

THE SCIENCE BEHIND BETTER PERFORMANCE

Better performance doesn't start on a track. It starts in a lab. The internal combustion engine is a complex piece of machinery, and the performance additives that clean and maintain it need to react in specific ways to keep it performing properly. In short, when better science goes into a product, better performance comes out.

SCIENCE OVERVIEW

ENGINE PROBLEMS

OUR INGREDIENTS

PROVEN RESULTS

HOW FUEL ADDITIVES WORK IN YOUR ENGINE

Fuel additives help eliminate damaging carbon deposits and fight corrosion from ethanol and water, restoring lost performance and extending engine life. How well fuel additives work depends on both the quality and quantity of the ingredients.

ENGINE PROBLEMS

Decreased engine performance can be affected in a number of ways, from corrosion of metal parts to excess cylinder friction. And one of the most common causes is fuel itself. Even high-quality fuel leaves behind carbon deposits that build up on key engine parts, causing problems that range from reduced horsepower to poor fuel economy.

OUR INGREDIENTS

Gumout® fuel and oil additives are scientifically formulated using the strongest ingredients available, like P.E.A. (polyether-amine), a potent nitrogen-based detergent capable of cleaning engine parts in a way weaker detergents can't match. Gumout uses higher concentrations of active ingredients and rigorously tests every formula to meet tough performance and safety standards.

PROVEN RESULTS

In science, results reign supreme. Formulas need to work consistently and in a variety of conditions to be considered successful. Gumout uses ASTM Industry Standard tests to ensure our formulas are scientifically effective, time after time, under the toughest conditions.

ENGINE PROBLEMS

Engine performance can be affected in a number of ways, from corrosion of metal parts to excess cylinder friction. And one of the most common causes of decreased performance is fuel itself. Even high-quality fuel can leave behind carbon deposits that build up on key engine parts, causing problems that range from reduced horsepower to poor fuel economy.

SCIENCE OVERVIEW

ENGINE PROBLEMS

OUR INGREDIENTS

PROVEN RESULTS

FUEL SYSTEM

COMBUSTION

ENGINE FLUIDS

Fuel systems have come a long way in the past century, but an inefficient fuel system can still be tremendously frustrating. When fuel leaves behind carbon deposits and ethanol draws water into the fuel system, performance, fuel economy and an engine's longevity can all suffer.

FUEL INJECTORS

Fuel injectors are a key component in delivering the right amount of gasoline to the combustion chamber. Poor fuel injector performance results in hard starts, power loss, rough idling, reduced fuel economy and increased emissions.

CARBON BUILDUP



Clogged Fuel Injector



Clean Fuel Injector

Fuel injectors increase fuel efficiency and engine response times by delivering a fine mist of fuel right at the engine's intake valves. This allows fuel to burn more easily, increasing the engine's response times while reducing the amount of fuel used. Port fuel injectors spray fuel in the intake port area where it flows past the intake valve into the combustion chamber. Direct injectors have the tip positioned directly in the combustion chamber and spray fuel into the combustion chamber, bypassing the intake valve. This design allows the engine to have even better fuel economy. Carbon deposits can clog fuel injectors, turning the fuel pattern into a stream instead of a mist. As a result, less fuel is delivered to the combustion chamber and the fuel that does enter the chamber burns less efficiently.

PERFORMANCE ISSUES

Hard starts, power loss, rough idle, slow acceleration, lower fuel economy, increased emissions.

SOLUTION

Gumout® fuel additives use a variety of detergents to fight carbon buildup in fuel injectors. These detergents bond to carbon particles on injectors and disperse them to restore performance. They also bond to the surface of the nozzle, helping prevent further carbon buildup.



Clogged injector with poor fuel dispersion



Injector after one treatment with Gumout® One-N-Done Complete Fuel System Cleaner

Port fuel injectors can be cleaned using a detergent called PIBA (polyisobutylenamine). But GDI/direct injectors are harder to clean. They require P.E.A. (polyether-amine), a specialized detergent that's strong enough to survive the heat of a combustion chamber. Check individual product details for detergents used. Port fuel injectors spray fuel in the intake port area where it flows past the intake valve into the combustion chamber. Direct injectors have the tip positioned directly in the combustion chamber and spray fuel into the combustion chamber by-passing the intake valve. This design allows the engine to have even better fuel economy.

