# NOTE on the Oil of Castanha DeCotia

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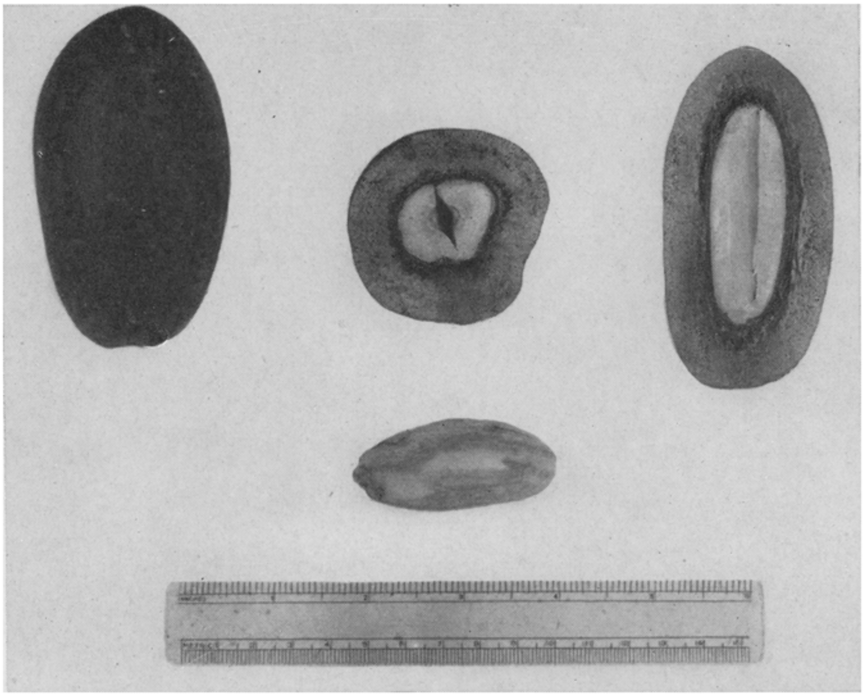
**Abstract**

Oil of Cotia, a new semi-drying oil, obtained from a Brazilian nut is described. Some chemical constants are determined and tabulated. The high Diene Value of this oil and other properties indicate that it might be used in the paint and varnish industries.



| ANALYSIS: | Sample of Oil Received From Brazil | Oil Extracted Here From the Nuts |
|---|---|---|
| Acid No. | 0.58 | 0.72 |
| Sap. No. | 195.8 | 194.2 |
| Iod. No. 1 hr. Hanus | 128.1 | 153.5(?) |
| 1 hr. Wijs | 114.0 | — |
| 3 days Wijs | 151.8 | — |
| Diene Value | 32.8 | 33.5; 33.9 |
| Unsaponifiables | — | 0.54% |
| Hexabromides | — | 0 |
| Brown Heat Test | No Gel after 1¾ hours | No Gel after 1½ hours |
| Gel Test with Boron Fluoride Ethyl Ester | — | quick action; coagulation |
| Color | light yellow | light straw |

DURING a search for substitutes for Tung Oil an investigation of the properties of the oil of Cotia was started when about two years ago we received a small sample from Brazil. The material was called Oil of Castanha de Cotia, but a thorough search of the literature failed to disclose any sizable references. The analysis indicated that it had properties which were of interest to us, and we therefore imported a bag of nuts which were called "Monkey Nuts".

An inquiry at the Brazilian Trade Authorities in New York revealed the following citation of the botanical source and description of the nuts:

"There are two varieties; the most interesting comes from the Upper Amazon River, the oval shaped fruits are 9 to 10 cm. long (3.5″ to 3.9″), diameter 5 to 6 cm. (2″ to 2.3″); and they have a large white kernel inside which gives 60% of a colorless, light, odorless oil. On the Lower Amazon River exists a smaller variety, 6 to 7 cm. long (2.4″ to 2.7″), diameter 4 cm. (1.5″)".

Further efforts to determine the true botanical source of these nuts resulted in several divergent opinions. However, we believe that the identification offered by Dr. G. S. Jamieson of Washington, D. C. is correct. He writes as follows:

"In so far as it can be determined by the Departments' botanists from specimens of the fruit, the tree probably belongs to the genus Parinarium of the Rosaceae family. To date, thirty Parinarium species have been described. The fact that the oil in question contains elaeostearic acid tends to confirm the opinion of the botanist because seed oils from a number of tropical trees of the Rosaceae have been shown to contain either elaeostearic or a closely related acid having conjugated double bonds."

It was ascertained that the designation "Castanha de Cotia" is derived from the name of a tailless animal called the Cotia, which feeds on these nuts.

The hard nuts were greyish brown in appearance from the outside, oval shaped, about 3 to 4″ long and about 2 to 2½″ in diameter, which contained a relatively small kernel of about the size and appearance of a Para or Brazil-Nut. The shell covering the kernel is very tough and fibrous, and it was necessary for us to saw the nuts in half in order to obtain the kernels. A total of 18.5 lbs of nuts yielded 2 lbs. 14 oz. of good kernels and 1 lb. 5 oz. of bad kernels. These good kernels contained 74.2% of oil and 1.75% of moisture. Since the quantity of kernels was small, they were not pressed but subjected to extraction with hexane to obtain the oil.

