The Advantages of Purely Absorptive Carbon in Decolorizing

Its Relation to Elimination of Emulsifying Agents

By JOHN P. HARRIS

DECOLORIZING of vegetable oils has long been accomplished by means of Fullers' Earth, and for many years Fullers' Earth constituted the sole purifying and clarifying agent employed, in addition to its decolorizing ability.

Most refinery operatives will tell you of the "Fullers' Earth" flavor which comes to oil when it has been treated with Fullers' Earth. Whereas, actually, Fullers' Earth possesses, and imparts to the oil, no flavor any more than nickel imparts a flavor during hydrogenation. But, in both cases, a peculiar unmistakable odor and flavor is imparted to the oil. This I shall call, for want of a better name, a "catalytic" flavor, because, just as the nickel acts as a catalyst at certain temperatures to cause hydrogen to combine with the oil to convert unsaturated fatty acids, so, I believe, Fullers' Earth acts as a catalyst, at certain definite temperatures, to cause oxygen from the air to combine with oils or fats, whereby a bleaching and whitening occurs.

Many decolorizing agents other than Fullers' Earth have been used, most of them depending on a like catalytically induced oxidation, for a bleaching action. Among these bleaching agents may be mentioned acid treated clays, which for a time proved rather popular; and acid treated carbons, where activation is induced by means of an acid treatment.

So far, a light color is of such importance to the refiner that on

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most oils and fats he is ready to risk a little oxidation in order to achieve a very light product, since as yet no *complete* bleaching agent for cottonseed oil has been commercially prepared which does not tend to oxidize the oil.

Every intelligent refiner knows and deprecates this tendency toward oxidation thus induced, because he realizes that oxidation predisposes an oil to rancidity. I do not mean that bleaching makes an oil rancid, nor that the absorption of a small amount of oxygen makes an oil rancid, but I do mean that a virgin oil, totally without oxygen, may absorb a considerable amount of oxygen while still remaining sweet to taste and smell, but that there is a point of satura-

tion, when an *excess* of oxygen generates rancidity; first, perhaps, marked by a flat or stale flavor; then becoming positive, acrid rancidity. Elimination of this initial oxidation, no matter how slight, would, thus, increase the keeping quality of the oil just that much.

A Purely Absorptive, Non-Catalytic Carbon

While, as stated above, there is no complete bleaching agent for cottonseed oil, which possesses markedly strong decolorizing ability without a catalytic reaction, there is a non-acid, vegetable, activated decolorizing carbon, which produces decolorization by pure absorption. This carbon possesses such a remarkably strong affinity for resins, albuminoids, phosphatides, mucilaginous matter, as well as natural pigmentation, that it cleans, purifies and decolorizes (being especially valuable for the removal of red color), merely by straight absorption, and it does this without exerting any catalytic action whatever upon the oil.

It is interesting to observe that temperature has little effect upon the decolorizing properties of this form of carbon. Catalytic combination occurs between oil and most bleaching agents at temperatures around 180° F., and treatment with such agents at temperatures substantially lower than this would be valueless, yet such substantially lower temperatures produce equally good results with this pure form of carbon, proving that its decolorizing properties do not come, even in part, from catalytic action. Further proof comes from the utter lack of the "catalytic" flavor described above, in fact, this carbon actually does a noticeable job of deodorizing within certain limits, leaving the oil purer and sweeter, as well as whiter, for having been treated with it.

So the wise refiner of cottonseed oil minimizes his chances of oxidation as completely as possible, by using this carbon, and it is noteworthy that this carbon, when used supplementarily to other bleaching agents, actually seems to largely do away with the "catalytic" flavor produced by the other bleaching agents.

A Complete Decolorant for Some Oils

With some oils, such as coconut, corn and peanut, this carbon, in a very small amount, suffices *entirely* for decolorizing, leaving the oil free from oxidation and absolutely clean and pure.

It may be contended from this that the sheer power of absorption which distinguishes this class of carbon from all others, comes close to making it a 100% refining agent. That is, it tends even to neutralize, as well as to decolorize and deodorize. It has been reported by many users that such a carbon actually absorbs some of the free fatty acids as well as the other impurities from the oil, whereas treatment with other decolorizing agents invariably tends to increase the free fatty acid content.

Preparation of Smalley Foundation Samples

THOMAS C. LAW, Atlanta, Georgia, has very kindly consented to prepare the samples for this year's Smalley Foundation Co-operative Checkmeal Analyses of the American Oil Chemists' Society. This work calls for considerable sacrifice on Mr. Law's part and his agreement to undertake the work has earned him the gratitude of the Society.