unless there is some objection, we will have a "Convention Issue" again this year.

There were 43 contributors to volume 5, the same as last year, but of these, 20 or nearly half were new. It is gratifying to see that we have gotten some of the younger men interested, for without their help, the Section would have been very lean at times. Why are some of us no longer writing anything for our paper? Is it a lack of interest, or a feeling that the time spent in getting up material for publication can better be devoted to other things?

We have made no attempt to classify the 105 articles, reports and committee notes but the proportion of original matter to comments and reports was a little higher than last year. We believe on the whole the Section makes a better showing this year than ever before. We have found it easier to get articles since Mr. Geldert is so generously furnishing us reprints for all contributors. If now we can give to those who want them separates of their individual articles in a size uniform with those of the American Chemical Society, we will doubly secure more high class scientific papers by college and Government men. These we need badly and it is hoped that the new style of reprints can be supplied next year.

The fundamental reason, however, why the Chemists Section has not as yet won for itself a place alongside of other technical and scientific publications is because it is only a "Section," a part of a trade paper. How many chemists read the Oil Paint and Drug Reporter, The Leather Manufacturers Review, The Iron Age, and similar magazines? Yet all of these contain many splendid articles on technical, yes, and often theoretical chemical subjects.

To Mr. Geldert and the Interstate we owe a great deal, for to him our Society is largely indebted for its present publication. The time is coming, however, when if the American Oil Chemists are to be anything more than The Cotton Products Analysts we must have a journal of our own. Don't misunderstand, the time has not yet arrived, but it's in the dawning and we should be turning our eyes toward the coming of that day when in reality we will be the American Oil Chemist's Society.

Where, when you come to think of it, would the great American Chemical Society be without for its journals? How many of its members would pay fifteen dollars a year for the honor of that membership, or from a loyalty to their profession, if they did not receive four or five hundred pages of the best chemical literature each month? I grant you many would, but how many? ten percent? We are joined by a closer bond of fellowship than those in the show under the "big top" but we seem to have gotten into our organization about all of those who care to come in without further inducements. When the time arrives that the "A. O. C. S. Journal" goes to members as a valuable portion of what they get for their dues and cannot be purchased by anybody for one sixth of the membership fee, then our numbers will increase and your publication will be something we will all be proud of.

But it takes hard cash to run a paper and as a society we cannot publish our own journal without contributing. It will be necessary for us to look at the small amount of space in the pages of the Cotton Oil Press taken by chemical supply houses, our members have not yet awakened to a realization of the fact that we must "mention the Press when we write." Why not have sixteen pages in every issue of the Press next year? Have you all you want to read now, or is it simply that you want the other fellow to furnish it? If you have nothing to say, don't say it, but surely more than 45 out of our membership know one or two new things, or have an original idea once a year. Go get a little advertising if you cannot write for us, and if you don't qualify in either class, just cut out the Editor once in a while. He likes to know somebody reads the Chemist's Section and this year, it wasn't until we slipped in a "real-live-one" on dirty laboratories that pinched one of our loyal members toes did he hear a single peep.

As prophesied last April "the greatest asset we now have on our Editorial balance sheet is Dr. J. H. Shrdiner." To him is due all credit for the fine set of articles by men in our profession "who have arrived" telling how they did it. With his help in collecting and preparing articles and the cooperation of the Associate Editors, the year's work has been most enjoyable.


This is a report of the progress made on Investigation No. 2, Isolation and Identification of All Constituents of Crude Cottonseed Oil with Special Reference to Effect on Refining Loss and Quality, which was assigned to this laboratory at the conference of the Basic Research Committee and the U. S. Department of Agriculture, September 4, 1921.

