

# FUEL

PETROL IS THE ENERGY SOURCE FOR YOUR CAR. WITHOUT IT, YOU WOULD NOT BE GOING ANYWHERE. YET, EVEN THOUGH PRICES ARE STILL ESCALATING, MANY TAKE IT FOR GRANTED AS IT IS READILY AVAILABLE. A BETTER UNDERSTANDING OF PETROL WILL HELP YOU APPRECIATE HOW COMPLEX THE SUBSTANCE REALLY IS.

PETROL, AS WE ALL KNOW, IS USED AS FUEL IN INTERNAL COMBUSTION ENGINES. The term petrol is derived from the word petroleum spirit and the name used by most Commonwealth countries. Gas is the term commonly used to describe petrol in North America, and it is derived from the term gasoline.

Petrol is produced in oil refineries, but modern fuel requirements mean that the material which is simply separated from crude oil via distillation will not suffice. Petrol that consumers use in their vehicles is a blend of different refinery streams, with the bulk of typical petrol consisting of hydrocarbons with between five and 12 carbon atoms per-molecule. The primary streams of which petrol is made up consists of paraffins, naphthenes, aromatics and olefins.

As a fuel source, petrol is more volatile than diesel mainly due to the number of additives that are blended into it. Butane is often added as the final control of volatility, with the desired volatility level depending on the ambient temperature - in colder climates, petrol elements of lower molecular weight (and therefore higher volatility) are used, and vice versa. In Australia, the volatility limit varies from month to month and differs for each main distribution centre, but most countries simply have a summer, winter and some have an intermediate limit. Recently, the maximum volatility of petrol in many countries has been reduced to minimise emissions during refuelling. The volatility standards can be relaxed during emergency situations, as shown by the USA's response to Hurricane Katrina, whereby there was an early switch to 'winter gasoline' which has a higher volatility than summer petrol.

The most important feature of petrol is its octane rating. Octane is a measure of how resistant petrol is to detonation, also known as pinging or knocking. Knocking is the premature exploding, rather than clean ignition, of petrol during the power stroke of the motor. A common misconception people make is comparing Australian octane levels to the octane levels of other countries, in particular the USA. In Australia, and many other countries, the octane rating is measured by the Research Octane Number (RON). RON is determined by running the petrol through a specific test engine with a variable compression ratio and comparing the results to a particular set of chemicals. The other type of octane rating, known as Motor Octane Number (MON), is said to be a better measure of how the fuel behaves under load. MON testing is similar to RON testing in that it uses a similar test engine, but with a pre-heated fuel mixture, higher engine speed and variable ignition timing to further test the fuel's knock-resistance. The general rule of thumb is that MON levels are generally eight-to-ten points lower than RON. In most countries, Australia included, the 'headline' octane level shown at the bowser is RON, but in the USA and some other countries, the headline octane is the average of RON and MON, which is sometimes known as the Anti Knock Index (AKI), Road Octane Number (RdON) or Pump Octane Number (PON). This means that the rating of fuel in the USA is about four-to-five points lower than the same fuel elsewhere.

Diesel is a commonly used alternative to petrol as a fuel source, but it can only be used on diesel motors. Diesel is derived from petroleum, and is sometimes known as petrodiesel or dinodiesel. Diesel is generally simpler to refine than petrol but often contains higher quantities of sulphur. The reason why some car owners decide to purchase diesel vehicles is due to their frugal running costs. Diesel produces about 18% more energy per unit of volume than petrol and along with the greater efficiency of diesel engines, far greater fuel economy is achieved compared to petrol motors.

In the 1920s, the practice of adding lead to petrol became widespread, as it was discovered that lead helped to control knocking. However, it was later recognised lead caused serious environmental damage and it was incompatible with catalytic converters. The use of leaded petrol began to decline in the 1980s and most countries have phased out the use of leaded petrol, with different additives replacing the use of lead.

Another additive which is causing much debate is the use of ethanol in petrol. Adding ethanol is a form of oxygenate blending, which adds oxygen to the fuel and reduces the amount of carbon monoxide and unburned fuel in the exhaust gases. Ethanol is a renewable resource and in Australia it is distilled from sugar or grains. Petrol containing ethanol is generally slightly cheaper than regular unleaded petrol and can be more fuel efficient due to its higher octane level. Ethanol was first introduced five years ago and the public was, and still is, sceptical about reports that ethanol damages engines. The Government has since set an ethanol limit of 10 percent, which most car manufacturers say is safe for cars made after 1986. The Government has also determined that petrol containing only one percent ethanol does not need to be labelled. The use of ethanol petrol and as to whether it causes any damage is still a grey area, but once conclusive evidence is revealed, we will be the first to let you know. 