



CATALYTIC ACTION OF FTC

OVERVIEW

FTC is a combustion *catalyst*.

Although there is some documented evidence that the product may improve cetane ratings, the principal mechanism of the catalyst is to force the carbon monoxide gases formed during combustion to convert to carbon dioxide more rapidly, than otherwise. This catalytic action releases the available energy of the fuel in shorter time and improves the power delivered by each combustion cycle.

Fe⁺⁺ also reduces the tendency of the combustion process to saturate with CO a condition which would lead to the formation of soot and smoke products.

EXPLANATION

1. Hydrocarbon fuels release energy in a series of oxidation steps by which the original hydrocarbon molecule is broken down giving up energy in each step.
2. This oxidation process desires to convert all the hydrogen atoms in a hydrocarbon molecule into H₂O (water) and all the carbon atoms to CO₂.
3. In a combustion chamber the oxidation reactions proceed at explosive rates until all the HCs are converted to OH, H₂O and CO (carbon monoxide).
4. The oxidation of CO to CO₂ is a much slower, less explosive, reaction than the earlier stages of combustion. It requires OH (hydroxyl) molecules in the process to form intermediate compounds prior to the formation of the CO₂ end product.
5. In the presence of the ferrous ion (Fe⁺⁺) and oxygen however, carbon monoxide at elevated temperatures converts rapidly to CO₂ as a result of the unusual affinity of CO for ions of ferrous iron.
6. This affinity CO has for Fe⁺⁺ is 1000 times stronger than it has for oxygen. And as mentioned, CO will not even burn in O₂ without the presence of OH molecules. (The unusual affinity CO has for Fe⁺⁺ is forcefully demonstrated by the fact that blood haemoglobin, which has a Fe⁺⁺ ion, preferentially scavenges the lung for CO even when O₂ is available, causing intoxication and death even

at low CO levels).

7. Thus in the combustion chamber, the FTC ferrous ions react violently with CO to form an unstable intermediate compound, probably iron pentacarbonyl, which at the high temperatures reacts rapidly with oxygen to form CO₂ releasing the Fe⁺⁺ to repeat its catalytic role.
8. This accelerated reaction releases the energy from the conversion of CO → CO₂ much faster than otherwise, producing more power and preventing the soot forming process when CO otherwise saturates the combustion chamber before the completion of other hydrocarbon reactions.
9. It is worth noting that as diesel fuels are produced with more and more unhydrogenated "cracked" bottoms, the ratio of C to H increases. This means that engines must deal with increased proportions of CO and reduced available OH, causing more smoke and soot. Under these circumstances FTC is of greater benefit. (eg. is the case at high altitudes where oxygen levels are lower)

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