|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | Global Warming Potential for Given Time Horizon | | | |
| Industrial Designation or Common Name (years) | **Chemical Formula** | **Lifetime (years)** | **RadiativeEfficiency (W m–2 ppb–1)** | **SAR‡ (100-yr)** | **20-yr** | **100-yr** | **500-yr** |
| Carbon dioxide | CO2 | 30-95 | b1.4x10–5 | 1 | 1 | 1 | 1 |
| Methanec | CH4 | 12c | 3.7x10–4 | 21 | 72 | 25 | 7.6 |
| Nitrous oxide | N2O | 114 | 3.03x10–3 | 310 | 289 | 298 | 153 |
| Substances controlled by the Montreal Protocol | | | | | | | |
| CFC-11 | CCl3F | 45 | 0.25 | 3,800 | 6,730 | 4,750 | 1,620 |
| CFC-12 | CCl2F2 | 100 | 0.32 | 8,100 | 11,000 | 10,900 | 5,200 |
| CFC-13 | CClF3 | 640 | 0.25 |  | 10,800 | 14,400 | 16,400 |
| CFC-113 | CCl2FCClF2 | 85 | 0.3 | 4,800 | 6,540 | 6,130 | 2,700 |
| CFC-114 | CClF2CClF2 | 300 | 0.31 |  | 8,040 | 10,000 | 8,730 |
| CFC-115 | CClF2CF3 | 1,700 | 0.18 |  | 5,310 | 7,370 | 9,990 |
| Halon-1301 | CBrF3 | 65 | 0.32 | 5,400 | 8,480 | 7,140 | 2,760 |
| Halon-1211 | CBrClF2 | 16 | 0.3 |  | 4,750 | 1,890 | 575 |
| Halon-2402 | CBrF2CBrF2 | 20 | 0.33 |  | 3,680 | 1,640 | 503 |
| Carbon tetrachloride | CCl4 | 26 | 0.13 | 1,400 | 2,700 | 1,400 | 435 |
| Methyl bromide | CH3Br | 0.7 | 0.01 |  | 17 | 5 | 1 |
| Methyl chloroform | CH3CCl3 | 5 | 0.06 |  | 506 | 146 | 45 |
| HCFC-22 | CHClF2 | 12 | 0.2 | 1,500 | 5,160 | 1,810 | 549 |
| HCFC-123 | CHCl2CF3 | 1.3 | 0.14 | 90 | 273 | 77 | 24 |
| HCFC-124 | CHClFCF3 | 5.8 | 0.22 | 470 | 2,070 | 609 | 185 |
| HCFC-141b | CH3CCl2F | 9.3 | 0.14 |  | 2,250 | 725 | 220 |
| HCFC-142b | CH3CClF2 | 17.9 | 0.2 | 1,800 | 5,490 | 2,310 | 705 |
| HCFC-225ca | CHCl2CF2CF3 | 1.9 | 0.2 |  | 429 | 122 | 37 |
| HCFC-225cb | CHClFCF2CClF2 | 5.8 | 0.32 |  | 2,030 | 595 | 181 |
| Hydrofluorocarbons | | | | | | | |
| HFC-23 | CHF3 | 270 | 0.19 | 11,700 | 12,000 | 14,800 | 12,200 |
| HFC-32 | CH2F2 | 4.9 | 0.11 | 650 | 2,330 | 675 | 205 |
| HFC-125 | CHF2CF3 | 29 | 0.23 | 2,800 | 6,350 | 3,500 | 1,100 |
| HFC-134a | CH2FCF3 | 14 | 0.16 | 1,300 | 3,830 | 1,430 | 435 |
| HFC-143a | CH3CF3 | 52 | 0.13 | 3,800 | 5,890 | 4,470 | 1,590 |
| HFC-152a | CH3CHF2 | 1.4 | 0.09 | 140 | 437 | 124 | 38 |
| HFC-227ea | CF3CHFCF3 | 34.2 | 0.26 | 2,900 | 5,310 | 3,220 | 1,040 |
| HFC-236fa | CF3CH2CF3 | 240 | 0.28 | 6,300 | 8,100 | 9,810 | 7,660 |
| HFC-245fa | CHF2CH2CF3 | 7.6 | 0.28 |  | 3,380 | 1030 | 314 |
| HFC-365mfc | CH3CF2CH2CF3 | 8.6 | 0.21 |  | 2,520 | 794 | 241 |
| HFC-43-10mee | CF3CHFCHFCF2CF3 | 15.9 | 0.4 | 1,300 | 4,140 | 1,640 | 500 |
| Perfluorinated compounds | | | | | | | |
| Sulphur hexafluoride | SF6 | 3,200 | 0.52 | 23,900 | 16,300 | 22,800 | 32,600 |
| Nitrogen trifluoride | NF3 | 740 | 0.21 |  | 12,300 | 17,200 | 20,700 |
| PFC-14 | CF4 | 50,000 | 0.10 | 6,500 | 5,210 | 7,390 | 11,200 |
| PFC-116 | C2F6 | 10,000 | 0.26 | 9,200 | 8,630 | 12,200 | 18,200 |

