

The Fluorocarbon-Free Option for the sake of the planet

Fluorocarbon - Free Air dusters



Ministry of the Environment



Ministry of the Environment
JAPAN

The Fluorocarbon-Free Option

The Fluorocarbon-Free Option - for the sake of the environment

Climate change has become a serious problem. To help solve this problem, we have the option to purchase products that do not use fluorocarbons, "Fluorocarbon-free products"

What are Fluorocarbons?

Various types of fluorocarbons are used in various applications

Fluorocarbons are composed of Fluorine and Carbon. Fluorocarbons have many advantages such as being hard to burn, chemically stable, easy to liquefy and safe to humans. Because of this, they have become used widely as refrigerants, which carry heat in air-conditioners, mobile air-conditioners, refrigerators, vending machines, drinks coolers, freezer showcases and water coolers. They are also used as foam agents for insulation, cleaning agents for semiconductors and precision components and propellants for aerosols such as air dusters. There are many types of fluorocarbons; the first type was CFCs, followed by HCFCs and then HFCs.

Types of Fluorocarbons

- CFCs (Chlorofluorocarbons)

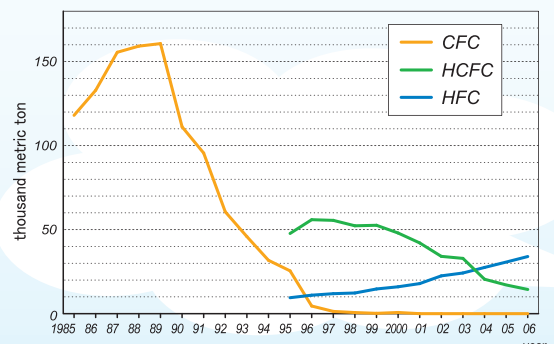
Compounds of Carbon, Fluorine and Chlorine

- HCFCs (Hydrochlorofluorocarbons)

Compounds of Carbon, Fluorine, Chlorine and Hydrogen

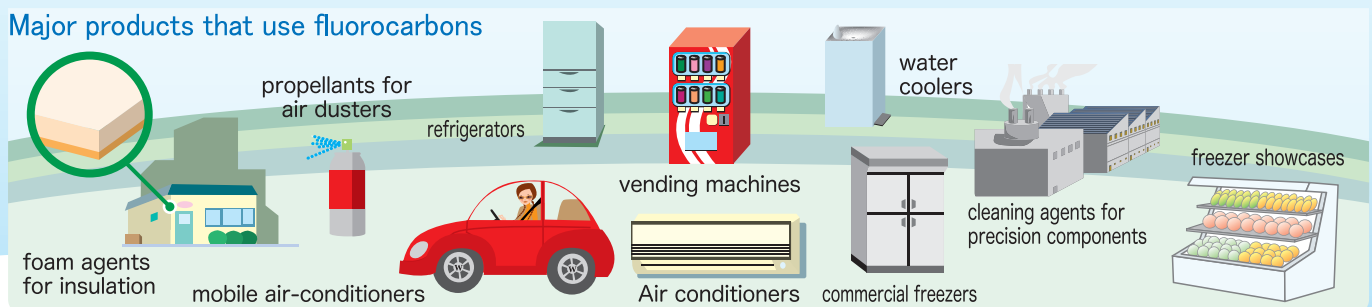
- HFCs (Hydrofluorocarbons)

Compounds of Carbon, Fluorine and Hydrogen



Fluorocarbons shipments in Japan
Based on data of Japan Fluorocarbon Manufacturers Association

Major products that use fluorocarbons

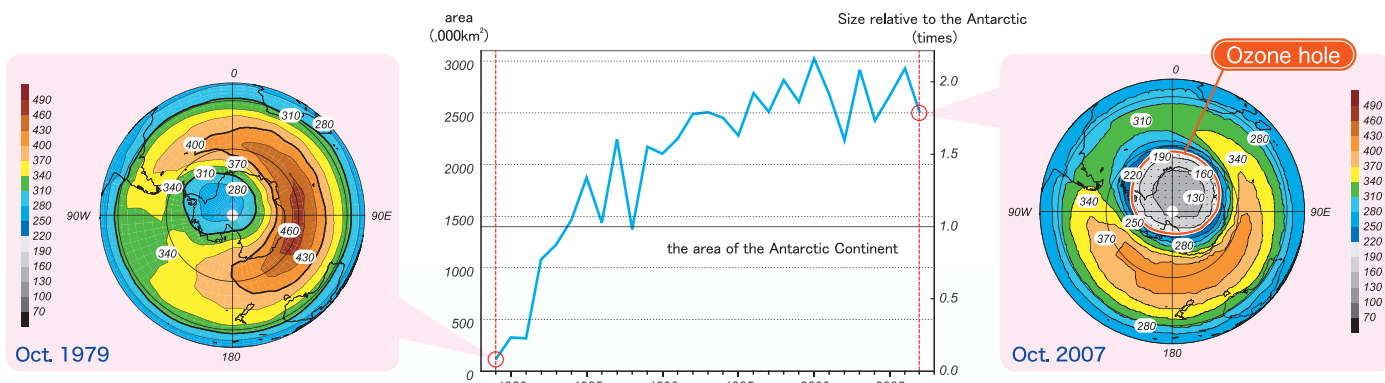


However, Freons are a cause of climate change and ozone layer depletion!!

