

# Crude BioDiesel Purification

Having a good and complete reaction is not enough. The production residues and impurities left in the crude biodiesel after the reaction are dangerous to any combustion system and must be removed. Whether your method of Biodiesel purification is Wet or Dry, it is a step that must not be overlooked.

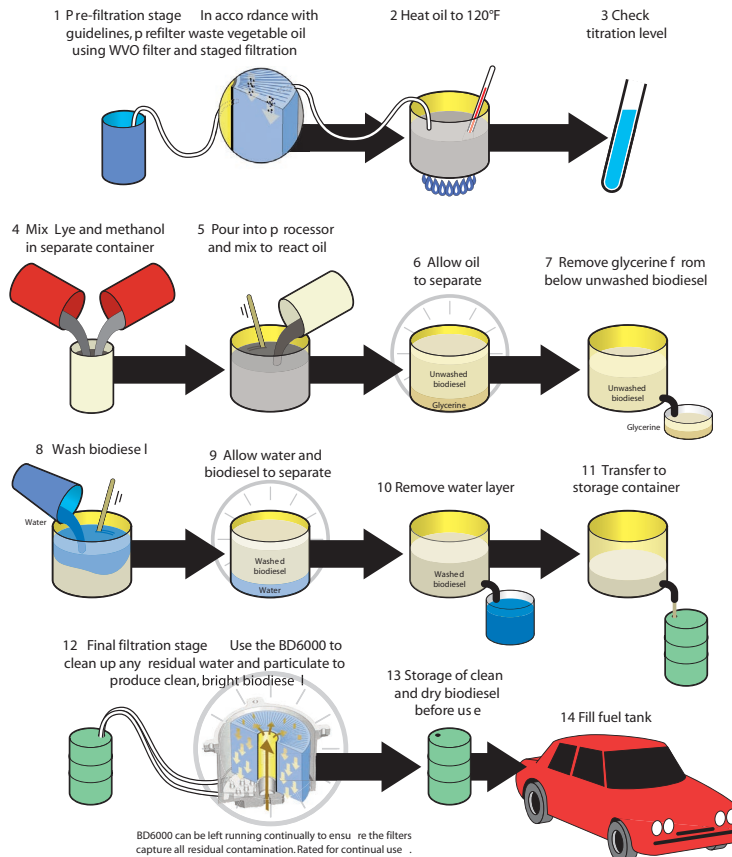
As mentioned earlier, after the reaction, separation of the glycerol and demethylating, the biodiesel still has high levels of soaps, aggressive pH, excess caustic and other impurities that must be removed via a wash process. Though Schroeder BioFuels does not endorse one wash method over another, our product portfolio supports the use of any wash method and has the perfect addition for your process to produce clean, pure traceable fuel confidently.

## Wet Wash Purification

The longest standing method for purification is the wet or water wash method. It is a process where a certain percentage of water is added to the crude biodiesel and the water is let to settle. As the water passes through the fuel, it attaches to impurities. (An air wash or bubble wash is sometimes paired with this process to accelerate the water passing through the fuel.) Once settled, the contaminated water is drained off. This process is repeated until the water removed is clear in color. To assure the amount of water being removed meets standards, the addition of SchroederBiofuels' TestMate Water Sensor (TWS-C-E) allows you to monitor the amount of moisture in the biodiesel. Once all the water is removed, the remaining clean biodiesel is dried using a BD6000 or other demisting unit and is ready for final quality check.

This purification method works very well; however, with tightening government standards it becomes difficult and costly to treat and dispose of the highly contaminated water. Other challenges may include the cost and effort to dry the emulsified (oil and water in suspension together) fuel once the purification is complete. All of these issues mentioned can vary based on your actual production method, experience and local laws.

## The Wet Wash Process Explained\*

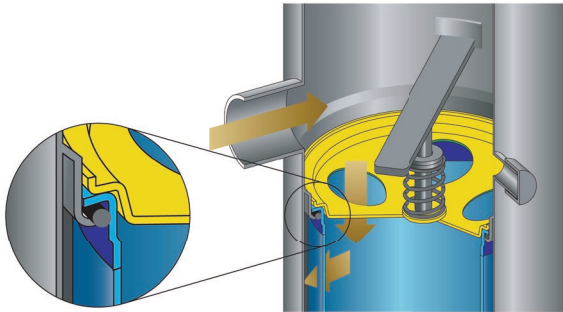


\* The method shown is just for example. The actual method and variables can be changed based on your preferences and experience.

