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Ultraviolet absorption cross-sections of photoactive species of stratospheric interest

Part 1 : The Halocarbons

by

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Foreword

This note gives the results of ultraviolet absorption cross-section measurements of halogenated compounds of methane and ethane as a function of temperature, obtained at the Belgian Institute for Space Aeronomy. This study, undertaken under the impulse of Prof. Marcel Nicolet, also presents contributions of Mrs. N. Van Laethem-Meurée, Mr. L. Dierickx and Mr. J. Wisemberg. The results obtained by other laboratories on the same compounds are also given for comparison purposes.

Avant-propos

Cette note synthétise les résultats des mesures de sections efficaces d'absorption dans l'ultraviolet de composés halogénés du méthane et de l'éthane, en fonction de la température, obtenus à l'Institut d'Aéronomie Spatiale de Belgique. Ces études ont été entreprises sous l'impulsion du Professeur Marcel Nicolet et sont le fruit du travail de toute une équipe qui inclut les contributions de Mme N. Van Laethem-Meurée, M. L. Dierickx, et M. J. Wisemberg. A des fins de comparaison, les résultats obtenus par d'autres laboratoires sur ces mêmes composés sont également présentés.

Voorwoord

Dit artikel toont resultaten van metingen over ultraviolette absorptiedoorsneden van gehalogeneerde methaan- en ethaanverbindingen afhankelijk van de temperatuur, bekomen in het Belgisch Instituut voor Ruimte-Aëronomie. Deze studie werd ondernomen onder impuls van Prof. Marcel Nicolet en geeft eveneens de bijdragen van Mw. Van Laethem-Meurée, M. L. Dierickx en M. J. Wisemberg. Ter vergelijking, worden de resultaten bekomen door andere laboratoria over dezelfde verbindingen eveneens medegedeeld.

Vorwort

Dieser Artikel zeigt Resultaten von Messungen über ultravioletten Absorptionquerschnitten von halogenierten Methan- und Ethanverbindungen abhängig von der Temperatur, bekommen im Belgischen Institut für Raum-Aeronomie. Diese Studie wurde unternommen unter dem Impuls von Prof. Marcel Nicolet und gibt auch Beitragen von Fr. Van Laethem-Meurée, Herr L. Dierickx und Herr J. Wisemberg. Zum Vergleich werden die Resultaten bekommen bei anderen Laboratorien über diese Verbindungen auch gegeben.

ULTRAVIOLET ABSORPTION CROSS_SECTIONS OF PHOTOACTIVE SPECIES OF STRATOSPHERIC INTEREST

Part 1 : The Halocarbons.

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ABSTRACT

Ultraviolet absorption cross-section values of 31 halocarbons of atmospheric interest are presented as a function of wavelength and temperature. Polynomial formulae to compute the absorption cross-sections for given temperature and wavelength ranges are also proposed.

RESUME

Les valeurs des sections efficaces d'absorption dans l'ultraviolet de 31 halocarbures, ayant un intérêt atmosphérique, sont présentées en fonction de la longueur d'onde et de la température. Des expressions polynomiales, permettant de calculer les sections efficaces d'absorption pour des intervalles de longueur d'onde et de température donnés, sont également proposées.

SAMEVATTING

De waarden van de werkzame absorptiedoorsneden in het ultraviolet van 31 halocarbonen die een atmosferisch belang vertonen, worden voorgesteld afhankelijk van de golflengte en van de temperatuur. Polynomiale formules die toelaten de werkzame absorptiedoorsneden te berekenen voor gegeven golflengte- en temperatuurintervallen, worden eveneens voorgesteld.

ZUSAMMENFASSUNG

Die Werte der Absorptionquerschnitten im Ultraviolet von 31 Halokarbonen die atmosphärisch wichtig sind, werden vorgestellt abhängig von der Wellenlänge und der Temperatuur. Polynomiale Formeln die zulassen die Absorptionquerschnitten zu berechnen für gegeben Wellenlängte- une Temperaturintervallen, werden auch vorgestellt.

INTRODUCTION.

It is well known that a significant mechanism of destruction of stratospheric ozone is the catalytic cycles involving halogen radicals. These radicals are produced, for a not negligible fraction, by the ultraviolet photodissociation of halocarbons, mainly, chloro-, chloro-fluoro-, bromo-, bromofluoro-methanes and ethanes.

The knowledge of accurate cross-sections with their eventual temperature dependence is needed for photodissociation calculations, and then, for modelling calculations of the stratospheric photochemistry of ozone.

The purpose of this compilation is to give an updated overview of the measurements of ultraviolet absorption cross-sections of halocarbons of interest for stratospheric chemistry.

Tables of the absorption cross-sections values proposed by different laboratories are presented in the three first parts of this paper : the first one deals with the chloro- and chlorofluoromethanes, the second with the chloro and chlorofluoro-ethanes and ethylenes, and the third one with the brominated compounds.
In each part, and for each species, the absorption cross-sections are also represented on a figure as well as the relative absorption cross-section at room temperature (the measurements performed in our laboratory being taken as reference), when more than one study is available.

In the last part, the parameters A_i and B_i of the polynomial equation :

$$\mathrm{Log}_{10}\,\sigma(\lambda,T) = A_0 + A_1\lambda + \ldots + A_n\lambda^n + (T-273)\times (B_0 + B_1\lambda + \ldots + B_n\lambda^n) \qquad (1)$$

are presented in the cases where such a polynomial expression is proposed by the authors.

