



Major HFC, HFO and HCFOs; HCFC molecules used as feedstocks.

Environmental properties and main applications

Major HFC molecules

Designation	Complete Name	Formula	CAS number	GWP (1)			Atmospheric lifetime AR6 (4)	Main Applications
				F-Gas Regulation AR4 (2)	AR5 (3)	AR6 (4)		
HFC-23	trifluoromethane	CHF ₃	75-46-7	14800	12400	14600	228 years	<ul style="list-style-type: none"> • Very low temperature specialist refrigerant • By product in production of HCFC-22 and aluminium smelting • Used as a feedstock
HFC-32	difluoromethane	CH ₂ F ₂	75-10-5	675	677	771	5.4 years	<ul style="list-style-type: none"> • Refrigerant for air-conditioning • Component of refrigerants for air-conditioning, commercial refrigeration and heat pumps
HFC-125	pentafluoroethane	CHF ₂ CF ₃	354-33-6	3500	3170	3740	30 years	<ul style="list-style-type: none"> • Blend component for stationary air-conditioning, commercial refrigeration and heat pumps • Firefighting agent

HFC-134a	1,1,1,2-tetrafluoroethane	CH ₂ FCF ₃	811-97-2	1430	1300	1530	14 years	<ul style="list-style-type: none"> • Refrigerant for mobile air-conditioning applications (servicing only for cars) • Blend component for stationary-air conditioning and commercial refrigeration • Propellant for pharmaceutical aerosols (MDIs); and for technical aerosols, to meet national safety standards from 2018 • Blowing agent component for extruded polystyrene foams (XPS)
HFC-143a	1,1,1-trifluoroethane	CH ₃ CF ₃	420-46-2	4470	4800	5810	51 years	<ul style="list-style-type: none"> • Blend component for commercial refrigeration
HFC-152a	1,1-difluoroethane	CH ₃ CHF ₂	75-37-6	124	138	164	1.6 years	<ul style="list-style-type: none"> • Propellant for specialized industrial aerosols • Blowing agent component for extruded polystyrene foams (XPS)
HFC-227ea	1,1,1,2,3,3,3-heptafluoropropane	CF ₃ CHFCF ₃	431-89-0	3220	3350	3600	36 years	<ul style="list-style-type: none"> • Propellant for Pharmaceutical Aerosols (MDIs) • Firefighting Agent • Refrigerant for high-temperature environments
HFC-236fa	1,1,1,3,3,3-hexafluoropropane	CF ₃ CH ₂ CF ₃	690-39-1	9810	8060	8690	213 years	<ul style="list-style-type: none"> • Firefighting Agent • Refrigerant for high-temperature environments
HFC-245fa	1,1,1,3,3-pentafluoropropane	CHF ₂ CH ₂ CF ₃	460-73-1	1030	858	962	7.9 years	<ul style="list-style-type: none"> • Foam Blowing agent for Polyurethane (PUR) foams • Working fluid for organic rankine cycles (ORC)

HFC-365mfc	1,1,1,3,3-pentafluorobutane	CF ₃ CH ₂ CF ₂ CH ₃	406-58-6	794	804	914	8.9 years	<ul style="list-style-type: none"> • Foam Blowing agent for Polyurethane (PUR) and phenolic foams • Blend component for Solvents • Working fluid for organic rankine cycle (ORC)
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Major HFO and HCFO molecules

Designation	Complete Name	Formula	CAS number	GWP (1)			Atmospheric lifetime AR6 (4)	Ozone Depleting Substance (ODS)	Main Applications
				F-Gas Regulation AR4 (2) unless stated	AR5 (3) unless stated	AR6 (4)			
HFO-1234yf	2,3,3,3-tetrafluoroprop-1-ene	CF ₃ CF=CH ₂	754-12-1	4 (5)	<1	0.501	12 days (0.033 years)	No	<ul style="list-style-type: none"> • Refrigerant for mobile air-conditioning, stationary air conditioning and refrigeration • Blend component for HFC-HFO blends
HFO-1234ze(E)	Trans-1,3,3,3-tetrafluoroprop-1-ene	Trans-CF ₃ CH=CFH	29118-24-9	7 (5)	<1	1.37	19 days (0.052 years)	No	<ul style="list-style-type: none"> • Refrigerant for chillers, refrigeration • Blend component for HFC-HFO blends • Aerosol propellant • Blowing agent for insulation foams