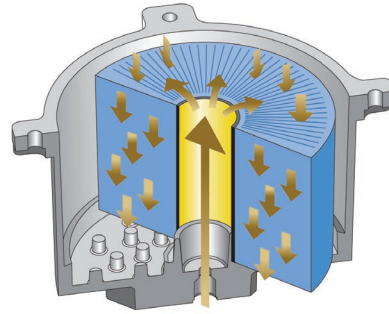
# Crude BioDiesel Purification

Dry wash purification is a more recent addition to biodiesel purification. Current methods for dry washing the crude fuel include ion-exchange resins (like Amberlite or Purolite) and silicates (like Magnesol or TriSyl). Though both methods are dry, they are applied differently.

## Dry Wash Purification



Dry Wash Cell Illustration



BD600 Polishing Unit Illustration

An ion exchange resin is an insoluble matrix (or support structure) normally in the form of small (1-2 mm diameter) beads, usually white or yellowish, fabricated from an organic polymer substrate. The material has highly developed structure of pores on the surface of which are sites with easily trapped and released ions. The trapping of ions takes place only with simultaneous releasing of other ions; thus the process is called ion exchange. There are different types of ion exchange resin which are fabricated to selectively prefer one or several different types of ions.

## Ion Exchange Purification

Ion exchange resins are widely used in different separation, purification, and decontamination processes. The most common examples in the past have been water softening and water purification. Specialty ion exchange resins can be utilized to bind and remove trace impurities from a biodiesel process stream. After the bulk separation of the glycerin, the biodiesel stream is simply passed through a column of the dried ion exchange resin to bind and remove ionic salts (such as  $\text{Na}^+$  and  $\text{Ca}^{++}$ ), trace catalysts, soaps, and glycerin. The dried resin also acts as a desiccant retaining and removing trace water from the biodiesel feed.

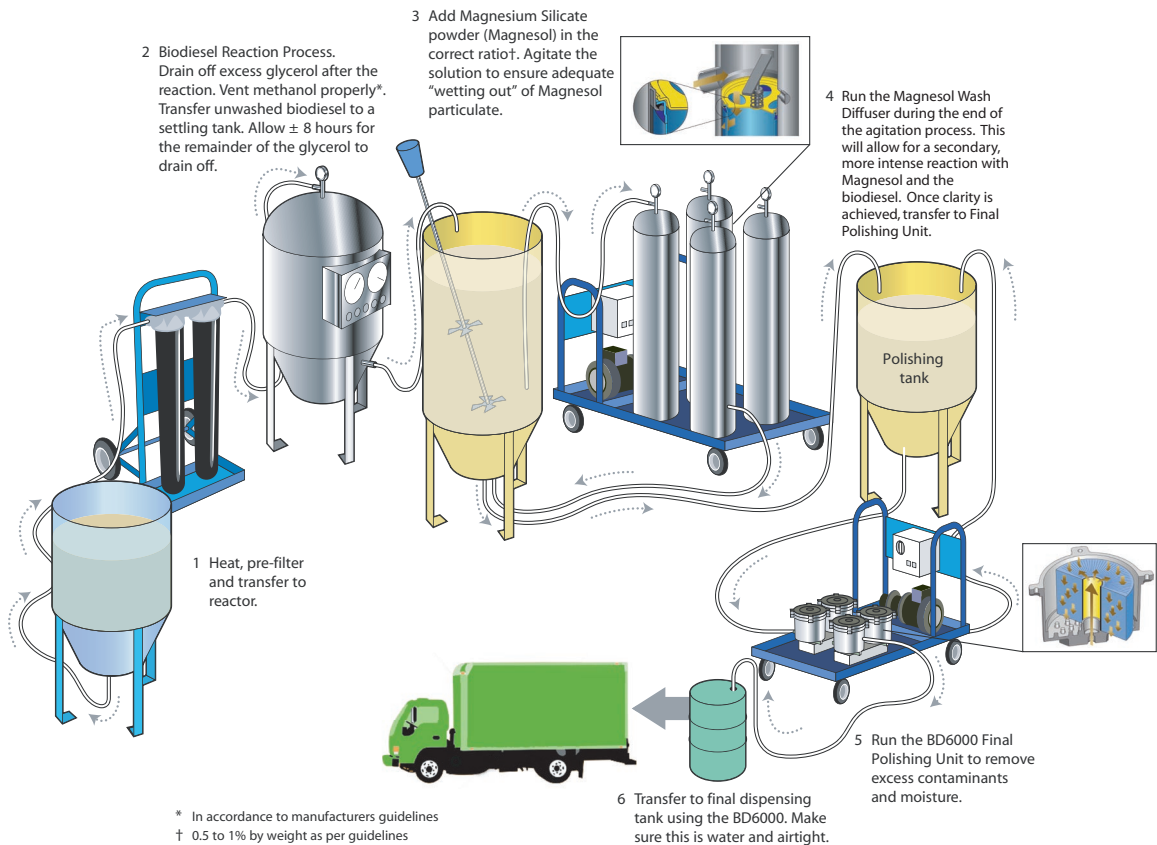
The efficiency and life of a resin to reduce and remove impurities from the biodiesel will depend upon how well bulk separation of the biodiesel and glycerin are made. A resin operation step should be viewed as a polishing process to remove trace materials in the 275-750ppm range, not as a replacement for optimizing the bulk separation.