The only published error budget (Simon et al., 1988a), quoted uncertainties on the absorption cross-section values of the order of +/- 2%, at room temperature, increasing from +/- 3% to +/- 4 % at lower temperatures and for absorption cross-section values lower than 2×10^{-21} cm^2 $molec.^{-1}$. These uncertainties are applicable for the values published by Simon et al. (1988a, 1988b), Gillotay and Simon (1988a, 1988b), Gillotay et al. (1988a, 1988b), Gillotay et al. (1989a, 1989b) and Gillotay and Simon (1990).
It must be pointed out that this error budget, reproduced below, is only applicable when incident and transmitted fluxes are measured in the same conditions of temperature and when transmitted fluxes taken into account in the cross-sections calculation are limited between 15 and 80 % of the incident flux in order to get data only in the range where Beer-Lambert law is still applicable. An example of absorption cross-sections determined for different pressure conditions using an unlimited range of transmitted flux is illustrated in figure 1.

The measurements of Hubrich and Stuhl, (1982); Robbins (1976a, 1976b) and Robbins and Stolarski, (1976) are given with an accuracy in the range of 2-3 % at ambient temperature

Details on experimental techniques are not described and the reader has to refer to the original paper for more informations (see reference list).

The values reported in this compilation are available on PC compatible floppy disk, coded in ASCII.

ERROR BUDGET

T = 295 K	%
Optical path (200 cm ± 0.1 cm)	0.05
Pressure (in the range 10^{3}-2x10^{-3} torr)	0.1
Impurities in the sample	0.1
Temperature (± 0.1 K at 300 K)	0.03
Absorbance $\ln(I_0/I)$ for τ = 1	2.0
Total r.m.s. error (2σ)	± 2.00

T = 210 K	%	%
Optical path (200 cm ± 0.1 cm)	0.05	
Pressure (in the range 10^{3}-2x10^{-3} torr)	0.1	
Impurities in the sample	0.1	
Temperature (± 2 K at 210 K)	1.0	
cross-section dependence on T error	1.0	
Absorbance $\ln(I_0/I)$ for τ = 1	2.0	
= 0.6 (min value considered)		3.3
Total r.m.s. error (2σ)	± 2.47	± 3.62

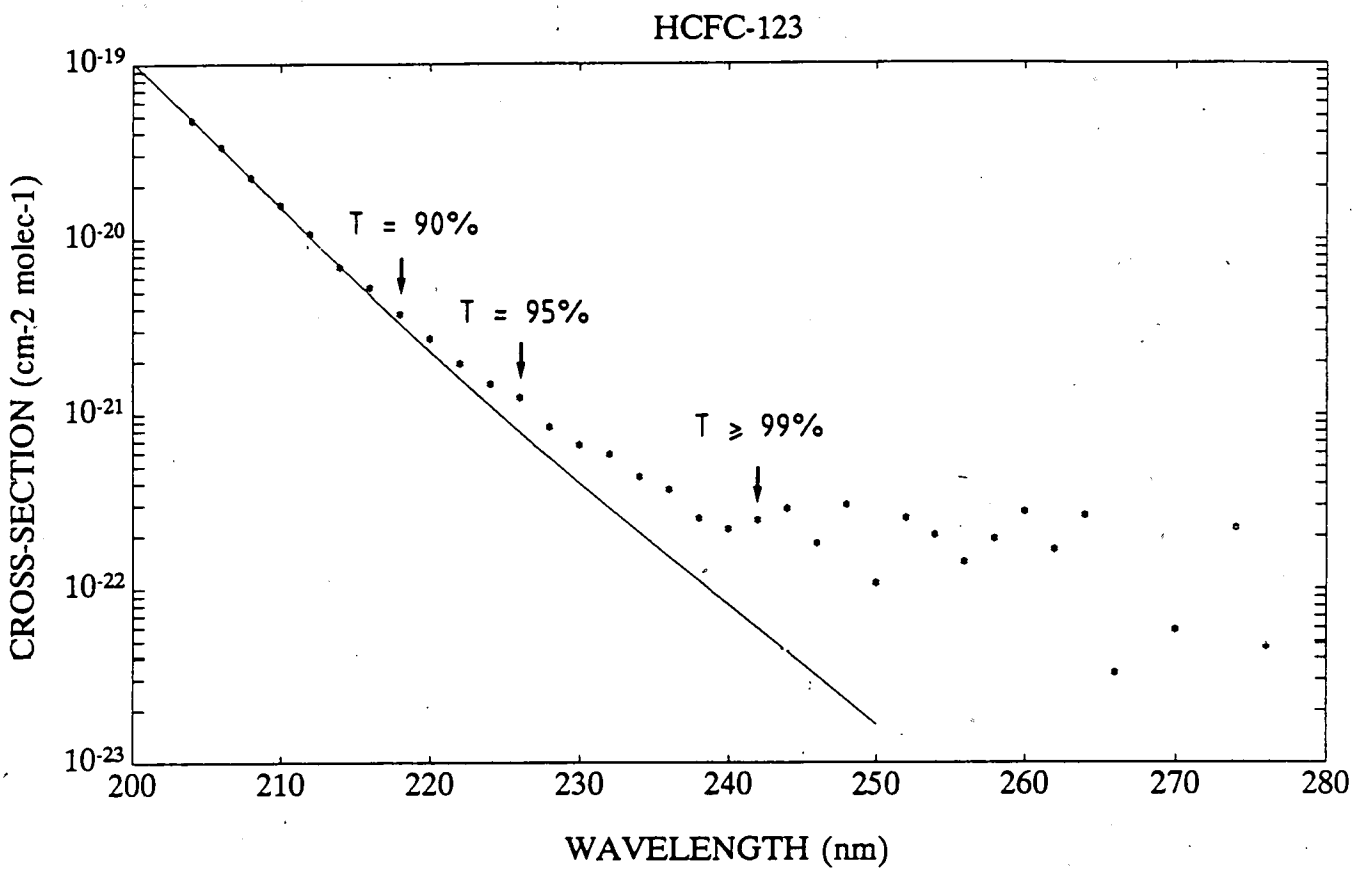

Figure 1. Comparison between cross-section values obtained for one pressure condition with unlimited range of transmitted flux (*) , and for various pressure conditions considering limited range of transmitted fluxes (———).
T = 90 % means Transmission = 90 %

