SYLOBEAD® Molecular Sieves for Biodiesel

Introduction

Biodiesel is a valuable alternative to conventional petroleum-based diesel fuel. It is bio-degradeable and has almost no detrimental effects on the environment. The worldwide drive for less dependence on fossil fuels and natural gas resources, coupled with an increased environmental awareness, has accelerated the demand for this alternative fuel.

Biodiesel is a fatty acid alkyl ester obtained from renewable sources. It can be produced from a wide range of feedstocks including vegetable oils, animal fats and used cooking oils.

Water in biodiesel could make the fuel go rancid and alter its chemical structure. SYLOBEAD® Molecular Sieves can help you solve these issues.

SYLOBEAD® Molecular Sieves are beaded zeolites with a clay (binder) in pore sizes of 3Å, 4Å, 5Å and 10Å that are offered in various bead sizes.

Zeolite molecular sieves are crystalline, highly porous materials, which belong to the class of aluminosilicates. These crystals are characterized by a three dimensional pore system, with identical pores of precisely defined diameters. While the pore size is determining the selective adsorption behavior, the bead size is influencing the pressure drop and the mass transfer zone of the adsorber.
The Biodiesel Process

Biodiesel will typically be produced according to the process scheme shown to the right.

The biodiesel must meet certain standards, such as ASTM D6751 or EN14214. The current standards have set the water specification at 500 ppm maximum; however, it is expected that in the future this specification might be reduced even further. Although not miscible with water, biodiesel is a very hygroscopic fluid. When biodiesel is stored in tanks for a longer period of time (>24 h), water absorption is reported to take place. Water in biodiesel can alter its chemical structure and increase the free fatty acids levels.

Biodiesel Impurities

In some cases, microbial growth has been observed in biodiesel, potentially causing fuel filter plugging. In order to overcome this issue and deliver to the end user biodiesel that safely meets the above mentioned standards, longer term stored biodiesel must be additionally dried. Biodiesel drying with molecular sieves is a well established process that can be applied to storage tanks in remote areas, far away from the biodiesel manufacturing plants.

Biodiesel, pure or mixed with fossil based diesel, that contains water above this 500 ppm level, might cause severe damage to the engine. The water might result in the formation of acids and, consequently, corrosion problems in the engine and peripheral devices.

What We Offer

In addition to our SYLOBEAD® molecular sieve and silica gel product range, Grace also offers a range of specialty products and technologies that have been developed specifically for edible oil and fat refining and associated industries. Grace TRISYL® silica is engineered to significantly reduce polar contaminants from biodiesel feedstock oils and fats. For more details, please refer to our TRISYL® silica literature, available at www.grace.com/Products/TriSyl.

*FAAE = Fatty Acid Alkyl Ester
The SYLOBEAD® Advantages

SYLOBEAD® MS518 Molecular Sieve is a 4Å product that has been specifically sized to improve mass transfer in order to cope with the viscous biodiesel.

SYLOBEAD® MS518 Molecular Sieve shows the following product characteristics:

- Good selectivity for water
- Excellent adsorption capacity
- Sound kinetics, even with high-viscous fluids (2 – 5 cP)
- Suitable mechanical strength

For more details, please refer to our SYLOBEAD® portfolio leaflet. There you can also find information on other 4Å SYLOBEAD® products, in case other bead sizes are required.

Grace brings a team of experts working together to assist you in setting up and designing your biodiesel drying unit. We continuously seek to improve our products, adapt them for new applications and add new products to our portfolio.

The Biodiesel Drying Process

Biodiesel drying takes place in a circuit consisting of the storage tank, a heat exchanger and an adsorber unit. A pump is circulating the biodiesel until the desired moisture content (typically 200 ppm) has been reached.

Depending on the technical environment at the final user, the unit can be operated with a regeneration system or to the exhaustion of the adsorbent. The way to set up such a SYLOBEAD® MS518 Molecular Sieve based drying unit with a regeneration system is shown below. Our Technical Support is available to discuss with you a solution tailored for your needs. Please contact us.
Grace is a leading global supplier of catalysts; engineered and packaging materials; and, specialty construction chemicals and building materials. The company’s three industry-leading business segments – Grace Catalysts Technologies, Grace Materials Technologies and Grace Construction Products – provide innovative products, technologies and services that enhance the quality of life. Grace employs approximately 6,000 people in over 40 countries.

Grace has met all REACH requirements for the given deadline for Tier 1, December 1, 2010, and can hereby assure today’s and future customers full REACH compliance of its products. This assurance also includes the very diverse use of a spectrum of our products.