Generally a lead-lag two column continuous feed system is recommended for most operations. In many cases, a third column should be considered in order to ensure continuous operations and reduce down time.

Challenges of this process include the possibility of blinding over the resin, and thereby disabling its capacity by passing a bad batch of fuel through it. Other concerns are that fine particles can pass downstream into your final fuel, so final polishing and filtration is still required. Polishing can be accomplished via our BD-6000 line, MFD or any of our Schroeder filters outfitted with our Z (high efficiency) media or Schroeder meltblown elements. The adoption of a TCM, a laser particle monitor, can provide assurance that all final particles have been removed.

# Crude BioDiesel Purification

## The Dry Wash Process Using Magnesol



## The Dry Wash Process Explained

In a standard biodiesel production process, Magnesol (a fine white powder) is mixed with unwashed biodiesel in a mixing tank for five to 10 minutes, after glycerin separation and methanol removal.

Magnesium silicate has a strong affinity for polar compounds. By absorbing these compounds, magnesium silicate actively filters excess methanol, free glycerin, mono and di-glycerides, metal contaminants, free fatty acids and soap. These materials are then removed from the process through filtration.

*Note: Glycerin is a polar molecule, and thereby susceptible to the adsorptive abilities of magnesium silicate. That is why Magnesol is added to the process after the glycerin separation step.*

After agitation or recirculation, the Magnesol is removed through a wash and removal system (sized according to flow and production amounts) that will recirculate the fluid through its own filter cake, thereby allowing the fuel to be touched again by the Magnesol. The filter cake actually acts as its own filter, short cutting the amount of time when recirculating will only allow more contamination to be left to go downstream. This method of removal is also important so that the Magnesol can fully remove all the contaminants in the fuel.

# Crude BioDiesel Purification

Schroeder Biofuels' Dry Wash units are made of stainless steel. These solid, made-for-purpose filter units provide a double safety seal to ensure there is no migration of potentially harmful contaminant particles and magnesium silicates (like Magnesol) downstream. This unique double seal system together with a high quality consumable element ensures your biodiesel meets or exceeds filtration requirements.

Challenges with this process include difficulty of removing the Magnesol after agitation. Because of this it is essential to follow up with a polishing step to remove fine contamination. Polishing can be accomplished via our BD-6000 line, MFD or any of our Schroeder filters outfitted with our high efficiency media (Z or Schroeder Meltblown). The adoption of a TCM, a laser particle monitor, can provide assurance that all final particles have been removed.