Health and Science Series

By

Gerald S. Linder, M. D., FACA

Number 8 December 14, 2004

OCTANE EFFECTS

ON PERFORMANCE & POCKETBOOK

Choosing the correct grade of gasoline to use in your particular vehicle is confusing to many drivers. When the selection is based on the gasoline octane rating, it is widely misunderstood. Using a higher octane gasoline than is needed in your vehicle will add 20 cents a gallon or more for the premium grade than regular, resulting in drivers spending **millions of dollars more than they need to each year**, without improving performance. (1).

If your vehicle **knocks or pings** when using the gasoline grade recommended for it, a higher octane level can eliminate this condition of premature ignition of the compressed fuel-air mixture in one or more cylinders. Heavy or persistent knocking can damage the engine.

Pinging was more common in older engines using carburetors to regulate air/gas mix. Too much fuel would be mixed with the air with the incompletely burned gasoline soaking into carbon deposits and causing premature ignition due to intense engine cylinder heat producing knocking or pinging. Substituting higher octane (**slower burning gasoline)** resisted the premature burn thus eliminating the knocking. **Octane is the resistance to burn or detonation.** (2).

Pinging is a function of engine temperature, timing, compression ratio and octane. If the engine does not overheat, the timing is not too far advanced and the compression ratio is not too high, then pinging will not occur and higher octane gas will not be necessary. Since the 1980's fuel injectors with computers accurately control engine air/fuel mix, based on using the recommended gasoline. When higher octane gasoline than the vehicle requires is used, the unburned fuel is sent into the emissions system and can collect in the catalytic converter. (3).

Higher octane gasoline doesn't clean the engine better than lower octane (regular) gasoline since they both by government regulation contain basically the same amount of additives to clean the injectors and valves. **Since all gasoline burns at the same rate, it is the additives which produce the different octane ratings.**

Octane number is the gasoline's resistance to knocking as it burns in the engine combustion chamber. Pinging or knocking occurs when part of the fuel/air mixture ignites spontaneously and burns very rapidly. This causes a sudden pressure rise resulting in a metallic knocking or pinging sound. Octane rating represents iso-octane (octane rating of 100) mixed with normal heptane (octane rating of 0). **Octane number determines how the fuel resists uncontrolled burning.**

AKI (anti-knock index), **the pump octane** is determined by averaging the **RON (research octane number) and the MON (motor octane number)**. RON measures gasoline's knock resistance under less severe conditions such as low to medium speed knock and engine run-on (dieseling) than the MON severe situations such as high speed, part throttle and performance (under load such as in passing).

Since the Fuel Fx reactors crack hydrocarbon chains into shorter hydrocarbon chains creating a more easily combustible fuel **with operating temperatures being reduced five to ten percent**, **installation of a Fuel Fx reactor allows the use of regular gasoline instead of high octane gasoline in high performance engines.** The reactor amounts to an onboard fuel cracker, re-refining the fuel while driving.

A few days ago I drove my '96 S-500 Mercedes on a 112 mile round trip which posed all traffic conditions from bumper-to-bumper traffic to wide open freeway driving. This was a good test of what I calculated was **88 octane in a car rated for 91 octane gasoline**. The auto performed splendidly as it has since I had a reactor installed about eight months ago. There was **no pinging at low, medium or high speeds. Another benefit added to the increase in fuel efficiency, horsepower, reduction in noise and vibration and lower emissions already noted with the reactor!**

REFERENCES

1. Federal Trade Commission, Facts for Consumers: *The low-down on high octane gasoline.* http://www.ftc.gov/bcp/conlin/pubs/autos/octane.htm, 2004.

2. Emmanuel, J.D.: *What octane rating of gasoline should I use?* http://theserviceadvisor.com/octane.htm, 1997.

3. Chemistry: *Before you buy gasoline or petrol.* http://chemistryabout.com/library/weekly/aabyb/00401.htm, 2004.