INTAKE VALVES & PORTS

Intake valves regulate the delivery of fuel and air into the combustion chamber. In a port-injected engine, air travels down the port and mixes with fuel from the injector, spraying onto the intake valve which opens into the combustion chamber. In a direct-injected engine, air only travels past the intake valve and then mixes with fuel in the combustion chamber.

ENGINE PROBLEMS

Engine performance can be affected in a number of ways, from corrosion of metal parts to excess cylinder friction. And one of the most common causes of decreased performance is fuel itself. Even high-quality fuel can leave behind carbon deposits that build up on key engine parts, causing problems that range from reduced horsepower to poor fuel economy.

SCIENCE OVERVIEW

ENGINE PROBLEMS

OUR INGREDIENTS

PROVEN RESULTS

FUEL SYSTEM

COMBUSTION

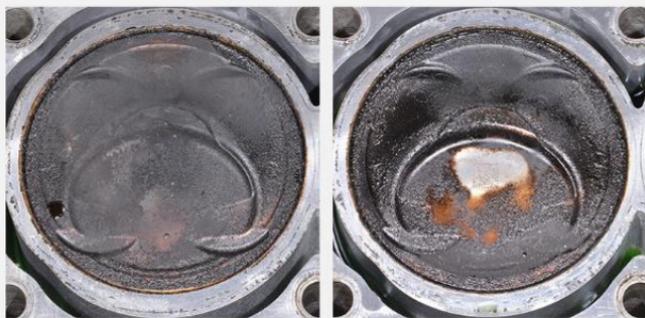
ENGINE FLUIDS

The combustion chamber is the most unforgiving environment in the engine. With temperatures as high as 495° F, it's the most difficult part of the engine to clean. Carbon buildup on piston tops and cylinder heads can create hot spots, leading to preignition, loss of performance and potentially severe engine damage.

PISTON TOPS

Piston tops are subjected to massive amounts of pressure and heat during the combustion process. When deposits form, they cause hot spots that ignite fuel before spark ignition. The resulting noise is knocking and pinging caused by this pre-ignition. This causes the piston to be pre-maturely pushed down in the cylinder when the crankshaft is trying to push it up. This can lead to parts damage and head gasket failure.

CARBON BUILDUP



Piston top with carbon deposits

*Piston top treated with Gumout®
One-N-Done Complete Fuel System
Cleaner*



Cylinder heads (left) with deposits

*Cylinder heads (right) after Gumout®
One-N-Done Complete Fuel System
Cleaner*

Engines generate power by igniting a precise fuel-air mixture in the combustion chamber. The fuel and air are heated through compression, then ignited with a spark plug for a controlled explosion. Carbon deposits on piston tops and cylinder heads trap heat, creating hot spots that can cause fuel to ignite prematurely. These uncontrolled ignitions create higher pressures than normal combustion and can cause knocking, pinging and, in extreme conditions, engine damage.

PERFORMANCE ISSUES

Preignition, increased emissions, engine failure.

SOLUTION

Gumout® fuel additives use P.E.A. (polyether-amine) to remove deposits from difficult-to-clean parts like combustion chambers, piston tops and cylinder heads. While most detergents burn up in the heat of the combustion chamber, P.E.A. remains stable, even at 495° F. It bonds to carbon deposits and removes them from the fuel system. P.E.A. also bonds to metal surfaces to prevent future buildup.

CYLINDER HEADS

When running smoothly, cylinder heads allow fuel/air mixture and exhaust to flow smoothly into and out of the combustion chambers. But when deposits form, they can cause a disruption of the air-fuel mixture, leading to inefficient combustion and lost performance.

ENGINE PROBLEMS

Engine performance can be affected in a number of ways, from corrosion of metal parts to excess cylinder friction. And one of the most common causes of decreased performance is fuel itself. Even high-quality fuel can leave behind carbon deposits that build up on key engine parts, causing problems that range from reduced horsepower to poor fuel economy.

SCIENCE OVERVIEW

ENGINE PROBLEMS

OUR INGREDIENTS

PROVEN RESULTS

FUEL SYSTEM

COMBUSTION

ENGINE FLUIDS

An engine's fluids interact with its metal surfaces, often under extreme conditions.

OIL

Oil is the lifeblood of the engine, working to lubricate parts, dissipate heat and remove contaminants. And as an engine ages, these functions become even more important. Excessive heat or humidity in the oil system accelerates the breakdown of oil, creating a layer of sludge on engine parts.

