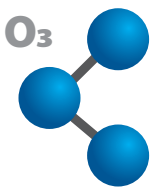
Australian Government
Department of the Environment and Energy

The Ozone Layer

What is ozone?

Ozone is a naturally occurring molecule. An ozone molecule is made up of three oxygen atoms. It has the chemical formula O_3.



What is the ozone layer?

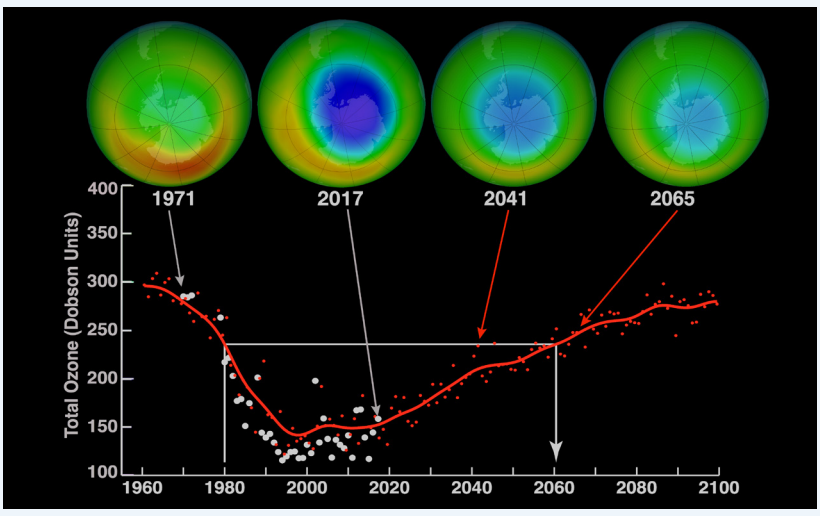
The ozone layer is the common term for the high concentration of ozone that is found in the stratosphere around 15–30km above the earth's surface. It covers the entire planet and protects life on earth by absorbing harmful ultraviolet-B (UV-B) radiation from the sun.

Why is UV-B radiation bad?

Prolonged exposure to UV-B radiation is linked to skin cancer, genetic damage and immune system suppression in humans and animals, and lower yielding agricultural crops.

What is the ozone hole?

Chemicals containing chlorine and bromine atoms are released to the atmosphere through human activities. These chemicals combine with certain weather conditions to cause reactions in the ozone layer, leading to ozone molecules being destroyed. Depletion of the ozone layer occurs globally, however, the severe depletion of the ozone layer over the Antarctic is often referred to as the 'ozone hole'. Increased depletion has recently started occurring over the Arctic as well.



The decline and projected recovery of ozone levels over Antarctica using October average minimum ozone levels. Source: NASA Visualization Studio

Will things improve?

The Montreal Protocol on Substances that Deplete the Ozone Layer came into effect in 1987. It sets binding obligations for countries to phase out production of all the major ozone depleting substances. Data shows that stratospheric concentrations of ozone depleting substances are declining. As a result of international action, the ozone layer is expected to recover to pre-1980 levels over the mid-latitudes by 2050 and over the polar regions by 2065.

TIMELINE

1974 ▶ Chemists in the USA discover the link between CFCs and the breakdown of ozone in the stratosphere

1985 ▶ British scientists publish results of abnormally low ozone concentrations above the Antarctic

1985 ▶ Vienna Convention for the Protection of the Ozone Layer agreed

1987 ▶ Montreal Protocol on Substances that Deplete the Ozone Layer agreed

1989 ▶ Ozone Protection and Synthetic Greenhouse Gas Management Act commenced in Australia

1991 ▶ Phase out of CFCs (chlorofluorocarbons) begins

1996 ▶ Phase out of HCFCs (hydrochlorofluorocarbons) begins

When was the problem discovered?

In 1974, chemists Mario Molina and Frank Sherwood Rowland discovered a link between chlorofluorocarbons (CFCs) and the breakdown of ozone in the stratosphere. In 1985, geophysicist Joe Farman, along with meteorologists Brian G Gardiner and Jon Shanklin published findings of abnormally low ozone concentrations above the Antarctic.

Releasing an ozone sonde
Source: Australian Antarctic Division