The extreme delicacy of this reaction naturally suggested the possible use of anthocyanin as an indicator. Anthocyanin, prepared according to Willstätter's method and dissolved in absolute alcohol, was compared with phenolthalein, by the Henderson and Palmer indicator-method for the determination of the concentration of hydrogen ions, with the results tabulated below:

| Tubes | $p_H$ | Phenolthalein | Anthocyanin |
|---|---|---|---|
| 1 | 9.27 | Red + + | Yellowish green + + |
| 2 | 8.70 | Red + | Yellowish green + |
| 3 | 8.00 | Colorless | Colorless |
| 4 | 7.48 | " | Pink + |
| 5 | 7.38 | " | Pink + + |
| 6 | 6.90 | " | Pink + + + |
| 7 | 6.70 | " | Intensity of pink coloration increases in the direction of 11, with increase in acidity |
| 8 | 6.30 | " | |
| 9 | 6.00 | " | |
| 10 | 5.70 | " | |
| 11 | 5.30 | " | |

From these data it is obvious that, in point of delicacy, under the conditions specified, anthrocyanin is, in general, the equal of phenolthalein. Furthermore, anthocyanin is superior to the latter in the fact that a change from alkali to acid is indicated by a sharp change from green to red, and not, as for phenolthalein, from red to no color at all.

The relationship of these observations to those by Gies,[1] on "alkaverdin," will be indicated in a later communication.

## 7 (1382)

## The probable cause for the failure of some sodium tungstate to give a suitable reagent for the determination of uric acid.

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In one of his articles, Folin mentions that some preparations of sodium tungstate on the market do not yield a satisfactory

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[1] Gies, Chemical studies of the pitcher plant, *Sarracenia purpurea; Journal of the New York Botanical Garden*, 1903, iv, p. 37.

reagent for uric acid, presumably because of impurities such as nitrates and molybdates. The tungstate which we have in our laboratory failed to give the reagent although free from the impurities mentioned above. Further investigations, however, disclosed that our sodium tungstate contained but one third tungstate the rest being sodium carbonate. The reagent was therefore prepared in the following manner:

Dissolve 25 g. of sodium tungstate in 300 c.c. of water, heat to boiling in a large beaker, add 40 c.c. of conc. hydrochloric acid whereupon the tungstic acid is precipitated. Continue to boil for ten minutes. Allow to settle. Filter by suction. Wash precipitate with cold water while still in Buchner funnel, 20 c.c. each time, discontinuing as soon as the precipitate starts to pass through the filter, which usually occurs at the third washing. Transfer to an Erlenmeyer flask without drying the precipitate. Add 15 c.c. of 10 per cent. sodium hydroxide solution for each ten g. of tungstic acid, which will dissolve the tungstic acid on heating.

Continue according to instructions given for the preparation of reagent using but 31.2 g. of tungstic acid in place of 100 g. of sodium tungstate as required in the original description of the reagent.

In our search for the explanation of the failure to obtain the reagent we had to limit ourselves to the use of the two tungstates in stock in our store-room; one of them free from carbonate gave the reagent, the other containing carbonate failed to do so. We are postponing the investigation, to determine if any tungstate free from carbonate will react in the desired manner, until the substance is more accessible. The writers regret that they were also unable to procure tungstic acid itself which they believe could be used in place of the tungstate, by dissolving the acid in a slight excess of sodium hydroxide followed by the procedure given above.

It is necessary to establish the content of actual tungstate only once in order to know how much sodium hydroxide solution has to be added. This is accomplished by transferring the tungstic acid precipitate to a weighed porcelain dish. After drying the contents on a waterbath and subsequent washing with alcohol the dish is weighed again. For preparing the reagent, however, the isolation of the sodium salt is unnecessary.