OIL SYSTEM



Oil Sludge Buildup – Before



Oil Sludge Buildup – After

Oil Sludge Buildup

When sheared past its limitations, oil will not deliver the lubrication needed to keep the engine from overheating or potentially causing complete failure. The oil system literally and figuratively keeps things running smoothly. Metal engine parts interacting with each other work more efficiently when properly lubricated with clean oil. Oil filters can only do so much, so when the extreme conditions of the engine take their toll on oil, it can lose viscosity, decreasing its ability to lubricate. Dirty oil can cause sludge and acid buildup, which can damage key engine parts. When sheared past its limitations, oil will not deliver the lubrication to keep the engine from overheating or potentially completely failing.

PERFORMANCE ISSUES

Dirty oil can cause sludge build up that can reduce performance and increase wear. Acid build up leads to corrosion that can damage engine parts. The second paragraph needs to be tailored to MSTU not high mileage oil treatment which we haven't sold in years. So detergency and anti-corrosion should be the main talking points – clean oil lubricates better reducing heat that can cause parts damage and reduced sludge allows parts to move more freely increasing performance. Cleaning agents found in MSTU help keep engine oil and parts clean to unleash your engines full potential and corrosion inhibitors ensure that you maximize engine life.

SOLUTION

Gumout High Mileage Oil Treatment removes sludge and deposits using specialized cleaning agents to help restore performance and extend the life of engine parts. Gumout additives also recondition worn seals to prevent leaks, while viscosity improvers work to increase oil pressure, reducing blow-by and oil consumption. To protect the valve train from wear and corrosion, the ZDDP (zinc dialkyl dithiophosphate) in Gumout adheres to metal surfaces, forming a protective layer against friction and corrosion to keep the engine running longer and smoother.

FUEL

The same fuel you put into your vehicle to make it run is also slowly killing it. Fuel – even top-tier gasoline with added detergents – leaves behind carbon deposits that bind to engine parts and sap performance and this problem is compounded the longer the engine is not run.

There are also other enemies of your engine that can not only hinder optimal engine operation, but can actually damage your engine: water and cold temperatures.

OUR INGREDIENTS

Gumout fuel and oil additives are scientifically formulated using the most potent ingredients available, like P.E.A. (polyether-amine), a potent nitrogen-based detergent capable of cleaning engine parts in a way weaker detergents can't match. Gumout uses higher concentrations of active ingredients and rigorously tests every formula to meet tough performance and safety standards.

SCIENCE OVERVIEW

ENGINE PROBLEMS

OUR INGREDIENTS

PROVEN RESULTS

CLEANING INGREDIENTS

CONDITIONING INGREDIENTS

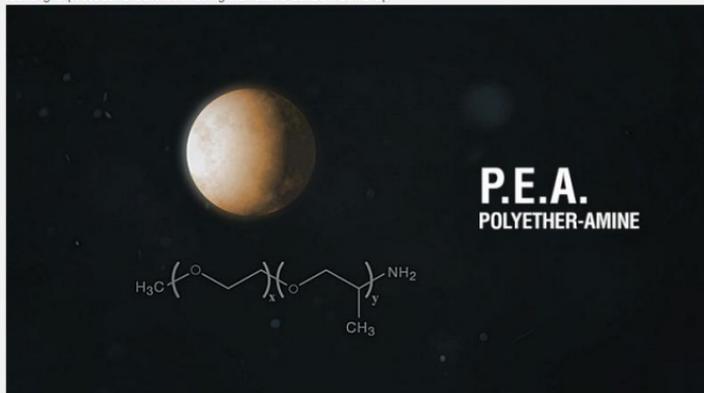
Because of the premium formulations used in our fuel additives, Gumout products help clean deposits after just one use and improve engine performance immediately. Each of Gumout's products have built-for-purpose formulations and can deliver a variety of cleaning, conditioning and preventative benefits. The use of Gumout fuel additives as part of a regular maintenance program nets the greatest performance results and the highest level of cleaning.

P.E.A. (POLYETHER-AMINE)

P.E.A. is a nitrogen-based detergent stable enough to survive the harsh conditions of a combustion chamber. It is the most potent detergent available for cleaning carbon deposits in fuel systems and the only cleaning agent that has been proven to clean the combustion chamber, piston tops and cylinder heads. P.E.A. also cleans ports, valves and GDI and port injectors and keeps them clean for up to 3,000 miles.

