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Pollutants in air

Common air pollutants	Sources	Harmful effects
Carbon dioxide	Carbon containing fuel burn to produce CO2(Complete combustion)	Leads to global warming and climate change
Carbon monoxide	Carbon containing fuel burn in limited supply of oxygen produce CO(Incomplete combustion)	Toxic gas,reacts with haemoglobin and reduce the ability of hemoglobin to transport oxygen
Methane	It produces when plant (vegetation) decomposes and produce as a waste gas due to digestion of food from cows and sheeps.	Leads to global warming and climate change
Oxides of nitrogen	In car engine because of high temperature nitrogen and oxygen of air reacts to form oxides of nitrogen	Oxides of nitrogen reacts with rain water to form acid rain which corrodes buildings and kill fishes. $4NO_2 + 2H_2O + O_2 \rightarrow 4HNO_3$
Sulfur dioxide	From burning of fossil fuels containing sulfur compounds	Sulfur dioxide reacts with rain water and form acid rain $2SO_2 + 2H_2O + O_2 \rightarrow 2H_2SO_4$
Lead	From old pipes and petrol	Damages brain and lower IQ level
Particulates (small particles in air like soot(Carbon) , lead and dust		Increase the risk of respiratory problems and cancer.

Effect of acid rain: It corrodes buildings and acidify lakes which kill sea creatures.

Flue gas desulfurisation:

Combustion of fossil fuel produces mixture of gases called flue gases. The process of removal of sulfur dioxide from flue gas is called flue gas desulfurisation.

$CaO + SO_2 \rightarrow CaSO_3$

Calcium sulfite

$2CaSO_3 + O_2 \rightarrow 2CaSO4$

Calcium sulfate

Catalytic converter: It is design to reduce harmful emisiions.

Catalytic converter converts Carbon monoxide in to carbon di oxide and oxides of nitrogen in to Nitrogen gas.

In a car engine where temperature is very high nitrogen combines with oxygen and forms nitrogen monoxide and further react with oxygen to form nitrogen di oxide.

$N_2 + O_2 \rightarrow 2NO$

$2NO + O_2 \rightarrow 2NO_2$

Due to incomplete combustion of petrol Carbon monoxide also formed.

Unburnt Petrol is also there

Catalytic converter converts them in a safer substances.

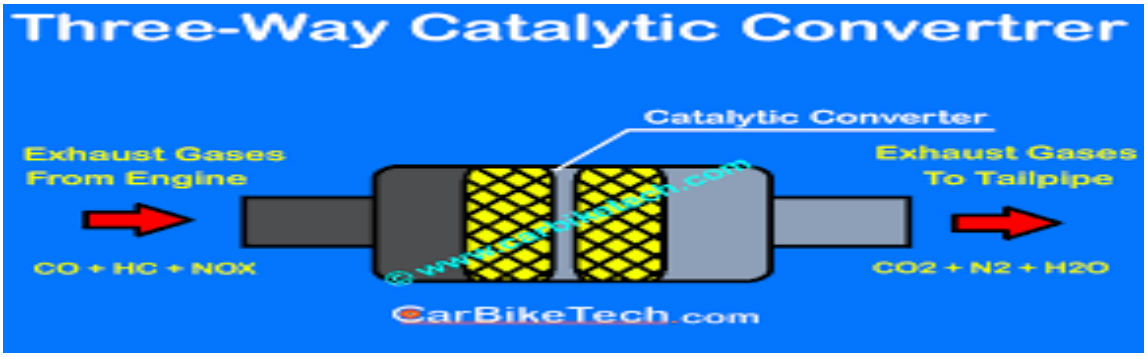
$2\ NO \rightarrow N_2 + O_2$ / $2NO2 \rightarrow N_2 + 2O_2$

$2CO + O_2 \rightarrow 2CO_2$

$2NO + 2CO \rightarrow N_2 + 2CO_2$

Unburnt hydrocarbon oxidises and convert in to CO_2 and H_2O

$2C_8H_{18} + 25O_2 \rightarrow 16CO_2 + 18\ H_2O$



GLOBAL WARMING:

A green house gas is gas that absorbes heat energy and stops heat escaping in to the space. Carbondioxide and methane are the green house gases.s

The greenhouse effect and global warming

The greenhouse effect has always been with us. Greenhouse gases prevent the Earth from cooling down too rapidly when we are not exposed to the Sun's rays. If we did not have greenhouse gases in the atmosphere, the Earth would be extremely cold.

The greenhouse effect works like this:

- Ultraviolet rays from the Sun have very short wavelengths. They get through the Earth's atmosphere easily and are not absorbed by carbon dioxide.
- The ultraviolet rays hit the Earth's surface.
- The Earth's surface absorbs the ultraviolet rays and it heats up.
- Heat energy is lost from the Earth's surface as infrared rays. This is long wavelength radiation.
- Infrared rays can be absorbed by carbon dioxide.
- Some of the heat is re-radiated back to the Earth and some escapes into space.

The more carbon dioxide there is in the atmosphere, the more heat is absorbed by this greenhouse gas. More heat is re-radiated back to Earth and less is lost into space. So the atmosphere heats up more. We have **global warming**.