

HFC-125

Molecular Formula: CHF₂-CF₃
 CAS RN: 354-33-6
 Molecular Weight: 120.02

Global Atmospheric Lifetime (years): 23.7 (30)
 Tropospheric Atmospheric Lifetime (years): 24.8 (32)
 Stratospheric Atmospheric Lifetime (years): 532.3 (595)

	<i>Well-mixed</i>	<i>Lifetime and Stratosphere adjusted</i>
Radiative Efficiency (RE):	0.234	0.251 (0.23)
Global Warming Potential (GWP _H):		
GWP ₂₀		6393 (6280)
GWP ₁₀₀		3010 (3450)
Global Temperature Change Potentials (GTP _H):		
GTP ₂₀		5919 (6040)
GTP ₅₀		2605 (3350)
GTP ₁₀₀		748 (1180)

* RE units: W m² ppb⁻¹
 * GWP and GTP: Relative to CO₂
 * Italic values in () taken from WMO-2018

Atmospheric Loss Processes *****

OH Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{SAR}}(298 \text{ K}) = 2.37 \times 10^{-15}$$

$$k_{\text{SAR}}(272 \text{ K}) \approx 1.51 \times 10^{-15}$$

$$\tau_{\text{Global}}^{\text{OH}} = 23.8 \text{ years}$$

$$\tau_{\text{Trop}}^{\text{OH}} = 24.8 \text{ years}$$

$$\tau_{\text{Strat}}^{\text{OH}} = 609.8 \text{ years}$$

$$k_{\text{Rec}}(T) = 5.16 \times 10^{-13} \exp(-1670/T)$$

$$k_{\text{Rec}}(298 \text{ K}) = 1.9 \times 10^{-15}$$

$$k_{\text{Rec}}(272 \text{ K}) = 1.11 \times 10^{-15}$$

O(¹D) Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{Est}}(T) = 8.8 \times 10^{-12}$$

$$\tau_{\text{O}(\text{1D})} = 4226 \text{ years}$$

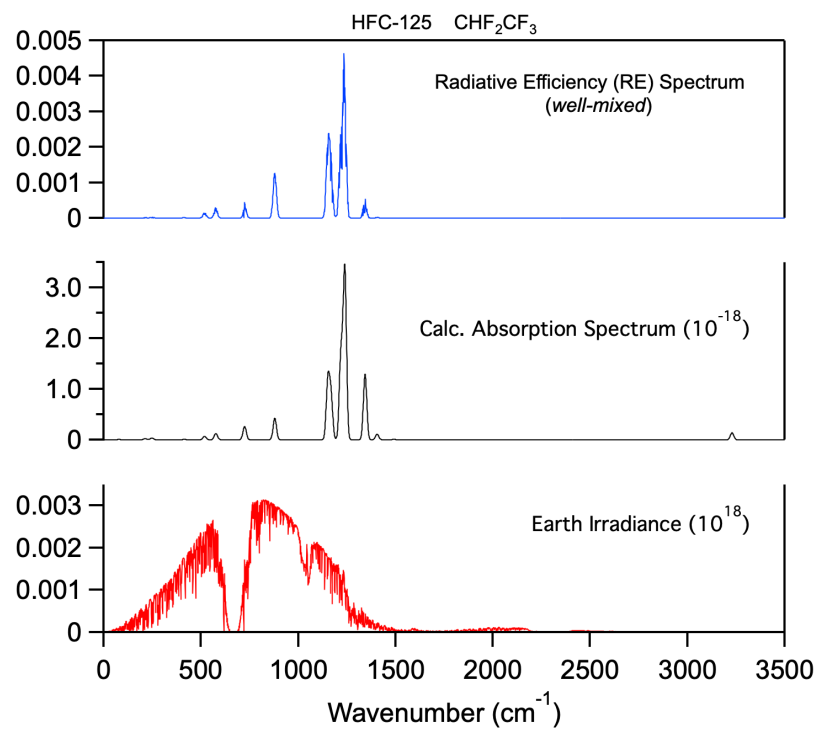
$$k_{\text{Rec}}(T) = 0.75 \times 9.5 \times 10^{-12} \exp(25/T)$$



