Rockett Brand® Racing Fuel

Octane Number Confusion

Octane numbers can be very confusing due to different terminologies used in discussion. I will try to clear up some common misunderstandings and define some of the various terms used when discussing octane quality.

Octane

The octane quality of a gasoline is it's ability to resist detonation, a form of abnormal combustion. Detonation occurs when the air-fuel mixture reaches a temperature and/or pressure at which it can no longer keep from self igniting. Two types of abnormal combustion are common: the first is detonation as previously mentioned and the other is preignition.

Detonation occurs after the spark plug has ignited the air-fuel mixture and the flame front is moving through the combustion chamber. If, during this burning process, the unburned air-fuel mixture reaches a temperature and/or pressure at which it is no longer stable, it burns very rapidly causing a new flame front to collide with the one that originated at the spark plug. Maximum pressure in the cylinder occurs before the piston reaches Top Dead Center (TDC) and that pressure tries to push the piston down before it is ready to go down. Piston burning and rod bearing damage are the result as well as loss of power.

Preignition is the other bad actor and is usually started by a hot spot in the combustion chamber which causes the mixture to ignite before the spark plug fires. Under wide open throttle conditions, preignition will destroy pistons in seconds.

Research Octane Number (RON)

RON is determined in a single cylinder variable compression ratio engine that operates at 600 RPM with a 125° F inlet air temperature at standard barometric pressure. Spark advance is fixed at 13° BTDC. In a real world engine, RON is necessary to satisfy part throttle knock problems. A good quality racing gasoline has a RON in the range of 110 to 115. A high quality racing gasoline can have a RON in excess of 120 which is the top of the octane scale. The difference in the spread of RON is not very important to racing engines

The procedures and hardware for the RON test were originally developed in 1931. The hardware was revised in 1948 with procedural changes made until the late 1960s.

Motor Octane Number (MON)

MON is determined in a single cylinder engine similar to the RON engine with a few changes that make operating conditions more severe and therefore the octane numbers are lower. The MON engine runs at 900 RPM with a 300° F mixture temperature. Spark advance varies with compression ratio. In a real world engine, MON is necessary to satisfy octane demands at wide open throttle. This is a very important number for racing engines since they spend a high percentage of their lives under high speed and high load conditions. Racing engines cannot afford to be short on octane quality, since detonation or preignition will quickly reduce a racing engine to junk.

The Motor Octane Number (MON) appetite of an engine with 13:1 compression ratio and a four inch bore varies with operating conditions but is normally around 101. Good quality racing gasolines have MON in the range 100 to 110. High quality racing gasolines have a MON in excess of 110. If your engine requires a 101 MON, it is of no value to use a gasoline that has a 115 MON. To cover yourself for extreme conditions, it is wise to have an octane cushion, but there is no performance advantage to using a very high octane quality product if you do not need it.

The MON test was originally developed in 1932. Major hardware changes were made in 1948 with procedural changes made until the late 1960s.

(R+M)/2

This is the average of RON and MON. It is sometimes referred to as the AKI or Anti-Knock Index. By law this number must be posted on the dispensing pump at retail outlets in most states. It is the most commonly used octane reference today. It came into use in the early 1970s as a compromise between RON and MON for advertising purposes, and to keep from confusing the consumer with too many different terms. It has erroneously been referred to as Road Octane Number (RdON).

Observed Road Octane Number (RdON)

This is derived from testing gasolines in real world multi-cylinder engines, normally at wide open throttle. It was developed in the 1920s and is still reliable today. The original testing was done in cars on the road but as technology developed the testing was moved to chassis dynamometers with environmental controls to improve consistency.

Rockett Brand™ Racing Fuels has modified this test additionally to use it with racing engines on engine dynamometers. This has given us the opportunity to evaluate gasoline blends during our racing gasoline development that had good RON and MON but that did not respond well in the racing engine under full throttle excursion through the entire RPM range. We felt these conditions were the true indicators of how the fuel could be best developed. In our program we found that the gasoline blending components and their ratios are far more important to the racing engine response than high RON and MON numbers. RON and MON can only be used as a guide, the final work must come from the Road Octane Number (RdON).

As an example, ***Rockett Brand™ 112 Racing Gasoline*** is the result of testing over 100 experimental blends. The final blend has a Road Octane Number (RdON) of 112, the same RdON as one of our competitor's gasolines that has an advertised 116 RON and 116 MON. Using only RON and MON can lure a person into a false sense of security. If you want to be certain that your racing gasoline has been thoroughly tested in real world racing engines, choose ***Rockett Brand™ Racing Gasoline*** for your engine.

For your nearest Rockett Brand™ Distributor, call or click:
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