Applications for High Shear Mixers

Edible Oil Refining

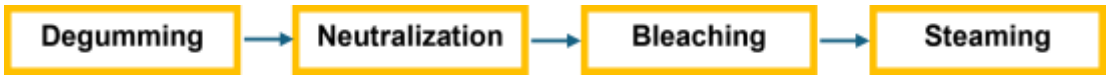
Coramix LLC
+1 (910) 225 4080
Sales@coramix.com

Edible Oil Refining

Edible oils such as olive, peanut, coconut, avocado, and canola oil used for deep frying and pan frying.

Mixing Process

Each edible oil begins as a crude oil, which then undergoes multiple stages of refining. The processes are as follows:



Degumming: Oils with hydratable phospholipids may be degummed using water. Hot water is added to the crude oil according to the phosphatide content. The hydratable phospholipids absorb the water and expand, allowing a separator to isolate the gums. The byproduct gums are then able to be reused in other applications.

An alternative degumming process for oils with non-hydratable phospholipids, such as coconut, palm, and olive oil, is the use of acid. A small concentration of phosphoric or citric acid is added to the crude oil. A reaction occurs that converts the non-hydratable phospholipids to become hydratable. Water is then added, and any phospholipids, proteins, and contaminants are removed with a separator. This method is more efficient for further refining of the oil.

Neutralization: Free fatty acids invoke undesired properties in the oil, such as lower smoke points, off-flavoring, and unwanted coloring. To remove these acids, the oil is neutralized using a solution of alkaline. It is then heated to where a reaction occurs, separating the acids into soapstock and water. The soapstock may be further broken down using acid or pressure. The oil is then washed with water and dried.

Bleaching: Bleaching is accomplished by heating the oil and adding bleaching earth, a natural or synthetic high porous clay. The reaction strips the oil of colorants and leftover contaminants, as well as organic contaminants. After bleaching, the oil is recovered by extraction.

Steaming: The final step involves heating the oil in a vacuum boiler and injecting steam. This removes unwanted odors, flavors, and volatile byproducts before packaging.

Mixing Issues

A variety of processing requirements come along with the different oil refining processes. Many oils tend to emulsify while sitting in a vessel before running through a separator, and during bleaching, a filter aid such as kieselguhr [see coramix.com/learn for more on kieselguhr] may be added to prevent finer bleaching earth particles from clogging the filter. These variations along with continuously running larger volumes create problems for static mixers and traditional agitators:

- The low concentrations of acid in neutralizing require minimal particle sizes in order to contact an optimal amount of oil. Traditional agitators require long mixing times to achieve this.
- Fine clay particles during bleaching tend to form agglomerates that are difficult for a traditional agitator to remove, increasing the mixing time.
- Improper dispersion of reagents (phosphoric or citric acid, alkaline solution, bleaching earth) results in additional chemical consumption and waste.

Our Solution

Dispersion: Instead of slowly stirring the mixture until it is homogeneous, Coramix mixers use high-shear and mechanical design to disperse the reagents, greatly reducing each batch's cycle time while eliminating any agglomerates.

Phase 1: The Coramix inline mixer is connected with the eductor assembly, as well as pipes from the tank outlet to the mixer inlet and from the mixer outlet to the top of the tank. Base fluid is added to the tank, and the mixer is started to recirculate the fluid.

Phase 2: The powder feed valve is opened, and the reagent is added directly into the hopper. The inline mixer pulls in the reagent and deagglomerates the mixture as it passes through the high shear mixing zone.

Phase 3: After all of the reagent is added along with any additional ingredients, the valve is shut and mixing continues.

Advantages

Coramix high shear mixers offer a variety of advantages over traditional agitators and mixing processes.

- Reduced particle sizes of the reagents maximize surface area in contact with the oil, accelerating reactions.
- Rapidly deagglomerates, drastically reducing batch cycle times.
- Increased yields from chemical reagents, reducing chemical waste and saving on consumption costs.
- Disperses filter aids quickly and reduces particle sizes, resulting in a stable suspension and lesser mixing times.

Contact: For more information on Coramix products go to Coramix.com, or contact our sales team at Sales@Coramix.com for help in configuring a mixer to fit your needs.