Calculated Infrared Spectrum

Band Center (cm ⁻¹)	Band Strength (km mole ⁻¹)
78	1.1
213	2.9
248	4.5
364	0.1
414	1.1
518	8.8
576	15.4
583	0.7
724	33.9
879	54.6
1152	149.8
1168	107.8
1219	214.7
1239	429.8
1343	166.4
1405	14.2
1491	1.3
3229	17.9

Radiative Efficiency Spectrum



HFC-134

Molecular Formula: CHF₂-CHF₂
 CAS RN: 359-35-3
 Molecular Weight: 102.03

Global Atmospheric Lifetime (years): 7.79 (10)
 Tropospheric Atmospheric Lifetime (years): 8.11 (10.5)
 Stratospheric Atmospheric Lifetime (years): 198.4 (240)

	<i>Well-mixed</i>	<i>Lifetime and Stratosphere adjusted</i>
Radiative Efficiency (RE):	0.208	0.216 (0.19)

Global Warming Potential (GWP _H):	
GWP ₂₀	3445 (3625)
GWP ₁₀₀	1015 (1135)

Global Temperature Change Potentials (GTP _H):	
GTP ₂₀	2335 (2725)
GTP ₅₀	293 (440)
GTP ₁₀₀	143 (164)

* RE units: W m² ppb⁻¹
 * GWP and GTP: Relative to CO₂
 * Italic values in () taken from WMO-2018

Atmospheric Loss Processes *****

OH Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{SAR}}(298 \text{ K}) = 6.78 \times 10^{-15}$$

$$k_{\text{SAR}}(272 \text{ K}) \approx 4.62 \times 10^{-15}$$

$$\tau_{\text{Global}}^{\text{OH}} = 7.82 \text{ years}$$

$$\tau_{\text{Trop}}^{\text{OH}} = 8.11 \text{ years}$$

$$\tau_{\text{Strat}}^{\text{OH}} = 222.3 \text{ years}$$

$$k_{\text{Rec}}(T) = 1.6 \times 10^{-12} \exp(-1660/T)$$

$$k_{\text{Rec}}(298 \text{ K}) = 6.1 \times 10^{-15}$$

$$k_{\text{Rec}}(272 \text{ K}) = 3.58 \times 10^{-15}$$

O(¹D) Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{Est}}(T) = 2.0 \times 10^{-11}$$

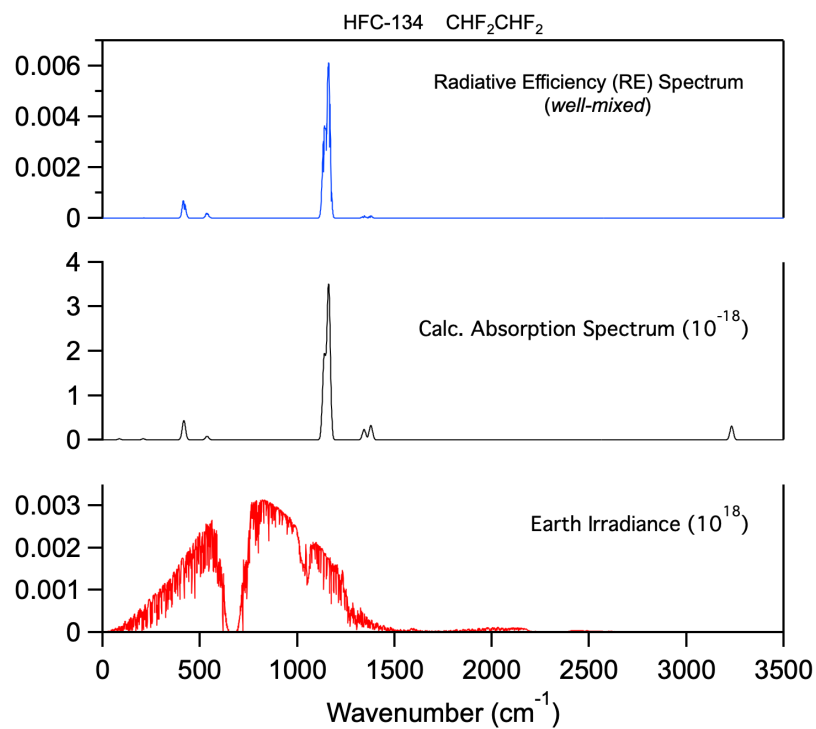
$$\tau_{\text{O}(\text{1D})} = 1850 \text{ years}$$

$$k_{\text{Rec}}(T) = NA$$

Calculated Infrared Spectrum

Band Center (cm ⁻¹)	Band Strength (km mole ⁻¹)
85	2.7
208	2.8
362	0
417	55.1
484	0
536	10.3
624	0
1124	0
1126	0
1138	235.7
1161	443.8
1190	0
1343	30.3
1378	42.2
1407	0
1512	0
3222	0
3232	40.3