HOW IT WORKS

P.E.A. cleans the entire fuel system. Its molecules have a nitrogen head that attaches to the carbon deposit and lift it away while the fuel-soluble tail of the molecule pulls the deposit off the surface where it is burned and/or flushed out through the exhaust. The molecule will also attach to the surface areas without deposits, leaving a protective barrier that fights future carbon build up.



BENEFITS

A fuel additive that contains P.E.A. starts restoring fuel economy and improving engine performance in a single fill-up. It also scavenges water and helps neutralize the corrosive effects of ethanol blends. A fuel additive that does not contain P.E.A. will not clean the entire fuel system. P.E.A. also leaves lasting protection from carbon deposits in addition to cleaning existing deposits. Regular use yields even better results.

PRODUCTS WITH P.E.A.



One-N-Done Complete Fuel System Cleaner



All-In-One Complete Fuel System Cleaner



Regane High Mileage Fuel System Cleaner



Regane Complete Fuel System Cleaner



Multi-System Tune-Up



Regane Direct Injection Intake Valve & Port Cleaner



Regane Parts Cleaner/Degreaser

PIBA (POLYISOBUTYLENE AMINE)

PIBA is an efficient detergent, in strong enough concentration, helps clean intake ports, port fuel injectors and intake valves. It controls deposit buildup, preventing carbon and varnish from accumulating on critical engine parts.

PETROLEUM DISTILLATE (SOLVENT)

Petroleum distillates are used to carry components into the fuel so the additives mix completely with the fuel. When concentrated – as in a carb spray, parts cleaner, air intake/throttle body cleaner – petroleum distillates soften and dissolve carbon deposits.

DIESEL DEPOSIT CONTROL ADDITIVE (HYPERDISPERSANT)

Diesel deposit control additives act as detergents and dispersants to latch onto sludge and carbon buildup, break them up and pull them into the fuel, where the deposits are burned off and removed through the exhaust.

PIBA (POLYISOBUTYLENE AMINE)

PIBA is an efficient detergent, in strong enough concentration, helps clean intake ports, port fuel injectors and intake valves. It controls deposit buildup, preventing carbon and varnish from accumulating on critical engine parts.

HOW IT WORKS

PIBA acts as a surfactant/dispersant. One part of the molecule is attracted to the deposit on the metal's surface and the remaining parts are soluble in the fuel. This allows it to pull the deposit into the fuel, where it is carried through the combustion chamber, vaporized and finally eliminated through the exhaust.

BENEFITS

A clean engine performs better. Clean injectors disperse a fine spray pattern that increases combustion efficiency for better fuel economy, smoother idle and better performance. Clean intake valves and ports allow the proper air-fuel mixture into the combustion chamber so the engine responds quickly and efficiently.

PRODUCTS WITH PIBA



Fuel System Treatment



High Mileage Fuel Injector Cleaner



Fuel Injector Cleaner



Fuel Injector/Carburetor Cleaner



Gas Treatment



Octane Booster

PETROLEUM DISTILLATE (SOLVENT)

Petroleum distillates are used to carry components into the fuel so the additives mix completely with the fuel. When concentrated – as in a carb spray, parts cleaner, air intake/throttle body cleaner – petroleum distillates soften and dissolve carbon deposits.

DIESEL DEPOSIT CONTROL ADDITIVE (HYPERDISPERSANT)

Diesel deposit control additives act as detergents and dispersants to latch onto sludge and carbon buildup, break them up and pull them into the fuel, where the deposits are burned off and removed through the exhaust.

PETROLEUM DISTILLATE (SOLVENT)

Petroleum distillates are used to carry components into the fuel so the additives mix completely with the fuel. When concentrated – as in a carb spray, parts cleaner, air intake/throttle body cleaner – petroleum distillates soften and dissolve carbon deposits.

HOW IT WORKS

When diluted in the fuel tank, a petroleum distillate's deposit-removing abilities are minor to nonexistent. However, in Gumout® Multi-System Tune-Up, the distillate is a carrier fluid that increases the effectiveness of PEA by helping it mix easily into the fuel.

