



Rockett Brand Racing Gasoline Glossary

Summary: Know What the Words Mean

- Aromatics:** This is a type of chemical compound referred to as a cyclic organic due to its circular structure. They are found in nearly all gasolines, normally as toluene. Xylene is less common, and benzene is restricted to very low levels due to toxicity.
- Color:** Most racing gasolines contain a dye for easy identification. If the color is “off”, contamination may exist.
- Detonation:** Also known as ping or spark knock, detonation takes place after the spark plug has fired and a portion of the air/fuel mixture has been consumed in the normal combustion process. As combustion progresses and octane quality is inadequate, the pressure and temperature in the combustion chamber increase to a point where the remaining unburned mixture is unstable. At that point, the remaining mixture self ignites, creating much higher pressure and temperature than would occur during normal combustion. The sound of detonation occurs when the peak cylinder pressure takes place too early in the cycle. This causes vibration in the cylinder walls, resulting in ring seal loss, and excessive piston rock. Detonation can also overload the pistons, rings, wrist pin bushings, and rod bearings. Some engine damage can occur when detonation is minimal, but severe detonation can cause major damage.
- Dielectric Constant:** The dielectric constant (DC) of a substance is a measure of the relative effectiveness of that substance as an electrical insulator. A dielectric meter measures the relative DC of a gasoline by measuring the difference in capacitance between a standard and the gasoline sample. DC numbers for leaded non-oxygenated gasoline usually fall in the range of 0.0 to -2.0. Unleaded gasolines containing an oxygenate usually fall in the range of +1.0 to +10.0.
- Distillation:** A gasoline contains various hydrocarbons that boil at different temperatures. As a result, the gasoline boiling range can extend from 80° F to a maximum of 437° F. This is in contrast to water that boils only at 212° F at sea level.
- Energy Value:** The measurement here is BTUs (British Thermal Units), a measurement of energy content. A typical measurement is in BTUs per pound of gasoline. This can also be converted to BTUs per gallon of gasoline. Heavier gasolines have higher BTU content, but that is not always best because heavy gasolines frequently burn slow and may have a significant amount of fuel still burning as the exhaust valve opens. Flame in the exhaust or unburned hydrocarbons coming out the exhaust pipe are lost energy and just got in the way of making horsepower.

Flame Speed:	<p>The standard laboratory test for flame speed is done in a long hollow glass tube where the flame can be seen and measured. This does not relate directly to the flame speed during the combustion process because combustion has far more variables than the standard lab test. The flame speed numbers published in the literature are a bit misleading because they ignore “real world” things like turbulence, combustion chamber shape, valve locations, valve angle, compression ratio, and engine RPM. Higher flame speeds are always better especially at high RPM where there is very little time for the combustion process to take place efficiently. High octane does not have to mean low flame speed like some of our competitors claim.</p>
Octane Numbers:	<p>Research Octane Number (RON) is measured under mild conditions and is most important in controlling part throttle knock.</p> <p>Motor Octane Number (MON) is measured under severe conditions and is most important for octane satisfaction at wide open throttle.</p> <p>Anti-Knock Index (AKI) is the average of the RON and MON. This is the number posted on the retail gasoline pumps normally indicating 87, 89, or 92 octane. Rockett Brand Racing gasolines have AKI’s from 100 to 118.</p>
Octane Requirement:	<p>Engine octane requirement is defined as the octane number of the gasoline needed to give repeatable borderline knock (barely audible to a trained rater) under the most severe operating conditions. The standard test for this was developed by the Coordinating Research Council (CRC) and is normally conducted on a chassis dynamometer, but some researchers have modified the procedure to make it usable on an engine dynamometer.</p>
Octane Requirement Increase (ORI):	<p>When an engine is new with clean combustion chambers, the Octane Requirement can be measured. As miles are accumulated on the engine, the octane requirement increases, then levels off between 15,000 and 20,000 miles. At this point, the OR is approximately five or six numbers higher than it was when the engine was new.</p>
Oxygenated Compounds:	<p>These are required in street gasoline in many areas of the U.S. to help reduce exhaust emissions. The two most common oxygenated compounds are Methyl Tertiary Butyl Ether (MTBE) and Ethanol (this is an alcohol).</p>

- Pre-Ignition:** This phenomenon is just as its name implies that it takes place before ignition of the air/fuel mixture would normally occur (that is, before the spark plug fires). This condition is caused by a hot spot in the combustion chamber. It could be a piece of carbon, a hot spot on the exhaust valve, or from heat generated in the previous combustion stroke. Pre-Ignition is very likely to be destructive due to the very high cylinder pressure that occurs before the piston has reached top dead center. This condition can damage or destroy pistons, rings, bearings, crankshafts, and head gaskets.
- Reid Vapor Pressure (RVP):** Normally measured in psi, RVP is a measure of the front end volatility of the gasoline at 100°F. This is important for getting a carbureted car started in cold weather. Summer RVP = 7 psi, and winter RVP = 13.5 psi.
- Specific Gravity:** Measures the density of gasoline compared to water. A specific gravity of 0.720 means that the gasoline weighs 0.72 times as much as water, or it is 72% of the weight of water. Most gasolines weigh about 6.2 pounds per gallon. Water weighs 8.34 pounds per gallon.
- Tetraethyl Lead (TEL):** TEL is an anti-knock compound that is used in some aviation gasolines and some racing gasolines. It is designed to increase the octane quality of the gasoline blend. TEL in gasoline is legal only for sanctioned off-highway events. It has been illegal to use in any street driven vehicle in all states in the United States since 1996.
- Volatility:** Used in referring to the ease with which a gasoline turns from a liquid to a vapor. Low volatility refers to low RVP, indicating less light hydrocarbons in the gasoline front end. Southern California summer grade gasolines have low volatility. Winter grade gasoline in Michigan is high volatility, or high RVP to make the engine easier to start in sub-zero temperatures.

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