Radiative Efficiency Spectrum



HFC-134a

Molecular Formula: CH₂F-CF₃
 CAS RN: 811-97-2
 Molecular Weight: 102.03

Global Atmospheric Lifetime (years): 14.5 (*14*)
 Tropospheric Atmospheric Lifetime (years): 15.3 (*14.1*)
 Stratospheric Atmospheric Lifetime (years): 269.4 (*267*)

	<i>Well-mixed</i>	<i>Lifetime and Stratosphere adjusted</i>
Radiative Efficiency (RE):	0.185	0.196 (<i>0.16</i>)

Global Warming Potential (GWP _H):		
GWP ₂₀		4725 (<i>3810</i>)
GWP ₁₀₀		1717 (<i>1360</i>)

Global Temperature Change Potentials (GTP _H):		
GTP ₂₀		3961 (<i>3170</i>)
GTP ₅₀		1007 (<i>770</i>)
GTP ₁₀₀		274 (<i>215</i>)

* RE units: W m² ppb⁻¹
 * GWP and GTP: Relative to CO₂
 * Italic values in () taken from WMO-2018

Atmospheric Loss Processes *****

OH Reactivity (cm³ molecule⁻¹ s⁻¹)

$k_{\text{SAR}}(298 \text{ K}) = 3.72 \times 10^{-15}$	$k_{\text{Rec}}(T) = 1.03 \times 10^{-12} \exp(-1620/T)$
$k_{\text{SAR}}(272 \text{ K}) \approx 2.44 \times 10^{-15}$	$k_{\text{Rec}}(298 \text{ K}) = 4.5 \times 10^{-15}$
	$k_{\text{Rec}}(272 \text{ K}) = 2.67 \times 10^{-15}$
$\tau_{\text{Global}}^{\text{OH}} = 14.7 \text{ years}$	
$\tau_{\text{Trop}}^{\text{OH}} = 15.3 \text{ years}$	
$\tau_{\text{Strat}}^{\text{OH}} = 394.8 \text{ years}$	

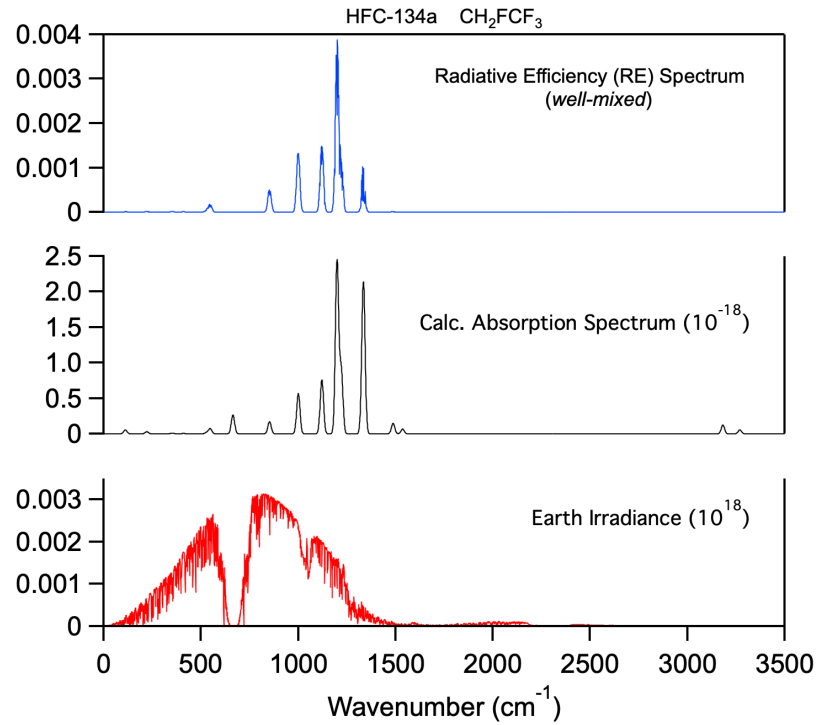
O(¹D) Reactivity (cm³ molecule⁻¹ s⁻¹)

