Application of Absorptive Carbons to Crude Vegetable Oils

Tangible Profits Accrue to Millers and Refiners Through Improvement of Quality

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IN a previous issue of OIL & FAT INDUSTRIES, the writer has outlined the advantages to the edible oil refiner of using a purely absorptive activated carbon for bleaching purposes, either alone or in combination with fullers' earth or other bleaching agents. In that article the economies of bleaching refined oil with such carbon were stressed and inasmuch as this carbon acts particularly well in the removal of all impurities from refined oils, even incuding traces of fatty acids, it naturally occurred to us to try it out upon the crude oil itself, particularly since it works as well cold as it does hot, as it is surely logical to attack the removal of color, odor, flavor and all of the emulsificants present in crude oil, right at the start of processing, whereby their presence will not affect the subsequent stages of refining.

For example, in a prime crude cottonseed oil, possessing under 1% free fatty acids, we invariably have a neutralizing loss of considerably more than five times the free fatty acids. If we were able to free the crude oil of *all* of the emulsifying agents, pigmentation, etc., by completely cleansing the crude oil, we could neutralize that oil with a loss very close to the percentage of free fatty acids.

It Produces Almost Theoretical Losses Upon Coconut Oil

This we have already accomplished in the case of coconut oil, where, for example, by treating crude coconut oil running 5% free fatty acid (oleic), in the cold with a purely absorptive carbon, we have been able to reduce the neutralizing loss to 5.5%, and we can accomplish such results consistently, and with varying percentages of free fatty acids in the crude oil.

A Great Benefit in Treating Crude Linseed Oil

Experiments were started some years ago, covering the purification of crude linseed oil with this purely absorptive carbon. The results showed that a better varnish oil could be obtained by first treating the crude oil with carbon prior to neutralizing, than by neutralizing first and using a bleaching agent thereafter.

Excellent results have also been obtained in the pretreatment of crude peanut oil with this purely absorptive carbon.

But only recently have we had the opportunity of trying this out upon the economically most important vegetable oil—American Cottonseed Oil.

Advantages of Pre-treating Crude Cotton Oil

We shall cite here two, from a series of large scale tests, made in conjunction with an American crusher and refiner. In these tests, the oil was followed through

from the crude mill, to the deodorizer and finishing press, and the crude oil was first filtered as it came from the presses, so that the advantages of straight filtration should be eliminated as far as possible, in order that the results might represent exclusively the effect of the purely absorptive carbon only, upon the crude oil.

This carbon treatment consisted of adding to the crude oil, ¼% of this purely absorptive carbon, together with ¼% of diatomaceous earth, as a filter aid, the latter being used to insure satisfactory, quick and easy filtration at room temperatures. This mixture was agitated at 28°C. for thirty minutes and was then pumped through a recessed plate filter press. The cake was blown and and steamed, and the residual oil determined in the laboratory. Results were as follows:

Test I. *Untreated Crude*
10% of 15° Be. Caustic Soda used in refining.
Refining loss 8.1%
Free fatty acid 2.9%
Flavor and odor Sour
Grade off.

Carbon Treated Crude
Same amount of Caustic Soda used in refining.
Refining loss 5.95%
62% of oil in press cake, therefore loss of oil in press cake equal to ½% x 0.62 or 0.31%. Net Reduction of Refining loss 1.84%.

Test II. *Untreated Crude*
Free Fatty Acid 3.54%
Flavor and odor Sour
Grade Off
Refining loss 10.60%

Carbon Treated Crude
Same amount of Caustic Soda used in refining.
Refining loss 7.10%
Percentage of oil in the press cake was the same as in Test I.
Net Reduction of Refining Loss 3.19%

The average net reduction of refining loss in the two instances quoted was 2.51%. Figuring on the present market value of oil and allowing for soap stock, this would mean a saving of about $90.00 on every 160 barrel tank car treated.

Color of Oil

The results obtained in the above tests are sufficiently striking to merit particular discussion. The refined oils obtained without treatment of the crudes other than straight filtration when hot, were further treated with a total of 0.9% of the bleaching agents commonly employed by this refiner, and the color was satisfactory.

The refined oil obtained from the carbon-treated crude, however, was lighter and brighter *without any further treatment*, than the refined and bleached oil from the untreated crude.

This represented a further saving, for the costs incidental to bleaching would amount to about ½% of the value of the oil, or about $24.00 based on a tank car.

Deodorization of Oil

The bleached refined oil obtained from the untreated crude, and the refined oil from the treated crude were then sent on to the deodorizer and the difference in duration of time necessary to deodorize was noted. The oil from the carbon treated crude enabled this refiner to cut the deodorizing period by 45 minutes per batch, lessening his steam consumption by 15%, and increasing his daily output capacity proportionately.

The actual steam saving would come to about $2.00 per tank car treated, in their case.