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fuel improvers

HANDBOOK

- Fuel improvers Why?
- Specialized improvers How do they work?
- Improvement Packages What are they?
- Racing fuel – Enhancers How do I choose them?
- Humidity in fuel What am I doing?
- Biofuels & their problems How do I deal with it?
- DPF How do I maintain it?
- LPG (CNG) How do I improve it?
- 2stroke engines How are they lubricated?



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Development of fuel improvers

The constant increasing requirements for designing a modern engine as well as developments in refinery processes have resulted in a continue increase in the use of fuel improvers.

The production of fuel improvers is an ongoing process, because technology is constantly changing and market demands are constantly being refined.

VOULIS CHEMICALS, with several years of experience in the industry and in collaboration with the largest research firms of the market, is constantly developing modern technology products to improve fuel, achieve high and safe returns across the fuel range for both wholesale use (refineries - gas stations - fleets of cars - ships, etc.) as well as in the retail market. It also researches, designs, manufactures, packs and distributes all types of boosters for all types of fuels:

1. **Gasoline**
2. **Diesel (motion and combustion)**
3. **Biodiesel and Biodiesel Mixed with Diesel.**
4. **Crude oil**
5. **LPG and CNG (natural gas)**

How are they distributed?

The way they are studied, produced, packaged and handled is divided into 3 main categories:

- **Concentrated Packages** (for the wholesale market). A multiproduct is created of several enhancing agents for complete protection and quality improvement. The products are concentrated, and each dosage is measured in ppm (millions)

- **Dose per Tank:** (for the retail market). Specialized improvers in packages designed for use in a tank. They are addressed in the retail market so that the customer does not need to make dose calculations. (the gasoline tanks are approximately 70 liters and the diesel fuel tanks approximately 100 liters of fuel).

- **Racing Improvers and improved fuels.** In packs to accommodate the friends of the racing car and motorcycle.

Benzine

Benzine is a light flammable liquid derived from fractional distillation of the oil at 40 ° up to 210 ° C. It is a mixture of mainly three saturated hydrocarbons of hexane, heptane and octane.



What are the octanes?

The word octane has been established to be a measure of the quality of benzine. Inside the combustion chamber, a mixture of air and gas is compressed, where ignition-explosion occurs with the aid of spark plugs. If this is not done at the right time and an untimely self-ignition occurs, it goes to the walls of the cylinder, resulting in the well-known clangs, the so-called blows in the fires. Unless this is corrected, we have a significant loss of power and damage to the cylinders.

What is the octane scale?

0 of this scale is the normal heptane and 100 isooctane (2,2,4-trimethylpentane).

Mixing of n-heptane (Low self-ignition) and iso-octane (high self-ignition) provides products with any octane number from 0 to 100.

For example, when we say 95 octane benzine, we mean a mixture behavior with 95% isooctane and 5% n-heptane. When talking about 100 octane benzine we mean 100% isooctane behavior. Here, if you read for more than 100 octanes, this means that the test was not done using isooctane but with a material that has a higher resistance ability, such as ethanol that has RON 129.

The octane rating of a fuel is determined in the **RTC** (Research Octane Number) laboratories, and in Test engines using the **MON** test the (Motor Octane Number).

Diesel (mineral) - petrodiesel

It is produced by the fractional distillation of crude oil between 200°C and 350°C, at atmospheric pressure, and contains between 8 and 21 carbon atoms per molecule. It was last established internationally under the name **petrodiesel** to stand out in one word from **biodiesel**.

The **ULSD** standard (also there exists the European standard for **EN 590** vehicles) has been internationally established since 2006 for **petrodiesel** with very low sulfur content. The **Euro 5 ULSD** standard permits a maximum content of **10 ppm** in sulfur (**Euro 4** was 50 ppm ... and **Euro 3** was 350 ppm).

The ignition point of the **petrodiesel** is between 52°C and 96°C, ie safer to store and work than benzine, and the ignition value in use plays no particular role, since combustion is not done with a spark plug.

Petrodiesel during winter typically freezes at about -8.1°C, but this is relative, it also depends on other factors that play a very important role in the fluctuation of the freezing point of **petrodiesel**, the main ones being:

- the type and origin of the oil,
- the purity and mode of the particular batch refining,
- the moisture content in the storage area (moisture and water are the first to create crystals at 0°C).

- the quantity and quality of biodiesel that the diesel contains (biodiesel freezes between -1°C and -5°C).

The viscosity of the oil increases until it becomes gel, while at the same time the paraffin begins to form aggregates. The moisture content causes crystals first of all, and is the first to initiate crystallization, signaling the freezing process.

What are cetanes?

The word cetane has been established, respectively, to be a measure of the quality of oil. A mixture of air and oil is compressed into the combustion chamber. This compression produces an explosion. If this is not done at the right time and self-ignition occurs at another time, then the energy flows to the walls of the cylinder, resulting in the well-known clangs of the so-called hits in the fires. Unless this is corrected, we have a significant loss of power and damage to the cylinders.

What is the cetane scale?

It is a number - an indication of how quickly a fuel starts to ignite under the operating conditions of a diesel engine. The higher the number of cetane, the easier it is to ignite.

The cetane number determination test is carried out in accordance with the European Standard EN 590 standard ASTM D613 (Standard Test Method for Ignition Quality of Diesel Fuels by the Cetane Method). This test includes a standard single cylinder roller with variable compression. A specified fuel flow and spraying time is used, for the fuel sample, with two reference fuels with known cetane number.

1. **n-hexadecane** having excellent ignition properties and very low ignition delay (the test was 100). And

2. **1-methylnaphthalene** (1-methylnaphthalene) having very poor combustion quality was given the number 0.

Once a certain ignition delay is reached, the number of cetanes is determined using a mathematical formula. The European standard EN 590 diesel has a minimum number of cetane 51. Fuel with higher cetane numbers (superior quality) with additional cleaning agents and more synthetic content are available in some markets.

