Biodiesel Has a Bright, Multicolored Future

By Clayton McNeff | May 12, 2011

In the near future, “multifeedstock” and “nonfood-based” will provide the basis for salvation of the U.S. biodiesel industry. This change will occur through necessity and it must occur quickly in order for our industry to get back on track.

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In the U.S., soybeans have been the basis of the biodiesel industry, but today if you look at the price of soybean oil ($0.5882 per pound or $4.529 per gallon) and methanol ($1.50 per gallon) the raw materials cost is about $4.70 per gallon of biodiesel before you even start the chemical transformation. It is therefore little wonder that most of the biodiesel plants around the country are still idled.

Feedstock is the primary cost of biodiesel production. The USDA has done detailed studies that model the cost of biodiesel production and concluded that more than 88 percent of the cost of biodiesel production is the cost of lipid feedstock.

Chemically, the free fatty acid (FFA) content of a feedstock can be used as a determinant of its ability to be used as food or feed for animals. The FFA content also correlates strongly with lipid costs. Thus, it is advantageous to use fats and oils with higher FFA for the production of biodiesel.

New biodiesel production technologies such as the Mcgyan Process offer producers the ability to use less expensive feedstocks and still produce biodiesel that meets all ASTM D6751 specifications. The Mcgyan Process uses a solid, highly porous metal oxide catalyst that continuously catalyzes the production of biodiesel (at elevated temperature and pressure) in seconds and does not use sodium hydroxide or sulfuric acid. The process does not use any water and produces no byproducts such as glycerin or soap and, most importantly, is compatible with feedstocks that contain zero to 100 percent FFA content. Biodiesel’s future is dependent upon the development of new technologies like the Mcgyan Process that settle the question of whether the industry can become truly multifeedstock.
Isanti, Minn.-based Ever Cat Fuels is a 3 MMgy biodiesel facility that is the first commercial plant to employ the Mcgyan Process. The facility has been operational since Sept. 11, 2009, and has produced biodiesel that meets all ASTM D6751 specifications from a variety of inedible feedstocks.

New feedstocks that can be used to make biodiesel fuel may make it necessary to revise the ASTM quality specifications. For instance, the Mcgyan Process makes it possible for the first time to economically produce the ethyl ester by using ethanol as the alcohol in the production process. The use of ethanol will produce biodiesel under the chemical definition of biodiesel being an “alkylester.” However, some of the ASTM testing procedures that specifically determine the content of residual methanol left in the biodiesel fuel will be obsolete if ethanol is used as the alcohol.

Other ASTM specifications may also need revision, such as the flash point. The petroleum diesel fuel flash point specification is typically from 52 to 60 degrees Celsius, but for biodiesel it is greater than 93 degrees. Presumably, this was specified due to the widespread use of soybean oil and the long-chain FFAs that it contains. Other feedstocks such as coconut oil contain much shorter FFA chains (C6-C12) and therefore the biodiesel made with these

types of vegetable oils will not meet specification even though they would not alter the blended specification when they are added to petroleum diesel.

Multifeedstock can also result in multicolored biodiesel fuel. Most of the differently colored biodiesel fuels meet the ASTM D6751 specifications, although not all differently colored biodiesel fuels are accepted by blenders. In fact, many blenders have internal color specifications for biodiesel fuel. This nonacceptance by the blenders of differently colored biodiesel, does not jibe with the fact that petroleum diesel also has different colors. A recent study reported by scientists at Minneapolis-based Augsburg College looked into the correlation between B5 blends offered at 29 different fuel stations located in the Minneapolis/St. Paul metropolitan area and found no correlation between the color and biodiesel content, as measured by GC-MS and H NMR, of the diesel fuel that was being sold commercially.

The biodiesel industry is currently in survival mode, but there are some very bright spots on the horizon. With a refocusing on nonfood feedstocks and on the use of new technologies that allow for the use of all potential feedstocks, including those available now and those available in the future (e.g. camelina, jatropha, pennycress and algae oils), there is a clear path forward to continue the replacement of petroleum diesel fuel with renewable, sustainable, domestically produced and biodegradable biodiesel fuel.

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