I. Chloro- and chlorofluoro- methanes.

1. CH_3Cl
2. CH_2Cl_2
3. $CHCl_3$
4. CCl_4
5. CF_3Cl
6. CF_2Cl_2
7. $CFCl_3$
8. CHF_2Cl
9. $CHFCl_2$
10. CH_2FCl

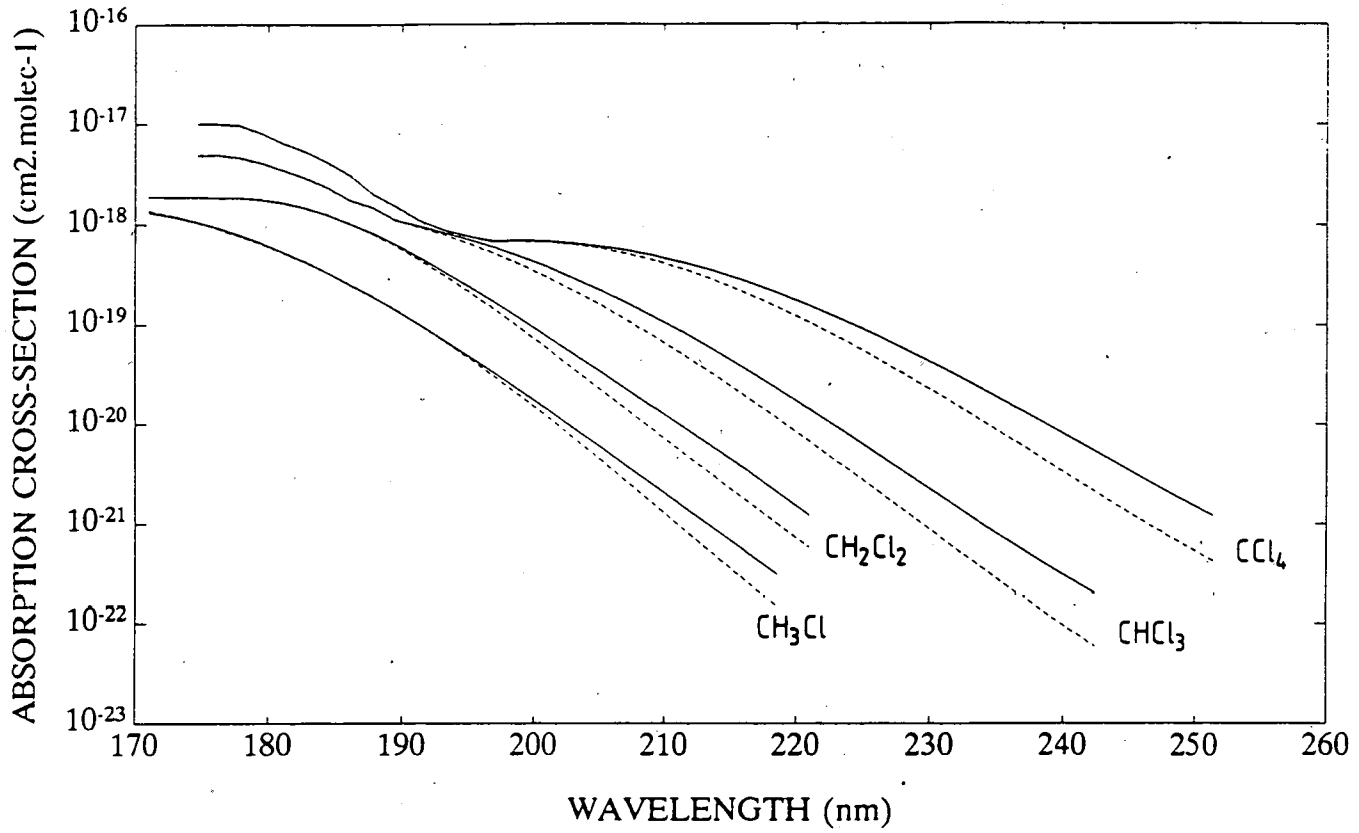

Figure 2. U.V. Absorption cross-sections of chloromethanes as a function of wavelength.

