 = 2H_2O + 2Cl_2$.

While working up some platinum and iridium residues, I found that finely divided platinum sponge on being washed with hydrochloric acid gave ample evidence of solution. This led me to investigate the subject further.

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[1] Read before the American Association for the Advancement of Science, Madison Meeting, August, 1893.

Platinum black was put on a filter and moistened with dilute hydrochloric acid. In a few hours the filter paper was stained yellow, and on washing, the filtrate had a yellow color and contained platinic chloride. Very soon, however, the filtrate became clear, even if the washing was continued with hydrochloric acid, but on standing after again moistening with hydrochloric acid, the platinum was dissolved as before, showing that the oxygen of the air was necessary for the decomposition of the hydrochloric acid, and that the platinum was attacked by the nascent chlorine. The action seemed to be most rapid as the filter paper approached dryness. By repeated moistening with hydrochloric acid and exposure to the air, the platinum black would probably have dissolved completely, but I did not carry the experiment to that point.

Platinum sponge was next tried in a similar way, and the result was found to be essentially the same, but not quite so marked.

Platinum black and platinum sponge were each subjected to the action of a dried mixture of hydrochloric acid gas and atmospheric air. Each was attacked by nascent chlorine. The effect on the sponge was, however, much less than on the black. Oxygen was substituted for the air, and the gases were used without being dried, but in each case the result was practically the same as that noted above. The experiment was tried at various temperatures up to 100° without any special change in the result. When the temperature reaches the point at which platinum chloride decomposes, chlorine is set free (Jullion, British patent, No. 11425, *1846*).

It is well known that finely divided palladium is soluble in hydrochloric acid mixed with oxygen or air (Fischer, *Schw.*, **51**, 192, and *Pogg*, **71**, 431).

Iridium, rhodium, ruthenium and osmium in finely divided condition were treated in the same way as the platinum and in each case it was found that the metal had the power to cause the union of the oxygen and the hydrogen of the hydrochloric acid, and to combine with the nascent chlorine. The action on ruthenium and osmium was greatly increased on heating, especially at about 250° and over, when the action was quite rapid, the respective chlorides subliming and condensing in the cooler portion of the tube beyond.

The metals used in these experiments were not specially purified, but were such as are furnished by the best German manufacturers as pure.

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THE ELECTRO-DEPOSITION OF IRIDIUM; A METHOD OF MAINTAINING THE UNIFORM COMPOSITION OF AN ELECTROPLATING BATH WITHOUT THE USE OF AN ANODE.[1]

BY WM. L. DUDLEY.

IN 1884 while engaged in studying the metallurgy of iridium from a commercial standpoint, I made many experiments in order to obtain a satisfactory bath for the electro-deposition of the metal. From a practical standpoint many difficulties were encountered, while experimentally most solutions of iridium yield the metal very readily under the influence of the electric current.

Much experimenting was done with the hope that a method might be devised by which a solution of the metal could be obtained electrolytically, thus avoiding the tedious and expensive processes for dissolving the platinum metals, but without success. Many electrolytes were employed under all conceivable conditions with iridium anodes in various forms, especially plates made by fusing iridium with phosphorus, but nothing practical was obtained. The iridium solutions were therefore made by several of the well known methods.

The next problem to be solved was to keep the solution of constant metallic strength and purity. Every electro-metallurgist knows that a plating bath must remain constant in composition, and that the slightest change in any particular will impair its

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[1] Read before the American Association for the Advancement of Science, Madison Meeting, August, 1893.