The most important constituent of crude oil is neutral oil, but at present there is no published method for determining the absolute amount of neutral oil. The object of the present refining test, which is used to evaluate crude oils, is to determine the amount of refined oil that a crude oil will produce. Of course, the refiner's profits depend upon how much refined oil he can obtain. A high content of neutral oil will not swell his bank account if he can not get it out. So the present refining test, simulating the actual process used in the refinery, might seem to be the ideal way of fixing the value of the crude oil and from a practical standpoint it is a valuable test. However, before much progress can be made in improving the art of refining, it will be necessary to know how to determine the absolute amount of neutral oil, and this information the refining test does not give. Chemists who make this test know that on some samples as much as 10 to 15 per cent, sometimes even more, of the neutral oil remains with the soapstock. Also it does not determine the entire amount of refined oil that the refiner can obtain.

A good refiner with his large scale operations has no trouble in beating the laboratory refining test which is of necessity done on a small scale.

In regard to the present refining test, Dr. David Wesson says in the November, 1919, number of the Cotton Oil Press, "Again, when we take our present methods of testing crude oil for the amount of refined oil it will produce, we are as far advanced as the old iron-masters of 50 or 70 years ago, who used to test their ore by mixing with limestone and powdered coke, melting in a crucible and weighing up the iron button obtained as the results of the fusion. The fact that the buttons might contain from 10 to 20 per cent of carbon and silica made no difference. It was not ill

(Continued on Page 41.)
careful scientific methods of chemical analysis were applied to the ore and the products, that the steel industry was placed on the solid foundation it occupies to-day. The logical first step in this investigation, therefore, was to devise a method for determining the total amount of neutral oil in a crude vegetable oil. Fortunately, Dr. David Wesson had worked on this problem several years ago and had originated a method for making this determination, and had also devised several other important tests for crude oil which he very generously communicated to us. These methods have been thoroughly investigated and applied to a number of vegetable oils, including cottonseed oil, peanut oil, soya bean oil, etc., and are believed to be a very valuable contribution to the chemistry of vegetable oils. A complete report of these methods has been prepared and will be presented at the coming meeting of the American Oil Chemists' Society.

Briefly, the absolute amount of neutral oil is determined as follows:

An accurately weighed sample of crude cottonseed oil is dissolved in petroleum ether, is shaken with a large excess of a potassium hydroxide solution. A measured volume of 50 per cent alcohol is then added and the shaking is continued. By this treatment the free fatty acids are neutralized and dissolved in the alcohol-alkali solution, the coloring matter is extracted and certain compounds of fatty acids other than glycerides are saponified. The mixture is allowed to stand until the free fatty acids separate into two layers, a lower alcohol-alkali layer containing the saponified fatty acids, the coloring matter, more or less precipitated matter and other impurities, and an upper layer consisting of a petroleum-ether solution of neutral, refined oil. The two layers are separated. The solvent is distilled off the solution of oil and the residue weighed. The oil thus obtained has about the same color as that obtained by the official refining loss test.

The absolute refining loss is obtained by subtracting the weight of neutral oil from the weight of crude oil. To determine the total fatty acids in the alcohol-alkali solution the alcohol is evaporated and the fatty acids are precipitated with hydrochloric acid. Upon cooling, the fatty acids solidify and are removed by filtration. They are thoroughly washed with cold water, dried, dissolved off the filter with petroleum ether and weighed after distilling off the solvent. There remains on the filter, especially in the case of cottonseed oil, some dark-colored material which has not been thoroughly investigated; it is known that it contains some phosphorus.

The amount of total fatty acids removed as soap is always greater than the free fatty acids, separating some other fatty acid compounds, the nature of which is not yet known, except that they are not glycerides. The alkali absorbed by this refining may be determined as follows: A weighed sample of crude oil is dissolved in petroleum ether and treated with an accurately measured quantity of the potassium hydroxide solution as described above. The separated alcohol-alkali solution is drawn off and titrated with 0.1 normal hydrochloric acid solution. At the same time an equal amount of the alkali solution is titrated and the alkali absorbed is calculated from the difference.

The difference between the amount of alkali absorbed and that equivalent to the free fatty acids is the amount required to decompose the fatty acid compounds mentioned above, precipitate the coloring matter, etc.