Why we need intervention in fuels using improvers?

Both benzine and diesel produced from the refinery by fractional distillation of crude oil, are not suitable to be marketed unless they are treated in a certain way with improvers. So even before they are on the market, the first



treatment with improvers is made at the refineries, based on some standard specifications, but also on extra specifications demanded by their customers, meaning the fuel companies.

But even the treatment the refiners perform on the basis of specifications, may not be sufficient for some final-users, who want even better fuel, and thus the so-called **after-market** sales covers those needs.

Another area covered by the **after-market** is where the fuel is distorted due to inadequate use or an accident, due to incomplete storage, malicious energy, or for any other reason (eg getting water), the quality of the fuel can be restored.

The basic interventions that we do in order to have:

- high-quality fuel - optimal performance
- better fuel lubricity.
- Reservoirs – tanks without water and moisture.
- Antioxidant and anti-corrosion properties of metals protection.
- Fixed long-life fuel and storage
- Sufficient seat and valve protection.
- Clean environment from flooding in the storage-feed-burning system.
- Improve winter flow in middle distillate fuels.
- Check foaming in oil.
- Burning of soot microparticles.
- Heat extraction to dry fuels (gas) and valve protection

Optimal performance is achieved when everything in an engine is working properly and at the right times. Then this offers us, perfect engine performance, minimal environmental pollution, fuel economy measurable, avoiding mechanical damage, uninterrupted driving.

In order to achieve those essential qualities so as to obtain optimal performance, the following decisive interventions are needed:

Octane improvers (benzine)

The octane improver resolves decisively on benzine, canceling the unintentional self-ignition, and stabilizing the ignition-explosion at the optimum point. They drastically improve yields (by preventing engine clutter and blowing in the fires) and contribute to fuel economy. Along with the antioxidant and anti-corrosion properties they contain, they also provide additional protection.

Cetane improvers (diesel)

Cetane enhancers interfere decisively in diesel fuel by providing stabiliza-

tion at the optimum ignition time and preventing untimely ignition and blowing into the fires. Functionally, a diesel engine with low cetane fuel leads:

- In weak start especially in cold weather
- Significant smoke emissions
- Higher noise levels
- Increased fuel consumption
- Higher exhaust emissions

The high quality cetane enhancer is therefore a very desirable feature in diesel fuels. Along with the antioxidant and anti-corrosion properties they contain, they provide additional protection.

Friction Converter

It is used in fuels to reduce friction loss in internal combustion engines, providing satisfactory lubricity to the fuel in order to improve friction values.

Stabilizers

Fuel (especially diesel) can be stored for prolonged periods, and it is of primary importance that the fuel remains appropriate and powerful for use throughout this time. Fuel (mainly diesel) is potentially prone to peroxide. Prolonged storage creates in addition to aging fuel, sediments that can cause oxidation, blockage of the filter, affecting the functionality of the vehicle.

Special stabilizers, are used to stabilize the quality of the fuel for long periods of time and prevent the so-called aging (gradual weakening), prevent sediment formation, and guarantee a safe and powerful fuel after a long time.

The stabilizers are particularly useful for long-term storage tanks. While for the aftermarket are particularly useful for long term paver engines, such as marine, military and seasonal vehicles in general.

Cleanser - Preventing-removing deposits

They are designed to clean and maintain a clean fuel storage and fueling system, from the tank to the combustion chamber. They act both to prevent deposition, especially in sensitive areas (nozzles, valves, etc.), and to removal of existing sediments. Special catalysts also assist optimal combustion, so that there is no unburned fuel that would result in unpleasant overflows.





Anti-oxidant and anti-corrosion inhibitors

Anti-oxidant and anti-corrosion inhibitors are some of the most important protective agents in both engine and fuel storage. They create a film that acts as a shield, on metallic surfaces, which prevents sulfur and moisture from reaching and reacting on the surface. They also provide protection for all metals that come in contact with the fuel both during the feed but also in the combustion chamber of the engine.

In addition to the engine's metals, they also effectively protect the metals of the fuel tank storage tanks of gas stations as well as the fuel tanks of the cars. Regular use is recommended for prevention.

VOULIS CHEMICALS produces the product:

Antirust suitable for benzine - diesel.

Dosage: 1 : 1,000 liters (gasoline - oil)



Valve protection

Valve protection additives create a thin protective layer on the surfaces of the seats and the valves. This absorbs part of the bumps, while preventing corrosion by avoiding metal contact with metal.

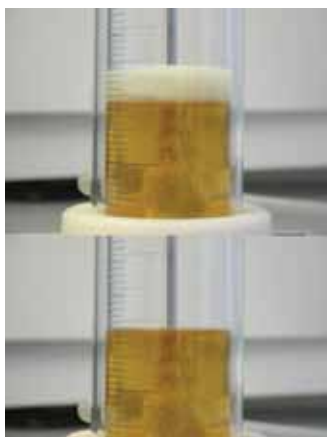
VOULIS CHEMICALS has developed and produce valve and seat protectors, that are used by old technology cars as a lead substitute. At the same time, it contains a packet of anti-oxidant and anti-corrosion inhibitors and combustion additives to prevent engine clutter. The product marketed in retail production and is:



Stop knocking (valve protector - lead substitute)

Packaging: 250 ml. With a dispenser

Dosage: 50 ml : 50 lit. gasoline



Antifoam (diesel)

Diesel has a natural tendency to entrain air and form a temporary foam, during refueling of the storage tanks or tank of the vehicle. Foaming is a special problem both in tank oil tanker unloading and tank filling of diesel-powered passenger cars, which use tanks of irregular shapes, and narrow supply pipes leading to premature fuel shutdown before fueling the fuel tank. This kind of annoying foaming can also lead to fuel splashing on the vehicle body or on the floor. None of these are desirable since fuel injection into a concrete floor is a safety hazard. Antifoam additives can effectively eliminate these problems. It should be inserted before filling with fuel to adequately mix and operate properly.