(———) : T = 295 K
(-----) : T = 210 K

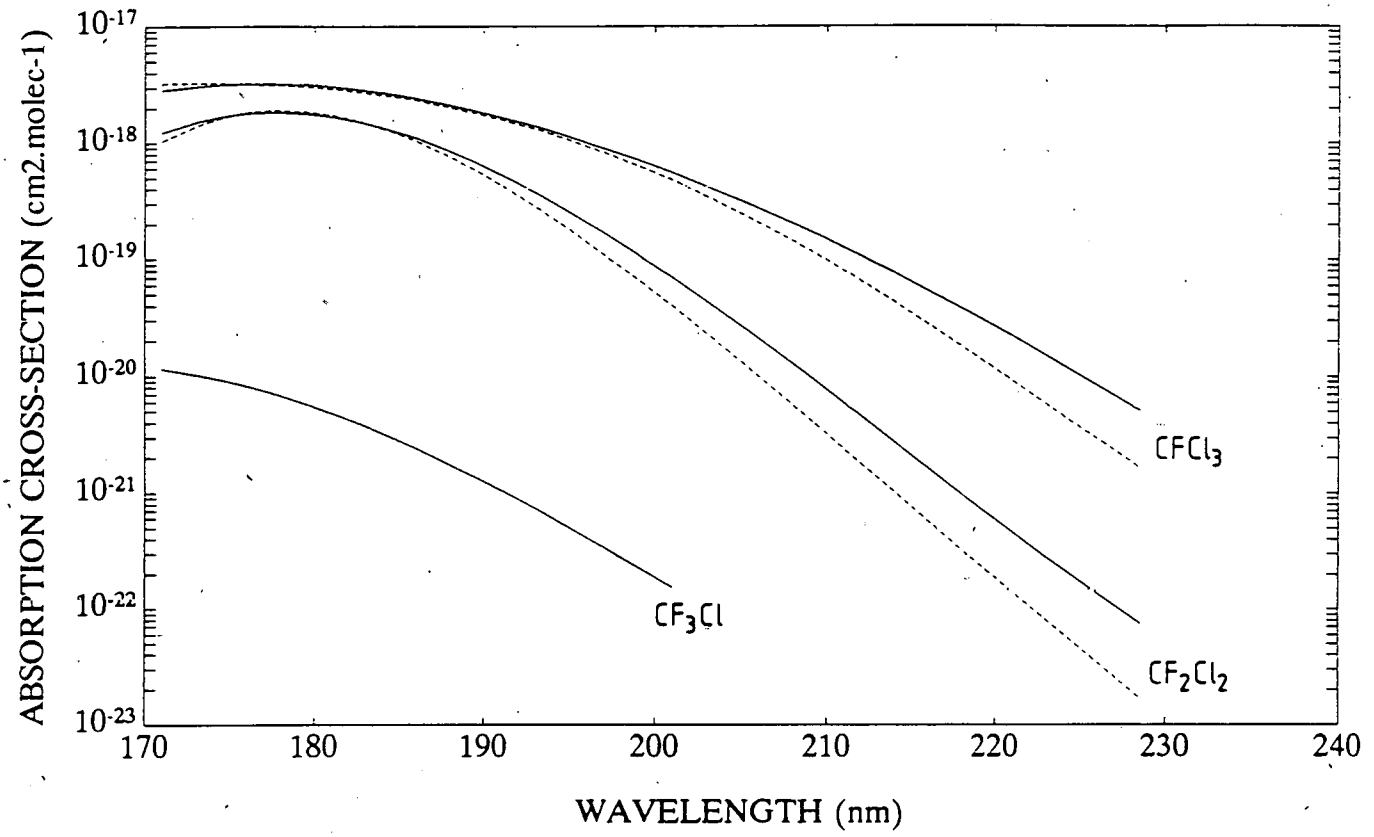

Figure 3. U.V. Absorption cross-sections of chlorofluoromethanes as a function of wavelength.

(———) : T = 295 K
(-----) : T = 210 K

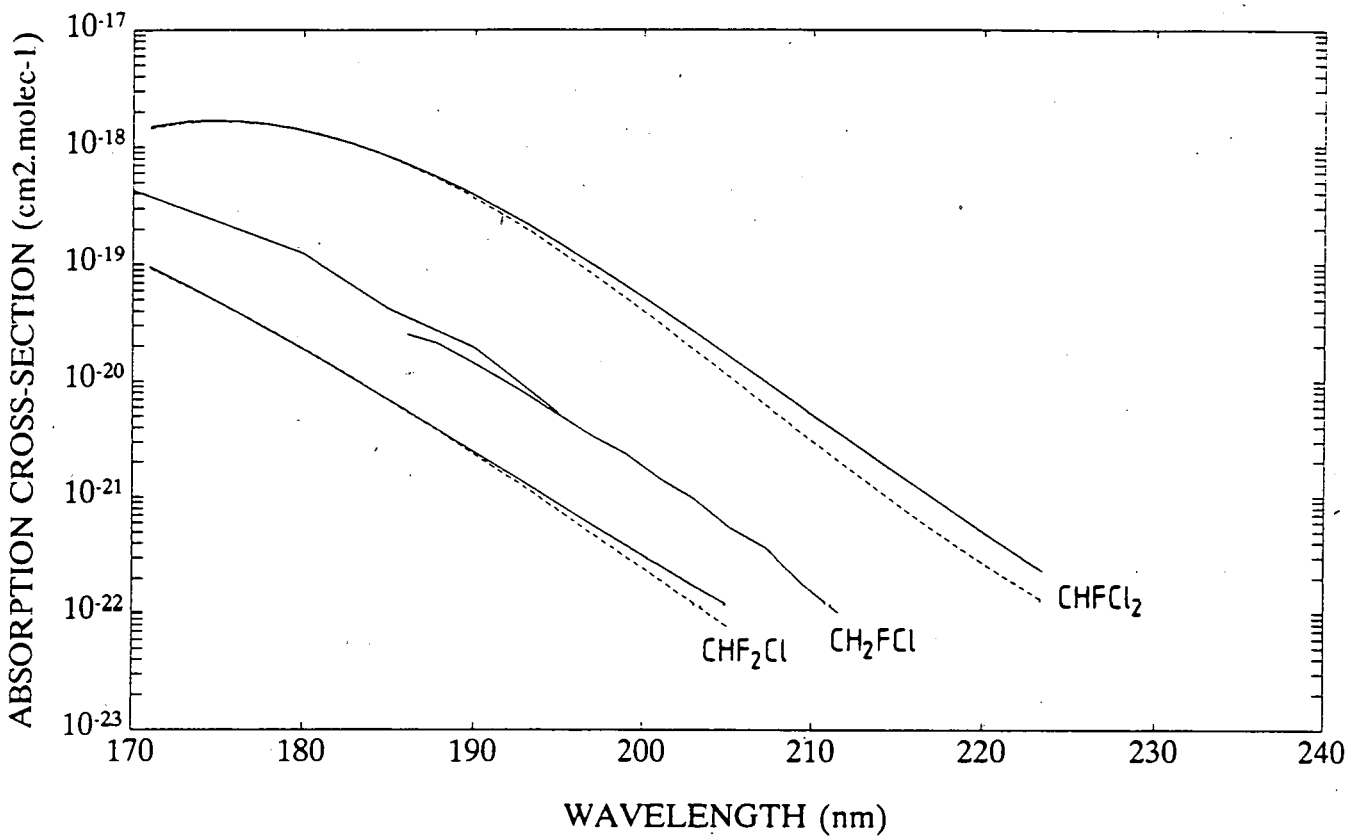

Figure 4. U.V. Absorption cross-sections of hydrochlorofluoromethanes as a function of wavelength.

