

Table 2.6. Lifetimes, radiative efficiencies, and direct global warming potentials (GWPs) relative to carbon dioxide, for the ODSs and their replacements.

Industrial Designation or Common Name	Chemical Formula	Other Name	Lifetime ^a (yr)	Radiative Efficiency ^a (W m ⁻² ppb ⁻¹)	Global Warming Potential for a Given Time Horizon				
					IPCC (1996) ^b 100 yr	IPCC (2001) & WMO (2003) 20 yr	IPCC (2001) & WMO (2003) 100 yr	500 yr	
Carbon dioxide	CO ₂		See text	See text	1	1	1	1	
Methane	CH ₄		12.0 ^e	3.7 × 10 ⁻⁴	21	63 ^c	23 ^c	7 ^c	
<i>Substances controlled by the Montreal Protocol</i>									
CFC-11	CCl ₃ F	Trichlorofluoromethane	45	0.25	3800	6330	4680	1630	
CFC-12	CCl ₂ F ₂	Dichlorodifluoromethane	100	0.32	8100	10,340	10,720	5230	
CFC-113	CCl ₂ FCClF ₂	1,1,2-Trichlorotrifluoroethane	85	0.3	4800	6150	6030	2700	
CFC-114	CClF ₂ CClF ₂	Dichlorotetrafluoroethane	300	0.31		7560	9880	8780	
CFC-115	CClF ₂ CF ₃	Monochloropentafluoroethane	1700	0.18		4990	7250	10,040	
Halon-1301	CBrF ₃	Bromotrifluoroethane	65	0.32	5400	7970	7030	2780	
Halon-1211	CBrClF ₂	Bromochlorodifluoroethane	16 ^d	0.3		4460	1860	578	
Halon-2402	CBrF ₂ CBrF ₂	Dibromotetrafluoroethane	20 ^d	0.33 ^d		3460 ^d	1620 ^d	505 ^d	
Carbon tetrachloride	CCl ₄		26 ^d	0.13	1400	2540 ^d	1380 ^d	437 ^d	
Methyl bromide	CH ₃ Br		0.7	0.01		16	5	1	
Bromochloromethane	CH ₂ BrCl		0.37 ^d						
Methyl chloroform	CH ₃ CCl ₃	1,1,1-Trichloroethane	5.0 ^d	0.06		476 ^d	144 ^d	45 ^d	
HCFC-22	CHClF ₂	Chlorodifluoromethane	12 ^d	0.20	1500	4850 ^d	1780 ^d	552 ^d	
HCFC-123	CHCl ₂ CF ₃	Dichlorotrifluoroethane	1.3 ^d	0.14 ^d	90	257 ^d	76 ^d	24 ^d	
HCFC-124	CHClF ₂ CF ₃	Chlorotetrafluoroethane	5.8 ^d	0.22	470	1950 ^d	599 ^d	186 ^d	
HCFC-141b	CH ₃ CCl ₂ F	Dichlorofluoroethane	9.3	0.14		2120	713	222	
HCFC-142b	CH ₃ CClF ₂	Chlorodifluoroethane	17.9 ^e	0.2	1800	5170	2270	709	
HCFC-225ca	CHCl ₂ CF ₂ CF ₃	Dichloropentafluoropropane	1.9 ^d	0.2 ^d		404 ^d	120 ^d	37 ^d	
HCFC-225cb	CHClF ₂ CClF ₂	Dichloropentafluoropropane	5.8 ^d	0.32		1910 ^d	586 ^d	182 ^d	
<i>Hydrofluorocarbons</i>									
HFC-23	CHF ₃	Trifluoromethane	270 ^d	0.19 ^e	11,700	11,100 ^f	14,310 ^f	12,100 ^f	
HFC-32	CH ₂ F ₂	Difluoromethane	4.9 ^d	0.11 ^e	650	2220 ^f	670 ^f	210 ^f	
HFC-125	CHF ₂ CF ₃	Pentafluoroethane	29	0.23	2800	5970	3450	1110	
HFC-134a	CH ₂ FCF ₃	1,1,1,2-Tetrafluoroethane	14 ^d	0.16 ^e	1300	3590 ^f	1410 ^f	440 ^f	
HFC-143a	CH ₃ CF ₃	1,1,1-Trifluoroethane	52	0.13	3800	5540	4400	1600	
HFC-152a	CH ₃ CHF ₂	1,1-Difluoroethane	1.4	0.09	140	411	122	38	
HFC-227ea	CF ₃ CH ₂ CF ₃	1,1,1,2,3,3,3-Heptafluoropropane	34.2 ^d	0.26 ^e	2900	4930 ^f	3140 ^f	1030 ^f	
HFC-236fa	CF ₃ CH ₂ CF ₃	1,1,1,3,3,3-Hexafluoropropane	240 ^d	0.28	6300	7620 ^d	9500 ^d	7700 ^d	
HFC-245fa	CHF ₂ CH ₂ CF ₃	1,1,1,3,3-Pentafluoropropane	7.6 ^d	0.28		3180 ^d	1020 ^d	316 ^d	
HFC-365mfc	CH ₃ CF ₂ CH ₂ CF ₃	1,1,1,3,3-Pentafluorobutane	8.6 ^d	0.21		2370 ^d	782 ^d	243 ^d	
HFC-43-10mee	CF ₃ CH ₂ CH ₂ CF ₂ CF ₃	1,1,1,2,3,4,4,5,5-Decafluoropentane	15.9 ^d	0.4	1300	3890 ^d	1610 ^d	502 ^d	
<i>Perfluorinated compounds</i>									
Sulphur hexafluoride	SF ₆		3200	0.52	23,900	15,290	22,450	32,780	
Nitrogen trifluoride	NF ₃		740	0.13		7780	10,970	13,240	
PFC-14	CF ₄	Carbon tetrafluoride	50,000	0.08	6500	3920	5820	9000	
PFC-116	C ₂ F ₆	Perfluoroethane	10,000	0.26	9200	8110	12,010	18,280	
PFC-218	C ₃ F ₈	Perfluoropropane	2600	0.26	7000	5940	8690	12,520	
PFC-318	c-C ₄ F ₈	Perfluorocyclobutane	3200	0.32	8700	6870	10,090	14,740	

