



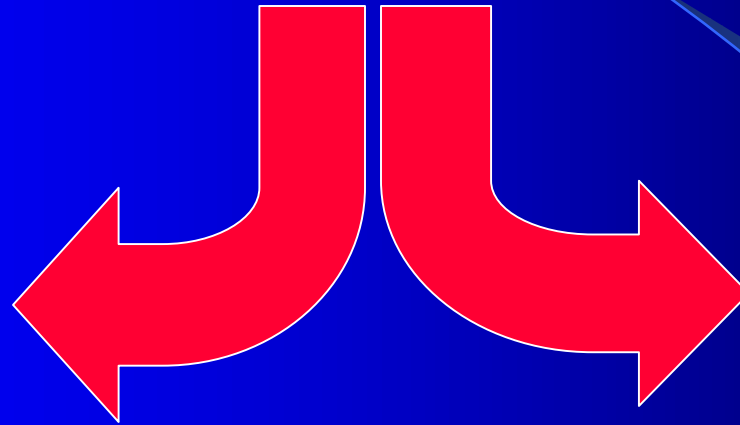


SAPCO and *Sharif University of technology*
Physical Chemistry

The Study in conversion of the Exhaust gases (CO, HC, NO_x) to the none pollutant gases by means of Anode Slime instead of precious metal which is using in to catalyst converter

The sources of pollution

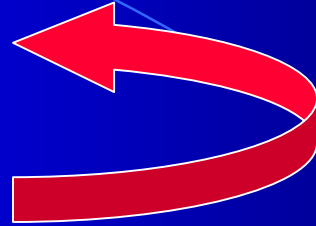
Industrial
20-30%



Mobile sources (automobile)
70-80%

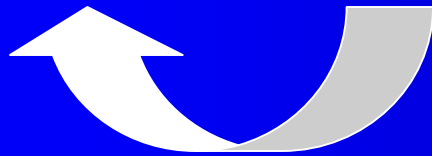
Carbon monoxide

CO



Hydrocarbons

HC



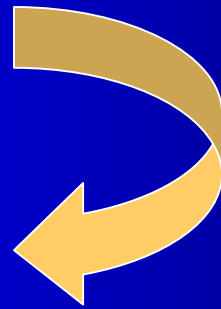
Nitrogen Oxides

NO_x



Exhaust

PM



Possible solution

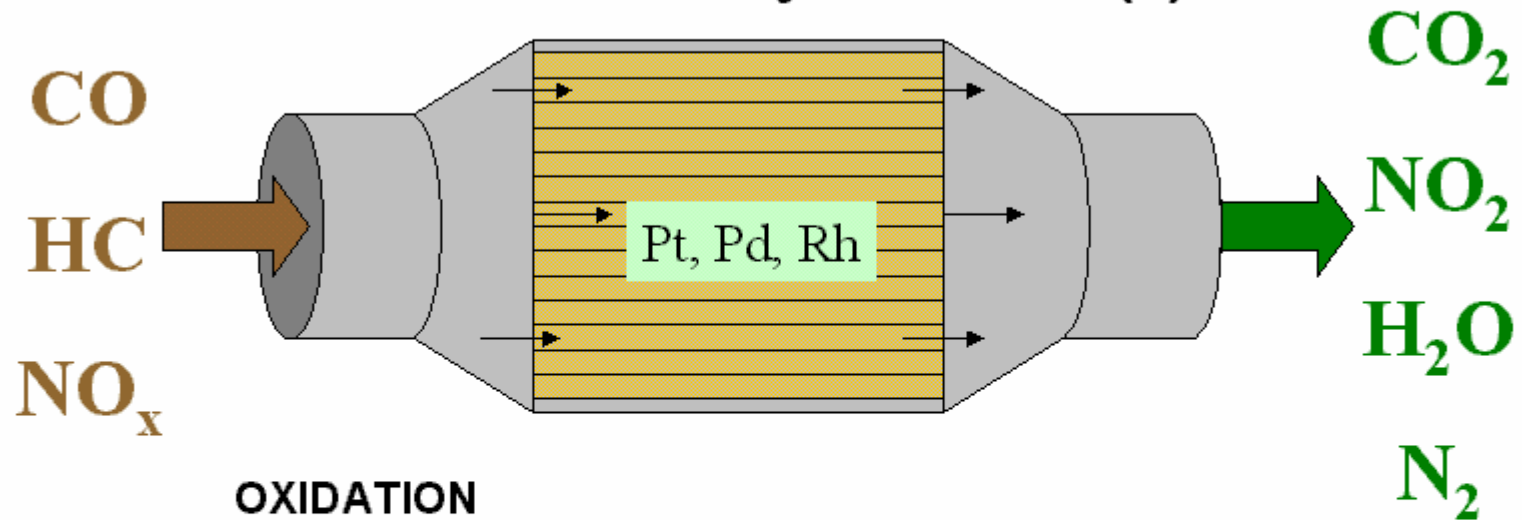
- | H₂ car (Fuel cells)
- | Electoral car (Hybrid)
- | Catalytic Converters

What is the catalytic converter ?