BENEFITS

Petroleum distillate is an effective solvent and removes sludge when added to the fuel system as a concentrate via induction through a vacuum line or fuel rail. In products added to the fuel tank, the petroleum distillate has limited sludge removal but helps control flow, assuring complete mixing into the fuel. It also helps the product deliver the full concentration of actives to where they are needed.

PRODUCTS WITH PETROLEUM DISTILLATE



[Multi-System Tune-Up](#)

DIESEL DEPOSIT CONTROL ADDITIVE (HYPERDISPERSANT)

Diesel deposit control additives act as detergents and dispersants to latch onto sludge and carbon buildup, break them up and pull them into the fuel, where the deposits are burned off and removed through the exhaust.

HOW IT WORKS

One part of the additive molecule attaches to deposits while the other part of the molecule is fuel-soluble, allowing it to lift the deposit from the metal surfaces. It's state-of-the-art diesel chemistry that addresses the needs of modern diesel engines and the issues they have had with the ultra-low-sulfur diesel (ULSD) fuel, like reduced lubricity and corrosion of fuel tanks, pumps, injectors and other metal parts due to increased water content. It is designed to keep modern diesel fuel injectors clean, both at the nozzle tip and inside the injector.

BENEFITS

Diesel engine performance can suffer when fuel injectors are dirty or sticky, resulting in loss of fuel economy and power. The hyperdispersant cleans injectors to restore power, remove internal GDI/direct injector deposits that cause sticking, reduce emissions, restore fuel economy, provide lubricity and wear protection for fuel pumps and injectors.

PRODUCTS WITH DIESEL DEPOSIT CONTROL ADDITIVE



[All-In-One® Diesel Complete Fuel System Cleaner](#)

OUR INGREDIENTS

Gumout fuel and oil additives are scientifically formulated using the most potent ingredients available, like P.E.A. (polyether-amine), a potent nitrogen-based detergent capable of cleaning engine parts in a way weaker detergents can't match. Gumout uses higher concentrations of active ingredients and rigorously tests every formula to meet tough performance and safety standards.

SCIENCE OVERVIEW

ENGINE PROBLEMS

OUR INGREDIENTS

PROVEN RESULTS

CLEANING INGREDIENTS

CONDITIONING INGREDIENTS

The ingredients used in Gumout fuel additives proactively condition against future buildup and corrosion, ensuring lasting performance. Each of Gumout's products have built-for-purpose formulations to deliver a mix of cleaning, conditioning and preventative benefits.

ANTIOXIDANT *(FUEL AND OIL STABILIZER)*

Fuel degradation is caused by oxygen reacting with fuel molecules, breaking them into smaller parts that attach onto other molecules to form gum and varnish. This is accelerated by the extreme heat of the engine, but it may also be seen in fuels and lubricants after long-term storage.

HOW IT WORKS

Antioxidants tie up oxygen molecules before they can react with the fuel, stabilizing it and protecting it from degradation. This stops the development of varnish and gummy buildup on metal parts, which occurs naturally when fuel and oil are allowed to sit for long periods of time.

BENEFITS

When fuel and oil sit unused for long periods of time, they deteriorate. Carbon residue settles, attaching itself to key engine parts and causing varnish and gummy buildup to develop. Antioxidants stabilize fuel and oil for best fuel performance, longer life and better performance from engines that are not operated regularly. Stabilizers are important for engines of all sizes that are used seasonally.

PRODUCTS WITH ANTIOXIDANTS



Multi-System Tune-Up

ISOPROPYL ALCOHOL (*WATER REMOVER*)

Isopropyl alcohol is a solvent that helps incompatible components of a formula stay together as one clear solution.

HOW IT WORKS

Isopropyl alcohol penetrates, softens and dissolves a wide variety of deposits, ranging from water-soluble soils to oil-based deposits. It also pulls condensed moisture from the fuel system and crankcase to prevent rust and corrosion on metal parts, expelling it through the exhaust.

BENEFITS

Acid and water are normal byproducts of combustion. Acid naturally attacks metal parts, and water will cause these corroded surfaces to rust. Removing water from the system helps prevent rust on critical engine parts, helping ensure a longer, healthier engine life.

PRODUCTS WITH ISOPROPYL ALCOHOL



[Multi-System Tune-Up](#)

ETHANOL CORROSION INHIBITOR (*CORROSION INHIBITOR*)

Ethanol, a fuel additive used to reduce emissions, is very water-friendly. So friendly, in fact, that it's able to draw water into fuel just from humid air. That water settles onto metal surfaces since it is more dense than ethanol and gasoline and can cause corrosion. This can damage an engine, particularly one that isn't being used regularly.