Table 2.6. (continued)

Industrial Designation or Common Name	Chemical Formula	Other Name	Lifetime ^a (yr)	Radiative Efficiency ^a (W m ⁻² ppb ⁻¹)	Global Warming Potential for a Given Time Horizon			
					IPCC (1996) ^b 100 yr	20 yr	100 yr	500 yr
Perfluorinated compounds								
PFC-3-1-10	C ₄ F ₁₀	Perfluorobutane	2600	0.33	7000	5950	8710	12,550
PFC-5-1-14	C ₆ F ₁₄	Perfluorohexane	3200	0.49	7400	6230	9140	13,350
Fluorinated ethers								
HFE-449sI	CH ₃ O(CF ₂) ₂ CF ₃		5	0.31		1310	397	123
HFE-569sI2	CH ₃ CH ₂ O(CF ₂) ₃ CF ₃		0.77	0.3		189	56	17
HFE-347pcf2 ^g	CF ₃ CH ₂ OCF ₂ CHF ₂		7.1	0.25		1800	540	170
Hydrocarbons and other compounds^h								
Ethane	C ₂ H ₆	(R-170)	0.21 ⁱ	0.0032 ^j				
Cyclopropane	c-C ₃ H ₆	(C-270)	0.44 ⁱ					
Propane	C ₃ H ₈	(R-290)	0.041 ⁱ	0.0031 ^j				
n-Butane	CH ₃ (CH ₂) ₂ CH ₃	(R-600)	0.018 ⁱ	0.0047 ^j				
Isobutane	(CH ₃) ₂ CHCH ₃	(R-600a) 2-Methylpropane	0.019 ⁱ	0.0047 ^j				
Pentane	CH ₃ (CH ₂) ₃ CH ₃	(R-601)	0.010 ⁱ	0.0046 ^j				
Isopentane	(CH ₃) ₂ CHCH ₂ CH ₃	(R-601a) 2-Methylbutane	0.010 ⁱ					
Cyclopentane	c-C ₅ H ₁₀		0.008 ⁱ					
Ethylene	CH ₂ CH ₂	(R-1150) Ethene	0.004 ⁱ	0.035 ^j				
Propylene	CH ₃ CHCH ₂	(R-1270) 1-Propene	0.001 ⁱ					
Ammonia	NH ₃	(R-717)	a few days					
Dimethylether	CH ₃ OCH ₃		0.015	0.02		1 ^a	1 ^a	<<1 ^a
Methylene chloride	CH ₂ Cl ₂	Dichloromethane	0.38 ⁱ	0.03	9	35 ^a	10 ^a	3 ^a
Methyl chloride	CH ₃ Cl	Chloromethane	1.3	0.01		55 ^a	16 ^a	5 ^a
Ethyl chloride	CH ₃ CH ₂ Cl	Chloroethane	0.11 ^d					
Methyl formate	C ₂ H ₄ O ₂		0.16 ⁱ					
Isopropanol	CH ₃ CHOHCH ₃	Isopropyl alcohol	0.013 ⁱ					
Trichloroethylene	CCl ₂ CHCl	Trichlorethene	0.013 ⁱ					
FK-5-1-12	CF ₃ CF ₂ C(O)CF(CF ₃) ₂		0.038 ^k	0.3 ^l				
n-Propyl bromide	CH ₃ CH ₂ CH ₂ Br	1-Bromopropane, n-PB	0.04	0.3 ^l				

^a From IPCC (2001, Chapter 6).^b Values adopted under the UNFCCC for the national inventories.^c The lifetime of methane includes feedbacks on emissions (IPCC, 2001, Chapter 6), and GWPs include indirect effects (see Section 2.5.3.2).^d Updated in WMO (2003, Chapter 1).^e Updated from two averaged model results in Gohar *et al.* (2004) and rounded for consistency.^f Scaled for the updated radiative efficiency noted in (e).^g From original paper by Tokuhashi *et al.* (2000). IPCC (2001) erroneously referred to this compound as HFE-374pcf2.^h From direct effects only. Some values for indirect effects are given in Table 2.8.ⁱ Global lifetime estimated from a process lifetime, with respect to tropospheric OH calculated relative to 6.1 years for CH₃CCl₃, assuming an average temperature of 272 K.^j Highwood *et al.* (1999).^k Upper value reported by Taniguchi *et al.* (2003).^l Suggested as upper limit.