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ESSENTIALS TO ADVANCEMENT

This is the second of a series of short discussions by leaders in the vegetable oil industry to show the training secured and the characteristics and personality developed which their experience has taught them is a basis for advancement.—EDITOR.

Observation of technical men seems to warrant the opinion that a great many of them become too technical to be good business men. The college courses in business administration are a step along the right line, but it is uncertain as to the extent of their effectiveness. It is unnecessary to say that the larger the business organization in which a technical man finds himself the easier it is for him to closely specialize, thereby losing the opportunity to gain any well-rounded business experience.

It is advisable, therefore, that young and ambitious technical men should affiliate with young or new companies in which their services will gain immediate recognition, and their opportunities will be more abundant. Today chemical engineering offers the very best field for any young man with good technical bent and training.

Such a man does not justify his position unless he understands very much more than the technical side of the industry in which he is engaged. He must broaden out and understand the entire business or he will not have the power of initiative which is so essential to progress.

M. M. D.

AGITATION IN EDIBLE OIL TREATING

By John P. Harris, Albright-Nell Company, Chicago, Ill.

Testifying recently before a congressional committee, regarding the need of protection for the American dye industry, one of our leading chemical manufacturers said that a recent change in the method of agitation in one of his kettles had made a difference of sixty-five per cent in the yield obtained in manufacturing a certain dye.

While this undoubtedly represents an extreme case of the effect of agitation upon chemical processing, yet it illustrates the extreme desirability of obtaining the very best possible means of agitation in every branch of the chemical industry.

Proper agitation is of extreme importance in every process of vegetable oil treating, and the oil chemist is prone to overlook the bearing of a really efficient means of agitation upon the final plant results, because, in the laboratory, the amount used for testing is so small and the agitation is so easily obtained, that it does not have the same effect as it does in the factory.

Let us consider the process of neutralizing, popularly designated as "refining." Ordinarily, neutralizing consists of adding an aqueous solution of sodium hydroxide, sufficient to neutralize the free fatty acids, with sufficient excess to throw down the coloring matter, mucilaginous substance and resins present in the oil. Of course, the addition of this neutralizing solution to the oil to be treated proceeds with the oil under full agitation, it being desirable to distribute the solution evenly throughout the oil in the minimum length of time. In the early days of oil treating, this agitation was often produced by means of blowing with compressed air, distributed by means of perforated pipes on the bottom of the tank. This produced a lively agitation, and a quick mixture of oil and neutralizing solution, but was subject to the following very serious objections:

1. A complete and heavy emulsion was frequently produced, or at least an emulsification of a very considerable quantity of oil into the soap stock, causing serious losses.

2. It is practically impossible to exclude a trace of mineral oil from the compressed air, and even such a trace not only renders a vegetable oil really unfit for

edible purposes, but gives the oil a "bloom," detracting seriously from its appearance.

3. There is no doubt that exposure of edible oil to the action of air causes oxidation, inducing early rancidity. This is particularly true at high temperatures, and is even more marked in case of the bleaching process, which ordinarily proceeds at a temperature of from 80° to 100° F. higher than the neutralizing process.

4. The vitamins in edible oils are easily destroyed by contact with air, especially at high temperatures. This also applies particularly to the bleaching process, so that the use of air as a means of agitation for treating fats and oils has been generally abandoned. However, it is noteworthy, as illustrating how little attention is generally paid to agitating mediums, that many very good concerns, otherwise up to date, are using air for agitation in spite of these very obvious objections, which must be very apparent to their technical staff.

The early days of neutralizing saw some fearful and wonderful mechanical agitators used for this purpose, such as the old water-wheel type, similar to the propelling equipment used on river steamers, usually installed in square tanks, revolving on a horizontal shaft with stuffing boxes in the sides, and the beater-blade type installed in a long, narrow tank with a dished bottom, the horizontal shaft, fitted with beater blades, running the length of the tank near the bottom.