VOULIS CHEMICALS produces and distributes the product for this purpose.

Diesel antifoam

Packaging: 1 liter with dispenser

Dosage: 1 : 50,000 liters of oil. (100 ml : 5,000 liters).



Improvement Packages (concentrated enhancers)

Modern technology allows us to create packages of all the factors we want to improve.

So, **VOULIS CHEMICALS** has created packages with concentrated products that perform many actions. A packet product, for example, can simultaneously improve octanes or cetanes, have anti-corrosion and anti-oxidant inhibitors, protect the valves from both the seats and the valve kick, effectively clean the entire feed system, prevent and dissolve plating, stabilize the mixture, control foaming, etc.

The results of this simultaneous protection and improvement of the fuel by using the packages are directly visible to both the trader-store-distributor and the final-user.

These packs due to the fact that they are concentrated, and their dosages are measured in ppm (millionths) produced and sold mainly in the wholesale market and in large packages. Such packages are:

Benzine packet. Suitable for all types of gasoline.

Dosage: 1 : 1,000 liters of benzine.

Diesel packet. Suitable for all types of diesel. (without crucible sputter)

Dosage: 1 : 2,000 liters of oil

Bio-diesel packet. Suitable for all types of diesel. (with

Dosage: 1 : 2,000 liters of oil.

Burning packet. Suitable for heating oil burners - factory

Dosage: 1 : 1,000 liters of oil.

Mazout packet. Suitable for engines and heavy fuel oil burners.

Dosage: 1 : 1,000 liters of fuel oil.





Specialized improvement interventions

With instructions for use



The flow improvers - antifreeze (diesel)

For use at low temperatures. Medium distillate fuels typically contain 20-40% n-paraffins which have many desirable properties in diesel fuel. During cold weather, however, n-paraffins tend to produce significant amounts of wax crystals. As the temperature drops, the crystals grow and begin to adhere to each other, forming large lattices of crystals. Uncontrolled wax crystallization in the diesel fuel can cause vehicle functional problems, blockage of the fuel filter and throughout the feed system, eventually leading to power loss and possible engine shutdown. The use of low temperature flow improvers prevents these problems. This can be achieved by preventing the formation of paraffin crystals contained in diesel, effectively acting at paraffin cohesion point (CFPP) and flow point (PP).

Of course, here we would like to emphasize that crystals, even early ones (at 0°C), are also created by moisture or even water that may be contained in diesel and which are not covered by the oil flow enhancer. Therefore it is good to take care of the quality and water tightness of our storage or tank.

VOULIS CHEMICALS produces and distributes the product for this purpose.

Winterflow (flow enhancer, diesel antifreeze - protection up to -27°C)

Dosage: 1 lit. : 1.000 lit. Diesel.

Moisture in fuel

A major problem is encountered in fuel storage areas when we need to protect them from moisture and water intake. Whether due to inadequate maintenance or tank filling, either due to moisture, or due to temperature difference, or moisture generated in the upper tank void and then transferred to the lower layers as a heavier material, or for any other reason, it is a major storage problem. The same is also a fact for the fuel tanks of cars, either because moisture has been created from incorrect use, or because the problem has been transferred from other exogenous factors. Techniques to solve the problem are two.

- The de-emulsification of water from the fuel
- Emulsifying the fuel with water

Two materials were developed to achieve these two methods.

1. The de-emulsifier. It is a complex mixture with properties that allow it to penetrate to the light fuel-water molecules where it acts as a separator. Water is released from oil, and heavier as it is, stays down (it is very difficult to be separated by itself because the amount of water is very small and the oil molecule as it is hygroscopic retains it as an emulsion). Water should be chemically separated completely, accumulated down to a separate layer, and then it is easy to be removed mechanically from the tank. In benzine, the above procedure is easier because its lighter molecule retains moisture, but less intervention is needed to quickly push it into separation and formation of the bottom layer of heavier water.

2. The emulsifier. It has been configured to keep the moisture in emulsion evenly throughout the fuel and in fine particles so that the moisture passes relatively innocuously through the fuel delivery system where it evaporates in the combustion chambers of the engine and is released as vapor. Emulsifiers are based on hydrogen bonding to keep water in emulsion. When a fuel is mixed with water, it acts as a coupling agent and encapsulates the two together in a homogeneous mixture. In addition, emulsifiers also have surfactant properties that reduce the surface tension between the dissimilar molecules of fuel and water, and making the mixture of the two again, somewhat more homogeneous and stable. The result is that water molecules are uniformly dispersed throughout the fuel, in nanoscale particles.

Operation of the two methods in practice

In order to choose correctly which method, we should follow, we must first take into account the following:

- In all cases the most efficient method for obtaining pure fuel is de-emulsification and then the pumping of the lower water layer.
- We can escape many such problems if we adhere properly to the rules of storage, unloading, tank insulation, and meticulous control of the fuels we take.
- Refinery fuels are absolutely safe because they are produced with specifications that do not allow any kind of contamination, including moisture contamination. The problem arises after the refineries due to many factors including: quality of transport tanks, ambient temperature, pumping and pumping mode, storage tank status, malicious actions, etc.
- **The preventive and continuous use of emulsifying or de-emulsifying materials provides a further guarantee for fuels without water and moisture.**



- Water is considered to be a quantity of about 0.5% or more in diesel and 0.2% or more in benzine. Below these indications, is moisture.
- A good emulsifier and de-emulsifier should definitely contain anti-rust and anti-corrosion inhibitors to protect the metals that will come in contact with both moisture and water. Both make a great deal of damage to the metals of both tanks and reservoirs as well as to the fueling and combustion systems of the vehicles.
- Both **VOULIS** emulsifiers and de-emulsifiers contain powerful antioxidant and anti-corrosion inhibitors as well as additional quality stabilizers in order to protect the fuel quality from long storage and alteration by other impurities.

De-emulsification - how it happens:

In large quantities of diesel and benzine tanks.

