The complete data together with the approximate cloud points appear in Table III. It should perhaps be pointed out that no attempt was made to make precise measurements of the critical solution temperatures since these are rather time-consuming and were not warranted for our purposes. It was apparent during the experiments that the temperatures could be rather definitely established and could be approached from both directions.

In Curve I solubility of water in cottonseed salad oil is plotted as a function of temperature. It will be observed that the solubility of water in the oil approximately doubles in the range of 32° to 90° F. The practical implication of course is that salad oils must run less than .07% moisture if they are not to haze when cooled to 32° F. Further, the data may be used to determine roughly the percentage of dissolved moisture in salad oils by cooling these slowly and observing the temperature at which haze is first noted. This procedure is obviously limited to oils of from 0.07 to .14% moisture content.

TABLE III.—DATA ON CRITICAL SOLUTION TEMPERATURES OF VARYING AMOUNTS OF WATER IN SALAD OIL

| Exp. No. | Duplicate | cc. into tubes—Oil of 0.138% Moisture | cc. into tubes—Oil of 0.043% Moisture | Calc. % Moisture in Oil Mixture | Critical Temp. of Solution Deg. F. |
|---|---|---|---|---|---|
| 1 | A | 10.0 | 0 | 0.138 | 90 |
| | B | 10.0 | 0 | 0.138 | 90 |
| 2 | A | 8.3 | 1.7 | 0.121 | 72.5 |
| | B | 8.3 | 1.7 | 0.121 | 72.5 |
| 3 | A | 6.7 | 3.3 | 0.106 | 60. |
| | B | 6.7 | 3.3 | 0.106 | 62.5 |
| 4 | A | 5.0 | 5.0 | 0.090 | 50. |
| | B | 5.0 | 5.0 | 0.090 | 50. |
| 5 | A | 3.3 | 6.7 | 0.074 | 32. |
| | B | 3.3 | 6.7 | 0.074 | 32. |
| 6 | A | 1.7 | 8.3 | 0.059 | Clear at 32° F. |
| | B | 1.7 | 8.3 | 0.059 | |
| 7 | A | 0 | 10.0 | 0.043 | Clear at 32° F. |
| | B | 0 | 10.0 | 0.043 | |

# THE EFFECT OF FUEL OIL ON COLOR OF REFINED COTTONSEED OIL

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THE fact has been known for years that a minute quantity of the lubricating oil used in a cottonseed oil mill would, if allowed to come in contact with the cottonseed or cottonseed meats, cause the refined oil obtained from the crude cottonseed oil produced from the contaminated seed or meats to be increased in color with a fluorescent appearance. The fluorescent appearance and a portion of the increase in color persists in the bleached oil.

A cottonseed oil mill suddenly commenced producing oil which, by the above criterion, was contaminated with mineral oil. No source of lubricating oil contamination could be found at the mill. On investigation, the contamination was found to be due to fuel oil which became mixed with the cottonseed in transit from the gins to the mill. The mill was furnishing fuel oil to the gins in drums. The trucks going to the gins for seed carried the drums of fuel oil. The trucks on returning to the mill with seed brought back the empty drums on top of the seed, thus contaminating the seed with fuel oil.

Tank cars and tanks on ships which have been used to transport fuel oil are often used, after cleaning, to carry crude or refined cottonseed oil. If the tanks are not thoroughly cleaned of fuel oil before loading with cottonseed oil, the latter will be contaminated, causing an increase in color. The following study was made to determine the effect of fuel oil contamination on the color of refined cottonseed oil.

