



## Octane Numbers Explained

The octane levels (research - RON) and (motor - MON) for petrol are obtained by comparison of their knock or detonation performance against 'pure' chemicals in the form of Iso-Octane (100) and normal heptane (zero octane) and mixtures of the two.

The engine used for this comparison is a CFR single cylinder variable compression ratio unit, which runs at 600 rpm fixed ignition for RON <sup>(1)</sup> determination and 900 rpm advancing ignition for MON <sup>(2)</sup> testing.

The MON test is more severe and tends to give a value 10 numbers (100 points) lower than RON values. The MON test is more representative of high-speed performance/protection. American fuel octane is normally quoted from RON+MON+2 ie: average.

Lead in the form of Tetra Ethyl Lead (TEL) could, when used at high levels provide a RON increase of about 6 numbers (60 points) but such high treatment levels could lead to spark plug fouling and reduced performance due to flame control. TEL was widely used to provide octane prior to catalytic converters.

Today octane is obtained from a number of chemical routes at the refinery in order to meet the minimum requirements. Methyl Benzene (Toluene) Xylene and Methyl Tertiary-Butyl-Ether (MTBE) are some of the chemicals used to replace lead octane.

Methylcyclopentadienyl Manganese Tricarbonyl (MMT) is also an octane provider which works in the same manner as lead and therefore similar rules apply ie. over treatment can promote spark plug fouling etc.

Millers CVL unlike some competitive products is designed to provide the maximum continuous safe use and will typically give about 3 octane (30 points) increase.

<sup>(1)</sup>ASTM D2699    <sup>(2)</sup>ASTM D2700

### Octane Examples

Fuel	RON	MON	Comments
Premium 95	95.0	85.5	Conforms to British/European standard
Premium + <b>Octane Plus</b>	97.1	86.5	Safe for full time use with 'Cats'
Shell Optimax <sup>®</sup> + <b>VSP Plus</b>	99.6	87.6	Good RON/MON
Shell Optimax <sup>®</sup>	98.3	86.9	Good unleaded fuel
Shell Optimax <sup>®</sup> + <b>Octane Plus</b>	99.4	87.5	Good RON/MON - for 'Cats'
Shell Optimax <sup>®</sup> + <b>CVL</b>	100.8	89.2	Old 5 Star type levels
Shell Optimax <sup>®</sup> + <b>CVL Turbo</b>	101.4	89.9	Excellent RON/MON