$k_{\text{Est}}(T) = 4.4 \times 10^{-11}$	$k_{\text{Rec}}(T) = 0.35 \times 4.9 \times 10^{-11}$
$\tau_{\text{O}(\text{1D})} = 848 \text{ years}$	

Calculated Infrared Spectrum

Band Center (cm ⁻¹)	Band Strength (km mole ⁻¹)
111	7.1
221	3.7
352	1.3
410	0.7
529	2.5
547	9.3
664	34
852	22.1
1000	72.6
1121	97.8
1199	311.4
1221	112
1334	139.2
1335	135.6
1487	18.9
1536	8.5
3182	15.8
3269	7.2

Radiative Efficiency Spectrum



HFC-143

Molecular Formula: CH₂F-CHF₂
 CAS RN: 430-66-0
 Molecular Weight: 84.04

Global Atmospheric Lifetime (years): 3.36 (3.6)
 Tropospheric Atmospheric Lifetime (years): 3.49 (3.70)
 Stratospheric Atmospheric Lifetime (years): 95.8 (100)

	<i>Well-mixed</i>	<i>Lifetime and Stratosphere adjusted</i>
Radiative Efficiency (RE):	0.155	0.152 (0.13)

Global Warming Potential (GWP _H):	
GWP ₂₀	1376 (1250)
GWP ₁₀₀	375 (340)

Global Temperature Change Potentials (GTP _H):	
GTP ₂₀	615 (580)
GTP ₅₀	70 (64)
GTP ₁₀₀	52 (48)

* RE units: W m² ppb⁻¹
 * GWP and GTP: Relative to CO₂
 * Italic values in () taken from WMO-2018

Atmospheric Loss Processes *****

OH Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{SAR}}(298 \text{ K}) = 1.51 \times 10^{-14}$$

$$k_{\text{SAR}}(272 \text{ K}) \approx 1.07 \times 10^{-14}$$

$$\tau_{\text{Global}}^{\text{OH}} = 3.38 \text{ years}$$

$$\tau_{\text{Trop}}^{\text{OH}} = 3.49 \text{ years}$$

$$\tau_{\text{Strat}}^{\text{OH}} = 103.9 \text{ years}$$

$$k_{\text{Rec}}(T) = 3.9 \times 10^{-12} \exp(-1620/T)$$

$$k_{\text{Rec}}(298 \text{ K}) = 1.7 \times 10^{-14}$$

$$k_{\text{Rec}}(272 \text{ K}) = 1.01 \times 10^{-14}$$

O(¹D) Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{Est}}(T) = 3.0 \times 10^{-11}$$