HOW IT WORKS

Ethanol corrosion inhibitors condition metal engine surfaces from the corrosive effects of water, preventing rust and helping extend engine life.

BENEFITS

Corrosion inhibitors prevent ethanol and water's corrosive side effects. As a solvent, ethanol eats away at seals, breaking them down and reducing their expected lifespan. Fuel containing ethanol can also undergo phase separation, where ethanol and water separate from fuel and settle at the bottom of the tank, where fuel pumps are typically located. When fuel sits unused for as little as a week in hot, humid climates, potentially corrosive water can be introduced to the fuel system. Corrosion inhibitors also protect engines running on ultra-low-sulfur diesel (ULSD) fuel and biodiesel.

PRODUCTS WITH ETHANOL CORROSION INHIBITOR



[Multi-System Tune-Up](#)

LIGHT MINERAL OIL (LUBRICANT)

Light mineral oil is a type of base oil, used as a basic lubricant to reduce heat, friction and wear on critical engine parts.

HOW IT WORKS

Light mineral oil lubricates the upper cylinder and other critical engine parts at start up. However, it loses its lubricating benefit when it burns up as engines reach normal operating temperatures. Also, when added to the fuel rail or vacuum line via induction, it generates tremendous amounts of exhaust smoke as it burns up in the combustion chamber.

BENEFITS

The lubrication properties of light mineral oil can lessen wear over time. A lubricated upper cylinder helps with cold starts and provides protection from wear. It has no cleaning ability, and there is no cleaning benefit to the white smoke created by light mineral oil being combusted.

PRODUCTS WITH LIGHT MINERAL OIL



[Multi-System Tune-Up](#)

FRICTION MODIFIER (LUBRICANT)

A friction modifier extends beyond ordinary lubrication to interact with metal surfaces even in the harsh environment found in the combustion chamber. This protective barrier is especially important between the piston rings and cylinder walls.

HOW IT WORKS

A friction modifier added to fuel will survive the heat of the combustion chamber even beyond start up. Pressure allows it to migrate between the piston rings and the cylinder wall, where it reduces friction immediately. The friction modifier also moves into the crankcase oil where it remains until the next oil change, continuing to reduce friction.

BENEFITS

Friction modifiers reduce wasted energy from internal engine friction. The energy is then available to power the vehicle, resulting in improved fuel economy and/or more power, depending on driving style. Even in an engine free of deposits, benefits are immediately evident and last until the oil is replaced (3000 – 5000 miles).

PRODUCTS WITH FRICTION MODIFIER



[All-In-One® Complete Fuel System Cleaner](#)



[Reoane® High Mileage Fuel System Cleaner](#)



[Fuel System Treatment](#)

OCTANE BOOSTER *(CONDITIONING INGREDIENTS)*

Octane booster enhances the gasoline itself to increase the octane rating. Octane booster fights knock and ping in the combustion chamber, which usually results from deposit buildup or operating under severe loads.

HOW IT WORKS

When deposits build up in the combustion chamber, they can form hot spots, similar to an ember in a campfire. The hot spot ignites the fuel early, preempting the sparkplug's ignition. This preignition can create high heat and stress within the engine, potentially causing severe damage. However, most modern engines have knock sensors that "hear" the knock even before the driver can even notice. The sensors automatically adjust the engine timing to protect the engine. This, however, has the side effect of reducing the engine's performance.

BENEFITS

Adding an octane booster prevents premature ignition of the gasoline by making it more difficult for the hot spots to ignite the fuel. This allows the engine to run without damage and allows the computer to time the engine for optimal performance and maximum efficiency. Also, owners of vehicles that call for a higher octane gasoline, often opt for lower octane to save money. By using an octane booster the knock sensor will adjust the timing closer to factory settings. The result is improved fuel economy and/or power.

OCTANE NUMBER

Adding a booster typically increases octane number by about one to two octane numbers. Adding more will result in only a slight gain, and adding extra (over-treating) is not recommended for street-legal vehicles. Some octane boosters advertise an octane raise of a certain number of "points." A point, however, is only 1/10 of an octane number, so the advertised octane increase may be misleading.