In the following table, the results of some determinations of neutral oil, absolute refining loss, fatty acids as soap, etc. made on crude cottonseed oils. The ordinary refining loss as determined by the official method is given in the last column for comparison.

### Table: Analysis of Crude Cottonseed Oil

<table>
<thead>
<tr>
<th>Sample</th>
<th>Neutral Oil</th>
<th>Absolute Refining Loss</th>
<th>Fatty Acids as Soap</th>
<th>Free Fatty Acids</th>
<th>Refining Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per cent</td>
<td>Per cent</td>
<td>Per cent</td>
<td>Per cent</td>
<td>Per cent</td>
</tr>
<tr>
<td>1</td>
<td>92.98</td>
<td>0.72</td>
<td>0.18</td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>96.89</td>
<td>1.93</td>
<td>1.13</td>
<td>0.63</td>
<td>6.69</td>
</tr>
<tr>
<td>3</td>
<td>96.80</td>
<td>3.20</td>
<td>2.23</td>
<td>1.57</td>
<td>10.10</td>
</tr>
<tr>
<td>4</td>
<td>96.38</td>
<td>3.72</td>
<td>2.96</td>
<td>2.05</td>
<td>8.60</td>
</tr>
<tr>
<td>5</td>
<td>95.98</td>
<td>4.02</td>
<td>2.98</td>
<td>2.19</td>
<td>8.20</td>
</tr>
<tr>
<td>6</td>
<td>94.05</td>
<td>5.85</td>
<td>4.99</td>
<td>3.79</td>
<td>12.35</td>
</tr>
<tr>
<td>7</td>
<td>97.12</td>
<td>12.58</td>
<td>11.34</td>
<td>9.18</td>
<td>29.60</td>
</tr>
</tbody>
</table>

Some progress has been made in investigating the material which separates from crude cottonseed oil when it is stirred with water and heated. Part of the material separated in this manner is insoluble in petroleum ether and is a magnesium salt of an organic phosphoric acid. From the preliminary examination already completed, the acid appears to be similar to a substance separated from cottonseed meal by R. J. Anderson and identified by him as either phytic acid or inositol hexaphosphate. From the material soluble in petroleum ether a substance was separated, which is apparently an organic phosphoric acid in combination with both magnesium and calcium. Its solubility suggests the possibility of its being an ester of an organic phosphoric acid.

The petroleum-ether insoluble substances amounts to about 0.03 percent of the original oil. The amount of the substance soluble in petroleum ether is apparently greater. Much remains to be done before this part of the investigation can be completed. It is believed that subsequent investigations will show that the larger part of the phosphorus present in crude cottonseed oil will be found to be in these organic phosphorus acid substances instead of in lecithin, as previously reported by various investigators.

### HALPHEN TEST FOR COTTONSEED OIL

By A. W. Putland, Portsmouth, Va.

Interstate Cotton Seed Crushers’ Association Rule 148 renders: “A Peanut oil which shows the presence of cotton seed oil by the Halphen test, when the color of the reaction is darker than that produced by an oil known to contain one half of one per cent may be rejected.”

On searching the literature extending over several years, no information could be found bearing on this much abused color reaction. It could not be learned when this rule was adopted nor on whose recommendation.

Recently we had occasion to investigate this reaction and our opinions were verified by exhaustive tests. This test in determining amounts of cotton seed oil in other oils is absolutely unreliable and inaccurate. It is beyond one’s comprehension why a purely QUALITATIVE test should be adopted by the Association as a QUANTITATIVE one, without positive information as to the accuracy of this test. The opinion of a number of members of the American Oil Chemist’s Society is that the Halphen reaction, “when used as a quantitative test is unreliable,” yet, the rules force us to accept or reject peanut, and other oils, according to the results obtained by this color reaction.

Reading from Allen’s Commercial Organic Analysis; “If cotton seed oil or oils containing cotton seed oil is heated with ceric ammonium sulfate and amyl alcohol a characteristic red is produced, the intensity of which is not the same with all samples, but with the same samples...”

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*Anderson, R. J. J. Biol. Chem., 13, 321, and 17, 121.