$$\tau_{\text{O}(\text{1D})} = 1233 \text{ years}$$

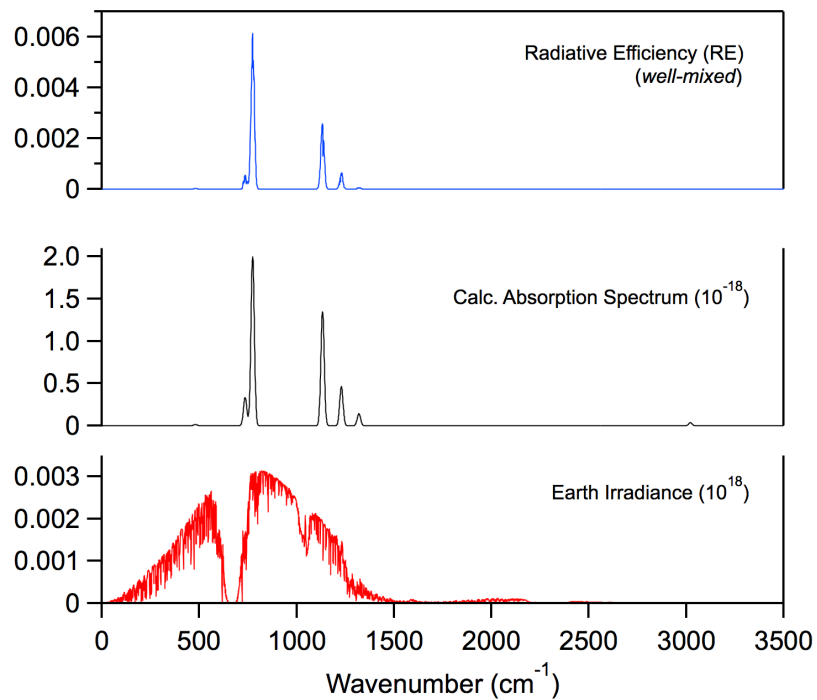
$$k_{\text{Rec}}(T) = NA$$



Calculated Infrared Spectrum

Band Center (cm ⁻¹)	Band Strength (km mole ⁻¹)
119	10.1
249	10
428	5.4
479	21.9
577	4.4
929	43.6
1094	41.1
1118	257.8
1159	33.8
1186	72.3
1284	10.7
1366	21.9
1429	25
1499	12.7
1537	6.9
3176	18.5
3225	24.3
3263	17.5

Radiative Efficiency Spectrum



HFC-143a

Molecular Formula: CH₃-CF₃
 CAS RN: 420-46-2
 Molecular Weight: 84.04

Global Atmospheric Lifetime (years): 36.3 (51)
 Tropospheric Atmospheric Lifetime (years): 39.5 (57)
 Stratospheric Atmospheric Lifetime (years): 441.9 (612)

	<i>Well-mixed</i>	<i>Lifetime and Stratosphere adjusted</i>
Radiative Efficiency (RE):	0.139	0.150 (0.16)

Global Warming Potential (GWP _H):		
GWP ₂₀		6207 (7050)
GWP ₁₀₀		3732 (5080)

Global Temperature Change Potentials (GTP _H):		
GTP ₂₀		6064 (7110)
GTP ₅₀		3768 (5390)
GTP ₁₀₀		1510 (2830)

* RE units: W m² ppb⁻¹
 * GWP and GTP: Relative to CO₂
 * Italic values in () taken from WMO-2018

Atmospheric Loss Processes *****

OH Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{SAR}}(298 \text{ K}) = 1.54 \times 10^{-15}$$

$$k_{\text{SAR}}(272 \text{ K}) \approx 9.47 \times 10^{-16}$$

$$\tau_{\text{Global}}^{\text{OH}} = 37.9 \text{ years}$$

$$\tau_{\text{Trop}}^{\text{OH}} = 39.5 \text{ years}$$

$$\tau_{\text{Strat}}^{\text{OH}} = 926.7 \text{ years}$$

$$k_{\text{Rec}}(T) = 1.07 \times 10^{-12} \exp(-2000/T)$$

$$k_{\text{Rec}}(298 \text{ K}) = 1.3 \times 10^{-15}$$

$$k_{\text{Rec}}(272 \text{ K}) = 6.86 \times 10^{-16}$$

O(¹D) Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{Est}}(T) = 4.4 \times 10^{-11}$$

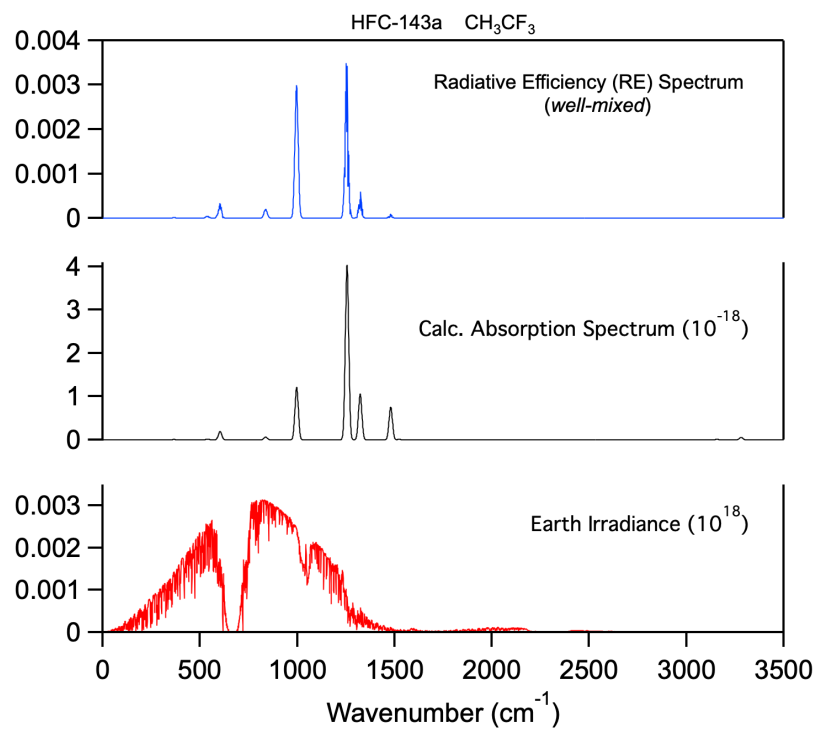
$$\tau_{\text{O}(\text{1D})} = 844.8 \text{ years}$$

