In treating the water from a well in Ashtabula, O., containing

Calcium sulphate	96
Magnesium sulphate	39

the theoretical amount of aluminate removed 98.3 per cent. of the lime and ninety-six per cent. of the magnesia.

A well in Glenville, Ohio., containing

Calcium carbonate	99
Calcium sulphate	36
Magnesium carbonate	23

after treatment with theoretical aluminate showed that 98.1 per cent. of the lime had been removed and ninety-five per cent. of the magnesia.

To test still further the efficiency of the aluminate, experiments were made with sodium hydroxide alone, using various proportions, but the removal of lime was not much more than half the quantity taken out by aluminate, and the magnesia was not affected. An important effect of alumina is to remove suspended matter which it does rapidly and completely.

THE HEAT OF BROMINATION TEST FOR OILS.

By Augustus H. Gill and Israel Hatch, Jr.

Received October 5, 1898.

THIS test occupies a middle position between the Maumené and Hübl tests; it suffers from the disadvantages that the required apparatus is not always obtainable, and that the results obtained with different apparatus are not comparable The object of the investigation was to simplify the apparatus and to ascertain if some substance could not be found with which the rise of temperature could be compared, and thus a "specific temperature reaction" obtained similar to the Maumené test.

Apparatus and reagents required twenty five cc. graduated flask; five cc. pipette; burette; thermometer divided into 0.2° calorimeter; measuring apparatus; bromine; carbon tetrachloride.

The calorimeter consists of a flat-bottomed glass tube about three quarters of an inch in internal diameter, and four inches long. This is held by a cork in a beaker two inches in diameter, thus making an air-jacket, and the beaker placed in-

side a four inch beaker, the space being filled with cotton waste; this cotton jacket guards against drafts.

The measuring apparatus is that devised by Wiley,[1] and consists of a filter bottle, through the neck of which passes the five cc. pipette carried by a rubber stopper. The side-neck is fitted with a blowing bulb; by pressing this bulb the liquid in the bottle is forced up into the pipette. One serves for the oil, and the other for the bromine solution.

The bromine solution is prepared by measuring from the burette one volume of bromine into four volumes of carbon tetrachloride, measured with the flask; it is kept in the filter bottle.

Five grams of the oil (ten grams of a tallow or neatsfoot oil and two and one half grams of a drying oil) are weighed out into the twenty-five cc. flask, and made up to the mark with carbon tetrachloride; it is then poured into the measuring apparatus. Five cc. of this solution are accurately withdrawn and run into the calorimeter, care being taken not to allow it to flow down the sides. The thermometer is inserted and, when the temperature has become constant, the reading is taken. Five cc. of the bromine solution measured out similarly to the oil, are allowed to flow down the sides of the colorimeter and mix with the oil; the reaction is instantaneous, and the highest temperature is noted. The mixture is poured out of the calorimeter, the latter wiped out, and allowed to cool before further use. At least three observations should be made, and the results should agree within 0.5°.

Notes: During the addition of the bromine solution to the oil the mixture should not be stirred, as the hot liquid will be cooled by contact with the sides of the calorimeter.

As in the Maumené test, the two solutions should be at the same temperature, which they will be if kept in the same room.

It was found that the bromine solution did not keep well longer than two days; hence a large quantity should not be prepared at one time.

Chloroform gives a slightly higher rise than over carbon tetrachloride, as would be expected; this was found to be 1.6° with the apparatus here described. Archbutt[2] and Jenkens[3] find

[1] This Journal, 18, 378

[2] *J. Soc. Chem. Ind.*, 16, 309.

[3] *Ibid.* 193.

that the presence of water either of the bromine or the oil is apparently of no influence.

The results obtained vary with each calorimeter; hence to make them comparable they must, as in Maumené test, be referred to some standard. Such a standard has been found in sublimed camphor, which can be prepared in sufficient purity; seven and five- tenths gram are dissolved in carbon tetrachloride and brominated, giving an average rise of 4.2°. The rises in temperature obtained with the various oils were divided by this number, giving a specific temperature reaction; if this be multiplied by a factor—found by dividing several of the iodine numbers by this specific temperature— the iodine of value any sample may be quite closely determined; this is shown in the following table, the factor being 17.18.

TABLE SHOWING THE RELATION OF THE BROMINATION AND IODINE VALUES.

Name of oil.	Spec. temp. Reaction.	Iodine. Calculated.	Found.
Neats-foot	3.286	56.5	59.1
Tallow	3.348	57.4	57.2
Prime lard	3.715	63.8	63.8
Sperm	4.191	72.1	73.2
No. 1 lard	4.096	70.3	73.9
Olive	4.762	81.8	82.0
Cottonseed	5.667	97.3	103.0
Corn	6.381	109.5	107.8
Cod	8.002	137.4	135.0
Linseed	9.949	152.6	160.0
25° paraffin	1.643	18.2	10.1
300° lantern	1.190	50.5	0.0

In the case of the hydrocarbon oils the discrepancy may be due to the fact that there is substitution by the dromine and and none with the iodine.

MASS. INSTITUTE OF TECHNOLOGY,
October, 1898.

THE ANALYTICAL CONSTANTS OF AMERICAN LINSEED OIL.

BY AUGUSTUS H. GILL AND AUGUSTUS C. LAMB.

Received October 5, 1898.

GENUINE samples of linseed oil having been found to yield lower iodine values than were usally excepted, it seemed desirable to determine the constants of some American oils of undoubted purity.