

Chlorofluorocarbon (CFC)

Chlorofluorocarbons (CFC) are gases used for various purposes including solvents, refrigerants and aerosol sprays. They are organic chemicals and contain carbon, (sometimes hydrogen,) chlorine, and fluorine. They were much used in the middle 20th century, replacing chemicals that were toxic or flammable or had traits that were generally harmful to human health.

Chlorofluorocarbons have a direct impact on the environment as a whole. As a result, they are an important concept for the Environment and Ecology segment of the UPSC Syllabus.

What are the applications of CFC?

Chlorofluorocarbons are used in a variety of applications because of their low toxicity, reactivity and flammability. Every permutation of fluorine, chlorine and hydrogen-based on methane and ethane has been examined and most have been commercialized.

Furthermore, many examples are known for higher numbers of carbon as well as related compounds containing bromine. Uses include refrigerants, blowing agents, propellants in medicinal applications and degreasing solvents.

How do CFCs impact the environment?

However, the atmospheric impacts of CFCs are not limited to their role as ozone-depleting chemicals. Infrared absorption bands prevent heat at that wavelength from escaping the earth's atmosphere. CFCs have their strongest absorption bands from C-F and C-Cl bonds in the spectral region of 7.8–15.3 μm —referred to as “atmospheric window” due to the relative transparency of the atmosphere within this region.

The strength of CFC absorption bands and the unique susceptibility of the atmosphere at wavelengths where CFCs (indeed all covalent fluorine compounds) absorb creates a “super” greenhouse gas (GHG) effect from CFCs and other unreactive fluorine-containing gases such as perfluorocarbons, HFCs, HCFCs, bromofluorocarbons.

Use of certain chloroalkanes as solvents for large scale application, such as dry cleaning, have been phased out, for example, by the IPPC directive on greenhouse gases in 1994 and by the volatile organic compounds (VOC) directive of the European Union in 1997. Permitted chlorofluoroalkane uses are medicinal only.

According to scientific communities, the hole in the ozone layer has begun to recover as a result of CFC bans.

Questions relevant to Chlorofluorocarbons for the UPSC Exams

What are some of the well-known examples of CFC's?

An example of a refrigerant CFC is dichlorodifluoromethane, CF_2Cl_2 (also known as CFC-12), which boils at -30°C . Another once-common CFC is trichlorofluoromethane, CFCl_3 (CFC-11), which boils at 24°C and was once the propellant in around half of all the aerosol cans used in the world.

Why were CFCs banned?

Chlorofluorocarbons (CFCs) are a group of odourless manufactured chemicals. Because they damage the earth's ozone layer, CFCs have been banned since 1996. Depletion of the Ozone Layer will have a negative impact on the biodiversity of the earth itself. With excessive radiations hitting the surface of the Earth will destroy agricultural productivity and even plant life. It will even cause skin cancer in humans.

How can we reduce chlorofluorocarbons?

Buy air-conditioning and refrigeration equipment that does not use CFCs as a refrigerant. Buy aerosol products that do not use **CFCs** as propellants. Conduct regular inspection and maintenance of air-conditioning and refrigeration appliances to prevent and minimize refrigerant leakage.

For more preparation material for the IAS Exam and other related articles, refer to the links given in the table below: