

tration of the iron with the copper, both metals having the same atomic volume.

The following table gives the elements and their degree of concentration, as found in the above-mentioned copper, compared with the other physical properties.

The degree of concentration was obtained by dividing the values of the fifth sample by those of the third.

Element.	Concentration.	T.	A.	D.	V.
Sb	1.39	437	122.0	6.70	18.2
Pb	1.21	332	206.4	11.38	18.1
Ag	1.21	967	107.66	10.50	10.2
Au	1.18	1037	197.0	19.30	10.2
Bi.....	1.17	265	210.0	9.82	21.4
As	1.12	500	74.9	4.71	15.9
Te	1.08	500	126.0	6.25	20.2
S	1.02	115	31.98	2.04	15.7
Cu	0.987	1057	63.3	8.80	7.2
Fe	0.79	2080	55.9	7.80	7.2

The material on the subject discussed is, as yet, too scant to allow the drawing of positive conclusions. It should always be remembered by investigators that to give their work full scientific value, not only one or two elements in a combination of many, should be studied, but the interrelations of all must be observed.

BALTIMORE COPPER WORKS, DEC. 1896.

[CONTRIBUTIONS FROM THE CHEMICAL DIVISION, U. S. DEPARTMENT OF AGRICULTURE. NO. 24.]

RECOVERY OF WASTE PLATINUM CHLORIDE.

CONTRIBUTED BY H. W. WILEY.

Received January 26, 1897.

ALUMINUM turnings, freed of oil, have been used in this laboratory for some time for many purposes. Immediately after the publication of the paper of Wislicenus and Kaufmann¹ on the various applications of aluminum amalgam in the laboratory, a large quantity of these turnings was procured from the Pittsburg Reduction Co. Considerable difficulty was encountered in attempting to use these turnings in the manner described in the paper cited above. Mr. McElroy prepared the amalgam by washing aluminum clippings with ether to remove oil, treating with dilute caustic soda till free evolution of gas took place,

¹ *Ber. d. chem. Ges.*, 28, 1323.

and then washing with water to remove the alkali. The solution of corrosive sublimate was made in alcohol (chosen because the most convenient solvent), diluted with water, and poured over the aluminum. When the evolution of gas was seen to take place from every piece of aluminum in sight, the mercuric chloride solution was decanted and the aluminum washed chloride-free with water. The treatment with soda and mercuric chloride was then repeated. Finally the turnings were washed free of water with strong alcohol. The washed amalgam in fresh portions of "absolute" alcohol kept up a steady evolution of gas, long after the time all water should have been removed. A portion was removed from the alcohol, washed with ether, and placed in petroleum ether, where the evolution of gas became quite strong. The containing flask was loosely stoppered and stood aside over night. In the morning the petroleum ether was gone.

A fresh portion of amalgam from 200 grams of aluminum was prepared and treated as before, except that the washing with alcohol was more thorough. The alcohol was removed with ether and the amalgam finally washed with kerosene. It was then covered with kerosene and stood aside. In about half an hour the evolution of gas became quite violent and the containing bottle hot. On cooling under the tap the generation of gas slackened, but on standing increased again as the mixture warmed up.

The kerosene was such as is used for lamps. It gave a black zone of lead sulphide when treated with the lead acetate test. It is very likely Lima oil. As is well known in the Frasch process of purifying, the oil is passed through copper oxide, which it converts into copper sulphide. As for every atom of sulphur removed an atom of oxygen must go into the oil, probably the action of the aluminum consisted in appropriating this oxygen. Neither bright sodium or sodium amalgam had any special action on the kerosene used. The action of the amalgam on strong alcohol has been confirmed by Hillyer.¹ We have been able to use these turnings, amalgamated with mercuric chloride, for the reduction of nitrates to ammonia for analytical and other purposes, and it is probable that a speedy and accurate analytical process may be elaborated on this line. We

¹ *Am. Chem. J.*, 18, 621.

