ing more data, with the re-examination of figures of early date, as a part of the study of the chemical character of the nitrogen bases. To the same end some work upon the hydroxides of these bases is nearly ready for presentation from this laboratory. And to the same end work is being continued upon the periodides,[1] and other super halides, that these extreme additive combinations may show something of the base making power of nitrogen.

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[CONTRIBUTION FROM THE CHEMICAL LABORATORY OF THE UNIVERSITY OF CALIFORNIA.]

AN ELECTROLYTIC METHOD FOR THE DETERMINATION OF MERCURY IN CINNABAR.

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WHEN a rapid solution of cinnabar is desired, heretofore, oxidation with aqua regia has seemed most convenient; the length of time required to expel the nitric acid used, and the likliehood of loss of mercury by distillation in hydrochloric acid, are serious hindrances to the use of this method. Hydrobromic acid dissolves very readily mercuric sulphide, as well as many other naturally occurring sulphides with the evolution of hydrogen sulphide and the formation of the bromide.

If this solution be nearly neutralized with caustic potash, pure potassium cyanide added in sufficient excess to dissolve the cyanide first precipitated (Smith, Electro-Chemical Analysis, p. 58), and electrolyzed with a weak current, the mercury will be readily deposited as metal on a platinum dish used as a negative electrode. The use of hydrobromic acid is to be recommended, as it gives such a ready method of decomposition, and can be used at low temperatures, when there will be no loss of mercury by distillation.

The hydrobromic acid used in the following experiments was prepared by treating potassium bromide with sulphuric acid of 56° Baumé; the gas was conducted into water, as in the preparation of hydrochloric acid. By using potassium bromide

[1] This Journal, 17, 775, 859.

with the above strength of acid, hydrobromic acid quite free from bromine, can be readily prepared.

The ordinary hydrobromic acid used in the laboratory, containing bromine, could be used in the following experiments:

The first sample which was worked with was pure mercuric sulphide. Hydrobromic acid of constant boiling point, *i. e.*, forty-nine per cent. was diluted with water one to four, and the sample treated with as little excess as possible over what would be necessary for its solution; the slight excess of acid was neutralized with potassium hydroxide, potassium cyanide added in excess and the solution electrolyzed by a current giving 0.025 amperes N. $D._{100}$.

The following results were obtained:

Mercuric sulphide. gram.	Mercury found. gram.	Mercury Per cent.
0.2110	0.1818	86.16
0.2058	0.1774	86.20

The second sample was a naturally occurring cinnabar; determination (*a*) was made, using the decomposition by aqua regia; evaporating off the excess of nitric acid with hydrochloric, neutralizing the excess of hydrochloric acid with potassium hydroxide, adding potassium cyanide in excess and electrolyzing as before. (*b*) and (*c*) were treated with twenty per cent. hydrobromic acid at the boiling temperature; solution was effected in a few minutes, the excess of acid was neutralized by potassium hydroxide, potassium cyanide added in excess and electrolyzed with the same strength of current as before.

Results were:

	Cinnabar. gram.	Mercury found. gram.	Mercury. per cent.
(*a*).....	0.2024	0.1046	51.68
(*b*).....	0.2514	0.1299	51.67
(*c*).....	0.5135	0.2656	51.72

The last sample was a lower grade cinnabar, very silicious, and long digestion with either hydrobromic acid or aqua regia was necessary. In this last experiment the action of the hydrobromic acid was very much more rapid than that with aqua regia. The mercury was deposited from a cyanide solution as before.

Results were, using hydrobromic acid as solvent:

	Cinnabar. gram.	Mercury found. gram.
(*a*)	0.2011	0.0616
(*b*)	0.2011	0.0622

Using aqua regia as solvent :

	gram.	gram.
(*a*)	0.2030	0.0629
(*b*)	0.2030	0.0631

NEW BOOKS.

THE SCIENTIFIC FOUNDATIONS OF ANALYTICAL CHEMISTRY TREATED IN AN ELEMENTARY MANNER. BY WILHELM OSTWALD. TRANSLATED BY GEORGE M'GOWAN. xviii, 207 pp. 8vo. London and New York : Macmillan & Co. Price, $1.60.

The little book before us undertakes, as its title indicates, a scientific presentation of the principles which underlie the physico-chemical phenomena upon which the art of analyses depends for the separation, detection and determination of the various substances with which it deals. In this undertaking the electrolytic dissociation theory is freely made use of and with such success that a flood of light is let in upon many of the obscurer phenomena encountered in the ordinary course of analysis.

The presentation of the subject is elementary in the best sense, but little in the way of previous knowledge being assumed, while by the clearness of statement and logical order of ideas preserved throughout, the author has fairly deserved the right to be named with the great masters of scientific style, with Tyndall and with Hofmann.

The theory and its applications are separately considered. Under the former head we find a discussion of the theory of the washing of precipitates and of the adsorption phenomena which are of such importance in that process, further, of physical methods of separation, such as distillation, of the law of mass action, of supersaturation and of many other topics, the treatment of all being condensed and full of suggestions to the thoughtful reader.

In the special or applied part the analytical reactions of the metallic and acidic ions of the various analytical groups are taken up in detail, but briefly.