$$k_{\text{Rec}}(T) = 0.65 \times 5.6 \times 10^{-11} \exp(20/T)$$

Calculated Infrared Spectrum

Band Center (cm ⁻¹)	Band Strength (km mole ⁻¹)
229	0
366	0.5
367	0.5
538	1.1
539	1.1
603	24.8
837	8.1
996	78.1
997	77.6
1255	259.2
1256	259.9
1323	135.7
1480	97.2
1523	0.7
1523	0.7
3157	1.3
3281	3.5
3281	3.6

Radiative Efficiency Spectrum



HFC-152

Molecular Formula: CH₂F-CH₂F
 CAS RN: 624-72-6
 Molecular Weight: 66.05

Global Atmospheric Lifetime (years): 0.73 (172 days)
 Tropospheric Atmospheric Lifetime (years): 0.76 (172 days)
 Stratospheric Atmospheric Lifetime (years): 25.5

	<i>Well-mixed</i>	<i>Lifetime and Stratosphere adjusted</i>
Radiative Efficiency (RE):	0.077	0.058 (0.04)

Global Warming Potential (GWP _H):	
GWP ₂₀	146 (64)
GWP ₁₀₀	40 (17)

Global Temperature Change Potentials (GTP _H):	
GTP ₂₀	46 (20)
GTP ₅₀	7 (3.0)
GTP ₁₀₀	5 (2.4)

* RE units: W m² ppb⁻¹
 * GWP and GTP: Relative to CO₂
 * Italic values in () taken from WMO-2018

Atmospheric Loss Processes *****

OH Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{SAR}}(298 \text{ K}) = 6.49 \times 10^{-14}$$

$$k_{\text{SAR}}(272 \text{ K}) \approx 4.95 \times 10^{-14}$$

$$\tau_{\text{Global}}^{\text{OH}} = 0.738 \text{ years}$$

$$\tau_{\text{Trop}}^{\text{OH}} = 0.76 \text{ years}$$

$$\tau_{\text{Strat}}^{\text{OH}} = 26.2 \text{ years}$$

$$k_{\text{Rec}}(T) = 1.05 \times 10^{-12} \exp(-710/T)$$

$$k_{\text{Rec}}(298 \text{ K}) = 9.7 \times 10^{-14}$$

$$k_{\text{Rec}}(272 \text{ K}) = 7.72 \times 10^{-14}$$

O(¹D) Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{Est}}(T) = 4.0 \times 10^{-11}$$