**Global Warming Potential (GWP) of Atmospheric Gases**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | Global Warming Potential for Given Time Horizon | | | |
| Industrial Designation or Common Name (years) | **Chemical Formula** | **Lifetime (years)** | **RadiativeEfficiency (W m–2 ppb–1)** | **SAR‡ (100-yr)** | **20-yr** | **100-yr** | **500-yr** |
| Perfluorinated compounds (continued) | | | | | | | |
| PFC-218 |  | 2,600 | 0.26 | 7,000 | 6,310 | 8,830 | 12,500 |
| PFC-318 |  | 3,200 | 0.32 | 8,700 | 7,310 | 10,300 | 14,700 |
| PFC-3-1-10 |  | 2,600 | 0.33 | 7,000 | 6,330 | 8,860 | 12,500 |
| PFC-4-1-12 |  | 4,100 | 0.41 |  | 6,510 | 9,160 | 13,300 |
| PFC-5-1-14 |  | 3,200 | 0.49 | 7,400 | 6,600 | 9,300 | 13,300 |
| PFC-9-1-18 |  | >1,000d | 0.56 |  | >5,500 | >7,500 | >9,500 |
| trifluoromethyl sulphur pentafluoride |  | 800 | 0.57 |  | 13,200 | 17,700 | 21,200 |
| Fluorinated ethers | | | | | | | |
| HFE-125 |  | 136 | 0.44 |  | 13,800 | 14,900 | 8,490 |
| HFE-134 |  | 26 | 0.45 |  | 12,200 | 6,320 | 1,960 |
| HFE-143a |  | 4.3 | 0.27 |  | 2,630 | 756 | 230 |
| HCFE-235da2 |  | 2.6 | 0.38 |  | 1,230 | 350 | 106 |
| HFE-245cb2 |  | 5.1 | 0.32 |  | 2,440 | 708 | 215 |
| HFE-245fa2 |  | 4.9 | 0.31 |  | 2,280 | 659 | 200 |
| HFE-254cb2 |  | 2.6 | 0.28 |  | 1,260 | 359 | 109 |
| HFE-347mcc3 |  | 5.2 | 0.34 |  | 1,980 | 575 | 175 |
| HFE-347pcf2 |  | 7.1 | 0.25 |  | 1,900 | 580 | 175 |
| HFE-356pcc3 |  | 0.33 | 0.93 |  | 386 | 110 | 33 |
| HFE-449sl (HFE-7100) |  | 3.8 | 0.31 |  | 1,040 | 297 | 90 |
| HFE-569sf2 (HFE-7200) |  | 0.77 | 0.3 |  | 207 | 59 | 18 |
| HFE-43-10pccc124 (H-Galden 1040x) |  | 6.3 | 1.37 |  | 6,320 | 1,870 | 569 |
| HFE-236ca12 (HG-10) |  | 12.1 | 0.66 |  | 8,000 | 2,800 | 860 |
| HFE-338pcc13 (HG-01) |  | 6.2 | 0.87 |  | 5,100 | 1,500 | 460 |
| Perfluoropolyethers | | | | | | | |
| PFPMIE |  | 800 | 0.65 |  | 7,620 | 10,300 | 12,400 |
| Hydrocarbons and other compounds – Direct Effects | | | | | | | |
| Dimethylether |  | 0.015 | 0.02 |  | 1 | 1 | <<1 |
| Methylene chloride |  | 0.38 | 0.03 |  | 31 | 8.7 | 2.7 |
| Methyl chloride |  | 1.0 | 0.01 |  | 45 | 13 | 4 |

Notes:

a The CO2 response function used in this report is based on the revised version of the Bern Carbon cycle model used in [Chapter 10](http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch10.html) of this report (Bern2.5CC; Joos et al. 2001) using a background CO2 concentration value of 378 ppm. The decay of a pulse of CO2 with time t is given by

http://www.ipcc.ch/publications_and_data/ar4/wg1/en/fig/ch2-gr-3.jpeg

Where a0 = 0.217, a1 = 0.259, a2 = 0.338, a3 = 0.186, τ1 = 172.9 years, τ2 = 18.51 years, and τ3 = 1.186 years.

b The radiative efficiency of CO2 is calculated using the IPCC (1990) simplified expression as revised in the TAR, with an updated background concentration value of 378 ppm and a perturbation of +1 ppm (see [Section 2.10.2](http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html)).

c The perturbation lifetime for methane is 12 years as in the TAR (see also [Section 7.4](http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch7s7-4.html)). The GWP for methane includes indirect effects from enhancements of ozone and stratospheric water vapour (see [Section 2.10.3.1](http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-3.html#2-10-3-1)).

d Shine et al. (2005c), updated by the revised AGWP for CO2. The assumed lifetime of 1,000 years is a lower limit.

e Hurley et al. (2005)

f Robson et al. (2006)

g Young et al. (2006)