



Pollutant factsheets: carbon monoxide

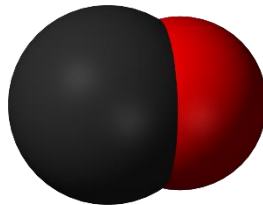
Carbon monoxide (CO)

MAIN SOURCES:

Road transport

Incomplete combustion in BBQs
lawn mowers or solid fuel burners

Smoking



Carbon monoxide is:

A colourless, odourless and tasteless gas that is slightly less dense than air

Made up of 1 carbon and 1 oxygen atom

CO is produced by the incomplete burning (i.e. there is not enough oxygen for each carbon atom to combine with two oxygen atoms) of carbon-based fuels, including petrol, diesel, gas, oil, wood and coal. In recent years CO is mostly produced by road transport, in particular petrol vehicles. If you have a solid or gas boiler or fire or other non-electrical heating, you may have a CO sensor/alarm to warn of CO emission if the appliance is not operating correctly.

CO emissions can kill within minutes if inhaled. The early symptoms can be nausea/ feeling sick and a feeling of disorientation. Carbon-based fuels are generally safe to use, it is only when the fuel does not burn completely so that CO is produced instead of CO₂ which is formed when combustion is complete (i.e. in the presence of plenty of oxygen).

CO can affect the transport of oxygen in the blood and reduce the supply of oxygen to the heart, particularly in people suffering from heart disease.





Pollutant factsheets: nitrogen dioxide

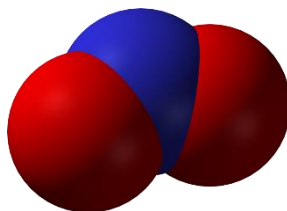
Nitrogen dioxide (NO₂)

MAIN SOURCES:

Power stations

Domestic heating

Transport



Nitrogen dioxide is:

Red/brown coloured gas with a sharp, unpleasant smell

Made up of one nitrogen atom and two oxygen atoms

A secondary pollutant and is created when Nitric Oxide (NO) – formed in the combustion process – reacts with oxygen in the atmosphere

The major sources of NO₂ in the UK are through the burning of fossil fuels (coal, oil, gas, petrol and diesel) for domestic heating, power generation and road transport.

Transport emissions are thought to be the largest contributor to NO₂ air concentrations which are highest near busy and congested roads.

NO₂ can be formed naturally in the atmosphere by lightning and can also be produced by plants; although naturally formed NO₂ only represents a fraction of the total NO₂ found in the atmosphere.

Useful definition: A primary pollutant is an air pollutant emitted directly from a source. A secondary pollutant is not directly emitted in large quantities, but forms when other pollutants (primary pollutants) react in the atmosphere.





Pollutant factsheets: particulates

Particulates

MAIN SOURCES:

Transport (road and rail)

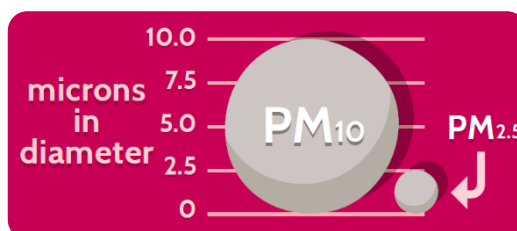
Shipping

Industry

Sand and seas salt

Solid fuel burning

BBQs



Particulates are:

Very fine particles found in the atmosphere and can be made of a wide range of different materials from many different sources

To give a sense of size, a human hair is 50-70 microns in diameter, so five to seven times as big as a single PM₁₀ particle and over twenty times bigger than a PM_{2.5} particle. Microns are very small indeed; 1 micron is equivalent to one thousandth of a millimetre! The diagram above shows how PM₁₀ and PM_{2.5} particles sizes compare.

When scientists talk about particulates, they generally categorise them into two main groups, depending on the size of the particles. PM₁₀ is the term given to a group of particles of up to 10 microns in size. PM_{2.5} refers to the group of smaller particulates up to 2.5 microns in size.

PM_{2.5} is made up of finer particles than PM₁₀ including organic compounds and some metals. These fine particles are emitted by all types of vehicles and some industrial processes. Other sources include natural sources such as forest or wild fires.

The particles that make up PM₁₀ includes PM_{2.5} particles but is also is made up of coarser particles including dust, pollen and mould. These particles can be produced from human activity, through road transport, diesel trains, shipping, industry and solid fuel burning or naturally occurring, such as sand and sea salt. The smaller particles are lighter therefore they stay in the atmosphere longer and travel further. PM₁₀ particles can stay in the air for minutes or hours while PM_{2.5} particles can stay in the air for days or weeks.