$$\tau_{\text{O}(\text{1D})} = 925 \text{ years}$$

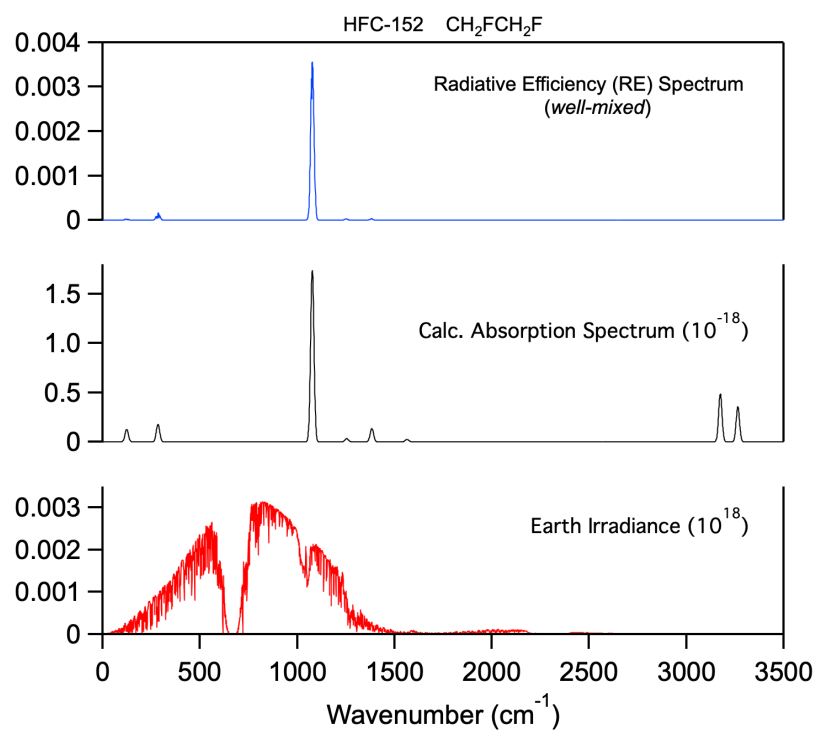
$$k_{\text{Rec}}(T) = NA$$



Calculated Infrared Spectrum

Band Center (cm ⁻¹)	Band Strength (km mole ⁻¹)
123	16.1
284	22.8
460	0
836	0.1
1070	0
1077	223.4
1133	0
1191	0
1254	4.2
1324	0
1383	17.5
1490	0
1561	0
1564	3.2
3171	0.5
3174	62.2
3243	0
3264	45.9

Radiative Efficiency Spectrum



HFC-152a

Molecular Formula: CH₃-CHF₂
 CAS RN: 75-37-6
 Molecular Weight: 66.05

Global Atmospheric Lifetime (years): 3.55 (1.6)
 Tropospheric Atmospheric Lifetime (years): 3.71 (1.55)
 Stratospheric Atmospheric Lifetime (years): 83.7 (39)

	<i>Well-mixed</i>	<i>Lifetime and Stratosphere adjusted</i>
Radiative Efficiency (RE):	0.124	0.122 (0.10)

Global Warming Potential (GWP _H):	
GWP ₂₀	1483 (545)
GWP ₁₀₀	405 (148)

Global Temperature Change Potentials (GTP _H):	
GTP ₂₀	680 (190)
GTP ₅₀	76 (26)
GTP ₁₀₀	56 (21)

* RE units: W m² ppb⁻¹
 * GWP and GTP: Relative to CO₂
 * Italic values in () taken from WMO-2018

Atmospheric Loss Processes *****

OH Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{SAR}}(298 \text{ K}) = 1.42 \times 10^{-14}$$

$$k_{\text{SAR}}(272 \text{ K}) \approx 1.01 \times 10^{-14}$$

$$\tau_{\text{Global}}^{\text{OH}} = 3.59 \text{ years}$$

$$\tau_{\text{Trop}}^{\text{OH}} = 3.71 \text{ years}$$

$$\tau_{\text{Strat}}^{\text{OH}} = 109.8 \text{ years}$$

$$k_{\text{Rec}}(T) = 8.7 \times 10^{-13} \exp(-975/T)$$

$$k_{\text{Rec}}(298 \text{ K}) = 3.3 \times 10^{-14}$$

$$k_{\text{Rec}}(272 \text{ K}) = 2.41 \times 10^{-14}$$

O(¹D) Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{Est}}(T) = 1.05 \times 10^{-10}$$

