RENTAR
Environmental Solutions, Inc.
MANUFACTURER OF THE RENTAR FUEL CATALYST

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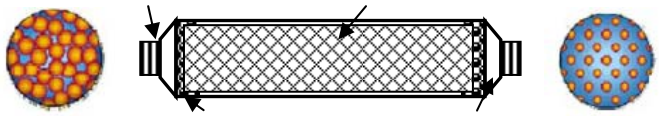
The Science Of The Rentar Technology

The Rentar Fuel Catalyst consists of an encapsulated epoxy matrix of proprietary catalytic components. The combined contact catalyst preconditions the fuel before entering the combustion chamber to form an activated complex in the classical sense with lowered activation energy such that more fuel molecules react to form a fuel mixture consisting of a ratio of fuel species of aliphatic to aromatics that has improved combustion

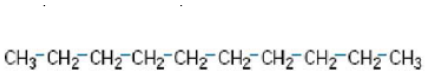
The science behind the Rentar Technology is based on creating a more complete burn by using a number of well documented processes, occurring simultaneously, and leading to a lower fuel vapor density. The Rentar Fuel Catalyst is an in-line pre-combustion heterogeneous or contact catalyst that conditions diesel fuel through a series of complementary processes.

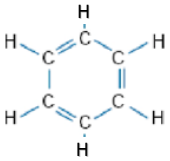
The Rentar Technology uses a number of mechanisms to stimulate a more complete burn. Reactions take place as fuel passes through the Rentar Fuel Catalyst's proprietary patented combination of metals and rare earth elements prior to combustion.



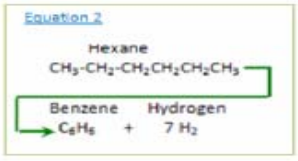
The Rentar technology causes clustered fuel molecules to temporarily repulse each other resulting in more surface area of the fuel molecules being exposed to oxygen at the point of combustion. Other studies document how the Rentar technology causes "Aromatics" to form, which creates Hydrogen Gas, which works with the Oxygen at the point of combustion to interact or better surround the "dispersed" fuel molecules to achieve a more complete combustion. Separating the fuel molecules allows Oxygen and H2 to better surround the dispersed molecules. The turbulence caused by the Rentar Fuel Catalyst enhances the above described reactions.

Hydrogen is released when the molecular structure changes from saturated to none saturated (aromatic). The resulting double bond provides an addition combustion source to the fuel.





CHEMICAL COMPLEX: As the fuel passes over the chemical complex of catalytic metals and rare earth elements, the fuel molecules form a classical activated chemical complex with a lowered activation energy which leads to some the fuel molecules to react as described in Equation 1.

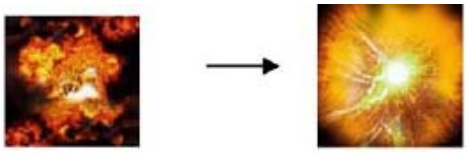


HYDROGEN RELEASE: The Rentar Fuel Catalyst causes a change in the ratio of aliphatic or paraffinic contents of the fuel to aromatics (i.e., saturated straight-chain to unsaturated ring compounds) which results in the release of hydrogen gas as shown as a sample illustration in Equation 2.

FUEL DENSITY: Fuel with more aromatics normally tend to have a higher" fuel density" which would tend to lead to producing less efficient combustion. However the mechanisms taking place within the Rentar Fuel Catalyst, including turbulent flow actually leads to a "lower fuel vapor" density.

LARGE SURFACE AREA: The interior of the Rentar Fuel Catalyst is configured to cause the fuel to flow through a circuitous path over a large surface area of proprietary metal mesh matrices which in turn leads to turbulent flow of the fuel. This in turn results in the fuel developing a lower vapor density. The turbulent flow and polarization due to the generation of the EMF leads to lower fuel density which in turn leads to more efficient surrounding of the dispersed molecules with oxygen and hydrogen which leads to improved combustion.

LOWER FUEL VAPOR DENSITY: The Rentar technology lowers the fuel vapor density as a result of small amounts of moisture that exist within diesel fuel which helps to create a galvanic effect which is created between the different metals in the Rentar Fuel Catalyst. This galvanic effect of EMF in turn causes polarization of the fuel droplets. The polarized fuel droplets "repulse" each other, which again lowers the vapor fuel density. Lower fuel vapor density provides for better exposure of the fuel molecules to the air resulting in a better combustion. In addition it leads to better exposure of the released hydrogen which again leads to better combustion. Better combustion leads to increased fuel economy as well as less residual emissions including green house gases and soot.



REDUCED NOx: Whereas better combustion usually requires high temperature, which leads to more NOx generation, the Rentar Fuel Catalyst causes lower combustion temperatures and thus decrease the formation of NOx.

The basic reaction that occurs in the post-catalytic fuel conditioning reaction is exhibited in Equation 3 where "n" represent aliphatic organic fractions of 9-17 carbon atoms and "R represent methyl groups. Similar oxidation occurs for the aromatics and polycyclic and polyaromatics. Accompanying the aromatic ring formation is the loss of H2 gas as a byproduct, which can significantly improve the combustion process. The dehydrogenation reactions are well known and documented as aliphatic convert polycyclic and polyaromatics.

$$R\text{-}(CH_2)\text{-}R + 0_2 + N_2 \longrightarrow CO_2 + CO + H_20 + NO_x$$

$$CO + NO_x \longrightarrow CO_2 + N_2$$

EQUATION 3

SOOT: Soot is the residues of unburned fuel composed mainly of amorphous carbon. Soot is a major component of smoke from combustion of carbon-rich organic fuels that combust with a lack of sufficient oxygen. Soot is carbon deposited from incomplete burning of hydrocarbons.

The production of soot in combustion is a complex process consisting of several chemical reactions taking place in series. In the fuel-pyrolysis zone the fuel molecules are broken down into various fragments, including carbon-ring structures, acetylene (C2H2), the radical C3H3 (and higher order), as well as monatomic and diatomic hydrogen. As the combustion process continues the radicals quickly combine into new structures, giving off heat. These precursors polymerize into larger "pre-soot" chains then gather into formations of hydrogen-rich spheres in the soot-inception zone. In the soot-growth zone these spheres give up their hydrogen gas through diffusion, resulting in solids consisting of several of the formerly liquid spheres stuck together into larger chains. Hydrogen-rich examples then further oxidize, releasing more heat. In perfect combustion the soot would break down into almost pure CO2 and H2O, it is only in incomplete combustion that the soot is able to form.

Unburned fuel is wasted horsepower or BTU's. Unburned fuel creates byproducts such as Particulate Matter, Greenhouse Gases, Volatile Organics, and Soot & Carbon being deposited inside the engine. One such Rentar technology mechanism is the "Electrostatic and Mechanical Dispersion and Fuel Properties Effect on Soot Propensity in Clusters of Drops". This mechanism is described in a report prepared by Jet Propulsion Laboratory, California Institute of Technology in Pasadena California.

The Rentar technology creates a more complete fuel burn, creates more power on less fuel, reduced particulate matter emission, reduced carbon and soot buildup in the engine and reduced greenhouse gas emission. As an example, for every 100 gallons of diesel fuel not consumed as a result of better fuel burn, 1 metric ton of CO2 Greenhouse Gas is not released in the atmosphere.