Diesel Fuel Has a Shelf Life

ULSD and biodiesel both have reduced stability in storage compared to traditional high sulfur diesel. While it is true that removing sulfur improves stability, the hydro-treating process also tends to destroy naturally occurring antioxidants. As a result, some ULSD fuels may require the addition of a stabilizer to prevent the formation of peroxides that lead to soluble gums. Shelf life recommendations for petro diesel and biodiesel blends are less than a year, and sometimes as low as 2 months, depending on factors below.

CONSEQUENCES OF UNSTABLE FUEL

Oxidative instability in petro diesel or biodiesel leads to the formation of fuel degradation products. These include:

Gums: sticky varnishes that contribute to corrosion and injector deposits, causing over or under fueling

Sediments: particulate that clogs filters and causes abrasive wear to fuel pumps and injector.

Acids: cause corrosion of tanks and fuel systems, leading to hard particulate formation and premature parts failure.

Thickeners: increase fuel viscosity, leading to incomplete combustion and reduced fuel economy

Common consequences of fuel degradation include loss of power, increased fuel consumption, premature filter plugging, damaged fuel pumps / injectors and increased maintenance costs. Generally speaking, fuel degradation decreases the combustion quality of fuel. You may notice symptoms such as black smoke, harder starts and reduced engine performance.

FUEL DEGRADATION IN STORAGE

Time is the enemy of diesel fuel quality. Oxidative instability can occur slowly during long-term storage or be accelerated by warm temperatures, the presence of free water and contaminants. This degradation can lead to high acid number, high viscosity and the formation of gums and sediment (fuel degradation products). Biodiesel is especially susceptible to the effects of higher temperatures. Data sets vary, but a good rule of thumb is that the oxidation rate increases 2.2 times for every 18°F/10°C.

Example: biodiesel blend stored at various temperatures
68°F/20°C: marginally OK after 6 months
77°F/25°C: degraded after 6 months
86°F/30°C: degraded after 4 months

Water in fuel can accelerate the oxidation process, but even worse are the effects of the microbial infestations that can grow as a result of water in the tank. These bacteria and fungi literally feed off your fuel, leaving behind acids and various forms of black, sticky, slimy materials that corrode your tank and plug your fuel filters. Whatever the contributing factors fuel degradation cannot be reversed, the key to success is to prevent it before it occurs with good fuel handling practices.

FUEL DEGRADATION ON VEHICLE

Fuel degradation can occur rapidly on-engine when excess diesel is heated to extreme temperatures inside high pressure common rail systems and then returned to the fuel tank along with black carbon particles created at the injector. High thermal stability is important for diesel fuel to function effectively as a heat transfer fluid inside the HPCR fuel system. Future injector designs are expected to employ even higher pressures and temperatures than today to achieve better combustion and lower emissions.



Source: http://www.mycleandiesel.com/pages/FuelDegradation.aspx