(———) : T = 295 K
(-----) : T = 210 K

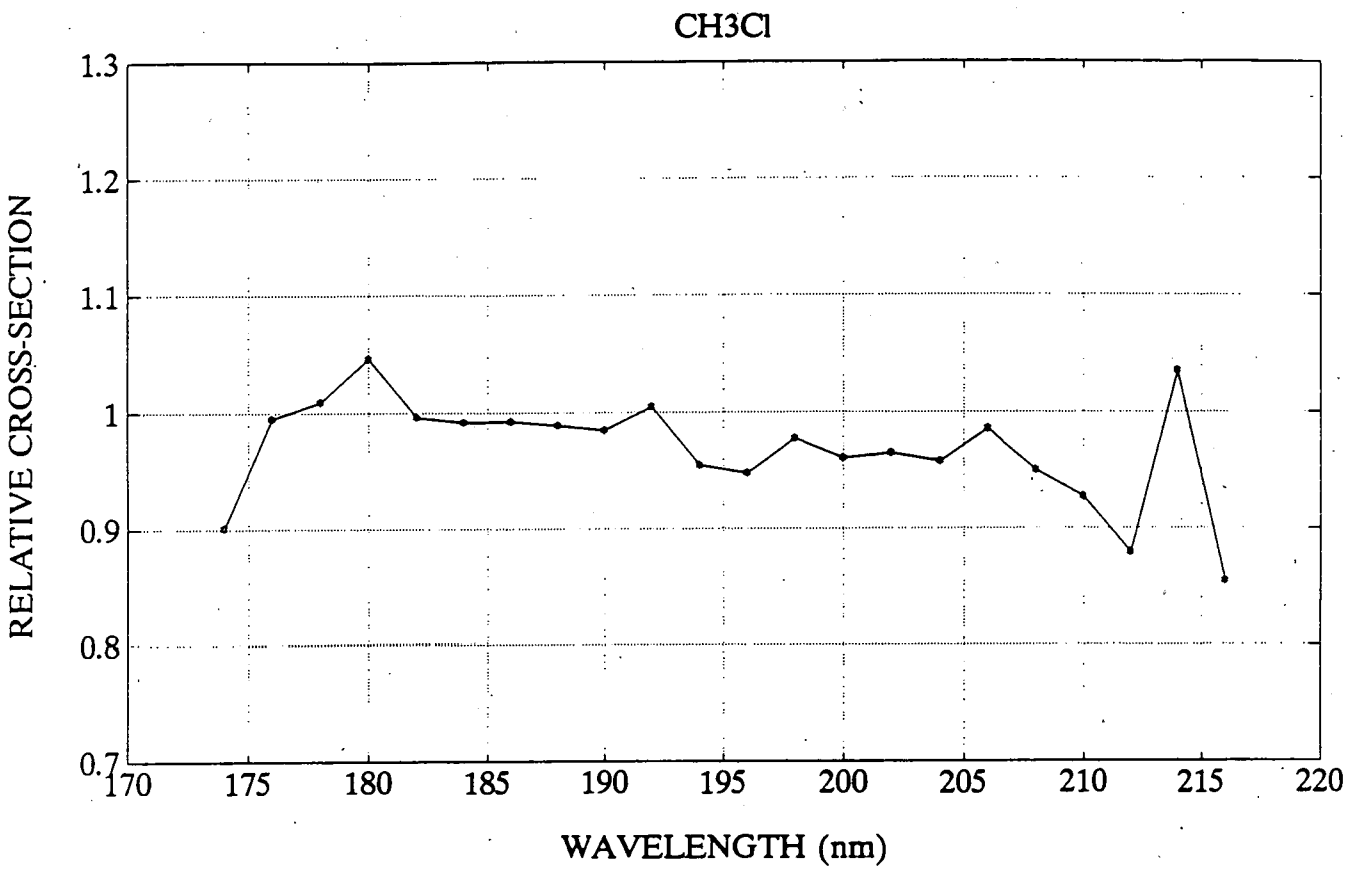

Figure 5. Relative absorption cross-sections of CH_3Cl at room temperature, as a function of wavelength.

(——*——) : Robbins, 1976a
Ref. : Simon et al., 1988a

Table I.1.1.

CH_3Cl (Simon et al., 1988a)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	295K	270K	250K	230K	210K
174	1110	1110	1110	1110	1110
176	938	938	938	938	938
178	766	766	766	766	766
180	607	607	607	607	607
182	467	467	467	467	467
184	350	350	350	350	350
186	255	255	255	255	255
188	182	182	182	182	182
190	127	127	127	127	127
192	87.2	87.2	87.2	87.2	87.2
194	58.8	58.8	58.8	58.8	58.8
196	40.1	40.1	40.1	40.1	40.1
198	26.6	26.6	26.1	25.8	24.3
200	17.6	17.3	16.9	16.3	15.1
202	11.3	10.7	10.3	9.70	9.30
204	7.50	6.91	6.60	6.11	5.73
206	4.83	4.50	4.05	3.75	3.45
208	3.18	2.85	2.57	2.35	2.12
210	2.06	1.82	1.64	1.45	1.30
212	1.32	1.12	1.00	0.90	0.80
214	0.86	0.72	0.63	0.55	0.47
216	0.55	0.44	0.38	0.33	0.27

Table I.1.2.