HFO-1336mzz(Z)	Cis-1,1,1,4,4,4-hexafluorobut-2-ene	Cis- $\text{CF}_3\text{CH}=\text{CHCF}_3$	692-49-9	9	2 (6 & 3)	2.08	27 days (0.074 years)	No	<ul style="list-style-type: none"> Refrigerant for low pressure chillers, residential and high temperature heat pumps, refrigeration and air-conditioning Working fluid for organic rankine cycle (ORC) Fire extinguishant Blowing agent for insulation foams
HFO-1336mzz(E)	Trans-1,1,1,4,4,4-hexafluorobut-2-ene	Trans- $\text{CF}_3\text{CH}=\text{CHCF}_3$	66711-86-2		7 (6)	17.9	122 days (0.334 years)	No	<ul style="list-style-type: none"> Refrigerant for medium temperature applications heat pumps and refrigeration systems Working fluid for organic Rankine cycle (ORC)
HFO-1132a	1,1-difluoroethylene	$\text{CH}_2=\text{CF}_2$	75-38-7		<1	0.052	5 days (0.013 years)	No	<ul style="list-style-type: none"> Used as a component for ultra-low temperature refrigeration

HCFOs

HCFO-1233zd(E)	Trans 1-Chloro-3,3,3-trifluoroprop-1-ene	Trans- $\text{CHCl}=\text{CHCF}_3$	102687-65-0	4.5	1	3.88	42 days (0.116 years)	No, a VSLS (7)	<ul style="list-style-type: none"> Refrigerant for chiller applications, high temperature heat pumps Working fluid for organic rankine cycle (ORC) Blowing agent for Insulation foams Precision solvents
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Major HCFC molecules- used as feedstock

Designation	Complete Name	Formula	CAS number	GWP (1)			Atmospheric lifetime AR6 (4)	Ozone Depleting Potential (ODP)	Main Applications
				AR4 (2)	AR5 (3)	AR6 (4)			
HCFC-22	chlorodifluoromethane	CHClF ₂	75-45-6	1810	1760	1960	11.9 years	0.055	<ul style="list-style-type: none"> Used as feedstock for the production of PTFE and other fluorocarbons polymers
HCFC-142b	1-chloro-1,1-difluoro-ethane	CH ₃ CClF ₂	75-68-3	2310	1980	2300	18 years	0.065	<ul style="list-style-type: none"> Used as feedstock for the production of vinylidene difluoride for fluoropolymers

NOTES

- 1) See [Selecting and Using GWP Values](#).
- 2) [IPCC Fourth Assessment Report GWP values](#)
- 3) IPCC Working Group I – [The Physical Science Basis](#) – Chap.8 Annex 8.A.1, 5th Assessment Report
- 4) IPCC Working Group I- [Climate Change 2021, The Physical Science Basis](#)- 7.SM Chapter 7: The Earth's 2 energy budget, climate feedbacks and climate sensitivity - Supplementary Material
- 5) GWP according to the Report of the 2010 Assessment of the Scientific Assessment Panel (SAP) of the Montreal Protocol, Tables 1-11, citing two peer-reviewed scientific references.



- 6) Atmospheric chemistry of Z- and E-CF₃CH=CHCF₃, Freja F. Østerstrøm, Simone Thirstrup Andersen, Theis I. Sølling, Ole John Nielsena and Mads P. Sulbaek Andersen, Phys. Chem. Chem. Phys., 2017, 19, 735–750,
<https://pubs.rsc.org/en/content/articlehtml/2017/cp/c6cp07234h>
- 7) Very short-lived substances (VSLS) have chemical lifetimes comparable with tropospheric transport time scales, with the result that the amount of the substance in the atmosphere depends on where and when (time of year) it is released. In practice, this happens for species with atmospheric lifetimes of a few months or less. From a regulatory point of view this means that VSLS cannot be included in the normal categories of the Montreal Protocol; not only is their contribution to ozone depletion very low but it is highly variable between countries and regions. For more detail see [HCFOs, CF3I Stratospheric Ozone and Climate Change](#)