fifteen minutes for a combustion and fifteen for aspiration, with an air flow of 4 bubbles per second during combustion and 5 during aspiration, and combustions may be made in less time than this, as the combustion is completed in from ten to fifteen minutes, and it is simply a matter of washing all the carbon dioxide from the train in as short a time as possible and using the least amount of air.

Blank determinations as obtained with this apparatus do not run over 0.0005 gram, and have been as low as 0.0002 gram. The results obtained on standard samples, the carbon of which was determined by combustion in platinum and porcelain tubes, checked very closely and a series of determinations on the same sample were very concordant.

The following changes might be made in the apparatus: (1) It could be made of aluminum. (2) The upper outside face of both cup and casing might be knurled, affording a better hold in putting together. (3) The cup might be closed and provided with water inlet and the outlet tube connected to the water-jacket of the copper oxide tube, thereby reducing the number of water connections. (4) The air inlet tube should be bent a little towards the center and away from the walls of the crucible. The original cost of the above form of apparatus need not exceed $5, not of course including the crucible, and can be made in any machine shop.

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OCCURRENCE OF SALICYLIC ACID IN FRUITS.[1]

BY F. W. TRAPHAGEN AND EDMUND BURKE.

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FOR the past twelve months or more, tests for salicylic acid in various fresh fruits have been carried on in the laboratory of the Montana Experiment Station with the result of showing its almost constant presence in extremely small quantity.

So far as we know the only similar work has been done by Portes and Desmouliere[2] who report its presence to the extent of

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[1] Read at the November meeting of the New York Section of the American Chemical Society.

[2] *J. Pharm. Chim.*, **14**, 342.

a milligram to the kilogram of strawberries. Desmouliere, in his doctorate thesis in the Université de Paris, also reports its presence in raspberries, mulberries and licorice root.[1] This, so far as we know, covers all the work done on fresh fruit outside of this laboratory. It is probable that the acid is present as the methyl salt, which is well known in oil of wintergreen, though we have not yet taken steps to prove this.

Among the fruits from which we have obtained the salicylic acid reaction are the following: strawberries, raspberries (both red and black), blackberries, currants, plums, black cherries, apricots, peaches, Concord grapes, crab-apples, standard apples and oranges. In a few instances we have made this work quantitative with the following results:

Currants, 0.57 mg. acid per kilo of fruit.
Cherries, 0.40 mg. acid per kilo of fruit.
Plums, 0.28 mg. acid per kilo of fruit.
Crab-apples, 0.24 mg. acid per kilo of fruit.
Grapes, 0.32 mg. acid per kilo of fruit.

These values, however, are not absolute but only comparative, and represent the amount which we have succeeded in extracting in each case. We distilled the fruit with phosphoric acid, extracted the distillate with ether, took up with a small amount of water, and applied the ferric chloride test after the ether had evaporated. Check analyses made with known amounts of salicylic acid showed that not nearly all of the acid was extracted by this method. We have also found the salicylic acid reaction to be given by tomatoes, cauliflower and string beans.

It seems to us that the bearing of this work is very important, particularly as regards the investigations of food chemists. While these very small quantities may not react to the tests for salicylic acid as usually applied, especially in view of the small amount of material generally worked upon (25 grams), yet a knowledge of its wide distribution may save reporting, on occasions, materials as adulterated to which salicylic acid has not been added. Knowing that salicylic acid may occur in many of the substances, either a quantitative determination will be necessary in each case or it will be well to report only on strong reactions. We were led to this investigation by the protest of a well-known

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[1] *J. Pharm. Chim.*, **16**, 86.

reputable firm in whose currant jelly we reported salicylic acid but which was present in no greater quantity than we have since found it in the fresh currants. A similar experience was lately had in one of the state laboratories for food control.

In addition to the above work we are studying the distribution of benzoic acid in fruits and vegetables, and hope to be able to publish our results within the year.

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[CONTRIBUTION FROM THE BUREAU OF CHEMISTRY—U. S. DEPARTMENT OF AGRICULTURE, NO. 46.—SENT BY H. W. WILEY.]

IODINE ABSORPTION OF OILS AND FATS.

A COMPARISON OF METHODS.

BY L. M. TOLMAN AND L. S. MUNSON.

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THE Hübl method has been used almost entirely for this determination but it has several faults. First, the solution rapidly loses in strength so that it will change materially during a determination, and after standing a week or so becomes too weak for use. Second, it is so slow in its reaction with some of the oils, such as linseed, that a very serious error is brought about by the change in the strength of the solution during the time of reacting. Wijs[1] showed how considerable this error might be, and the following table taken from his work shows how much difference the time of titrating the blank makes in the iodine number.

TABLE I.—IODINE NUMBERS OF LINSEED OIL BY HÜBL METHOD.

Time of absorption. Hours.	Blank titrated at beginning.	Blank titrated at end.
2	173.74	.....
7	177.65	170.39
24	181.89	163.16

These figures show a decrease in the iodine number after seven hours, if the blank is titrated at the end of the determination. Wijs considers that the true iodine number in this case lies between 173.7 and 181.89. This variation is a very serious objection

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[1] *Chem. Rev. Fett. u. Hartz. Ind.*, **6**, 6 (1899).