have, however, found the most successful use of the turnings in the recovery of platinum waste. This method of recovery is due to Mr. K. P. McElroy, and has been worked out by him in detail, and has been successfully used for some time in the recovery of platinum chloride waste from potash analyses. The method is as follows :

The waste platinum from potash determinations is collected and to the hot water solution of platinum potassium chloride is added aluminum in the form of clippings or turnings. In a few minutes a platinum-aluminum couple is formed and reduction goes on vigorously. The addition of hydrochloric acid is not necessary, but is advisable for promoting the settling of the platinum formed. After the reduction is complete, more hydrochloric acid is added to dissolve the excess of aluminum. When this is done the platinum will be found to settle and the supernatant liquid will be clear. The supernatant liquid contains but little suspended platinum, but it is passed through a large folded filter. If it does not come through clear, as is sometimes the case, return it a few times. As but little platinum gets on the filter, the same filter is used over and over again for successive filtrations until enough platinum accumulates to make its recovery worth while. When the clear liquid is all decanted, add water to the spongy platinum, shake, allow to settle, and decant. Repeat this until the supernatant liquid is free of chloride. The spongy platinum is then covered with strong nitric acid and heated for the purpose of removing copper. Aluminum often contains a little copper, which of course remains with the platinum. When the copper is all dissolved the copper nitrate and the excess of nitric acid are removed by washing with water by decantation as before, till the supernatant liquid is acid free when tested with Congo paper. The resulting platinum black is dissolved with aqua regia, made by mixing five parts of hydrochloric acid with one part of nitric, added in amount sufficient to dissolve all of the platinum present. The solution thus obtained is transferred to a porcelain dish and evaporated on a steam bath till a portion taken out with a rod solidifies on cooling. The residue is diluted with water and hydrochloric acid and re-evaporated. If, on adding water to the sirupy mass formed by this evaporation, nitrous vapors are

evolved, add plenty of water and re-evaporate. Repeat this evaporation with water till the nitrous vapors are no longer evolved on dilution. Finally dilute sufficiently to filter and add water until the color of a platinum chloride solution of known content is matched.

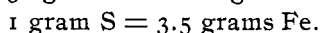
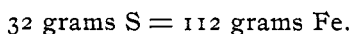
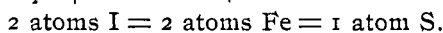
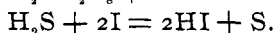
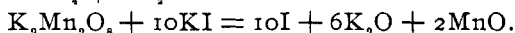
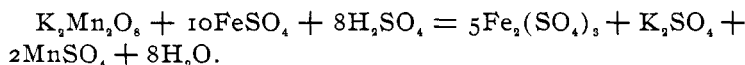
STANDARD IODINE SOLUTION FOR SULPHUR DETERMINATIONS.

BY EDWARD K. LANDIS.

Received January 11, 1897.

THE following calculation shows an easy method of preparing Payne's iodine solution, with the least amount of calculation.

REACTIONS.



When five grams are taken for analysis, 0.01 percent. = 0.0005 gram, and this multiplied by 1000 = 0.5 gram in a liter.

Let x = value of 1 cc. $\text{K}_2\text{Mn}_2\text{O}_8$ in Fe in grams.

$$\text{Then } \frac{0.5}{x} = 0.5 \times \frac{3.5}{x} = \frac{1.75}{x}.$$

Therefore 1.75 divided by the value of one cc. potassium permanganate in iron in grams, gives the number of cc. of potassium permanganate to be added to the potassium iodide and sulphuric acid and diluted to one liter, to form iodine solution of such strength that one cc. will be equal to 0.01 per cent. sulphur when using five grams of sample.

NOTE.

*Notes on "An Analytical Investigation of the Hydrolysis of Starch by Acids."*¹—A number of errors and misprints were overlooked by the authors in their compilation of this paper. The following are the most important:

¹ This Journal, 18, 869.