CH_3Cl (Simon et al., 1988a)

(wavenumber intervals : 500 cm^{-1})

$\sigma(\lambda) \times 10^{21}$ (cm^2 molec.$^{-1}$)

N°	λ(nm)	295K	270K	250K	230K	210K
45	173.9-174.4	1057	1057	1057	1057	1057
46	175.4-177.0	923	923	923	923	923
47	177.0-178.6	787	787	787	787	787
48	178.6-180.2	656	656	656	656	656
49	180.2-181.8	536	536	536	536	536
50	181.8-183.5	429	429	429	429	429
51	183.5-185.2	333	333	333	333	333
52	185.2-186.9	254	254	254	254	254
53	186.9-188.7	188	188	188	188	188
54	188.7-190.5	139	139	139	139	139
55	190.5-192.3	97.8	97.8	97.8	97.8	97.8
56	192.3-194.2	69.3	69.3	69.3	69.3	69.3
57	194.2-196.1	47.7	47.6	47.3	46.8	45.8
58	196.1-198.0	32.5	32.2	31.7	31.2	30.2
59	198.0-200.0	21.6	21.1	20.6	19.9	19.2
60	200.0-202.0	14.2	13.7	13.2	12.6	12.0
61	202.0-204.1	9.27	8.81	8.36	7.90	7.44
62	204.1-206.2	5.91	5.50	5.14	4.77	4.43
63	206.2-208.3	3.76	3.42	3.13	2.86	2.62
64	208.3-210.5	2.33	2.06	1.86	1.67	1.50
65	210.5-212.8	1.44	1.24	1.09	0.973	0.853
66	212.8-215.0	0.874	0.726	0.634	0.555	0.474
67	215.0-217.4	0.525	0.424	0.367	0.320	0.264

Table I.1.3.

CH_3Cl (Robbins, 1976a)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295 K
174	1100
176	933
178	773
180	635
182	465
184	347
186	253
188	180
190	125
192	87.6
194	56.1
196	38.0
198	26.0
200	16.9
202	10.9
204	7.18
206	4.76
208	3.02
210	1.91
212	1.16
214	0.89
216	0.47
218	0.36
220	0.23

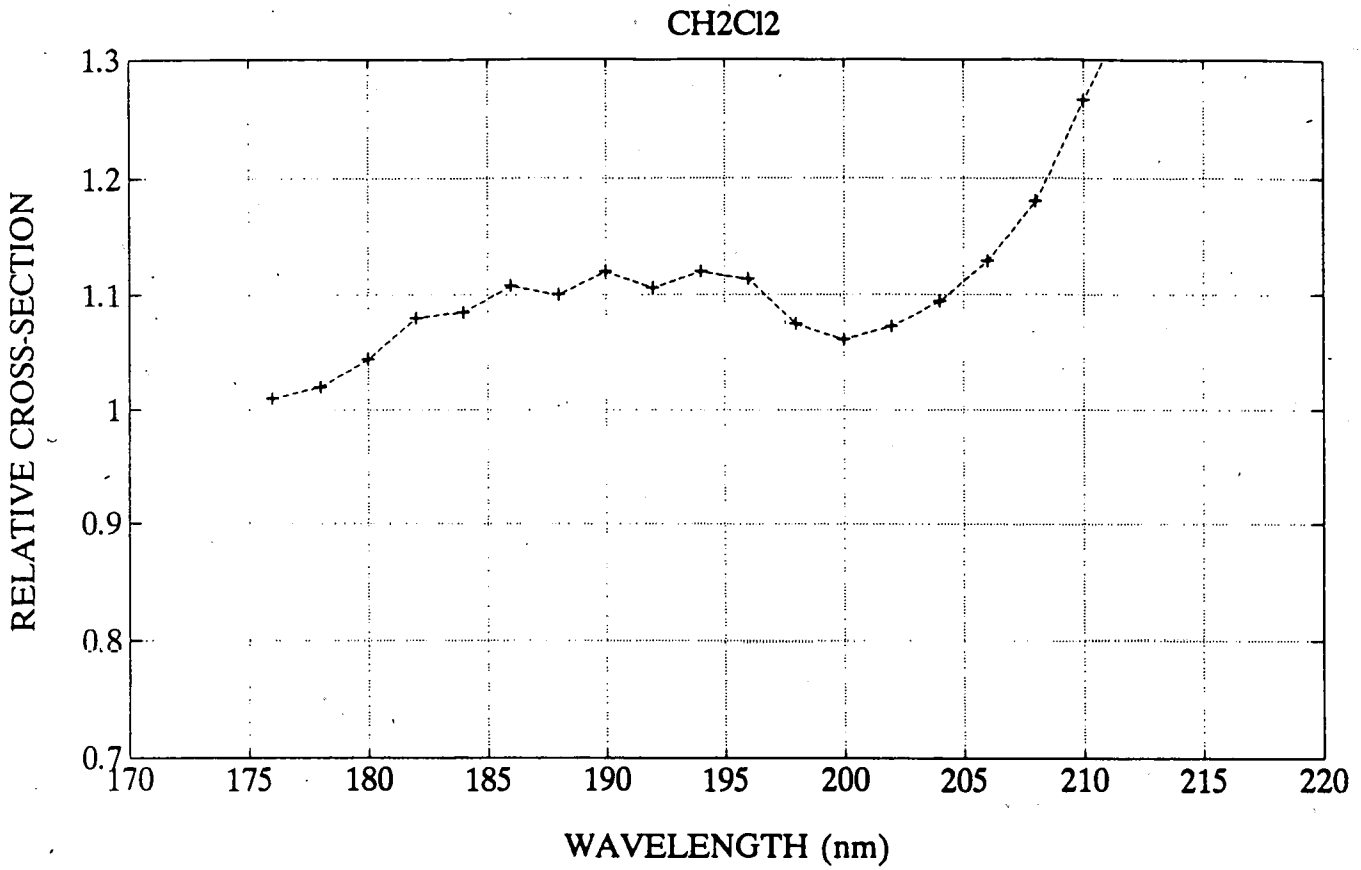

Figure 6. Relative absorption cross-sections of CH_2Cl_2 at room temperature, as a function of wavelength.

