

The oxidation is less destructive in neutral or alkaline solutions.

A current of .2 to .5 ampere causes a rise in temperature and the appearance of a yellow color if the solution be alkaline.

Acids and sometimes acroleine are formed.

The oxidized solutions reduce Fehling's solution strongly in the cold and give the fuchsin-sulfurous acid reaction for aldehydes.

To a solution which gave strong reactions for glyceric aldehyde was added enough caustic soda to make a 2 per cent. solution in order to induce polymerisation. After standing some days, a pherylhydrazin compound was obtained, which melted at 200°. This indicated the production of glyceric aldehyde and its polymerisation to glucose.

The product of a second oxidation was polymerised and underwent alcoholic fermentation with yeast.

The electric current, therefore, produces some glyceric aldehyde from glycerine, although the amount is small.

ON SULPHON-PHTHALEINS. By WALTER JONES.

MODIFICATION OF GRANDEAU'S METHOD OF DETERMINATION OF HUMUS IN SOILS,

By H. A. HUSTON AND W. F. MCBRIDE.

The paper discusses the numerous methods proposed and used for determining the total carbon in the soil and for determining the organic matter and shows that none of these methods are entitled to consideration excepting the process of Grandeau. This method, which consists essentially of removing the bases combined with the humic acid by means of hydrochloric acid, subsequent washing with water and extracting on a filter with ammonia water, is compared with a modification of the method in which the preliminary washing with acid and water is the same but, instead of leaching the soil upon the filter with ammonia water, the soil is transferred to a 500 cc. cylinder, treated with 500 cc. of 4% ammonia, allowed to remain in contact with the ammonia for thirty-six hours, with frequent shaking. During the earlier part of the digestion the cylinder is left upon its side, thus exposing a large amount of surface to the solvent; during the last twelve hours of the digestion the cylinder is placed upright,

thus allowing the soil to settle before an aliquot part is removed for the determination of the humus.

The aliquot part is evaporated to dryness, dried at 100° C., weighed, ignited, weighed again and the loss reckoned as humus. The following points were under discussion :

- 1st. Comparison of Grandeau's method with this modified method.
- 2d. Influence of varying the strength of the ammonia used.
- 3d. Influence of varying the time of digestion.
- 4th. Is it possible to complete the extraction by Grandeau's method in a reasonable time.
- 5th. Comparison of differences in duplicates by each method.
- 6th. Are the amounts of phosphoric acid, potash, etc., found in the ash necessarily associated with the humus, as claimed, or are they to be ascribed to the solvent action of the ammonia and to changes due to the absorptive property of the soils.

Numerous determinations are given upon seven different soils, showing that the modified method gives much higher results than the ordinary process of Grandeau.

Second, In the Grandeau method marked irregularities follow the changes in strength of the ammonia solution. These differences in results bear no relation to the strength of the solution used; they seem to be errors due to the difficulty of securing a complete washing of the soil by the ammonia solution. In the modified method the changes in the strength of the ammonia solution make practically no difference in the amount of the humus extracted, excepting in the case of the peat soil, where 2% ammonia failed to extract all the humus. The results show no considerable increase where the strength is increased above 4%. The ammonia solutions contained 2, 4, 7.3 and 8% of ammonia.

Third, The increase of time has not been fully investigated but the results so far obtained indicate that the time exerts less influence in the modified than in the Grandeau method.

Fourth, With peat, when the Grandeau method is used, considerable material is passing into solution at the end of ten days; with ordinary soils this is not the case, but in the case of the black soil (not peat) the extraction was not complete in a week. On the peat soil the modified method extracted from 10 to 50% more than the Grandeau and on ordinary soil from two to three times as much humus.

Fifth, In comparing a large number of duplicates the modified method

was found to give much more concordant results upon soils high in humus, and upon those low in humus there was a slight improvement over the Grandeau method.

Sixth, The authors see no reason for assuming that the phosphoric acid extracted by the ammonia is in any way associated with the humus, for Mr. Huston has already shown that the phosphoric acid is readily dissolved by ammonia from phosphate of alumina and iron. It is generally considered that there are bases with which the available phosphoric acid in the soil is combined. In the same way we may account for the presence of potash and lime in solution by the ordinary laws which govern the absorption of bases by zeolitic minerals in the soil.

While humates also take part in soil absorption, it is not necessary or even altogether reasonable to consider all the bases removed by ammonia were associated with the humus. In fact, the theory of the process is that the bases associated with the humus had already been removed by means of the hydrochloric acid used in the preliminary washing of the soil.

The paper is in the nature of a preliminary report and the work is still in progress. A complete report of the work will be published later.

THE EXTRACTION OF XYLAN FROM STRAW IN THE MANUFACTURE OF PAPER.

By W. E. STONE AND W. H. TEST.

[ABSTRACT.]

The extraction of substances from straw which on inversion, yield a pentose sugar, has been established. In the process of making straw paper the straw is boiled with a strong solution of quick lime. This liquor, when acidulated and treated with an excess of alcohol throws down a precipitate of pentosans. It seemed, therefore, a good material for the preparation of xylose.

The liquor is yellowish brown in color and alkaline. Specific gravity, 1.215; alkaline equivalent, 2 to 2.5 per cent. calcium oxide. Total residue on evaporation, 3.95 per cent., of which 30.77 per cent. was mineral and 69.23 per cent. organic in nature. Thirty-two liters of the liquor yielded on precipitation with alcohol, 300 grams of xylan. This, on distillation with hydrochloric acid, yielded 45.5 to 47.1 per cent. furfural. This could not be inverted by methods similar to those practiced by Wohl on inuline. The ordinary method of boiling with 2 per cent.