Pollutant factsheets: sulphur dioxide

Sulphur dioxide (SO₂)

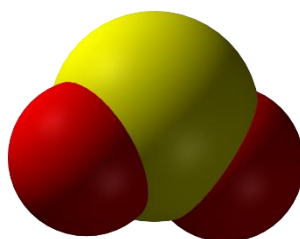
MAIN SOURCES:

Power stations

Industrial combustion processes

Shipping
(in some coastal areas)

Solid fuel burning



Sulphur dioxide is:

A colourless gas and has a pungent, irritating smell

Made up of one sulphur atom and two oxygen atoms

Reacts with other chemicals to form harmful compounds such as sulphuric acid (H₂SO₄) that can cause acid rain

SO₂ can be formed naturally and emitted by volcanoes or from geothermal hot springs, not many of these are found in Leicester! However, emissions from volcanos such as those that erupted in Iceland in 2010 can travel thousands of miles, it is not just local emissions that affect your environment.

The major sources of SO₂ in the UK have decreased significantly over the last few decades. The largest current sources of SO₂ in the UK are from the processing and burning of materials containing sulphur, such as the generation of electricity from coal and oil at power stations and from combustion processes such as solid fuel burning and particularly in industry. Shipping emissions may also be a potential source of SO₂ in busy coastal areas.

Recently a number of power stations have been closed as they could not meet stricter emissions requirements for SO₂. Newer coal and oil-fired power stations can have systems to remove large proportions of SO₂.





Pollutant factsheets: ammonia

Ammonia (NH₃)

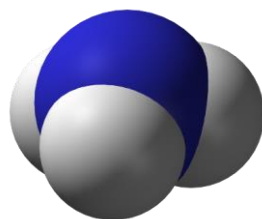
MAIN SOURCES:

Decaying organic materials

Overuse of fertilisers

Waste disposal sites

Industrial processes



Ammonia is:

A highly reactive and soluble alkaline gas

Made up of one nitrogen atom and 3 hydrogen atoms

Ammonia can lead to damage of terrestrial and aquatic ecosystems through deposition of eutrophying pollutants and through acidifying pollutants. Precursor to secondary particulate matter and therefore contributes to the ill-health effects caused by PM10 and PM2.5.

The main local problem of ammonia released into air is the unpleasant odour, which is detectable even at low concentrations. At particularly high concentrations it can also harm vegetation. The harm caused by ammonia in water bodies is more serious, because it is very toxic to aquatic organisms. Low concentrations of ammonia in soil are natural and actually essential for plant nutrition. Over-fertilisation can however lead to excessive concentrations which result in leaching to water bodies. On a wider scale, ammonia plays a role in the transportation and enhanced deposition of acidic pollutants - resulting in acidification of ground and water bodies, which can harm plant and animal life.

Exposure to ammonia at environmental concentrations is unlikely to have adverse effects on health. However, exposure to high concentrations following an accidental release or in occupational settings could cause irritation of the eyes, nose and throat as well as burning the skin where there is direct contact.



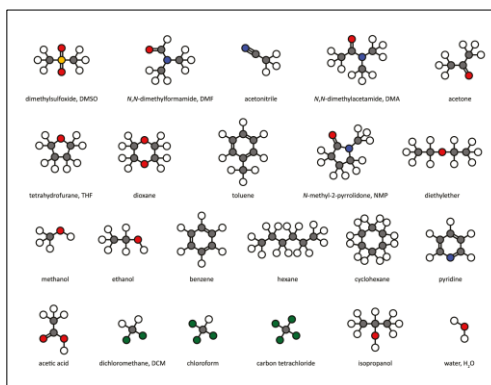


Pollutant factsheets: VOCs

VOCs

Description: VOCs are organic compounds meaning they contain carbon.

MAIN SOURCES:
Paints and coatings
CFCs
Fossil fuels



Volatile Organic Compounds (VOCs) are:

A large group of organic chemicals that easily vaporise at ordinary room temperature

They include both human and naturally occurring chemical compounds

Volatile organic compounds (VOCs) are emitted as gases from certain solids or liquids. VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects. Concentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors. VOCs are emitted by a wide array of products numbering in the thousands.

Organic chemicals are widely used as ingredients in household products. Paints, varnishes and wax all contain organic solvents, as do many cleaning, disinfecting, cosmetic, degreasing and hobby products. Fuels are made up of organic chemicals. All of these products can release organic compounds while you are using them, and to some degree, when they are stored.

Studies indicated that while people are using products containing organic chemicals, they can expose themselves and others to very high pollutant levels, and elevated concentrations can persist in the air long after the activity is completed.