(---+---) : Hubrich and Stuhl, 1980
Ref. : Simon et al., 1988a

Table I.2.1.

CH_2Cl_2 (Simon et al., 1988a)

σ (λ) x 10^{21} (cm^2 $molec.^{-1}$)

λ (nm)	295K	270K	250K	230K	210K
176	1850	1850	1850	1850	1850
178	1807	1807	1807	1807	1807
180	1695	1695	1695	1695	1695
182	1509	1509	1509	1509	1509
184	1307	1307	1307	1307	1307
186	1040	1040	1040	1040	1040
188	799	799	799	799	799
190	575	575	575	575	575
192	417	417	417	409	400
194	288	288	281	271	263
196	197	193	186	178	171
198	136	130	124	118	112
200	92.0	86.5	82.5	76.2	72.2
202	62.0	56.8	52.7	49.0	45.6
204	42.2	38.1	34.8	31.7	29.0
206	28.8	25.4	22.8	20.6	18.5
208	19.5	16.8	14.8	13.1	11.8
210	12.8	11.0	9.70	8.50	7.36
212	8.35	7.10	6.10	5.25	4.63
214	5.40	4.60	3.93	3.36	2.87
216	3.55	2.97	2.53	2.15	1.84
218	2.34	1.93	1.61	1.34	1.12
220	1.52	1.23	1.03	0.860	0.720

Table I.2.2.

CH_2Cl_2 (Simon et al., 1988a)

(wavenumber intervals : 500 cm^{-1})

σ (λ) x 10^{21} (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
46	175.4-177.0	1847	1847	1847	1847	1847
47	177.0-178.6	1812	1812	1812	1812	1812
48	178.6-180.2	1783	1783	1783	1783	1783
49	180.2-181.8	1652	1652	1652	1652	1652
50	181.8-183.5	1470	1470	1470	1470	1470
51	183.5-185.2	1252	1252	1252	1252	1252
52	185.2-186.9	1040	1040	1040	1040	1040
53	186.9-188.7	801	801	801	801	801
54	188.7-190.5	621	621	621	621	621
55	190.5-192.3	457	454	450	442	435
56	192.3-194.2	335	330	325	316	309
57	194.2-196.1	238	232	226	218	211
58	196.1-198.0	167	160	155	148	141
59	198.0-200.0	113	108	102	96.5	91.4
60	200.0-202.0	76.7	71.5	67.1	62.4	58.4
61	202.0-204.1	51.6	47.3	43.7	40.1	37.0
62	204.1-206.2	33.9	30.5	27.7	25.0	22.8
63	206.2-208.3	22.2	19.6	17.5	15.6	14.0
64	208.3-210.5	14.2	12.3	10.8	9.48	8.38
65	210.5-212.8	9.07	7.71	6.66	5.77	5.02
66	212.8-215.0	5.64	4.71	4.02	3.43	2.95
67	215.0-217.4	3.47	2.86	2.42	2.04	1.73
68	217.4-219.8	2.06	1.69	1.42	1.18	0.995

Table I.2.3.

CH_2Cl_2 (Hubrich and Stuhl, 1980)

σ (λ) x 10^{21} (cm^2 $molec.^{-1}$)

λ (nm)	298K
160	4810
165	2240
170	1890
175	1870
180	1770
185	1290
190	644
195	267
200	97.6
205	38.7
210	16.2
215	6.31
220	2.27
225	0.726
230	0.265
235	0.116
240	0.0472
245	0.0232
250	0.00786
255	0.00251