PRODUCTS WITH OCTANE BOOSTER



[Octane Booster](#)

DIESEL DETERGENT (*CLEANING INGREDIENTS*)

Diesel detergents are primarily designed to keep diesel injectors clean. Diesel injectors often operate under high pressure and spray directly into the combustion chamber where the fuel compresses to self-ignite. A fine spray pattern is essential for easy starts and efficient operation.

HOW IT WORKS

Diesel detergents act as dispersants to remove deposits from diesel injectors. The polar end of the molecule is attracted to the deposit material and the other end of the molecule is dissolved in the fuel. This allows the detergent to grab the deposit particle and pull it off the injector surface where it can be washed away with the fuel burning in the engine.

BENEFITS

A clean injector allows a fine, controlled spray that keeps the engine running smoothly and efficiently. Diesel engines typically are not bothered by intake valve and combustion chamber deposits, as are seen in gasoline engines.

PRODUCTS WITH DIESEL DETERGENT



[All-In-One® Diesel
Complete Fuel System
Cleaner](#)

DIESEL LUBRICITY ADDITIVE (*CONDITIONING INGREDIENT*)

Diesel fuels need to automatically lubricate the fuel pump as the engine runs. Ultra-low sulfur diesel (ULSD) was introduced to reduce emissions, but an unwanted side effect is reduced diesel fuel lubricity. Diesel lubricity additive is added to the fuel to replace the lost lubricant and protect the fuel pump and injector internals. As these vital fuel system parts operate over the long term, the additive protects surfaces from friction and wear.

HOW IT WORKS

A lubricity additive replaces lubricants lost in the refining process. As the fuel pump operates over the long term, the additive protects pump surfaces from friction and wear.

BENEFITS

Heat, friction and wear are reduced, extending the life of the diesel fuel pump and injector internals when the additive is used regularly.

PRODUCTS WITH DIESEL LUBRICITY ADDITIVE



[All-In-One® Diesel
Complete Fuel System
Cleaner](#)

CETANE IMPROVER (*CONDITIONING INGREDIENT*)

The cetane number indicates the tendency of diesel fuel to ignite under compression. The higher the number, the quicker the fuel ignites. Increasing the cetane number results in easier cold starts, better fuel economy and reduced emissions.

HOW IT WORKS

A cetane improver is a component in the fuel that causes it to ignite quicker when the piston compresses the air-fuel mixture. A fast flame allows easier starting and efficient operation, particularly at high speeds. The need for cetane improver varies with the hydrocarbon composition of the fuel, based on the crude oil source and the refinery process used to produce it.

BENEFITS

At a higher cetane number (limited by engine design and technology), combustion is more complete, resulting in less noise, reduced emissions, better cold starts and higher fuel economy.

PRODUCTS WITH CETANE IMPROVER



[All-In-One® Diesel Complete Fuel System Cleaner](#)

ANTI-GEL/COLD FLOW IMPROVER (*CONDITIONING INGREDIENT*)

Diesel fuel contains waxy hydrocarbons that can crystallize at low temperatures. These crystals can clog the fuel filter and even thicken the fuel to the point where it will not pump. Anti-gel prevents fuel gelling and allows it to flow at cold temperatures.

HOW IT WORKS

Anti-gel is a polymer that attaches to the wax crystal. It interferes with the crystal, preventing it from growing and agglomerating with other crystals to form a clog that might have otherwise ended up in the fuel filter.

BENEFITS

The flowable temperature of the fuel is reduced by 20-40°F, allowing vehicle operation in cold climates. This is more cost effective than the other common solution – diluting diesel fuel with large amounts of kerosene during winter operations. In addition, the chemistry in Gumout's All in One Diesel Complete Fuel System Cleaner will not only inhibit gelling, it can liquefy existing gelled fuel.

PRODUCTS WITH ANTI-GEL/COLD FLOW IMPROVER



[All-In-One® Diesel Complete Fuel System Cleaner](#)

PROVEN RESULTS

In science, results reign supreme. Formulas need to work consistently and in a variety of conditions to be considered successful. Gumout uses ASTM Industry Standard tests to ensure our formulas are scientifically effective, time after time, under the toughest conditions.

SCIENCE OVERVIEW

ENGINE PROBLEMS

OUR INGREDIENTS

PROVEN RESULTS

ASTM TESTING STANDARDS

Gumout follows detailed testing standards from ASTM, an international standards organization that develops and publishes testing standards for a wide range of industries, including major auto companies and the nation's leading fuel, oil and chemical companies.