De-emulsification is indicated when the tank is large and the fuel too and stagnant. Then we distinguish chemically, water from the fuel, create a lower layer of heavier water, and then pump it in mechanical ways.

In diesel tanks we need more time and more material, while in benzine tanks less material and time.

For preventive use in order to immediately distinguish the few moistures accumulated each time, we add to each filling (a less quantity of course) de-emulsifier so that we always have clean fuel, and in the long run when enough water accumulates in the lower layer we will need to make a total pumping.

For too much water it will require intense emulsification. We add a quantity of the material according to instructions. For the method of de-emulsification, a general rule is that we need double the amount of material and time for diesel than for benzine.

In diesel / benzine fuel tanks (small quantities).

This method can also be applied to the reservoir of the diesel vehicle that has been admitted with water, provided that the de-emulsifier can act for some time (approximately one hour) with the vehicle stationary and then open the reservoir plugs and run the lower water layer until clean diesel comes out. The same for benzine but in much less time. If we do not have the time for this procedure, then as the car will be on the move we have to go through the emulsification process.

Emulsifying - how it happens:

Large diesel and benzine tanks (large quantities).

For moisture intake rather than water in large multi-liter tanks, with stagnant diesel or benzine fuel, we use this method and emulsify, that is, we incorporate the water molecule with the fuel molecule equally throughout the entire quantity until all the fuel is used. Attention, however, we are referring here only to the humidity and not to large quantities of water that have entered the fuel. Large quantities of water in stagnant fuel should be de-

emulsified.

For preventive use in order to integrate moisture water molecules, always we recommend using it in every tank filling according to the instructions, so as to prevent accumulation of long-term moisture and a large amount of water.

In diesel / benzine vehicle reservoirs (small quantities).

For diesel or benzine reservoirs that got moisture and water and want to move rather than wait for the precipitation, the emulsification method is appropriate. In this case, due to the vibration of the movement, the fuel is constantly stirred and blended with water. The emulsifier helps it merge evenly until the dirty fuel is finished and the tank is filled with a new and safe one.

For this purpose, **VOULIS CHEMICALS** has developed the following products:

Emulsifier Packet suitable for diesel and benzine.

(stabilizer emulsifier and anti-corrosion - anti-oxidant additives)

For preventive use

Dosage: 1 : 2,000 liters of benzine

Dosage: 0.5 : 2,000 liters of diesel

For intense emulsification

Dosage: 1 : 1,000 liters minimum for benzine

Dosage: 0.5 : 1,000 liters minimum for diesel

D-emulsifier Packet suitable for diesel and benzine.

de-emulsifier with stabilizer and anti-corrosion - antioxidant additives.

For preventive use

Dosage: 1 : 3,000 liters of diesel

Dosage: 0.5 : 3,000 liters of benzine

For strong de-emulsification

Dosage: 2 : 1,500 liters minimum for diesel

Dosage: 1 : 1,500 liters minimum for benzine.



petrodiesel + biodiesel - fungicide

European Directive 2009/30 and EN 590: 2009 require diesel in Europe to contain biodiesel 7% the so-called B7 fuel. There is already a tendency for European debates to increase in the future to 20%.

Biodiesel (FAME: fatty acid methyl ester, is produced from vegetable oils from corn, sorghum, soybeans, etc.), animal fats, various other energy crops,



algae, and a variety of recycled edible oils. Biodiesel belongs to the large family of renewable fuels and is the best known and widespread of biofuels. Its normal use is diesel fuel, because its chemical composition is similar to that of mineral oil, that is, diesel fuel derived from the refining of crude oil and now internationally established under the name petrodiesel to stand out in one word from biodiesel. Biodiesel is produced throughout Europe in accordance with the European Standard EN14214.



The problem of the fungus in diesel.

The fungus is a living microorganism that needs moisture and food to grow, because it is nourished and eliminated as a living organism. In diesel, there is always a small amount of moisture, especially in storage areas, and especially when it is stored for a long time and the problem is even higher when the temperature is high. If the storage is poor and retains enough moisture, then the environment favors even more the growth of fungi.

The addition of biodiesel enhances the formation of fungi because it favors their food environment. When all of these fungal wastes occurs, they are transformed into a gel form (gelatinized), known as fungicide, and spread at double the rate across storage, resulting in very rapid blocking of exits and filters and consequently stopping the diesel circulation. When it happens, the best solution is manual cleaning of the tank, diodes, filters etc.

In order to avoid this situation, **VOULIS CHEMICALS** developed two excellent products that if used according to the instructions, the problem is effectively solved.

Product 1. **Biosolve**. This has the ability of dissolving the gel that fungal waste produces, without affecting the fungus. It also contains anti-corrosion and antioxidant additives, while protecting the entire circuit, storage, flow, feed, from rust and corrosion, which is another major threat.

Product 2. **Biopet**. This drastically reduces the fungal colony that produces the waste, resulting in a drastic reduction of its waste.

Instructions for use - general remarks

- None of the two products can make a perfect job by itself. The full result will come only in the right synergy of the two products.
- Always pour the product first in the tanks or in the fuel tank and then the fuel, because it is necessary to mix the entire quantity correctly.



For diesel storage tanks we use:

Biosolve (to dissolve fungus)

Dosage for prevention: 1 liter : 2,000 liters of diesel.

Dose for severe blockage (shock): 10 liters : 2,000 liters of diesel.

And at the same time

Biopet (to reduce fungus)

Dosage for prevention: 1 liter : 6,000 liters of diesel.

Dose for severe reduction: 10 liters : 6,000 liters of diesel.

Blocked vehicles from fungicide (useful instructions)

The safest thing to do is to always use precautionally and regularly according to these instructions the above products. If this did not happen and we have blocked the tank and the car's power system, we need to follow the steps below.

Step 1: Clean the diesel filter and reposition it.

