West River Chemicals
www.westriverchemicals.com

EthanOK®

Gasohol Fuel Stabilizer

21st Century Technology developed in America by West River Chemicals

Technical Information

Nature of Gasohol Fuels

Gasohol in its various forms is a fuel composition involving gasoline blended with anhydrous ethyl alcohol or ethanol. The amount of ethyl alcohol can vary between 5% in E5 to 95% in E95. Performance of the various compositions can be different. There are important dissimilarities between the hydrocarbon nature of gasoline and the inherent alcohol properties of ethanol. Gasoline is an energy rich hydrocarbon fuel which is totally insoluble in water. On the other hand, alcohol is an energy deficient fuel which has very high affinity for water. Physical, chemical and biochemical behavior of hydrocarbons and alcohols are certainly distinct. Once both fuels are brought together, there is a real need to stabilize the blend, which superficially may seem compatible but in reality, it has limited stability. Gasohol has inherent instabilities and potential usage and storage problems. As aviation fuel, the use of gasohol is forbidden due to various instability issues.

It is well known that ethyl alcohol has a substantially lower energy contents than gasoline, having a relative BTU output 36% lower than hydrocarbons. This is a proven thermodynamic fact determined by calorimetric calculations as well as by experimental calorimetry.

Ethyl alcohol is totally miscible with water, and in order to blend it with hydrocarbons like gasoline, it must be totally anhydrous. Deficient blending with gasoline will take place even with a very small amount of water present in this alcohol. Furthermore, a gasohol blend will quickly separate into its components even if a small amount of water is added, as phase separation becomes the dominant factor.

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The different chemical and biochemical reactivities of gasoline and ethanol become evident upon usage as well as upon extended storage of gasohol. Ethyl alcohol is corrosive in nature, and over time will attack unpassivated metals. The formation of alkoxides, in this case, ethoxides is thermodynamically a very favorable reaction. Even though it is kinetically negligible, the likelihood of this reaction happening will be ever present in an engine with an aluminum block. Moreover, microbial growth triggered by alcohol will also happen as a result of prolonged storage of gasohol.

The concept behind the existence of gasohol has been the creation of an environmentally friendly fuel. Yes, it has fewer emissions than gasoline per gallon of fuel, but this happens at the expense of lesser energy output, which means lower mileage. And then there is the issue of "green" carbons. This is the case of ethyl alcohol derived from agriculture feedstock; be it sugar cane, corn, or beets. However, fuel chemists and engineers also know of the existence of "fossil" ethanol, which is made by catalytic hydration of ethylene, a light petroleum distillate. Fossil ethanol is far cheaper than "green" ethanol. Gasohol made with fossil ethanol is not easily distinguishable from gasohol made with green ethanol, except by nuclear dating methods.

Problem Scenarios of Gasohol Fuels

The amount of energy available in a fuel is an important thermodynamic factor which is directly reflected in the engine output. Lower energy value of ethyl alcohol will result in reduced mileage of engines running on gasohol. In an E10 Gasohol blend mileage drop may not be too significant, yet it cannot be ignored. Ethyl alcohol has a fairly high-octane number, which improves engine performance, but does not increase mileage. Octane numbers are related to performance by kinetics, but are unrelated to energy output.

More significant is the possibility of water causing gasohol decomposition by the separation of ethyl alcohol water can find its way into storage tanks as well as vehicle fuel tanks. The formation of dew in empty tanks poses a particular problem. If ethyl alcohol becomes hydrated and phases out of the fuel blend, the remaining base fuel will suffer a drastic loss of octane number, in detriment of engine performance.

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Upon extended storage, gasohol will develop microorganisms by the biochemical action of ethanol. In many cases these are anaerobic microorganisms, and their long-term presence will cause clogging of fuel filters as well as fuel lines.

Direct reaction between ethyl alcohol and aluminum metal in the engine block will gradually happen over time forming aluminum ethoxide particles, ultimately causing ´premature engine wear. This is a type of corrosion, which will take place more rapidly under specific conditions including the presence of catalysts and the existence of other factors like surface exposure of bare metal.

Solutions Provided by EthanOK

All the potential scenarios that have been discussed can be dealt with by the use of EthanOK. EthanOK is a gasohol fuel stabilizer agent. It protects both engine and fuel, contributing to better performance. EthanOK offers a simple and practical solution to the previously identified problems. It provides octane index stability, metal passivation against alcohol corrosion, and biocidal protection against microbial growth. Also, it lessens the separation of alcohol to some extent. A simple application of 1 volume to 2,000 volumes of gasohol is enough to secure fuel stability.

Octane Index Stability

EthanOK is an inherent octane index enhancer, which increases performance in gasoline engines. In gasohol, ethyl alcohol provides an extra octane index kick relative to the base gasoline employed. However, in the event of water contamination, fuel performance can be severely affected as ethanol separates, unless octane index is compensated internally within the base fuel by the action of EthanOK.

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Metal Protection

EthanOK will inhibit and curtail the attack of ethyl alcohol on aluminum, which is the metal of choice used in engine blocks. Aluminum is a very reactive metal, however EthanOK is very effective at passivating it and completely hinders alcoholic corrosion. This way premature wear of engines employing gasohol will not take place

Microbial Growth Protection

EthanOK has powerful biocidal activity which inhibits microbial growth within gasohol upon extended storage. Microbial growth will result in clogging fuel lines and filters if allowed to proceed unchecked.

Reduced Sepáration

EthanOK diminishes the separation of ethanol by 12.5% by favoring the partition of alcohol towards the hydrocarbon phase.

Usage

Apply one part of EthanOK to 2,000 parts of gasohol by volume, and mix thoroughly.

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Precautions

EthanOK is a harmful, reactive, flammable and toxic composition, and should not be released to the environment, nor touched with bare hands. Hand, respiratory, and eye protection are required. EthanOK should never be ingested. Open flames should be avoided nearby within 25 feet, and unused portions should be diligently disposed of and never be allowed to dry completely. Spills should be washed immediately with rags of soap and water, and then incinerated.

Disposal

Proper disposal requires incineration in a controlled fashion and in a well-ventilated environment.

Availability

EthanOK is available in non-returnable five-gallon polyethylene containers.

Disclaimer

All information provided herein is in good faith, and West River Chemicals is not responsible for any consequences of mishandling or inadequate use of EthanOK.

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