results have been reported in patients with carbon monoxide poisoning.[2,3] Its use has therefore been widely recommended, particularly in patients with severe poisoning. However, the availability of hyperbaric oxygen is limited, and it remains unclear which patients should receive therapy; a systematic review considered its value unproven.[1] A controlled trial[4] comparing hyperbaric oxygen with normobaric oxygen (at higher levels than commonly used) in patients with severe poisoning found no benefit from hyperbaric oxygen, but a later study[5] using a different regimen did find a reduction in cognitive sequelae. Hyperbaric oxygen has been successfully used in pregnant patients with carbon monoxide poisoning[6] and its use should possibly be considered earlier in pregnant patients due to the risks to the fetus from hypoxia.


1. Juurlink DN, *et al.* Hyperbaric oxygen for carbon monoxide poisoning. Available in The Cochrane Database of Systematic Reviews; Issue 1. Chichester: John Wiley; 2005 (accessed 20/06/08).
2. Gorman DF. Problems and pitfalls in the use of hyperbaric oxygen for the treatment of poisoned patients. *Med Toxicol Adverse Drug Exp* 1989; **4:** 393–9.
3. Hawkins M, *et al.* Severe carbon monoxide poisoning: outcome after hyperbaric oxygen therapy. *Br J Anaesth* 2000; **84:** 584–6.
4. Scheinkestel CD, *et al.* Hyperbaric or normobaric oxygen for acute carbon monoxide poisoning: a randomised controlled clinical trial. *Med J Aust* 1999; **170:** 203–10.
5. Weaver LK, *et al.* Hyperbaric oxygen for acute carbon monoxide poisoning. *N Engl J Med* 2002; **347:** 1057–67.
6. Van Hoesen KB, *et al.* Should hyperbaric oxygen be used to treat the pregnant patient for acute carbon monoxide poisoning: a case report and literature review. *JAMA* 1989; **261:** 1039–43. Correction. *ibid.* 1990; **263:** 2750.


### Uses

Carbon monoxide has been used in low concentrations as a tracer gas in measurements of lung function. Carbon monoxide labelled with carbon-11 may also be used to assess the blood volume.

## Chlorofluorocarbons

CFCs; Clorofluorocarbonos.

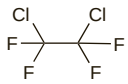
## Cryofluorane *(rINN)*

CFC-114; Criofluorano; Cryofluoranum; Dichlorotetrafluoroethane; Propellant 114; Refrigerant 114; Tetrafluorodichloroethane. 1,2-Dichloro-1,1,2,2-tetrafluoroethane.

Криофлуоран

$C_2Cl_2F_4$ = 170.9.

*CAS — 76-14-2.*



**Pharmacopoeias.** In *USNF.*

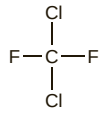
**USNF 26** (Dichlorotetrafluoroethane). A clear, colourless gas having a faint ethereal odour. Store in airtight cylinders at a temperature not exceeding 40°.

## Dichlorodifluoromethane

CFC-12; Diclorodifluorometano; Difluorodichloromethane; Propellant 12; Refrigerant 12.

$CCl_2F_2$ = 120.9.

*CAS — 75-71-8.*



**Pharmacopoeias.** In *USNF.*

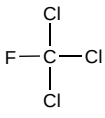
**USNF 26** (Dichlorodifluoromethane). A clear, colourless gas having a faint ethereal odour. Store in airtight cylinders at a temperature not exceeding 40°.

## Trichlorofluoromethane

CFC-11; Fluorotrichloromethane; Propellant 11; Refrigerant 11; Trichloromonofluoromethane; Triclorofluorometano.

$CCl_3F$ = 137.4.

*CAS — 75-69-4.*



NOTE. Trichlorofluoromethane is a gas above 24°.

**Pharmacopoeias.** In *USNF.*

**USNF 26** (Trichloromonofluoromethane). A clear, colourless gas having a faint ethereal odour. Store in airtight cylinders at a temperature not exceeding 40°.

### Profile

Chlorofluorocarbons are used as refrigerants and as aerosol propellants (p.1688). They may also be used as a spray for topical anaesthesia, the intense cold produced by the rapid evaporation of the spray making the tissues insensitive.

### Preparations

**Proprietary Preparations** (details are given in Part 3)

***Arg.:*** Algispray.

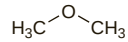
**Multi-ingredient:** ***Austral.:*** Derm-Freeze; ***USA:*** Aerofreeze; Fluori-Methane†; Fluro-Ethyl.

## Dimethyl Ether

Dimethyl Oxide; Éter dimetílico; Methoxymethane; Oxybismethane.

$C_2H_6O$ = 46.07.

*CAS — 115-10-6.*



### Profile

Dimethyl ether is used as a refrigerant, aerosol propellant (p.1688), and topical anaesthetic.

