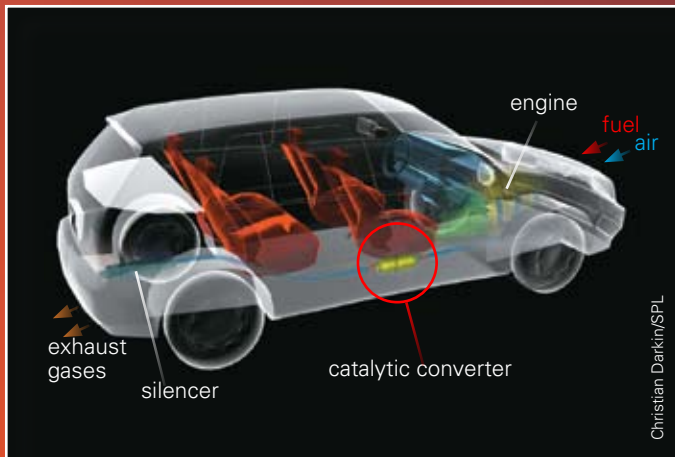


Catalytic converter

A *catalytic converter* is part of a vehicle's exhaust system. It removes harmful substances from the exhaust gases.



Reactions in the engine:

- Hydrocarbon fuel burns with oxygen:
 $\text{hydrocarbon} + \text{oxygen} \rightarrow \text{carbon monoxide} + \text{carbon dioxide} + \text{water}$
- Nitrogen from the air is also oxidised:
 $\text{nitrogen} + \text{oxygen} \rightarrow \text{nitrogen oxides (NO}_x\text{)}$

Exhaust gases contribute to urban smog. Carbon monoxide is poisonous. Nitrogen oxides cause acid rain.

Reactions in the converter:

- Unburned hydrocarbons are oxidised:
 $\text{hydrocarbon} + \text{oxygen} \rightarrow \text{carbon dioxide} + \text{water}$
- Carbon monoxide is oxidised:
 $\text{carbon monoxide} + \text{oxygen} \rightarrow \text{carbon dioxide}$
- Nitrogen oxides are reduced:
 $\text{nitrogen oxide} \rightarrow \text{nitrogen} + \text{oxygen}$

What's inside?

Inside the catalytic converter, hot exhaust gases and oxygen pass over unreactive metals (platinum, palladium, rhodium). These metals are coated on a ceramic or steel honeycomb, to give a large surface area. They catalyse the reactions which reduce the toxicity of the exhaust gases.

On the surface

The chemical reactions in the catalytic converter take place on the surface of the precious metal catalysts. A large surface area and a high temperature speed up the reactions.