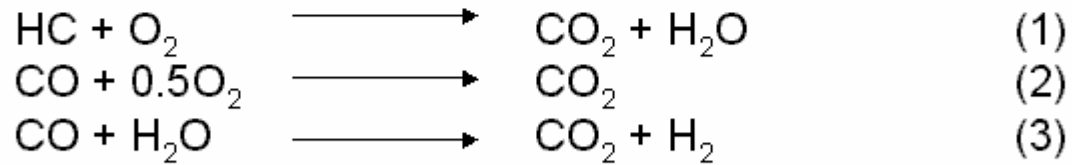
TWC

How the Exhaust is converter ?

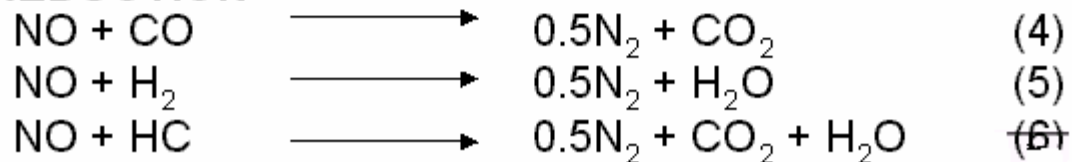
How do they Work (I)?



OXIDATION

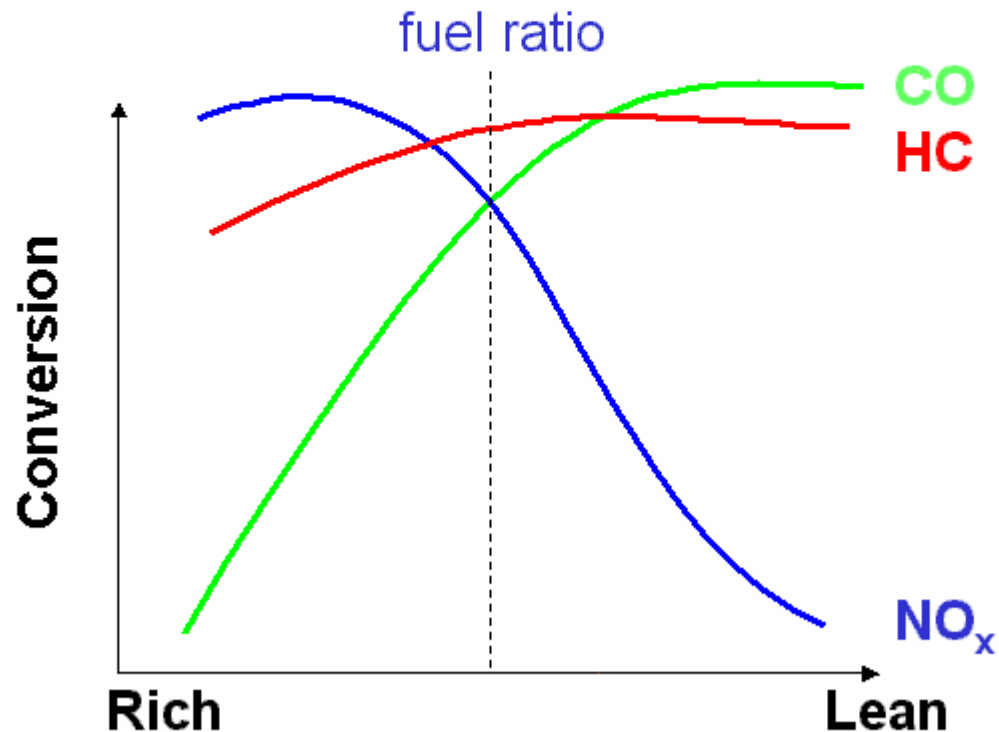


REDUCTION



How do they work? - II

In order to have high levels of oxidation and reduction they must operate at the balance point between oxidising and reducing conditions - stoichiometric air-to-fuel ratio



Properties of a suitable catalyst:

- *Highly active*

the pollutant gases convert to no pollutant up 90%

- *Highly selective*

H_2O , CO_2 and N_2 as products

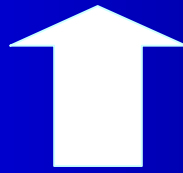
- *Thermally stable*

Working temperature 350 – 1100 °C

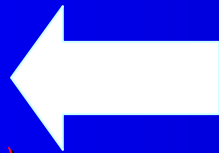
- *Long Life*

160,000 km or more

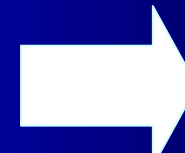
*Carrier material
(monolith)*



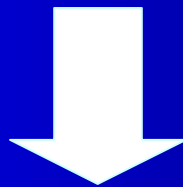
*support
(wash-coat)*



Structure of
converter



*Promoter
 CeO_2*



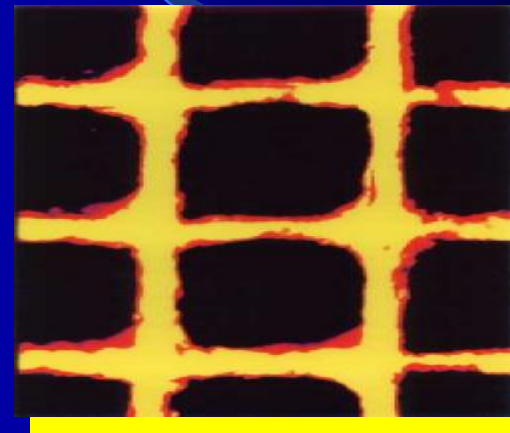
*Active phase
(noble metals)*

Monolith



Metallic

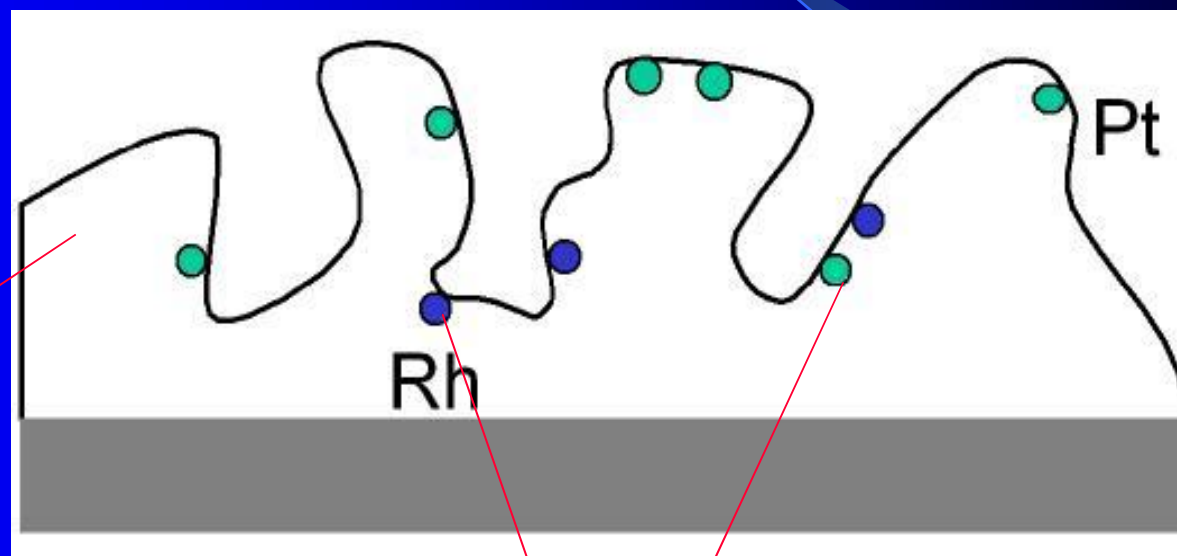
Fe 70%, Cr 20%, Al 10%



Ceramic

$2\text{MgO}, 2\text{Al}_2\text{O}_3, 3\text{SiO}_2$

Washcoat:
including
alumina, OSC
component,
promoters



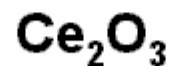
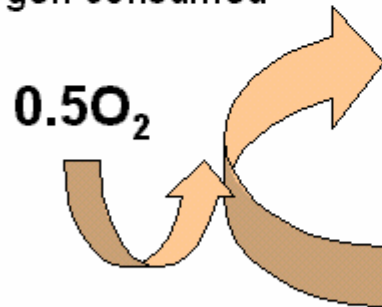
Active phase

Oxygen Storage of TWC

Having a material in the TWC that can both release and consume O_2 dampens out the rich-lean oscillations and results in a better performing catalyst. Ceria, CeO_2 , has been found to be such a material.

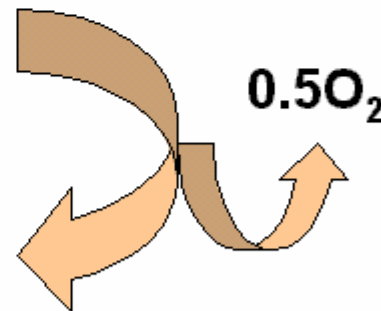
Lean Conditions

Oxygen consumed



Rich Conditions

Oxygen released



The image features the word "Experimental" in a large, 3D, metallic font. The letters are rendered with a gradient from light blue at the top to a reddish-orange at the bottom, giving them a three-dimensional appearance. The word is set against a dark blue background that transitions to a lighter blue at the bottom right. A bright blue light beam or lens flare effect originates from the top right and illuminates the word. The overall composition is clean and modern, typical of a presentation slide.

Experimental

