

# Product stewardship summary: Carboxylates



## Introduction

At Chevron Oronite, we foster a culture grounded in operational excellence and are committed to protecting people and the environment. This product stewardship summary is one example of that commitment.

For engines to perform their everyday functions as well as expected, all their moving parts must be powered and protected with fuels and lubricants enhanced by some of the most technologically advanced additives. The products we produce help fuels and lubricants push the boundaries of speed, strength, cleanliness, and durability. Detergents are critical components of lubricating oil formulations, providing protection against deposits, corrosive wear and oxidation in lawn mowers, automobiles, massive two-story marine diesel engines and more.

Detergents provide a means for dissolving otherwise insoluble metallic salts, like calcium or magnesium carbonate, into lubricating oil. These basic compounds have a key function to neutralize acids that could corrode key metal parts of the engine. These acids are either fuel combustion or lubricant oil oxidation during engine operation.

Detergents also prevent the buildup of harmful deposits on the rings and in the grooves of the engine pistons. These deposits can cause the rings of the piston to stick, causing potentially catastrophic wear to liners, which leads to loss of engine compression (power), poor emissions quality and fuel economy, and eventually engine failure.

## Description and Properties

Carboxylates are a type of detergent that are viscous brown liquids insoluble in water and have no appreciable odor. Per OSHA guidelines, these materials are not considered flammable or combustible.

Carboxylates consist of a hydrocarbon tail that provides oil solubility, a connecting group such as phenol, and a salt forming site (carboxylate) considered a polar head. This help dispersing calcium carbonate in oil.

The detergent, or “soap,” portion of the molecule (represented by the tail and polar head shown in Figure 1), helps to remove engine deposits, especially on the piston ring and lands. The salt base neutralizes harmful acids resulting from combustion. The balance of calcium carbonate base vs. the actual carboxylate detergent present in the molecule is tailored to the specific application for which the carboxylate is intended. Some types that are rich in soap protect against engine deposits, and those that are rich in metallic carbonate base protect against corrosive wear from combustion acids.



Figure 1: Generic Detergent Soap

## Health Information

Studies indicate that carboxylates are low in toxicity following acute exposure by dermal and oral routes. They are not expected to be harmful if inhaled. Signs of systemic toxicity occur only at very high dose levels that are much

greater than typical human exposure.

Studies indicate that some carboxylates are irritating to the skin and can be skin sensitizers. There is no evidence that these chemicals are significant eye irritants. Toxicity studies conducted by oral gavage demonstrate that carboxylates do not cause developmental malformations.

Some carboxylates may contain an impurity that may cause adverse reproductive effects. These adverse reproductive effects included reductions in fertility, reduction in number of offspring, and a reduction in the size of reproductive organs.

In-vitro and in-vivo studies demonstrate that these substances lack the potential to be genotoxic and do not present a significant risk for mutagenicity or carcinogenicity in humans.

## Environmental Information

Based on test data, carboxylates are not toxic to aquatic organisms. When used as recommended with proper controls, exposure of the aquatic environment to these chemicals is not likely. These substances are also not expected to affect or inhibit wastewater treatment plant microorganisms at typical discharge rates. Carboxylates are not readily biodegradable.

In the event of a spill of a product containing DPA antioxidants, stop the source of the release if it can be done safely. Refer to Safety Data Sheet for spill response and clean-up procedures. Report spills to local authorities. For USA, call National Response Center at 1-800-424-8802.

## Regulatory Information

Requirements may exist that govern the manufacture, importation, sale, transportation, use and/or disposal of carboxylates antioxidants or products containing them. These requirements may vary by jurisdiction. For more information, consult the Safety Data Sheet.

## Exposure Potential

The low volatility and low water solubility of carboxylates antioxidants limit the potential for exposure. Indirect exposure to these chemicals via the environment is likely to be negligible.

Manufacturing of carboxylates generally occurs in dedicated closed systems with proper engineering controls, minimizing exposure. Solid waste is either incinerated or recycled. Therefore, there is no significant release to the environment. Wastewater is treated before it is released. Workers in manufacturing plants – including those who conduct sample analysis, blending, maintenance and cleaning – are well trained in their operations and wear appropriate personal protection equipment. Professional mechanics, service station attendants and other skilled workers wear personal protective equipment and use hygiene practices that reduce exposure to the oil. Consumer exposure may occur while working around engines, but this is likely to be infrequent. In summary, there is minimal potential for exposure to carboxylates to the consumer.

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