### Preparations

**Proprietary Preparations** (details are given in Part 3)

**Multi-ingredient:** ***Austral.:*** Histofreezer†; ***Fr.:*** Freeze; Histofreezer†; ***Irl.:*** Wartner; ***Israel:*** Wartner; ***NZ:*** Wartner; ***UK:*** Histofreezer; PR Freeze Spray; Ralgex Freeze Spray; Wartner; ***USA:*** Compound W Freeze Off.

## Helium

E939; Helio; Hélium.

He = 4.002602.

*CAS — 7440-59-7.*

*ATC — V03AN03.*

*ATC Vet — QV03AN03.*

**Pharmacopoeias.** In *Eur.* (see p.vii) and *US.*

**Ph. Eur. 6.2** (Helium). A colourless, inert gas. Store as a compressed gas or liquid at cryogenic temperatures, in appropriate containers.

**USP 31** (Helium). A colourless, odourless, tasteless gas which is not combustible and does not support combustion. Very slightly soluble in water. Store in cylinders.

### Profile

As helium is less dense than nitrogen, breathing a mixture of 80% helium and 20% oxygen requires less effort than breathing air. Thus mixtures containing various concentrations of oxygen ('Heliox') have been used in patients with respiratory disorders. Due to the low solubility of helium, mixtures of helium and oxygen are used by divers or others working under high pressure to prevent the development of decompression sickness (caisson disease); they are preferred to compressed air as they do not cause nitrogen narcosis. Helium has been used in pulmonary function testing.

Breathing helium increases vocal pitch and causes voice distortion. Cerebral artery gas embolism has been reported after inhalation of helium from a pressurised container.

◊ Reviews.


1. Rodrigo GJ, *et al.* Use of helium-oxygen mixtures in the treatment of acute asthma: a systematic review. *Chest* 2003; **123:** 891–6.
2. Colebourn CL, *et al.* Use of helium-oxygen mixture in adult patients presenting with exacerbations of asthma and chronic obstructive pulmonary disease: a systematic review. *Anaesthesia* 2007; **62:** 34–42.
3. Harris PD, Barnes R. The uses of helium and xenon in current clinical practice. *Anaesthesia* 2008; **63:** 284–93.


## Hydrochlorofluorocarbons

HCFCs; Hidroclorofluorocarbonos.

## Chlorodifluoroethane

Clorodifluoroetano; Propellant 142b; Refrigerant 142b. 1-Chloro-1,1-difluoroethane.

$C_2H_3ClF_2$ = 100.5.

*CAS — 75-68-3.*

## Chlorodifluoromethane

Clorodifluorometano; Propellant 22; Refrigerant 22.

$CHClF_2$ = 86.47.

*CAS — 75-45-6.*

### Profile

Hydrochlorofluorocarbons are used as refrigerants and as aerosol propellants (p.1688).

## Hydrofluorocarbons

HFAs; HFCs; Hidrofluorocarbonos; Hydrofluroalkanes.

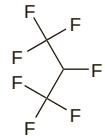
## Apaflurane *(BAN, rINN)*

Apaflurano; Apafluranum; Heptafluoropropane; HFA-227; HFC-227. 1,1,1,2,3,3,3-Heptafluoropropane.

Апафлуран

$C_3HF_7$ = 170.0.

*CAS — 431-89-0.*

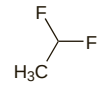


## Difluoroethane

Difluoroetano; Ethylene Fluoride; HFC-152a; Propellant 152a; Refrigerant 152a. 1,1-Difluoroethane.

$C_2H_4F_2$ = 66.05.

*CAS — 75-37-6.*



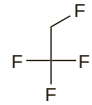
## Norflurane *(BAN, USAN, rINN)*

Fluorocarbon 134a; GR-106642X; HFA-134a; HFC-134a; Norflurano; Norfluranum; Propellant 134a; Refrigerant 134a. 1,1,1,2-Tetrafluoroethane.

Норфлуран

$C_2H_2F_4$ = 102.0.

*CAS — 811-97-2.*



### Profile

Hydrofluorocarbons are used as refrigerants and as aerosol propellants (p.1688). They are nonchlorinated and cause less ozone depletion than chlorinated fluorocarbons, which may lead to less detrimental effects on the environment. They are being used to replace chlorinated fluorocarbons as propellants in medicinal inhalers.

◊ References.


1. Denyer LH, *et al.* GR106642X, a non-chlorinated propellant for use in metered-dose inhalers: safety, tolerability and pharmacokinetics in healthy volunteers. *Br J Clin Pharmacol* 1994; **38:** 509P.
2. Taggart SCO, *et al.* GR106642X: a new, non-ozone depleting propellant for inhalers. *BMJ* 1995; **310:** 1639–40.


### Preparations

**Proprietary Preparations** (details are given in Part 3)

**Multi-ingredient:** ***USA:*** Gebauers Spray & Stretch.

## Hydrogen Sulfide

Hydrogen Sulphide; Siarkowodór; Sulfuro de hidrógeno; Sulphuretted Hydrogen.

$H_2S$ = 34.08.

*CAS — 7783-06-4.*

**Description.** Hydrogen sulfide is a colourless flammable gas with a characteristic odour.