Step 2: If you can start the engine, do it and leave it for a while so that the material is released throughout the system. Then turn off the engine and let the material act for a while (about 10 - 20 minutes). Then start the engine again and watch it until it returns to its proper operation.

Step 3: If you cannot start the engine, let the material act for about 30 minutes and then do regular attempts to start it (every five minutes). If after 2 or 3 attempts it does not start, it means that the blocking is very strong, so we should visit a workshop to clear the whole system.

Step 4: When the whole system has been unlocked and the engine returns to its proper operation, then clean and re-install the filter or even better place a new one.

For reservoirs of diesel fuel vehicles, we use:

Biosolve (for fungal dissolve)

Packaging: 250 ml and 1 liter with a dispenser

Dosage for preventive use: 50ml : 100lit diesel.

Dosage for severe obstruction: 500 ml :100 lit. diesel.

And at the same time

Biopet (to reduce fungus)

Packaging: 250 ml and 1 liter with a dispenser

Dosage for preventive use: 50 ml : 200 - 300 liters of diesel.

Dose for intense reduction: 500 ml : 100 lit. diesel.





Racing fuels and enhancers

Studies and years of experience have made **VOULIS CHEMICALS** a productive company of improvements and fuel enhancers for racing cars with particularly high demands but also high performances.

In the international racing scene of cars and motorcycles there are regular races, speed, skill, upholstery, etc. These games are divided into two categories:

1. In official international races where cars and drivers will have to comply in accordance with the international regulations created and controlled by the international federations, while at the same time counting races, cars - motorcycles and drivers in international rankings.

Those regulations are described in detail in the relevant regulatory circulars such as **FIA Appendix J** and are organized and controlled accordingly. In these cases, there are specific prescriptions for the racing vehicles and motorcycles that are defined by the regulation **Article 252 / Art 9**.

2. In the unofficial games organized by local clubs or other organizers, where it is not necessary to observe these international regulations, but the regulations of the organizers. These races have many times demanding performance requirements for motor racing and motorcycle fans.

VOULIS CHEMICALS developed after years of studies and tests, products that meet both above requirements. Improved fuel that gives strong torque and powerful dynamometer values, both inside and outside of the APEX specifications. While VOULIS CHEMICALS also created an octane enhancer specially for racing cars, that provides riders with the highest performance.

These products are offered in user-friendly packaging and are the ones listed below:

- **Standard.** improved fuel according to FIA Appendix J, Article 252 /Art9.

Dosage: Used it solid • Packaging: 5 liters with special filling funnel.

- **Ropi.** Improved fuel for high performance

Dosage: Used it solid. • Packaging: 5 liters with filling funnel.

- **Octane.** Octane enhancer for high performances

Dosage: 500 ml : 50 liters of petrol. • Packaging: 500 ml in carton of 10 pieces.

Le carburant doit répondre aux spécifications suivantes. The fuel must comply with the following specifications.

Propriété - Property	Unités - Units	Min.	Max.	Méthodes de test - Test methods
RON		95.0 ¹⁾	102.0 ²⁾	ISO 5164 ASTM D2699
MON		85.0 ¹⁾	90.0 ²⁾	ISO 5163 ASTM D2709
Densité - Density (à +15°C)	kg/m ³	720.0	785.0	ISO 12185 ASTM D4052
Oxygène - Oxygen	% m/m		3.7	EN ISO 22854 / EN 13332 ²⁾ Analyse élémentaire - Elemental Analysis ASTM D5622
Azote - Nitrogen	mg/kg		3000 ¹⁾	ASTM D4629 ASTM D5762
Soufre - Sulfur	mg/kg		10	ISO 20846 ²⁾ ASTM D5613
Ploomb - Lead	mg/l		5	EN 237 ASTM D3227 00 - 01 02 - 03
Manganèse - Manganese	mg/l		3.0	ASTM D1633 00 - 01 ICP-OES EN 15134
Benzène - Benzene	% v/v		1.00	ISO 12177 ASTM D5583 ISO 22854 ASTM D6819 EN 238
Oléfines - Olefins	% v/v		18.0	ISO 22854 ASTM D6819
Aromatiques - Aromatics	% v/v		35.0	ISO 22854 ASTM D6819
Total de di-oléfines Total di-olefins	% m/m		1.0	GC-MS 00 - 01 HPLC
Stabilité à l'oxydation Oxidation Stability	minutes	350		ISO 7536 ASTM D525
CVPE	kPa		80 ¹⁾	ISO 13016-1 ASTM D4553 ASTM D5191 ²⁾
Caractéristiques de distillation - Distillation characteristics				
A - At 100°C	% v/v	20.0	57.0	ISO 3405/ASTM D86
A - At 110°C	% v/v	46.0	72.0	ISO 3405 ASTM D86
A - At 150°C	% v/v	75.0		ISO 3405 ASTM D86
Point d'ébullition final Final boiling point	°C		210	ISO 3405 ASTM D86
Résidu - Residue	% v/v		3.0	ISO 3405 ASTM D86



Voulis
DPF cleaner
kitfluid
 DPF - Diesel Particulate Filter cleaner
 Καθαριστικό φίλτρου σωματιδίων αβόλης

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 URL: www.voulis.com MADE IN THE U.S.A.