Three refined cottonseed oils, A, B, and C, were mixed with various proportions of fuel oils, X, Y, and Z, and the color of the yellow and bleached oils determined. The results obtained are given in Tables I, II, and III. In making the color readings, standard Lovibond color glasses were used. All yellow oils

TABLE I.—REFINED COTTONSEED OIL A

| Mineral Oil Added | 0 Y.O. | 0 Bl. | .01% Y.O. | .01% Bl. | .02% Y.O. | .02% Bl. | .03% Y.O. | .03% Bl. |
|---|---|---|---|---|---|---|---|---|
| X | 4.5 | 2.2 | 6.4 | 2.7 | 8.7 | 3.8 | 11.1 | 4.3 |
| Y | 4.5 | 2.2 | 6.6 | 2.9 | 9.5 | 3.8 | 12.7 | 4.3 |
| Z | 4.5 | 2.2 | 5.8 | 2.5 | 7.2 | 3.0 | 8.7 | 3.5 |

TABLE II.—REFINED COTTONSEED OIL B

| Mineral Oil Added | 0 Y.O. | 0 Bl. | .01% Y.O. | .01% Bl. | .02% Y.O. | .02% Bl. | .03% Y.O. | .03% Bl. |
|---|---|---|---|---|---|---|---|---|
| X | 5.8 | 2.3 | 7.8 | 2.7 | 9.9 | 3.6 | 11.2 | 4.5 |
| Y | 5.8 | 2.3 | 8.1 | 2.9 | 10.8 | 3.7 | 14.3 | 4.5 |
| Z | 5.8 | 2.3 | 7.1 | 2.6 | 8.5 | 3.0 | 9.8 | 3.5 |

TABLE III.—REFINED COTTONSEED OIL C

| Mineral Oil Added | 0 Y.O. | 0 Bl. | .01% Y.O. | .01% Bl. | .02% Y.O. | .02% Bl. | .03% Y.O. | .03% Bl. |
|---|---|---|---|---|---|---|---|---|
| X | 9.1 | 3.0 | 11.1 | 3.4 | 13.2 | 4.2 | 16.8 | 5.0 |
| Y | 9.1 | 3.0 | 11.5 | 3.5 | 14.6 | 4.5 | 19.8 | 5.3 |
| Z | 9.1 | 3.0 | 10.2 | 3.3 | 11.9 | 3.8 | 13.5 | 4.1 |

TABLE IV.—COLOR INCREASE WITH ADDED MINERAL OIL X

| Refined Cottonseed Oil | .01% Numerical Increase Y.O. | .01% Numerical Increase Bl. | .01% Increase retained in bleached oil (%) | .02% Numerical Increase Y.O. | .02% Numerical Increase Bl. | .02% Increase retained in bleached oil (%) | .03% Numerical Increase Y.O. | .03% Numerical Increase Bl. | .03% Increase retained in bleached oil (%) |
|---|---|---|---|---|---|---|---|---|---|
| A | 1.9 | 0.5 | 26 | 4.2 | 1.6 | 38 | 6.6 | 2.1 | 32 |
| B | 2.0 | 0.4 | 20 | 4.1 | 1.3 | 32 | 5.4 | 2.2 | 41 |
| C | 2.0 | 0.4 | 20 | 4.1 | 1.2 | 29 | 7.6 | 2.0 | 28 |

TABLE V.—COLOR INCREASE WITH ADDED MINERAL OIL Y

| Refined Cottonseed Oil | .01% Numerical Increase Y.O. | .01% Numerical Increase Bl. | .01% Increase retained in bleached oil (%) | .02% Numerical Increase Y.O. | .02% Numerical Increase Bl. | .02% Increase retained in bleached oil (%) | .03% Numerical Increase Y.O. | .03% Numerical Increase Bl. | .03% Increase retained in bleached oil (%) |
|---|---|---|---|---|---|---|---|---|---|
| A | 2.1 | 0.7 | 33 | 5.0 | 1.6 | 32 | 8.2 | 2.1 | 26 |
| B | 2.3 | 0.6 | 26 | 5.0 | 1.4 | 28 | 8.5 | 2.2 | 26 |
| C | 2.4 | 0.5 | 21 | 5.5 | 1.5 | 27 | 10.7 | 2.3 | 22 |