Ozone Layer Depletion

Ozone layer depletion continues unabated

The Ozone Layer is 10-50km above the Earth's surface and absorbs harmful UV rays from the Sun. However, CFCs and HCFCs which are emitted into the air reach the ozone layer and decompose ozone by chemical reactions. The depletion of ozone above the Antarctic is so serious that in September - October each year the ozone density decreases drastically. This is called "Ozone Hole", because it looks like a hole in the sky. Still now, there is no clear sign of recovery of the Ozone Hole.



Chronological change of the size of the ozone hole and the distribution of the ozone above the Antarctic in October
Source: Japan Meteorological Agency Ozone Layer Observation Report 2007

Impact on Climate Change

Fluorocarbons are about 100-10,000 times stronger greenhouse gases than CO₂

Currently, climate change caused by man-made emissions of CO₂ is becoming more and more serious. Climate change is not only caused by CO₂. Fluorocarbons such as CFCs, HCFCs and HFCs also have strong greenhouse effects. Their impact on climate change is known to be extremely strong – ranging from a hundred times to over ten thousand times stronger than CO₂. For example, fluorocarbons used in air-conditioners and mobile air-conditioners are more than 1,000 times stronger greenhouse gases than CO₂. If 1 kg of fluorocarbons are emitted into the air accidentally, they will have the equivalent impact of more than 1 ton of CO₂.

Geographical pattern of surface warming

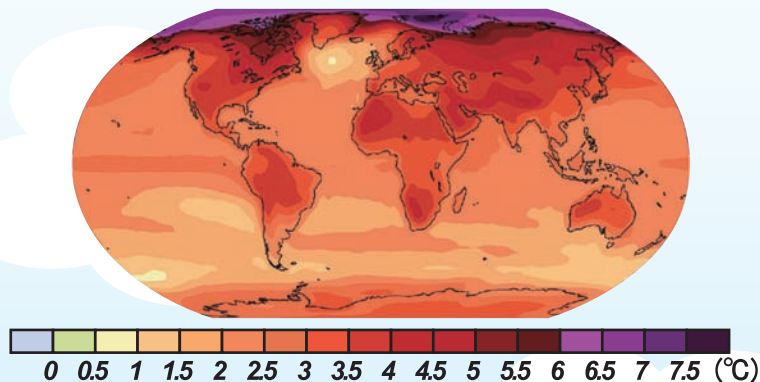


Figure : Projected surface temperature changes for the late 21st century (2090-2099). The map shows the multi-AOGCM average projection for the A1B SRES scenario. Temperatures are relative to the period 1980-1999.

Figures have been taken from IPCC third assessment report (2007)

Global warming potentials of CFC, HCFC and HFC (in comparison with CO₂ at equal weight)

1

CO₂

124

HFC-152a

1430

HFC-134a

1810

HCFC-22

4750

CFC-11

10900

CFC-12

14800

HFC-23

Figures have been taken from IPCC third assessment report (2007)

