Introduction

SI Group currently has six ETHANOX® fuel antioxidants: ETHANOX 4701, ETHANOX 4733, ETHANOX 4737R, ETHANOX 4740R, ETHANOX 4760R and ETHANOX 4776.

These antioxidants can be used in virtually every petroleum-based fuel in use today, from gasoline, pyrolysis gasoline and jet fuel, to diesel and kerosene. They also play an important role as oxidation inhibitors in biodiesel, a renewable alternative fuel. ETHANOX antioxidants extend storage life and protect fuel systems by increasing resistance to oxidation. They help reduce gum formation and meet stringent government regulations and OEM standards.

SI Group, in its continuous effort to provide high quality and compliant products, has recently modified the composition of several of its ETHANOX fuel stabilizer grades. The reformulated products no longer contain TTBP, which is considered to be highly toxic to the environment.

Description and Properties

The ETHANOX fuel antioxidants are stable materials in either liquid or solid form. They vary in color and form; from a light yellow crystalline solid to yellow, amber and reddish brown liquids. These products are organic based, characterized with a phenolic component. All ETHANOX products have a low solubility in water.
**Uses**

ETHANOX fuel antioxidants extend storage life and protect fuel systems by increasing resistance to oxidation. They also help control insoluble gum formation. Controlling gum formation in an engine is important as this causes poor combustion and deposits on the injectors and pistons. Excessive gum can also lead to fuel-filter plugging. By using the ETHANOX fuel antioxidants, petroleum and biofuel refiners and marketers can meet stringent government regulations and OEM standards, including those requiring reduced emissions. And of course, ETHANOX fuel antioxidants meet ASTM and military specifications for aviation fuels.

These antioxidants are also used to improve biodiesel fuel stability. Biodiesel is used to power standard diesel engines in buses, semi-trailer trucks and diesel cars.

Use of ETHANOX fuel antioxidants extends the useful life of aviation gasoline, jet fuel, automobile gasoline, and fuel oils such as diesel and home heating oil. These fuels are used in our everyday lives to power airplanes, lawnmowers, boat engines, cars, jet skis and many more internal combustion engines.

Use of ETHANOX fuel antioxidants is important in pyrolysis gasoline (pygas) as well. One type of pygas is generated from grades of refinery fuel that are unusable as gasoline. These refinery fuels have high molecular weights that are cracked or broken into lower molecular weight compounds via a pyrolysis reaction. The resulting pygas is unstable due to the pyrolysis process. The addition of ETHANOX fuel antioxidants improves the pygas stability so it can be used as a component in gasoline blends.

**Health Information**

The health effect of the ETHANOX fuel antioxidant blends depends on each product. The acute toxicity for the products ranges from non-toxic to irritant, all the way to possibly causing severe burns. All of the products are harmful if swallowed. Several of the components in the ETHANOX fuel antioxidants, according to literature data, have other health effects to areas such as the nervous system, liver, kidney, blood-clotting impairment and possible carcinogenicity. These antioxidants are a very small percentage of the total volume of the fuels. Therefore, exposure to the antioxidants from using any of the fuel products is minimal.

Please consult the product Safety Data Sheet for recommended personal protective equipment and further information.

**Exposure Potential**

Most of the ETHANOX fuel antioxidants are mixtures or preparations that contain components that may have exposure limits established by individual countries. These are listed on the product Safety Data Sheet. Workplace monitoring must be conducted to ensure that workers are not overexposed to those components for which exposure limits have been established. Good industrial hygiene practices and normal industrial precautionary measures to prevent contact should minimize the health risk when handling these products. In addition to eye protection, workers should use protective gloves and protective clothing when skin contact or clothing contamination is possible. The use of a National Institute for Occupational Safety and Health (NIOSH) approved respirator is also recommended when handling powder or crystalline...
materials. It is recommended that the products be handled in a well ventilated area.

Please consult the product Safety Data Sheet for recommended personal protective equipment and further information.

Environmental Information
The ETHANOX fuel antioxidants vary in their potential environmental impact. Some do not have any toxicity to marine life and others are toxic to aquatic organisms and are considered to be marine pollutants and environmentally hazardous substances. In all cases, release to water is not expected when these products are handled properly in transportation, storage and use.

Physical Hazards
Several of the ETHANOX fuel antioxidants are considered flammable. It is recommended that exposure to extremely high temperatures, sparks and sources of ignition is avoided. These materials should not come in contact with acids, bases as well as oxidizing and reducing agents.

Derivation/Manufacturing
SI Group manufactures the ETHANOX fuel antioxidants in Orangeburg, South Carolina.

Regulatory Information
All of the ETHANOX fuel antioxidants are regulated for transport purposes. Some are considered to be environmentally hazardous substances and marine pollutants. Others are flammable and corrosive liquids.

The ETHANOX fuel antioxidants are in compliance with the Toxic Substances Control Act (TSCA) and some are also in compliance with other international countries’ chemical inventories.

These products are classified in several different categories under the Canadian Workplace Hazardous Material Information System (WHMIS). One product is not controlled under WHMIS (ETHANOX 4701), the remainder are controlled products and have been classified under WHMIS based on the hazards of the material.

As with the other regulatory areas, the ETHANOX fuel antioxidants have a range of reporting triggers under the Emergency Planning and Community Right-to-Know Act (also known as SARA Title III or EPCRA). The SARA 311/312 hazardous categorizations for these products include acute and chronic health hazards, fire hazard and sudden release of pressure hazard.

Under the European “REACH” regulation, SI Group Europe, acting as the importer, has pre-registered the components of the ETHANOX fuel antioxidants. SI Group is deeply involved in industry activities to ensure timely registrations with deadlines depending on volume threshold put on the market and/or substance characteristics.
Product Stewardship

SI Group is committed to manage ETHANOX fuel antioxidants so that they can be safely used by our customers. Our relationships with our customers encourage communication about safety and environmental stewardship, and we work with them to minimize the risks of personnel exposure and spills.

SI Group is staffed and organized to investigate and provide advice regarding appropriate corrective actions if such incidents occur.

Conclusion

ETHANOX fuel antioxidants provide an important function in gasoline, pyrolysis gasoline, aviation fuel, diesel, kerosene and biodiesel. They maximize the storage life of many fuels. They inhibit the formation of decomposition products (gums) in fuels during storage. These gums cause poor combustion and other engine problems such as deposits on injectors and pistons. The presence of high-molecular weight insoluble gums generally leads to fuel-filter plugging.

SI Group’s broad ETHANOX fuel antioxidant line includes products tailored for countless applications, both civilian and military. These products meet some of the world’s most stringent OEM requirements, ASTM specifications and Mil Specs.

Note

This document provides general information about ETHANOX fuel antioxidants and does not supplant or replace required regulatory and/or legal communication documents, nor is it intended to provide an in-depth discussion of health and safety information. Always consult the product’s Safety Data Sheet, product label and Technical Data Sheet before using the chemical.

References


SI Group ETHANOX® Fuel Antioxidants brochure (UT05614 R1)

SI Group Solutions for Improved Biodiesel (UT05632 R1)

SI Group Technical Data Sheets and MSDS/SDS:
- Ethanox® 4701
- Ethanox® 4733
- Ethanox® 4737
- Ethanox® 4740R
- Ethanox® 4760R
- Ethanox® 4776

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