

# The Purpose and Use of Filter Aids

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## A Discussion of Diatomaceous Silica and Its Use in Filtration

**I**N connection with the production and refining of vegetable, animal, and marine oils, many operators, especially the larger ones, carry out one or more types of filtrations. By filtration we mean the separation of solids from liquids through filter fabrics. We will not consider this separation as carried out by such other means as settling, the use of centrifuges or centrifugals, etc. The term filtration is sometimes erroneously employed to describe a decolorization process. Whereas an already clear oil is allowed to percolate through a bed of fuller's earth it cannot be called a filtration as no suspended solids are removed from the oil.

To force the liquid through a filter fabric requires pressure. This pressure may be supplied by gravity (utilizing the hydrostatic head of the mixture) but pumps are usually employed. Filters utilizing atmospheric pressure by creating a vacuum on the filtrate side of the filter medium are not usual in the oil industry.

Gravity filters are ordinarily bag shaped and are only economical where a material is very free flowing and leaves a slight cake. They make for poor working conditions, entail a high labor expense and are rapidly going out of use.

The usual filters employed in oil work are the flush plate and frame filter and the recessed plate filter. These are alike in character. The recessed plate filter has a much smaller cake space and can be run

only on short cycles unless very little cake is formed. In such equipment the mixture is introduced into a chamber under pressure and the liquid passes through the cloths covering the plates, the suspended solids remaining upon the face of the cloth.

In order to filter a liquid which contains suspended matter of a slimy nature it is necessary to pass this liquid through a porous membrane with openings of capillary size. These openings must be sufficiently small to retain the gummy and colloidal particles and large enough so that the clarified liquid will pass through. The filter cloth screen against which the liquid is forced has openings of various definite sizes, as for instance 400 openings per square inch. Particles of the suspended matter which are smaller than these openings will therefore pass through while the larger particles will be retained upon the surface of the cloth. If sufficient gummy material is in suspension the surface of the cloth will soon become blocked up and smeared with a fine layer of slime. Eventually no liquid at all will pass through. The liquid which has been passed through on the short filtration time will have been clarified only to the extent to which particles larger in size than the screen openings have been retained.

Most filtrations in the various oil industries have to do with the removal of a slimy natured suspended solid. The object of this

article is to deal primarily with the philosophy underlying filtration in general rather than with the results of filtering at any given point. But here can be listed a number of points at which filtration is or could be employed to advantage.

(1) The filtration of raw oils of any type which are not to be immediately refined. Proper filtration removes practically all of the agents which cause deterioration in storage. These include gummy and colloidal meal and other matter and traces of moisture.

(2) Filtration before bleaching on some dirty oils.

(3) Filtration after bleaching to remove decolorizing media.

(4) Filtration after hardening to completely remove catalyst.

(5) Final clarification or polish filtration just before filling final packages.

Just before mentioning the above list we remarked that filtering a liquid containing slimy suspended matter through cloth gave a short time cycle on the filter and, often, a poor degree of clarification. This inexcusable condition actually exists at a number of filter stations and this in spite of the fact that a remedy is at hand. It is true that such preliminary treatments as chilling, heating, acidity and alkalinity control, etc., do put some liquids in a proper condition to filter, but these do not always change the slimy nature of the suspended matter.

A large number of the more progressive operators have adopted the use of diatomaceous silica as a filter aid. A filter aid is a material inert chemically to both the liquid and the suspended matter, but which, when well stirred in powder form into the mixture, facilitates filtration. The ways in

which the filtration will be helped will be discussed as soon as we note the properties to be desired in a filter aid. These are

(1) It should be insoluble and chemically inert.

(2) The particle should be rigid.

(3) The particle should be highly porous and expose a large surface area.

(4) It should be light in weight and remain well in suspension.

(5) It should be reasonable in price.

(6) It should be in a form easy to use.

(7) A uniform supply should be obtainable.

Now consider the action and advantages of a properly processed diatomaceous silica filter aid. The amount to be added is based upon the proportion of slimy matter to be removed and will usually be approximately four times the weight of this slimy solid suspended matter. This averages about one tenth of one per cent of the total weight of the liquid. The filter aid is then thoroughly mixed with the liquid to be filtered and this liquid is pumped against the cloth in the usual way. As the liquid starts through the filter press a film of the filter aid forms on the surface of the filter fabric or screen. If the proper quantity of filter aid has been added the film will consist almost entirely of the filter aid so that all of the slimy and colloidal particles are trapped and held back by the cellular filter aid particles. The clarified liquid will pass through the channels formed by the criss-cross building up process of the filter aid particles against the filter cloth or screen. As the liquid continues to trickle through this screen of filter aid particles a cake is gradually built

up which constantly presents a new face and which consists principally of the filter aid particles intermixed with the entrapped impurities which have been removed from the liquid.

Filtering in this manner confers a large number of advantages upon the operator. These are so numerous as to require listing.

(1) Cloths are protected from becoming impregnated with the slimy solids removed and therefore a much longer life, with less frequent washings, is obtained. Thinner and cheaper cloths can be used, as filtration is really controlled by the filter aid.

(2) Longer filtration cycles result.

(3) Much higher rates of flow are possible.

(4) There is considerable labor saving as the presses do not have to be cleaned so often.

(5) A new installation requires less filter equipment and a present installation is greatly increased in capacity.

(6) Saving in yield as presses do not have to be cleaned so often.

(7) A perfectly clarified filtrate is obtained.

It is difficult to conceive a filter aid not being used where a filter aid of the type described is employed and undoubtedly there are many places today where a suitable filter aid would be a source of gratification to the user.

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### NEW OIL MILL WILL BE BUILT

Anderson, Clayton & Company, of Houston, will begin construction about March 1, of a new six-press cotton oil mill at Lockney, Tex., under the supervision of J. Campbell Jones, vice-president and general manager, who has put the new A. C. & Co. mill into successful

operation during the past season at Abilene. Lockney is in the Pan-Handle, in Floyd County, about 20 miles east of Plainview on a branch of the Santa Fe railroad.

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### INTERSTATE CONVENTION DATE FIXED

The Interstate Cottonseed Crushers Association have fixed upon New Orleans as the location for their annual spring meeting, which will be held at the Hotel Roosevelt, May eleventh, twelfth and thirteenth. While the committee of the American Oil Chemists Society have not at this writing met to decide upon their convention location, it is probable that the society will hold its meeting at the same place on Monday and Tuesday, May 9 and 10.

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### PROPOSED LEGISLATION IN ARKANSAS

A bill has been introduced in the Arkansas General Assembly by Representative Shaver of Cross County, to make it unlawful for corporations or persons operating or having any financial interests in cotton oil mills or cotton compresses from operating or holding any stock or interest in any cotton gin. Exceptions are made of ginneries of not exceeding 600 saws, which may be operated or owned by mills or compresses if located in the same town or city, but such ginneries must not be operated "for the purpose of destroying the gin business." Another clause of the bill would make it permissible for the owner or operator of a gin plant, ginning for himself and his tenants, but not for the public, to own stock or be a director of an oil mill or compress.