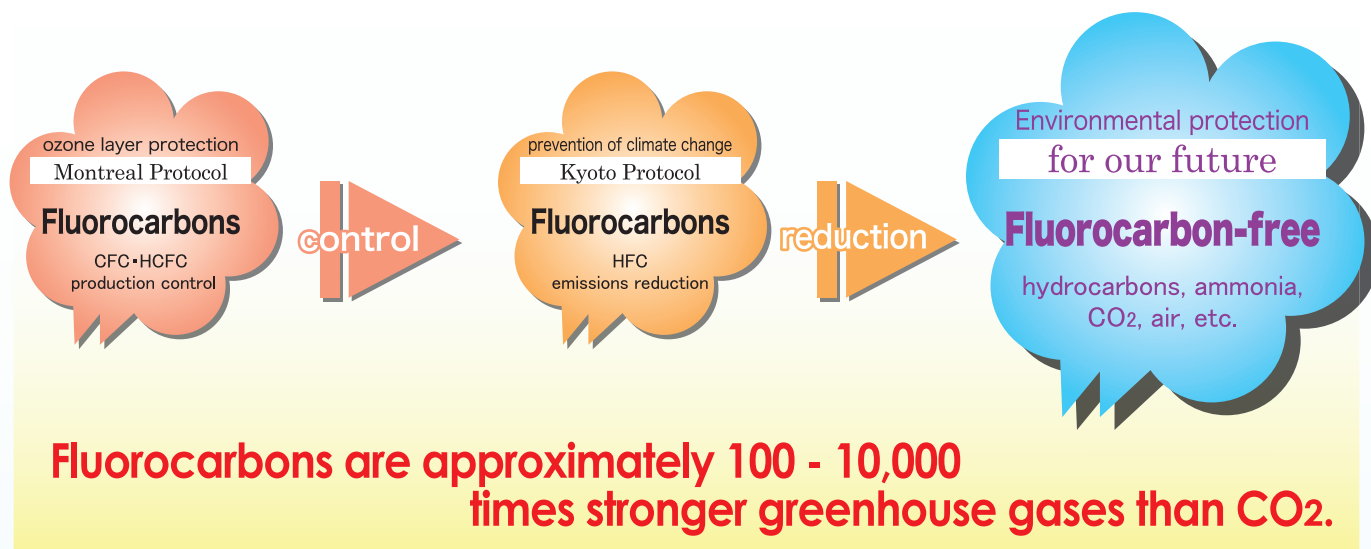
Global Developments in Action on Fluorocarbons

The world is moving forward to prevent climate change and protect the ozone layer

When ozone layer depletion was recognized as a global environmental problem caused by fluorocarbons, the "Montreal Protocol on Substances that Deplete the Ozone Layer" was adopted, under which production of CFCs has been completely phased out in developed countries including Japan. Global actions are also being taken for the phase-out of production of HCFCs, which were introduced as the alternatives to CFCs.

In addition, HFCs, the alternative to CFCs and HCFCs, are controlled under the "Kyoto Protocol" because they have a significant impact on climate change though they don't have any impact on ozone depletion.

In order to protect the ozone layer and prevent climate change, various measures are taken in Japan, including recovery and destruction of a fluorocarbons in equipment such as refrigerators and air-conditioners, and promotion of the use of alternative products.



Choose Fluorocarbon-Free Products

Our choices will change the future

Since fluorocarbons are a cause of climate change and ozone depletion, alternative technologies and products that do not use fluorocarbons are being developed. In Japan, to promote these products, government agencies are obliged to use fluorocarbon-free products in accordance with the "Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Law on Promoting Green Purchasing)" and the government provides subsidies to encourage companies to adopt fluorocarbon-free products.

Fluorocarbon-free products are being developed and marketed in many areas. In this pamphlet, we will introduce **Fluorocarbon-Free Air Dusters**. Please carefully consider whether you can choose a fluorocarbon-free product for the sake of the environment.



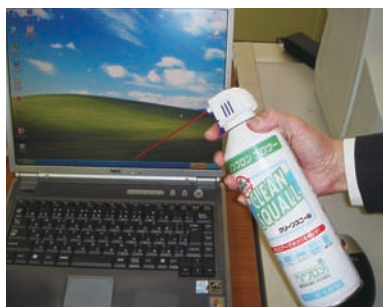
Label for
Fluorocarbon-Free
Products



Take a step towards combating climate change by choosing fluorocarbon-free products.

Fluorocarbon-Free Air Dusters • • • •

What is an air duster?



Air dusters, which emit a jet of high pressure gas, are used widely in maintenance of office appliances (computers, office automation equipment etc.) as well as precision equipment in factories and laboratories (electronic and optical equipment etc.), ATMs in banks and convenience stores, and automatic ticket gates etc. in stations, with the purpose of removing dust and static electricity and cooling the object. The demand for air dusters has grown strongly in parallel with the popularization

of computers etc. and in recent years approximately 6 million cans are sold every year.

Up to now, fluorocarbons have been used as the propellant in air dusters. As air dusters function by emitting the gas, all of the fluorocarbons are emitted to the atmosphere through the use of air dusters. In 2006, some 800,000 tons of CO₂ equivalent were emitted through air dusters, and this is equivalent to the CO₂ emissions of 80,000 people



under the assumption that a Japanese citizen be responsible for 10 tons.

The fluorocarbon propellants used in air dusters have changed from CFCs and HCFCs, the production of which is controlled under the Montreal Protocol, to HFCs which are one of the target gases of the Kyoto Protocol. Among various types of HFCs, there has been a shift of propellant from HFC134a with high GWP to HFC152a with lower GWP. Additionally, products using Dimethyl Ether (DME) or CO₂ as alternatives to fluorocarbons have recently begun to be marketed.

