

The causes and effects of co2



There are many different air pollutants created from many different sources. Sources of air pollution range from car exhaust emissions (Carbon dioxide, Carbon monoxide, Nitrogen Dioxide, Lead & particulate matter), industrial sources such as factories, power plants and refineries (Sulphur dioxide, Nitrogen dioxide, Carbon monoxide, carbon dioxide etc) air-conditioning and refrigeration (CFCs).

Natural sources also contribute to emissions of gases that we consider pollutants, such as forest fires caused by lightning (Again carbon monoxide & carbon dioxide) and things such as wetlands, non-wetland soils, oceans and fresh water bodies (Methane) These chemicals present a wide range of problems for living organisms and the environment, be it either from the pollutant directly or a subsequent problem that arises from the pollutant in question.

I will be discussing the causes and effects of the air pollutant CO₂ (Carbon Dioxide), what can be done to prevent this pollutant affecting our planet and also what measures have already been put in place to reduce the impact of these pollutants. CO₂ is a greenhouse gas, a greenhouse gas is characterised as being a gas that absorbs infrared radiation and contributes to the greenhouse effect. We need the greenhouse effect in moderation as otherwise the Earth would be cooler and would not be able to support life as we know it, our two closest planets are examples of how temperatures can differ due to the greenhouse effect.

Venus has an extremely dense atmosphere containing 96% CO₂ which keeps the temperature at around the 450oC. Again Mars' atmosphere contains the same amount of CO₂ but is only 1% as dense as the Earth's atmosphere, it

experiences greater temperature fluctuations because there are not enough CO₂ molecules to trap the infrared radiation from the Sun to create a greenhouse effect.

CO₂ is produced naturally through the respiration of animal organisms (the air inhaled contains approx 0.04% CO₂ and the air exhaled contains approx 3.5%), decaying biomass (plant and animal matter), the burning of wood through naturally started fires (lightning) and also emissions from volcanic eruptions. The CO₂ in the atmosphere is then reabsorbed back by plants e.g. trees and algae when they photosynthesise, as well as being absorbed by the ocean. This cycling of CO₂ is known as the 'CO₂ cycle' - fig. 1 below illustrates this at a simple level. Fig. 1 CO₂ cycle At the start of the industrial revolution in the 19th century we have seen an increase of CO₂ in the atmosphere.

Fig. 2. CO₂ concentrations over the past 1000 years. Most of the record is based on data obtained from Antarctic ice cores. Bubbles of air trapped in the glacial ice provide samples of past atmospheres. The record since 1958 comes from direct measurements of atmospheric CO₂ taken at Mauna Loa Observatory, Hawaii. The main source of this increase in atmospheric CO₂ is the burning of fossil fuels. Fossil fuels are hydrocarbons that come in the form of coal, crude oil & natural gas.

When any hydrocarbon is burnt completely then CO₂ and H₂O are produced, an example of this is butane (an alkane produced from crude oil) $2C_4H_{10}(g) + 13O_2(g) \rightarrow 8CO_2(g) + 10H_2O(l)$ Our society is heavily reliant on fossil fuels; here is a list of fossil fuels and their uses: * Coal is used to boil water that

turns to steam, the high pressure steam in turn drives a turbine and generates electricity (Coal fuels over 40% of electricity worldwide)

Crude oil used to make fuels for transport such as petrol for cars and kerosene for aircraft. The chemical industry uses substances derived from coal and petroleum to make plastics, fertilisers and cosmetics. Petroleum also produces other common substances such as tar, solvents, lubricants and waxes. Another source of the increase of atmospheric CO₂ could be down to deforestation, the removal of vast areas of vegetation contributes to this problem as well because of plants ability to remove CO₂ through the process of photosynthesis.