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CONTAINS 5 L

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DPF filter, smoke particles, diesel

The European specification (from Euro 5 and later) for diesel vehicles pollutant emissions greatly restrict smoke emissions that are particulate combustion residues. The amount of soot produced as a solid residue varies:

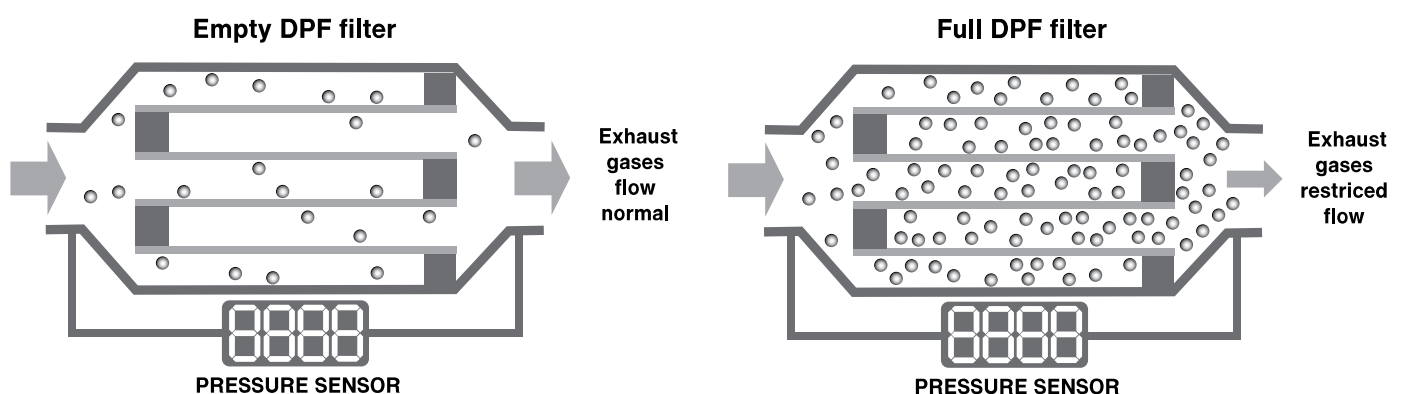
- Depending on the quality of diesel, (biodiesel greatly increases carbon residues)
- Engine oil (more suitable are low smoke)
- The average speed a car is driven (in or out of town)
- The normal wear and tear of the engine and its components

In EURO 5 and later common-rail engines, automakers place a smoke particle filter, which for the sake of brevity has established a name as the diesel particulate filter (DPF) to block the soot particles.



DPF filters have the property of retaining the soot particles while leaving the other gases to exit.

As with all filters, however, at some point they clog due to the particle accumulation, and it will be necessary to empty the retention cells in order to retrieve their properties. Several models have a differential pressure sensor, where they measure the exhaust gas pressure on the filter as opposed to the exhaust pressure exerted by the filter, in order to directly have the particle charge information on the filter, to initiate a warning with a special bulb to decongest the filter.



For the regeneration of filter renewal there are three main methods except replacement.

- **Passive regeneration:** This occurs during the route of the car on a



highway to achieve an increase in the temperature of the exhaust to burn the soot (Smoke burns to over 600°C). A temperature that cannot be achieved at low speeds of a car moving within a city. The Increase of the exhaust temperature is also achieved by the help of an oxidizing catalyst that several cars have placed.

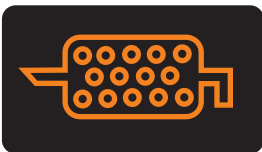
- **Active regeneration:** Cars with a differential pressure sensor, once they recognize a soot on the filter (around 45%), automatically trigger fuel injection time adjustments so that the exhaust fumes are fed into the filter in a higher temperature and burning the soot.

- **Forced regeneration:** When despite the passive regeneration attempt, the DPF fault light comes on, the system enters limp mode. When this happens, we should immediately go to a specialized garage where with the use of a diagnostic device proceed to forced regeneration.



What if I ignore the DPF fault light

Then the regeneration becomes quite difficult to impossible, and the only solution will now be cleaning by a specialized machine or direct replacement of the DPF



How does VOULIS CHEMICALS intervenes?

Here it was necessary to study a chemical material that incorporates in the fuel suitable combustion catalysts that raise the temperature in the DPF filter so that the soot microparticles burn. These are burned at around 600°C.

So **VOULIS CHEMICALS** developed the **DPF cleaner** in two types of packaging for the following reasons.

PSA diesel engines (Peugeot - Citroen) and other manufacturers, such as some Ford - Volvo and others, have a built - in automatic fuel injection system next to the tank, for fast, repetitive and regular regeneration. There is a separate KIT container that communicates with the tank, while a sensor instructs when and how much material to inject into the fuel.

In these types of engines, we use the KITFLUID type of DPF cleaner in large packs, as the refilling of the KIT material is obligatory done in the workshop. We also use it in the case of forced regeneration as it should be handled by an expert technician with special machinery.

The rest of the models that do not have a KIT should be handled by each driver and added to the fuel, a quantity of DPF cleaner to assist in raising the desired soot burning temperature before filling the filter and thus clean the filter up at intervals, when smoke quantities are still small and recent.

For this reason, it was packaged in a 250 ml bottle which is sufficient for precautionary use for 300 liters of diesel so that the individual driver puts about 50 ml of DPF cleaner in each 60 liters of diesel.

In case the DPF filter light turns on, then follow these steps:

1. multiply the amount of DPF cleaner (we pour the whole bottle (250ml) and first push the engine in passive regeneration.) Driving for about 30-40 minutes at a speed of about 60 km / h. Depending on the charge of the filter, it may be necessary to add a second bottle of DPF cleaner. After 50-100 Km the lamp must be turned off. If the lamp reappears quickly or is still on,

2. We are visiting a specialist garage with a diagnostic device in order to carry out forced regeneration, by assisting the DPF cleaner, but by the expert hands and machinery of the specialist. If the indicator lamp is not switched off once again and after making sure that the differential pressure sensor is not damaged, then the technician proceeds either:

- Disassembly of the filter and cleaning with the specialized VOULIS flushing products (according to the instructions we achieve 100% cleaning), or
- Not disassemble and clean with VOULIS DPF fast cleaning (the disassembly method is quick but not 100% effective)
- If filter blocking is now so powerful, and even with disassembly and cleaning cannot return to normal, the filter change remains the last solution.

VOULIS CHEMICALS has the following materials in the following packages:

DPF cleaner type KITFLUID

Packaging: 1 liter and 5 liters.

Dosage: Depending on the sensor setting

DPF cleaner

Packaging: 250 ml

For preventive use

Dosage: 250 ml : 300 liters of diesel.