TABLE VI.—COLOR INCREASE WITH ADDED MINERAL OIL Z

| Refined Cottonseed Oil | .01% Numerical Increase Y.O. | .01% Numerical Increase Bl. | .01% Increase retained in bleached oil (%) | .02% Numerical Increase Y.O. | .02% Numerical Increase Bl. | .02% Increase retained in bleached oil (%) | .03% Numerical Increase Y.O. | .03% Numerical Increase Bl. | .03% Increase retained in bleached oil (%) |
|---|---|---|---|---|---|---|---|---|---|
| A | 1 3 | 0.3 | 23 | 2.7 | 0.8 | 30 | 4.2 | 1.3 | 31 |
| B | 1.3 | 0.3 | 23 | 2.7 | 0.7 | 26 | 4.0 | 1.2 | 30 |
| C | 1.1 | 0.3 | 27 | 2.8 | 0.8 | 29 | 4.4 | 1.1 | 25 |

TABLE VII.

| Fuel Oil | A. P. I.° @ 60° F. | 100 Penetration Asphalt (%) |
|---|---|---|
| X | 21.2 | 45.3 |
| Y | 24.7 | 42.9 |
| Z | 29.3 | 24.1 |

were read using a 35 yellow glass and bleached oils using a 20 yellow glass. The colors given in the tables are the red glass colors. In Tables IV, V, and VI, the increase in color of the yellow and bleached oils is shown, together with the percentage of the yellow oil increase in color retained on bleaching. In Table VII, the gravities and per cent of 100 penetration asphalt in the fuel oils are shown. The original yellow and bleached oils did not have a fluorescent appearance when nine inch columns of the oils were viewed by reflected light. All of the yellow and bleached oils containing fuel oil did have a fluorescent appearance when examined in the same manner.

## CONCLUSIONS

Refined cottonseed oil contaminated with fuel oil has its color and the color of its bleach increased, the amount of increase in color being dependent upon the amount and type of fuel oil. Both the yellow and bleached oils when contaminated with fuel oil have fluorescent appearance. By comparing the color and fluorescent appearance of the yellow and bleached shipping sample of cottonseed with that of the destination sample, the presence of mineral oil contamination can be detected.

# REPORT OF THE UNIFORM METHODS AND PLANNING COMMITTEE AMERICAN OIL CHEMISTS' SOCIETY - 1936-1937

THE Uniform Methods and Planning Committee had a meeting in Dallas on May 11, 1937, to go over the reports of the committees submitted to them and discuss the work which has been accomplished. They have the following comments and recommendations to make regarding the work of the committees during the past year.

**SEED ANALYSIS COMMITTEE:**

This committee makes the following recommendations:

"1. That the description of the fuming procedure be changed as follows:
'Place the dried seed in the pot, cover with a watch glass and place in the fuming oven previously ventilated for at least five to ten minutes, and fume for one hour. The oven temperature should gradually rise to, but not exceed, 115° C.'

"2. That the following mixing method be added as an alternate: 'Place the sample in an ordinary small straight-sided iron mortar of about 4 inch inside depth. Using the pestle in an inverted position to avoid a crushing action, mix the sample lightly but thoroughly using a stirring or rotary movement. Brush out the mortar after each sample.'"

These recommendations came up for considerable discussion in the Uniform Methods and Planning Committee meeting and there was some question as to whether the second recommendation should be approved as given. In other words, if both recommendations are approved it will leave to the discretion of the laboratory which of the two methods is employed and some of the Committee felt that it would be better to have only one method approved or available. The Uniform Methods Committee then decided to concur in the recommendations of the Seed Analysis Committee with the suggestion that during the coming year the two methods be tried out by the new committee and a final decision as to which was preferable be obtained.

The Uniform Methods and Planning Committee concur in the recommendations of the Seed Analysis Committee and move that they be adopted as tentative.

There was some discussion on the motion, owing to the fact that