

the question of the relative quantities of the soil and solvents used as the present amounts—200 grams soil to 1 liter of solvent—seems to involve too small a volume of solvent. While we feel encouraged by the outcome of the work reported above, it must be borne in mind that before any method of soil testing can be considered satisfactory, it must give reliable indications on soils of different types that have been subjected to investigation by field tests; and these tests must not be confined to one crop, but must relate to all the crops likely to be produced on the land under investigation. From data now at hand it seems probable that certain soils may have ample potash in an available form to produce good crops of cereals, while not having enough to produce profitable crops of corn, potatoes, or tobacco. This phase of the matter must be kept in mind in deciding upon any definite amount of soluble ingredients which shall be used as a minimum in judging of the fertilizer needs of a soil.

Purdue Agricultural Experiment Station, November, 1896.

- (1) Jour. Chem. Soc., London, March, 1894. This paper contains a resume of suggestions by various authors and special investigations by Dr. Dyer.
- (2) Chem. Div. U. S. Dept. Agr., Bull. 47, p. 32.
- (3) Rhode Island Agr. Exp. Sta., 7th Ann. Rpt., p. 152.
- (4) Chem. Div. U. S. Dept. Agr., Bull. 38, p. 84; Wiley's Agr. Analysis, vol. 1, p. 326.
- (5) Chem. Div. U. S. Dept. Agr., Bull. 31, p. 99.
- (6) Determined by Harry Snyder. See Bull. 47, U. S. Dept. Agr., Chem. Div., p. 49.

ACTION OF AMMONIUM CITRATE AND CITRIC ACID ON BASIC SLAG. BY H.
A. HUSTON AND W. J. JONES, JR.

[ABSTRACT.]

This is a continuation of the work carried on for several years by the authors under the general head of the availability of commercial phosphates. This paper deals with the two most prominent materials proposed for determining the availability of the phosphoric acid in the slag. The factors controlling the action of the reagents are discussed under the following heads:

- I. Influence of time of digestion.
- II. Influence of temperature.
- III. Influence of acid (citric) and alkali (ammonia).
- IV. Influence of quantity of slag used.

V. Action of citric acid on slag.

Amount of acid neutralized in times ranging from one-half to five hours, at 25° C and at 65° C. Amount of phosphoric acid remaining in solution at the end of these periods. The phosphoric acid in solution decreases with a rise in temperature and with an increase in time.

VI. Comparison of the U. S. official method with the method proposed by Dr. Paul Wagner, including special molybdate and magnesia solutions.

The paper will be found in complete form in Bul. 49, Chem. Div. U. S. Dept. Agr., p. 68-72.

Laboratory State Chemist of Indiana, Purdue Univ., Nov., 1896.

THE CHARACTER OF THE VOLATILE MATTER LOST BY BITUMINOUS COALS AT 100° C. BY W. E. BURK.

The conditions accompanying the common method of determining moisture in coal suggested a study of the nature and amount of volatile matter given off at the temperature of determination.

The work was done on two classes of Indiana coals, one high in moisture, the other considerably lower, the operation consisting in passing the volatile products from the coal heated approximately to 100° C, together with a current of dry air over copper oxide in a combustion furnace, absorbing the moisture coming over with calcium chloride, and carbon dioxide arising from combustion of any volatile hydrocarbons in a caustic potash solution.

A hard glass combustion tube was used, which extended some 20 c. m. from the forward end of the furnace. This portion of the tube was jacketed with a glass sleeve with rubber plugs, and arranged with entrance and exit openings through which a continuous current of steam was passed. By this means a temperature approximating 100° C was maintained through the forward part of the tube in which a weighed quantity of powdered coal was placed in an aluminum boat. A slow current of dry air was passed, and the heating of coal and combustion of volatile products maintained for one hour. The boat was then removed and the absorption bulbs weighed, after which they were attached again and the tube heated for a further twenty to thirty minutes. The boat containing coal was weighed in a glass enclosing tube, and after the operation was allowed to cool in