The method possesses all the advantages of simplicity, ease of manipulation, rapidity and accuracy. Fourteen of the analyses included in the above tables were made, complete, in one afternoon.

There are no precipitations or filtrations (unless it is desired to filter off the graphite from pig iron) and therefore no possible chances for loss of manganese during the process of analysis.

The method is now being applied to the analysis of spiegels, rock, manganese ores, etc., and we hope to report on these in this journal in the near future.

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[CONTRIBUTION FROM THE TEXAS AGRICULTURAL EXPERIMENT STATION.]

EFFECT OF IGNITION ON SOLUBILITY OF SOIL PHOSPHATES.

By G. S. FRAPS.

Received February, 24, 1911.

It is known that ignition of the soil increases the quantity of phosphoric acid dissolved therefrom by acid. Stewart¹ uses this as a method for estimating the organic phosphoric acid of the soil. He extracts the original soil and the ignited soil with 12 per cent. hydrochloric acid, and assumes that the increased quantity of phosphoric acid secured originates from organic phosphates.

The object of the work here reported was to study the effect of ignition upon mineral phosphates such as may occur in the soil.

Method of Work.—The quantity of phosphate containing 0.1 gram phosphoric acid was weighed into a platinum dish and ignited for ten minutes, at a low red heat. It was transferred, dish and all, to a bottle, 200 cc. of 12 per cent. hydrochloric acid added, allowed to stand 24 hours, filtered, washed with hot water, and made up to 500 cc. Phosphoric acid was then determined in 200 cc.

Another series of experiments was made, in which the ignited phosphate was digested 5 hours at 40° with 500 cc. of N/5 nitric acid.

RESULTS.

The results of the experiments are reported in the table. Ignition increased the solubility of the phosphoric acid of these phosphates decidedly. With fifth-normal nitric acid, about ten times as much phosphoric acid is dissolved from the ignited phosphates, as from those not ignited. With the strong acid, ignition rendered practically completely soluble all the phosphates which were not already completely soluble in this solvent.

It is evident that no analytical method for organic phosphoric acid can be based on ignition. If the strong acid dissolves all inorganic phosphates, then any method which determines the remaining phosphoric acid will determine the organic phosphoric acid. If the strong acid does not dissolve all the inorganic phosphates (and we have evidence that it does not) then the remaining inorganic phosphates will be ren-

dered partly soluble in the acid by the ignition, so that the ignition method would not be accurate.

PHOSPHORIC ACID DISSOLVED FROM IGNITED AND ORIGINAL MINERALS.
(In Percentage of the Quantity of Phosphoric Acid Used.)

Laboratory number.	With 12 per cent. hydrochloric acid.		With N/5 nitric acid.	
	Original mineral.	Ignited mineral.	Original mineral.	Ignited mineral.
240 Wavellite.....	...	100	4.8	80.7
721 Wavellite.....	19	100	4.5	97.5
726 Wavellite.....	18	100	2.0	58.0
714 Dufrenite.....	100	100	4.8	35.5
718 Dufrenite.....	86	96	8.0	75.0
716 Variscite.....	26	100	12.0	100.0
724 Triplite.....	100	100	..	...

Phosphoric acid is not the only constituent of the soil whose solubility in acid is increased by ignition. We have examined twenty-five soils, and ignition increases the oxide of iron and alumina dissolved by the acid from every one of them. The increase is great in some instances. For example, in soil 3368, ignition increased the acid-soluble oxide of iron and alumina from 2.63 to 8.48 per cent., and in soil 1361, from 1.25 to 6.50 per cent. Full details of this work will be published in *Bull. 135* of the Texas Experiment Station.

SUMMARY AND CONCLUSIONS.

1. Ignition increases about ten times the solubility of the phosphoric acid of wavellite, dufrenite and variscite in fifth-normal nitric acid.
2. Ignition renders variscite, dufrenite and wavellite almost completely soluble in 12 per cent. hydrochloric acid.
3. Ignition of the soil will probably render inorganic phosphates soluble in acid, and therefore is not a method for estimating organic phosphoric acid.
4. Ignition of the soil renders considerable quantities of iron and aluminium oxides soluble in acid.

COLLEGE STATION, TEXAS,
February 15, 1911.

DEVELOPMENT OF THE SUGAR INDUSTRY.¹

By AUGUST VON WACHTEL.

Received April 26, 1911.

The sketch submitted to your kind attention treats an extensive subject and necessarily will give only a general impression and not one adequate to the importance and the technical development of the manufacture.

The sugar industry was the pioneer in vacuum boiling a rational extraction of raw products by cheap evaporation and filtration, and solved first the problem of handling a difficult crystallization on the largest scale and in an entirely modern way.

Still this industry has the reputation of not being strictly a chemical manufacture—a wrong impression, as it must be either classified with logwood or tannin extractions where the methods of sugar manufacture are simply copied, or it can be compared with the manufacture of cream of tartar or alkaloids, which are all extracted from some natural raw material and a nearly chemically pure product turned out.

¹ Read before the New York Section of the Society of Chemical Industry, March 17, 1911.

¹ *Bull. 145*, Illinois Experiment Station.