to prove it. It will be seen that these results confirm the observations of Auchy, Drown, Blair, Dudley, and others, that the ordinary form of potash bulb will not retain all the moisture unless the operation be controlled with the greatest care. Another serious difficulty with us has been the impurities in the granular copper oxide. In blank tests it does not cease to cause an increase in weight in both sulphuric-acid tube and potash bulb until it has been heated in oxygen as long at least as it would be in six combustions. But when constant it apparently remains so.

SOME FURTHER APPLICATIONS OF HYDROGEN PEROXIDE TO QUANTITATIVE ANALYSIS.

BY PERCY H. WALKER.

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SEPARATION OF TITANIUM FROM IRON.

THE addition of a large excess of hydrogen peroxide to a solution of a ferric salt does not prevent the precipitation of ferric hydroxide on addition of ammonia in excess; but a solution of a titanium salt gives, on treatment with hydrogen peroxide, the well-known yellow solution. This solution, if treated with sufficient hydrogen peroxide and kept cold, is not precipitated at once on adding ammonia in excess.

Taking advantage of this fact titanium may be separated from iron by the following method: The cold, slightly acid solution of the mixed sulphates (in all about 150 cc.) is mixed with 100 cc. hydrogen peroxide (about two and one-half per cent. solution) and run slowly from a dropping funnel into a rather large casserole containing 100 cc. hydrogen peroxide and thirty cc. strong ammonia, stirring constantly. The precipitated ferric hydroxide is filtered at once, washed slightly with cold dilute ammonia containing a little hydrogen peroxide. The precipitate is easily dissolved from the paper with a mixture of hydrochloric acid and hydrogen peroxide, again treated with an excess of hydrogen peroxide and reprecipitated as above. This is repeated a third time. The ferric hydroxide can then be dissolved and the iron determined in the ordinary way.

The filtrates containing the titanium are boiled down, which causes the titanium hydroxide, $Ti(OH)_4$, to separate out in a form easily filtered. This is washed with hot ammonium nitrate solution, ignited, and weighed as TiO_2.

Some titanium dioxide was fused with seven grams potassium bisulphate, cooled, dissolved in about 100 cc. cold water, and mixed with a solution of iron ammonium alum containing about one-tenth gram iron. The separation was then carried out as described above.

Titanium dioxide found by first separation	0.0872
Titanium dioxide found by second separation	0.0104
Titanium dioxide found by third separation	0.0041
Total found	0.1017
Theory (TiO_2 taken)	0.1016
Difference	+ 0.0001

SEPARATION OF URANIUM FROM IRON.

The presence of a large excess of hydrogen peroxide prevents the precipitation of uranium by sodium hydroxide, but does not prevent the precipitation of ferric hydroxide. A slightly acid solution containing the mixed salts is mixed with fifty cc. hydrogen peroxide, and run slowly with constant stirring into a large casserole containing a solution of five grams sodium hydroxide in fifty cc. water mixed with fifty cc. hydrogen peroxide. This is then diluted to about 400 cc. with hot water, filtered, and washed with hot water. The filtrate which contains all the uranium is made acid with hydrochloric acid, evaporated to dryness on the water-bath, heated to 110° C. for one hour to separate any silica (from the reagents and glass), dissolved in hydrochloric acid, filtered, and the uranium precipitated with ammonia, washed with ammonium nitrate and ammonia, finally with water, ignited, and weighed as U_3O_8.

The author used in his experiments a solution containing about equal weights of Fe_2O_3 and U_3O_8.

	U_3O_8 taken.	U_3O_8 found.	Difference.
(*a*)	0.1129	0.1124	—0.0005
(*b*)	0.1056	0.1064	+0.0008

SEPARATION OF ZIRCONIUM FROM URANIUM.

The mixture containing two-tenths to three-tenths gram each

U_3O_8 and ZrO_2, is fused with six to seven grams sodium bisulphate and the melt dissolved in cold water. The solution is mixed with fifty cc. hydrogen peroxide and poured into a casserole containing five grams pure sodium hydroxide dissolved in fifty cc. water and fifty cc. hydrogen peroxide. No precipitate forms at first, but after heating on the water-bath for a half hour the zirconium oxide settles to the bottom of the dish as a very heavy precipitate which is filtered and washed with hot water. The precipitate is easily dissolved by a warm mixture of hydrochloric acid and hydrogen peroxide. This solution is boiled, precipitated with ammonia, washed at first with ammonium nitrate solution, then with water, ignited, and weighed as ZrO_2.

Zirconium dioxide taken.	Zirconium dioxide found.	Difference.
0.2150	0.2158	+0.0008

In conclusion the author wishes to state that this work was suggested to him by Prof. Dr. P. Jannasch, of Heidelberg, over a year ago, and much of the work was done in his laboratory, but as the results then obtained were not entirely satisfactory, it was not published at that time.

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ON THE DECOMPOSITION OF CONCENTRATED SULPHURIC ACID BY MERCURY AT ORDINARY TEMPERATURES.

BY CHARLES BASKERVILLE AND F. W. MILLER.

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IN a recent number of this Journal,[1] Mr. J. R. Pitman denied the statement of the authors that concentrated sulphuric acid is decomposed by mercury at the ordinary atmospheric temperature, 20° C. Mr. Pitman leaves himself open to the same criticism that could with justice be urged against us; namely, a failure to report the *strength* of the acid obtained in any other way than that by specific gravity.

As is well known, sulphuric acid (sp. gr. 1.84) may contain either 95.6 or 99.2 per cent. H_2SO_4.[2] The apparatus which we made use of did not permit a determination of the specific gravity more accurately than the second decimal place. Sulphuric acid (sp. gr. 1.839) contains 99.70 per cent. H_2SO_4. The acid used

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[1] Vol. 20, 100.

[2] Lunge und Isler: Biedermann's Chemiker-Kalender, 1898, p. 186.