Comparison of Fluorocarbon-Based and Fluorocarbon-Free Products

	Name	Inflammability	Odor	GWP	Type	Pressure
fluorocarbon-based products	HFC134a	non-flammable	none	1430	aerosol can	low
	HFC152a	inflammable	none	124	aerosol can	low
	HFC152a/DME	inflammable	slight odor	<124	aerosol can	low
fluorocarbon-free products	DME/CO ₂	inflammable	slight odor	<1	aerosol can	low
	CO ₂	non-flammable	none	1	high-pressure gas cylinder	high

Types of Fluorocarbon-Free Air Dusters • • •

The types of fluorocarbon-free air duster available can be categorized into 1) Aerosol cans with mix of Dimethyl Ether(DME) and Carbon Dioxide (CO₂) gas, and 2) High pressure gas cylinders with Carbon Dioxide (CO₂). The switch to fluorocarbon-free products was difficult due to the necessary measures addressing the inflammability, high pressure and explosibility, but recently these points have been improved, and fluorocarbon-free air dusters are proactively being introduced in accordance with policies such as the Green Purchasing Law.

The features of fluorocarbon-free air dusters are as following.

1) DME/CO₂ mix gas type

- Ozone Depleting Potential: 0, Global Warming Potential: <1
- Comparable price to previous products
- To reduce risk of inflammation, a special absorbent is used in the can to prevent the injection of liquefied gas, which mixes DME with the CO₂ when sprayed.

2) CO₂ Type (high pressure gas cylinder type)

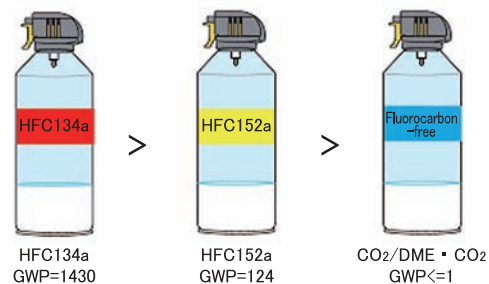
- Ozone Depleting Potential: 0, Global Warming Potential: 1
- No risk of inflammation
- Since the gas is at high pressure, a high pressure gas cylinder equipped with an automatic leakage device for high temperature situations is used
- Contents less than 100ml, which is exempted from the High Pressure Safety Law
- Gas cylinders can be replaced and reused

Gas	DME/CO ₂ mix gas	CO ₂	
Container type	Aerosol 2 piece can	High pressure gas cylinder	
		Cartridge style with replaceable cylinder	Used containers can be collected and reused
Contents	350ml	Less than 100ml (Exempted from the High Pressure Safety Law)	
Can weight (excluding gas)	200~250g	400~450g	250~300g
Measures against inflammation	Prevent inflammation by preventing injection of liquefied gas	No flammability, no risk of inflammation	
Measures against explosion, high pressure	Extra measures not necessary as the pressure is comparable to fluorocarbon products	High pressure, designed to allow automatic leakage from valve and cylinder at high temperatures. Have thick sides	
Sales price	Comparable price to fluorocarbon-based products	2-3 times price of fluorocarbon-based products	

※Fluorocarbon-free air dusters use inflammable and high pressure gases.
It is important to carefully read and follow the safety directions.

Points to Consider When Choosing Fluorocarbon-Free Air Dusters • • • • •

Fluorocarbon-free air dusters are labeled to show that they are fluorocarbon-free and contain CO₂ with Global Warming Potential of 1 or Dimethyl Ether (DME) with Global Warming Potential of less than 1. However, fluorocarbon (HFC)-based products also show “environmentally friendly” (because HFCs don’t damage the Ozone Layer), “Global Warming Potential one tenth” (the Global Warming Potential of HFC152a is 124, approximately one tenth of HFC134a),



None of the products harm the ozone layer, but their Global Warming Potential is markedly different

therefore it is important to confirm that a product is fluorocarbon-free when purchasing.

Major National Policies • • • • •

Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Law on Promoting Green Purchasing)

In accordance with the Law on Promoting Green Purchasing, evaluation criteria and factors for consideration in procurement of specific products are specified in the “Basic Policy on the Promotion of Procurement of Eco-Friendly Goods.”



Previously, government entities were supposed to consider purchasing air dusters without HFCs; but in February 2008, the Cabinet decided that it should become an evaluation criteria to use fluorocarbon-free products. From April 2008, government entities must fulfill the evaluation criteria when purchasing air dusters.

However, since there is danger of sparks, this does not apply to the sectors which require safety consideration. In addition, given the time to clear the stocks of fluorocarbon-based products, this is a transitional measure until March 31st 2009. For these uses and in this period, products which neither contain ozone-depleting substances nor substances with a Global Warming Potential higher than 150 are to be used.

When we maintain our equipment, it is important to choose fluorocarbon-free air dusters where suitable, or take options other than air dusters, in the light of prevention of climate change.



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