For passive regeneration

Dosage: 250 - 500 ml : 100 lit. diesel.





LPG and CNG natural gas

LPG as a fuel in internal combustion engines is facing rapid growth. However, technology should be developed at the same time to assist in the correct and safe operation of the engine by the fact that LPG in the combustion chamber behaves differently than benzine or diesel.

During injection and ignition, the temperature at the top of the cylinder is high enough, while the strain during the valve shut-off is strong.

Benzine, as a molecular structure and the additives it contains have a satisfactory heat dissipation potential, and special additives that create film between seats and valves, absorbing vibrations.

Unlike benzine, LPG is extremely hot (94MJ / m³ or 26.1KWh / m³), it has a dry burning and low heat dissipation and does not provide the necessary anti-vibration film on the seats and valves.

How does VOULIS CHEMICALS intervenes?

VOULIS CHEMICALS in collaboration with large reliable fuel efficiency companies, has developed a family of products that meet all the above-mentioned needs of a proper LPG with various methods and are the following:

With a special KIT spraying additive in the combustion chamber

With this method, we spray a special conditioning liquid (0.001%) in the combustion chamber, which is regulated by the skilled craftsmen, through a special KIT they place. This enhancer has an oil texture and contains additives that:



- efficiently remove heat,
- clean the feed and infusion system from deposits,
- provide the required protection and absorption film of the valves on the seats.

Some call it **refrigerant**, a designation that describes only the heat dissipation property and not the other two, namely the cleaning and the creation of a protective film.

For this case **VOULIS CHEMICALS** has a product in two qualities.

Valver super quality

Packaging: 1 liter and 500 ml.

Dosage: 100 ml : 100 lit (0.001%)

Valver premium

Packaging: 1 lit. and 500ml.

Dosage: 100 ml : 100 lit (0.001%)



Note: The product is fully compatible and in mixing with benzine (available through a special spout) to raise both properties in high levels (heat dissipation and film formation on the valves).

With a special spray a blend of LPG with an additive

Many technicians place LPG without any other precaution, except perhaps from starting using benzine. At this point, we would like to point out that the disadvantages of the LPG combustion, that we have mentioned above, remain, but because the results of the damage are not immediate, they will certainly emerge at some point. For these cases, a spray method was developed, whereby a special nozzle is fitted into the spout of the LPG filling tank (when it contains a small amount of LPG and before filling) and the spray is injected into the material. This material has the following properties:

- purifies the entire LPG storage and supply circuit from humidity and deposits
- carrying into the combustion chamber an additive that creates protective film on the valves and seats,
- it cannot offer satisfactory heat dissipation.

For this purpose, **VOULIS CHEMICALS** studied and produced in the form of a spray with a special application tube in the LPG or CNG tank cap the product

PROGAS spray

Packaging: 120 ml in spray.

Dosage: 100 - 120 ml : 50 - 60 liters of LPG.

Frequency:

For cleaning: per 10,000 km

For protective film: every filling of the tank.

Hybrid Combustion LPG / benzine

Many technicians develop a mixed system where, with appropriate adjustments, at regular intervals, is injected together with LPG and benzine at the same time, or in other cases pure benzine for a certain period of time, in order for the additives contained in the benzine to evacuate the generated heat and deposit, anti-vibration film.

However, because in the above cases the benzine ratio is low, a special benzene additive has been developed which ensures the following properties:

- clean the entire benzine feed system in order to achieve optimum performance and
- enrich benzine with an additional additive, which serves as an octane enhancer - combustion normalization - engine shielding, and
- valve improver to eliminate the risk of tumbling the valves by adding an





anti-vibration film when benzine is running or by storing an appropriate amount for the pause periods.

For this purpose, **VOULIS CHEMICALS** developed the product **Hybrid probenz**

Suitable for hybrid system of benzine and LPG or CNG combustion systems.

Packaging: 250 ml

Dosage: 250 ml : 75 lit. benzine.

Note: In this case of hybrid combustion, it would be beneficial at regular intervals to use the **Hybrid Probenz** in the LPG, in the same time with the special **Progas** spray in the gas tank for its good cleaning properties from moisture and sedimentation.

LPG for diesel engines

Diesel engines have a different way of installation and operation. Here we do not replace oil with LPG as in benzine, but in fact we have at the same time spraying about 85-90% of diesel and 10-15% of LPG. However, since this mix offers drastically better and cleaner combustion, with a high optimum performance value, the results are spectacular. B.C.

- economy 20-25%;
- drastic reduction of particulates and oxides of nitrogen in old technology cars,
- impressively fewer deposits with all the consequences (lowering maintenance costs - optimal performance - long-term proper operation).

In this case, we need an additive that comes into the diesel tank to:

- clean all storage, fueling and spraying systems and protect them from flooding, to achieve optimal performance while at the same time
- any dryness observed in combustion and possibly causing valve rattling to be efficiently improved.



For this purpose, **VOULIS CHEMICALS** developed the product

Hybride prodiesel

Suitable for hybrid diesel engines with LPG or CNG.

Packaging: 250 ml

Dosage: 250 ml : 100 liters of diesel.

Note: In this case of hybrid combustion, it would be beneficial at regular intervals to use the Hybride prodiesel in LPG, the special Progas spray in the

gas tank, for its good cleaning properties from moisture and sedimentation.

CNG - natural gas

Compressed natural gas supply stations have been set up in several countries. While LPG (Liquefied Petroleum Gas) is predominantly propane and butane, natural gas (CNG) is mainly methane and ethane.

Its main advantages are that it is basically cheaper and cleaner. The main disadvantages are that it has a lower calorific value (38MJ / m³ or 10.6KWH / m³). Larger storage of LPG is also needed.

Note: All of the above products of VOULIS CHEMICALS for use in LPG, are fully compatible with combustion of natural gas (CNG) in the same proportions.





2 stroke engines

A two-stroke engine is a type of internal combustion engine that completes a power cycle with two strokes (up and down movements) of the piston during a single rotation of the crankshaft. This contrasts with a four-stroke 4 stroke engine, which requires four piston strokes to complete a power cycle during two cranks. In a two-stroke engine, the end of the combustion stroke and the start of the compression stroke occur simultaneously, and the import and output functions simultaneously.

All of this technology enables the two-stroke engine to get rid of many metal parts that are needed in a four-stroke engine and make it so light. This in turn is an asset in cases where we need lightweight machines. Small cubic cycles, chainsaws, small outboard, mowers, and other machines and tools that apply low weight machines use 2 stoke two-stroke engines.



These engines do not have a sump to store and pump oil for lubrication, so the lubricating oil is mixed with the fuel. Previously, the fuel stations had a special pump with a ready-made fuel-oil mixture. Two-stroke oils released worldwide since the 1970's are specially formulated to blend in with gasoline and burn in the combustion chamber without leaving unburned oils or smoke. Nowadays, in many machines there is a special KIT that enters the oil, and with automatic pre - mixing it is fed into the fuel. Technology is referred to as **auto-lube**. Of course, as technology advances, special specifications have been made for all these uses to create oil for blending with fuel that will lubricate properly and protect the environment.



VOULIS CHEMICALS produces the following lubricants for two-stroke engines.

MIX 2T (red) Covers JASO FB / ISO-L-EGB specifications.

Wholesale packaging: 10 liters

Retail package: 1 liter with dispenser - and bottle of 200 ml and 100 ml.

Ratio: 2%

MIX 2T plus (blue): Covers specifications:

API TC / JASO FD / ISO-L-EGB / JASO FC / PIAGGIO HEXAGON.

Wholesale packaging: 10 liters

Retail package: 1 liter with dispenser - and 200 ml bottle.

Ratio: 2%

JET (blue): Covers NMMA / TC-W3 specifications.

Suitable for outboard motorboats and jet ski

Wholesale packaging: 10 liters

Retail package: 1 liter with dispenser - and 200 ml bottle.

Ratio: 2%





One use retail market fuel improvers

Packing: dose per tank.

For the retail market, in order the final consumer not to make dosage calculations, **VOULIS CHEMICALS** has established packing should be in a dose per tank, and one use.

- For gasoline cars, it is mainly estimated at 60 - 70 liters.
- For diesel cars mainly in 100 liters.

Available for retail sale at:

- Stations for liquid fuels.
- Car-Motorcycle-Boat Workshops, etc.
- Stores with car accessories.



These products are compatible with all types of gasoline and diesel and are as follows:

For gasoline engines

(suitable for conventional, common rail and hybrid petrol engines)

Multi benzine packet

Micro ceramic technology (suitable for conventional, common rail and hybrid gasoline engines)

Contains: a full pack of fine gasoline

Packaging: 250 ml

Dosage: 250 ml : 70 liters of gasoline



Benzine clean

Contains: scrub cleaner, anti-oxidant - anti-corrosion pack

Packaging: 250 ml

Dosage: 250 ml : 70 liters of gasoline



Benzine treatment (up to 2 RON)

Contains: octane improver, scrub cleaner, anti-oxidant-anti-corrosion pack

Packaging: 250 ml

Dosage: 250 ml : 70 liters of petrol



Octane (up to 8 more RON - for racing cars)

Contains: a specially designed octane improver and a full pack of gasoline improvers

Packaging: 500 ml

Dosage: 500 ml : 50 liters of petrol



Extra moto

(for motorcycles regardless of cubic capacity)

Contains: a complete package specially designed for motorcycle gasoline engines

Packaging: 250 ml

Dosage: 250 ml : 70 liters of petrol



Extra outboard

Contains: a complete package specially designed for outboard gasoline engines in sea conditions

Packaging: 250 ml

Dosage: 250 ml : 70 liters of gasoline





For diesel engines

(suitable for conventional, common rail and hybrid diesel engines)



Multi diesel packet

Micro ceramic technology

Contains: a full pack of oil improvers

Packaging: 250 ml & 1 lit

Dosage: 250ml : 100l of diesel



Diesel clean

Contains: scrub cleaner, anti-oxidant - anti-corrosion pack

Packaging: 250 ml

Dosage: 250ml : 100 lit of diesel



Diesel treatment (up to 2 cetanes)

Contains: cetane enhancer, glidant cleaner,
anti-oxidant - anti-corrosion pack

Packaging: 250 ml

Dosage: 250ml : 100 lit of diesel

Various specialized products

DPF cleaner

(to clean DPF microplate filters)

Packaging: 250 ml & 1 lit

Dose for preventive use: 250ml : 300lit diesel

Dosage for passive and energetic regeneration: 250 - 500 ml : 100 lit. diesel



Biosolve

(for fungal digestion)

Packaging: 250 ml

Dosage for preventive use: 50ml : 100lit diesel

Dose for severe occlusion: 500 ml : 100 lit. diesel



Biopet

(to reduce fungus)

Packaging: 250 ml

Dosage for preventive use: 50 ml : 200 - 300 liters of diesel

Dose for severe reduction (shock): 500 ml : 100 lit. diesel



Winterflow

(Oil Improvement - Provides protection up to - 27° C.)

Packaging: 250 ml and 1 liter

Dosage: 250 ml : 250 liter diesel - (1 liter : 1,000 lit)



Fuel emulsifier

(fuel and water emulsifier for gasoline and diesel)

Contains: emulsifier, anti-oxidant and anti-corrosion inhibitors

Packaging: 250 ml and 1 liter

Gasoline dose, precautionary use: about 50 ml : 50 liters of gasoline

Dosing gasoline: 250 ml : 50 lit. gasoline. (1 liter : 200 lit)

Oil dosage preventive use: about 50 ml : 100 liters of diesel

Dosing diesel: 250 ml : 100 lit. oil. or (1 liter : 400 lit)