In a world full of marketing slogans and hyperbole, ASTM standards are trusted for fostering innovation, industry competition and consumer confidence. ASTM's consensus standards mean that companies ranging from Fortune 500 behemoths to emerging start-ups are subject to the same scientific testing criteria.

LAC DETERGENCY TEST

This test measures CCDs (combustion chamber deposits) and the LAC (lowest additive concentrate) to control IVDs (intake valve deposits) for LAC registration.

TEST

Technicians operated a 1985 BMW 318i, that is specified in the test, on a test track under controlled cyclic conditions for 10,000 miles (16,000 km), simulating a mix of city, suburban and highway driving.

SPECS

The 1985 BMW 318i is powered by a 1.8L, 4-cylinder, port-fuel-injected, single-cam engine. Per ASTM specifications, the vehicle was also equipped with an automatic transmission and air conditioning.

RESULTS

The ASTM standard is adapted so that the initial 10,000 miles running on additive-free fuel must cause average deposits of greater than 290mg per intake valve. After addition of Gumout and running for one tank of fuel, fewer than 100mg of deposits remained on valves, signaling a successful passing score.

INJECTOR FOULING TEST

The US Environmental Protection Agency (EPA) and California Air Resources Board (CARB) require this test for additized gasoline to prove their qualifications for preventing deposits from building on fuel injectors.

TEST

The Injector Fouling Test recreates periods of engine activity and inactivity to create deposit build-up on fuel injectors. Testers alternate between running the engine at 55mph for fifteen minutes, then cooling the engine in a hot soak for 45 minutes. This cycle is done repeatedly until 2,000-3,500 miles are reached, at which time the additive is introduced to the fuel. The active-inactive driving cycle is then repeated for an additional 300 miles (approximately one tank of fuel) to examine additive effectiveness.

SPECS

Per the specifications of the Coordinating Research Council (CRC) and CARB, this test uses a Chrysler vehicle from 1985-1987 with a specified 2.2L engine. The vehicles must include the following properties: 4-cylinder, turbocharged engine and PFI.

RESULTS

The untreated fuel typically blocks injector flow so that it is notably less than 95%. For successful qualification, an additive must improve fuel injector flow to at least 95% in the final 300-mile test period. Gumout Fuel Injector Cleaners, Complete Fuel System Cleaners and Multi-System Tune Up products passed this test.

TOP TIER DETERGENCY TEST

This test is used to measure a fuel's ability to control IVD (intake valve deposits) for Top Tier™ certification. It is also used for measuring CCD (combustion chamber deposits).

TEST

The engine is operated for 100 hours using a two-phase cycling, laboratory dynamometer procedure. The average intake valve tulip deposit weight (mg/valve) is then measured at the end of the test.

SPECS

The 1994 test engine must be an in-line, 4-cylinder, four-stroke, gasoline engine with a 2.3L displacement. The engine has EGR and electronic PFI, with one spark plug and two valves per cylinder.

RESULTS

Per Top Tier™ Test Standards, base fuel must cause at least 500 mg/valve of IVD during 100 testing hours. Once additive is introduced to fuel, IVD must be reduced to less than 50 mg/valve. Additionally, CCD of additized fuel must not exceed 140% of CCD caused by base fuel. Gumout additives successfully exceeded both the IVD and CCD testing requirements.

A THOROUGH TESTING PROCESS

Our stringent standards require analysis throughout the entire fuel additive testing process for optimal comparison of affected parts.

We put all Gumout products through the rigors of ASTM testing, using objective measurements from tools like the permascope, which compares carbon deposit depth on piston tops before and after treatment.



A test technician uses a permascope to measure the thickness of carbon deposits on piston tops.

TESTED TO DO NO HARM

Testing is performed to ensure fuel additives do not harm engine components or vehicle operation in any way.

SLUDGE TEST

Ensures that fuel additive does not cause an increase of sludge in the engine oil.

INTAKE VALVE STICKING (IVS) TEST

Ensures that fuel additive does not cause valve sticking in cold temperatures.

CATALYTIC CONVERTER TEST

Ensures that fuel additive does not increase the exhaust temperature causing degradation to the catalyst system.

OXYGEN SENSOR TEST

Ensures that fuel additive does not build deposits or damage the oxygen sensors.