



# HIGH-OCTANE PERFORMER

The petrochemical industry relies on platinum catalysts to meet growing global demand for the higher-octane fuels needed by gasoline and gasoline-hybrid vehicles

Platinum is used as part of the petroleum refinery process – the process by which crude oil is transformed into more useful petrochemicals needed for a wide range of industrial applications.

Petrochemical refinery happens in several stages, and platinum catalysts are involved once the initial separation of the crude oil has occurred, helping to manufacture higher-octane fuels such as gasoline.

Octanes are a family of hydrocarbons that are typical components of gasoline. Fuels with higher-octane ratings are vital to the effective functioning of internal combustion engines, with fuel quality being especially important today as automakers strive to make car engines more efficient.

An octane rating is a standard measure of a fuel's performance. The higher its octane number, the more compression a fuel can withstand before detonating, lessening the likelihood of the air and fuel mixture detonating too soon, leading to the problem of engine 'knocking'.

Generally, higher performance gasoline engines have higher compression ratios and therefore

require fuels with a higher-octane rating. Using a lower octane fuel than the one recommended can cause an engine to run poorly and cause damage over time.

## Platinum is key

Once crude oil has been through the initial distillation process, work can begin to turn the resultant low-octane hydrocarbons into high-octane end products by using a platinum-based catalyst in secondary processes known as catalytic reforming and isomerisation.

## DID YOU KNOW?

**A catalyst speeds up a chemical reaction without itself being chemically changed or used up in the reaction.**

Isomerisation works by rearranging the chemical structure of the low-octane hydrocarbons to create a compound with the same molecular formula, yet with 'branched chains' rather than 'straight chains'.

It is the presence of these branched chains that raises the octane-rating of fuel, producing higher-octane gasoline that burns better in modern combustion engines.

Catalytic reforming is another process involving isomerisation which uses platinum as a catalyst to improve the octane rating of hydrocarbons. It also results in the production of other petrochemicals

that are used as the raw materials to make plastics, synthetic rubber and polyester fibres.

Platinum is key to the production of gasoline as it increases reaction rates and improves product yields. Without it, the petroleum industry would not be able to satisfy global demand for gasoline, which, according to the Organisation of the Petroleum Exporting Countries, is forecast to rise by approximately one per cent per annum until 2025.

Continued worldwide expansion of gasoline and gasoline-hybrid vehicle production, especially in India and China, lies behind this growth, which is predicted to occur despite the slow, yet growing, penetration of electric vehicles — both battery and fuel cell — and improvements in fuel economy seen in gasoline engines.

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