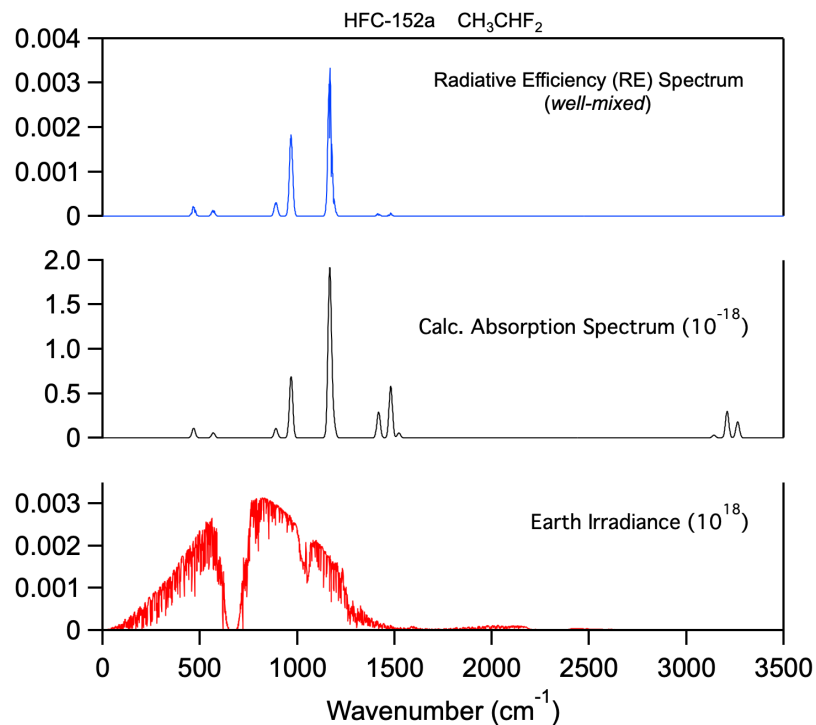
$$\tau_{\text{O}(\text{1D})} = 352.4 \text{ years}$$

$$k_{\text{Rec}}(T) = 0.55 \times 1.75 \times 10^{-10}$$

Calculated Infrared Spectrum

Band Center (cm ⁻¹)	Band Strength (km mole ⁻¹)
238	0
3886	0
467	13.8
568	7.3
890	13.6
968	88.6
1165	150.6
1169	101.24
1187	23.988
1416	5.466
1418	32.01
1480	74.7
1522	1.03
1522	5.9
3141	3.9
3209	38.1
3260	9.5
3265	14.9

Radiative Efficiency Spectrum



HFC-161

Molecular Formula: CH₃-CH₂F
 CAS RN: 353-36-6
 Molecular Weight: 48.06

Global Atmospheric Lifetime (years): 0.23 (*80 days*)
 Tropospheric Atmospheric Lifetime (years): 0.23 (*80 days*)
 Stratospheric Atmospheric Lifetime (years): 25

	<i>Well-mixed</i>	<i>Lifetime and Stratosphere adjusted</i>
Radiative Efficiency (RE):	0.049	0.023 (<i>0.02</i>)

Global Warming Potential (GWP _H):	
GWP ₂₀	24 (<i>20</i>)
GWP ₁₀₀	7 (<i>6</i>)

Global Temperature Change Potentials (GTP _H):	
GTP ₂₀	7 (<i>6</i>)
GTP ₅₀	1 (<i><1</i>)
GTP ₁₀₀	1 (<i><1</i>)

* RE units: W m² ppb⁻¹
 * GWP and GTP: Relative to CO₂
 * Italic values in () taken from WMO-2018

Atmospheric Loss Processes *****

OH Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{SAR}}(298 \text{ K}) = 2.06 \times 10^{-13}$$

$$k_{\text{SAR}}(272 \text{ K}) \approx 1.65 \times 10^{-13}$$

$$\tau_{\text{Global}}^{\text{OH}} = 0.23 \text{ years}$$

$$\tau_{\text{Trop}}^{\text{OH}} = 0.23 \text{ years}$$

$$\tau_{\text{Strat}}^{\text{OH}} = 25 \text{ years}$$

$$k_{\text{Rec}}(T) = 2.5 \times 10^{-12} \exp(-730/T)$$

$$k_{\text{Rec}}(298 \text{ K}) = 2.2 \times 10^{-13}$$

$$k_{\text{Rec}}(272 \text{ K}) = 1.71 \times 10^{-13}$$

O(¹D) Reactivity (cm³ molecule⁻¹ s⁻¹)

$$k_{\text{Est}}(T) = 4.7 \times 10^{-11}$$

$$\tau_{\text{O}(\text{1D})} = 791 \text{ years}$$

$$k_{\text{Rec}}(T) = 0.82 \times 2.6 \times 10^{-10}$$



Calculated Infrared Spectrum

Band Center (cm ⁻¹)	Band Strength (km mole ⁻¹)
265	0.6
413	6.7
832	0.3
903	26.1
1097	90.8
1147	12.2
1212	4
1321	0
1427	3.5
1466	32.9
1517	5.5
1537	2.3
1558	0.5
3126	13.5
3153	43.8
3222	14.8
3234	24.8
3252	41.5

Radiative Efficiency Spectrum