Of course, such methods were extremely crude, precluding the proper settling out of the soap stock and separation of the oil, and they provided a source of constant trouble and expense in repairs and maintenance, besides being awkward and unwieldy in the tank. As the industry advanced, steam-jacketed, cone-bottomed tanks were generally adopted, agitation being provided by means of a gear-driven vertical shaft with one or more sets of arms or propellers projecting from the shaft:

This agitation, although a great improvement, is subject to many objections. It provides a merely swirling motion, whereby the motion is merely constantly circular, so that when the treating solution enters the tank it is very likely that the two liquids will travel around and around together in relatively similar positions for some time, before obtaining a mixture.

A circulatory system of agitation, lately introduced, seems to overcome the objections to the old systems of agitation.

It consists of marine propellers, mounted on separate shafts, revolving in opposite directions, whereby, by virtue of "the resultant of two uniform motions," a basic law of physics, a solid column of oil the diameter of the propellers is lifted directly from the bottom to the top of the tank, where it overflows like the bubbling of a spring in a pool—flows to the sides, down the sides to the bottom, whence it is lifted again in violent contact with the flying propellers. When the treating solution is dumped into the oil, it is immediately projected to the bottom of the tank and then flung violently to the top in an atomized condition and distributed equally to every part of the tank in the most intimate possible manner, producing the following desirable results:

1. A thorough and completely homogeneous mixture is achieved.

2. This homogeneous mixture is almost instantly produced.

3. Once the circulation starts, it is almost self-sustaining, requiring only about one-sixth the horsepower ordinarily employed by other systems of agitation, much less efficient.

Its action in the process of neutralization is to produce an immediate neutralization of the free fatty acids, without saponifying free oil, because the immediate dis-

tribution of the refining solution to all parts of the tank removes the probability of excessive quantities of treating solution coming in contact with the oil at certain points in the tank, and an incomplete neutralization at other points in the tank, due to the action of too small an amount of treating solution coming in contact with the oil, as is practically certain to happen where a merely swirling agitation is employed.

In the process of bleaching, a smaller amount of bleaching material can be used, because of the more immediate and intimate contact of the oil and Fullers earth and/or infusorial earth and carbon, and the time of mixing can be materially shortened, allowing the oil to absorb less of the Fullers earth flavor and odor, thereby reducing the time and amount of steam necessary to remove this later in the deodorizing process. Further, the action of the propellers produces a suction on the bottom of the tank, sweeping the Fullers earth from the bottom and keeping it constantly suspended. In the case of a swirling agitation the bleaching materials constantly tend to sink to the bottom, crusting on the bottom, sides and coils and blocking the outlets, cutting down the efficiency and being troublesome to clean. The circulation keeps the sides, coils and bottom constantly clean and bright.

In the process of hydrogenation, usually designated as conversion, the immediate, intimate and even contact between the oil, catalyzer and hydrogen accomplishes the most complete absorption of gas in the shortest length of time and produces the most satisfactory color and odor. In many other processes of edible oil treating, this circulatory system of agitation is an improvement, even when there is a simple question of liquid mixing.

The period of reconstruction is with us. The refinery superintendent and oil chemist are often, and should be, over the drafting board, analyzing their plant processes, weeding out inefficient and antiquated methods and machinery, and replacing them with modern and up-to-date methods and equipment, whereby plant losses may be eliminated and better results secured. Competition is keener, the margin of profit lower now, than ever before. There is only one way to meet this, and that is increased efficiency in every department of the refinery, cheaper operation and a better product, and in achieving these results agitation is often of the utmost importance.

NEW MEMBERS ELECTED

Secretary Caldwell's Report From September 15 to Date

Mark A. Hamilton, Southern Cotton Oil Co., Memphis, Tenn.

C. W. Wilson, El Paso Refining Co., El Paso, Texas.

Louis E. Walter, San Diego Oil Products Corporation, San Diego, Calif.

Wm. J. Young, American Cotton Oil Co., Cincinnati, Ohio.

Albert S. Richardson, Procter & Gamble Co., Ivorydale, Ohio.

Almond L. Chesley, American Tobacco Co., 544 Park Ave., Brooklyn, N. Y.

E. Pettigrew Verner, The Parker Laboratory, Charleston, S. C.

Rudolph Borhringer, National Oil Products Co., Harrison, N. J.

Edward A. Schlessner, Wilson & Co., Chicago, Ill.

D. L. Weatherhead, Wilson & Co., Chicago, Ill.

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