From the Iodine series and the Diene Value it will be observed that acids with conjugated double bonds must be present in the oil. Further it was shown that when the oil was exposed to sunlight for several days, it gradually solidified to a solid white mass. This would indicate the presence of elaeostearic acid which is converted by the sunlight to the beta form. Indeed, the odor of the oil is very suggestive of chinawood oil, although it is not as pronounced. The 2 minute Wijs — v. Mikusch Iod. No. of the solidified oil after 2 years was = 103.

## MODIFICATIONS

The small quantity of fresh oil available before solidification prevented the application of extensive experiments to determine its value in the varnish and synthetic resin field. However, the blown and stand oils were made and resulted in light amber colored products.

A Blown Oil was obtained passing air through the Cotia Oil at 130° C. for about 12 hours. A heavy viscous oil resulted, light brown in color which dried to a glossy soft film in two days without the addition of driers;

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|---|---|
| Acid No. | 0.63 |
| Sap. No. | 206.4 |
| Iod. No. (Hanus) | 77.8 |

The drying of this blown oil is in direct contrast to the original oil which dries only partly, remains greasy, and frosts over similar to Chinawood oil.

A Stand Oil was made by heating the oil at a temperature of 250 to 280° C. for 18 hours while agitating it with a current of nitrogen. This Stand oil was a semi viscous liquid, light yellow in color which had the following constants:

| | |
|---|---|
| Acid No. | low |
| Sap. No. | 194.1 |
| Iod. No. (Hanus) | 101.7 |

An Alkyd Resin was made from the Fatty Acid. The very heavy, viscous, light colored material was entirely soluble in xylene.

The Alkali split Fatty Acids of Cotia distil readily with steam in a vacuum, and yield a light colored product.

| | |
|---|---|
| Acid No. | 198 |
| Iod. No. (Hanus 1 hr.) | 111 |
| Odor | resembling Tung F. A. |

The drop of the Iod. No. indicates a partial loss of the more unsaturated part by polymerization which is retained in the bottoms.

Urgent work in other fields forced us to abandon temporarily further studies. However, it was thought that the publication of the above incomplete data might be of value to some investigators.

# Report of the Uniform Methods and Planning Committee---American Oil Chemists' Society---Fall Meeting October 6-7, 1938

THE Uniform Methods and Planning Committee have just two things that they want to bring before the Society at this time. The first one concerns the report of the Glycerin Analysis Committee, which has made a recommendation in which we concur.

"The Glycerin Analysis Committee has had under consideration for several years the Methods of Crude Glycerin Analysis recommended by the International Committee. Our efforts to improve the absolute accuracy of the acetin method have been unsuccessful. Since these methods are in universal use commercially and have stood the test of over a quarter century, your committee has no hesitation in recommending their adoption as tentative methods of the American Oil Chemists' Society. These methods are to be found in the Journal of Industrial and Engineering Chemistry, Vol. 3, pp. 682-86 (Sept. 1911)."

The Uniform Methods and Planning Committee concur in this recommendation and move that these methods be adopted as tentative by the Society. Motion was seconded and the methods adopted as tentative.

The second matter has to do with the Modified Gardner Break Test. This method is used in the testing of soybean oil and has never been a part of the methods of our Society. It is a method which is in use and has been adopted by the American Society for Testing Materials. We give you herewith the method as the Uniform Methods and Planning Committee have voted upon it.

"MODIFIED GARDNER BREAK" TEST

"Weigh 25 grams of oil in a 100 ml. pyrex beaker. Add 3 drops of concentrated HCl and stir in thoroughly. Suspend a thermometer in center of oil-acid mixture, not allowing the stem of the thermometer to touch the bottom of the beaker. Apply heat from a Bunsen burner at the rate of 165-175° F. rise per minute. Do not disturb or stir the oil after the operation has begun. Heat to 550° F., then withdraw the flame. Set aside to cool. After cooling, stir in about 50 mls. of $CCl_4$, dissolving all of the oil. Filter mixture through a prepared Gooch crucible with suction. A bitumen type obtainable from the Wilkens-Anderson Company, # 3050, as specified in A. S. T. M. test D4-27, is recommended. The Gooch crucible is prepared with asbestos. This is washed thoroughly with water and alcohol and dried to constant weight. Any traces of break in the beaker are carefully washed onto the filter with $CCl_4$, using a stirring rod if necessary. The filter is then washed thoroughly with $CCl_4$, using not less than 100 ml. The crucible with break residue is then dried at 105° C. to constant weight, cooled and weighed. The increase in weight x 4 gives percentage break.

NOTE: Filtration is about four times more rapid in the bitumen type crucible, with the result that washing may not in some cases be complete unless the break is allowed to be thoroughly soaked by the solvent. This may best be insured by breaking vacuum for about a minute after fiilling the crucible with solvent, then sucking this through and repeating several times."

We move that we adopt it as a tentative method. Motion was seconded and the Modified Gardner Break Method was adopted by the Society as a tentative method.

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