separation must be made have not been so closely defined that satisfactorily concordant results were obtained.

A study of the percentage of the ash of the oil is under way. Apparently, because of the variation of the amount of the ash of the different foots-forming materials this determination will not give satisfactory indication of quality. Because of the high ash of the materials which form the break, their presence in excessive amount will be indicated. But moisture and high melting-point fats will not be included. The elimination of the moisture is, of course, unimportant, because that can be determined in another way.

The situation as it now stands is that there is no satisfactory determination, or set of determinations for the estimation of the quality of linseed oil. There is, however, sufficient data to warrant the continuation of investigations to the end that quality determination can be satisfactorily and accurately accomplished.

IS THE BLEACHING ACTION OF FULLER'S EARTH DUE TO OXIDATION?

By Clarence W. Benedict

Fuller's Earth is essentially a clay. It differs from ordinary clay in that it is derived from Hornblende and Augite rather than from Feldspars. It contains hydrous aluminum silicates and has a marked colloidal structure.

A large amount of research work has been done on Fuller's Earth to determine just why it bleaches. The accepted theory has always been that the bleaching is the result of adsorption of the coloring matter by the earth.

However, this theory while generally accepted is as yet only a theory. Just why Fuller's Earth bleaches is still unknown. Dr. Wesson has advanced the theory that this bleaching power of Fuller's Earth may be due to oxidizing action of the earth upon the oil. This theory seems plausible in as much as oils can be bleached by treating them with strong oxidizing agents. It was the purpose of this study to determine whether or not oxidation had anything to do with the bleaching.

Procedure. The first step in the investigation was to determine the oxidizing power of the earth. This was done by weighing out accurately five grams each of twelve different earths, into 250 cc. volumetric flasks, and covering them with 50 cc. of carbonated water to drive out the air present and permit of working in an atmosphere of carbon dioxide. Next 25 cc. of Mohrs salt solution were added and the flasks filled to the 250-cc. mark with boiled, distilled, oxygen-free water. They were then shaken by hand for five minutes, allowed to stand and settle, until 50 cc. of clear liquid could be drawn off and titrated with potassium permanganate. Checks were made on each titration. Two blanks were run at the same time to determine the amount of the Mohrs salt which had been oxidized by the air.

The permanganate and Mohrs salt solution used in these experiments were made up in the usual manner, approximately N/20. Sulfuric acid was added to the Mohrs solution to keep it from oxidizing, and each day the solutions were restandardized.

When the excess of Mohrs solution was titrated back, it was found that a certain number of cc. of permanganate were required to neutralize it. Knowing the equivalent of this many cc. of permanganate in terms of grams of Mohrs salt, and knowing also the number of grams of Mohrs salt added, the difference represented the number of grams of Mohrs salt oxidized by the earth. From this value the number of grams of Mohrs salt oxidized by the air in the blanks was subtracted. This gave the number of grams of Mohrs salt oxidized by the earth.

In actual practice the oils are bleached at the temperature of boiling water. The next problem therefore, was to see if the oxidizing effect of the earth was increased at this temperature. The experiments were carried out exactly as those above, and the results showed a marked increase in oxidizing activity. This increase was practically the same for all the earths.

The next problem which came up was to determine whether or not the earth was really oxidizing the Mohrs salt or just adsorbing it. In order to arrive at a decision, an adsorption isotherm was run on one of the samples of the earth. After two rather unsuccessful efforts, a third gave fair results. The curve, which for an adsorption should be a straight line was only approximately so. However, the points which were off the line were correct, as they were later checked. The curve does not show clear adsorption but only a tendency toward it.

If the bleaching was due to oxidation, it seemed possible that by reducing the earths with hydrogen in a hot tube, and then measuring its oxidation and bleaching powers, different results might be obtained than without this treatment. Of course this method is open to the objection that at this temperature some internal structure change might take place. However, the results obtained were fairly satisfactory. They showed that all oxidizing effect had been removed. In fact, the earths after this treatment reduced rather than oxidized the Mohrs solution.

To "reduce" an earth it was placed in a small alundum boat in a silica tube in the gas furnace and a stream of purified hydrogen was passed over it. The flame was then lighted and the boat left in the furnace for two hours; then allowed to cool with the stream of hydrogen still running.

The earths which had been treated with hydrogen did not bleach as well as they did before they were reduced. This may of course be due to some catalytic change or effect, but it is more probably due to loss of oxidizing power.

The bleaching tests were conducted on the earths in the following way. Fifty cc. of cotton seed oil were placed in a flask immersed in boiling water. Then 2.5 grams of earth added and the mixture stirred for three minutes, then filtered through filter paper in a steam jacketed funnel.

Conclusions. The oxidizing properties of the earths are roughly proportional to their bleaching powers. That is, Filtrol and Pikes Peak are the best bleaches, and they show the highest oxidizing power, while Floated Silica, which is the poorest bleach, shows a very low oxidizing power. The intermediate earths check up fairly well as shown in the following table.

OXIDIZING POWER OF BLEACH EARTHS—GRAMS OF $FeSO_4$ OXIDIZED BY 5 G. OF SAMPLE

Earth	Cold	Hot
XXF	0.0405	0.0542
—975	.0085	.0416
XL-000	.0199	.0445
Pikes Peak	.0875	.1372
Filtrol	.0434	.0750
Floated Silica	.0072	.0100
X-897	.0546	.0722
X-898	.0884	.1250
Georgia Fuller's Earth	.0107	.0552
Filter Clay	.0294	.0567
Tonsil	.0352	.0612
Unknown Quantity	.0436	.0655

The experimental work and results obtained during the research suggest the following conclusions.

1. Fuller's earth does oxidize different earths to a different extent.
2. The bleaching of oils by Fuller's earth is not due to oxidation alone.
3. The oxidizing power of the earth *is* a measure of its bleaching power.
4. The bleaching property of Fuller's earth is due to a combination of adsorption and oxidation. Dr. Wesson has suggested that the coloring matter is first oxidized and then adsorbed. This is, I think, a better explanation of its action than the straight adsorption theory.

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THE DISINFECTING POWER OF SOAPS

FROM "HANDBUCH DER SEIFENFABRIKATION"
BY DR. WALTER SCHRAUTH—5TH EDITION, 1921, PAGES 59–63
TRANSLATION BY L. W. BOSART

The opinions of the early authors differ widely concerning the disinfecting value of soaps. That soap can act as a disinfectant is nevertheless quite positively known at present, and recent research has established the conditions under which this disinfecting power is exerted and its extent.