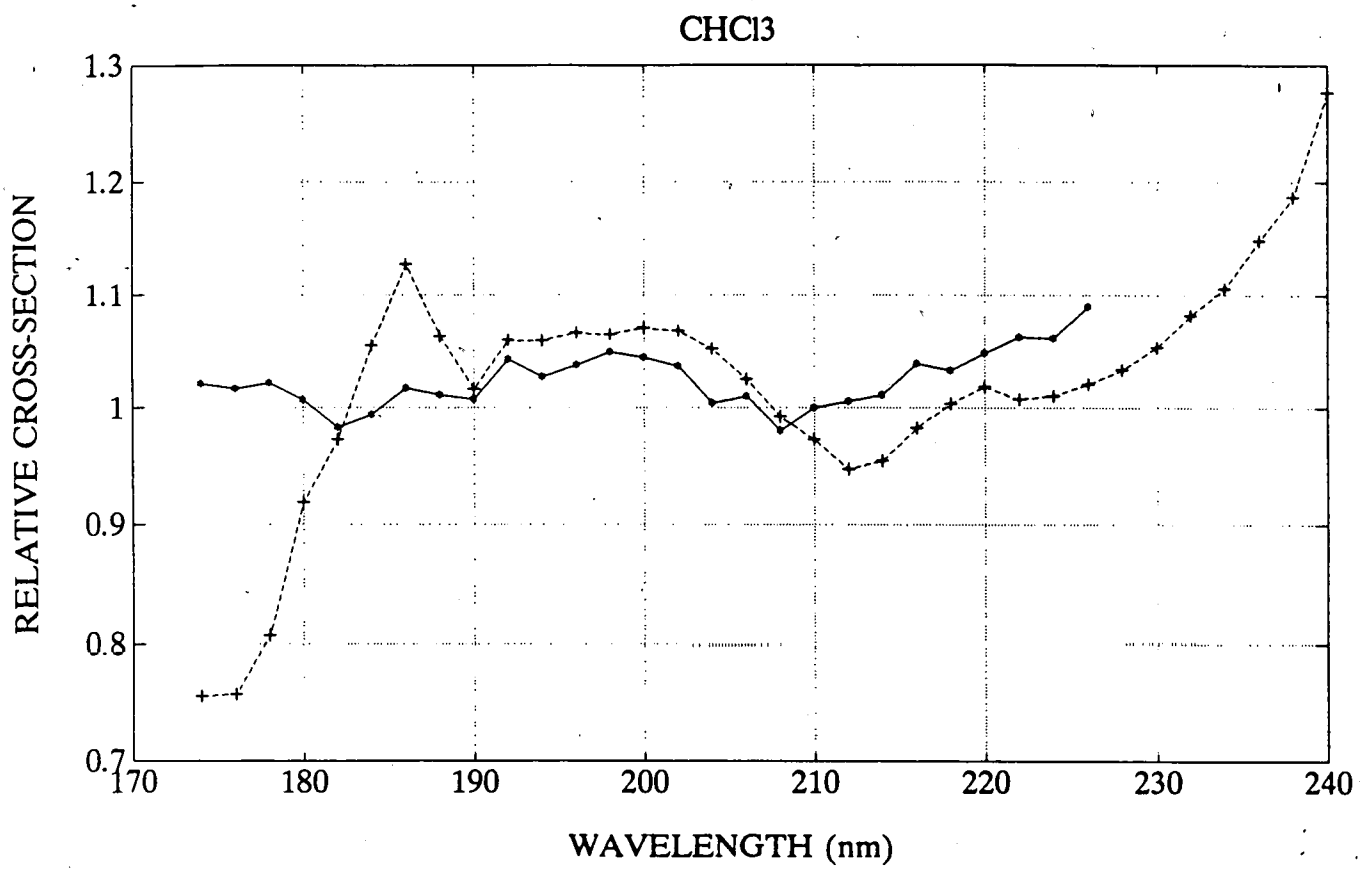

Figure 7. Relative absorption cross-sections of $CHCl_3$ at room temperature, as a function of wavelength.

(——*——) : Robbins, 1976a
(---+---) : Hubrich and Stuhl, 1980
Ref. : Simon et al., 1988a

Table I.3.1.

$CHCl_3$ (Simon et al., 1988a)

σ (λ) x 10^{21} (cm^2 $molec.^{-1}$)

λ (nm)	295K	270K	250K	230K	210K
174	4750	4750	4750	4750	4750
176	4930	4930	4930	4930	4930
178	4650	4650	4650	4650	4650
180	3875	3875	3875	3875	3875
182	3216	3216	3216	3216	3216
184	2425	2425	2425	2425	2425
186	1750	1750	1750	1750	1750
188	1395	1395	1395	1395	1395
190	1122	1122	1122	1122	1122
192	878	878	878	878	878
194	741	741	730	715	696
196	618	609	593	578	556
198	509	494	476	458	438
200	411	390	374	355	339
202	332	317	302	277	259
204	265	247	228	213	198
206	204	183	170	158	143
208	151	134	122	110	100
210	108	95.0	84.8	76.0	67.5
212	77.5	66.8	58.8	51.8	45.5
214	53.8	45.5	39.5	34.3	29.7
216	36.5	30.3	26.4	22.9	19.3
218	24.8	20.2	17.3	14.7	12.6
220	16.7	13.6	11.4	9.68	8.15
222	11.3	9.05	7.50	6.25	5.20
224	7.50	5.95	4.94	4.10	3.40
226	5.00	3.95	3.25	2.67	2.19
228	3.38	2.65	2.18	1.77	1.45
230	2.28	1.79	1.43	1.14	0.900
232	1.52	1.11	0.896	0.711	0.566
234	1.02	0.725	0.581	0.456	0.361
236	0.680	0.472	0.378	0.294	0.231
238	0.460	0.308	0.247	0.190	0.149
240	0.310	0.202	0.162	0.124	0.096

Table I.3.2.

$CHCl_3$ (Simon et al., 1988a)

(wavenumber intervals : 500 cm^{-1})

σ (λ) x 10^{21} (cm^2 $molec^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
45	173.9-175.4	4850	4850	4850	4850	4850
46	175.4-177.0	4929	4929	4929	4929	4929
47	177.0-178.6	4680	4680	4680	4680	4680
48	178.6-180.2	4145	4145	4145	4145	4145
49	180.2-181.8	3500	3500	3500	3500	3500
50	181.8-183.5	2930	2930	2930	2930	2930
51	183.5-185.2	2340	2340	2340	2340	2340
52	185.2-186.9	1750	1750	1750	1750	1750
53	186.9-188.7	1470	1470	1470	1470	1470
54	188.7-190.5	1180	1180	1180	1180	1180
55	190.5-192.3	920	920	920	920	911
56	192.3-194.2	790	790	790	774	754
57	194.2-196.1	665	658	645	631	608
58	196.1-198.0	560	546	529	515	493
59	198.0-200.0	455	437	419	403	382
60	200.0-202.0	367	347	328	312	295
61	202.0-204.1	295	274	257	242	226
62	204.1-206.2	228	209	193	180	165
63	206.2-208.3	168	151	137	126	114
64	208.3-210.5	118	104	92.6	85.0	75.5
65	210.5-212.8	82.0	70.5	62.3	56.2	49.2
66	212.8-215.0	55.0	46.5	40.1	35.7	30.8
67	215.0-217.4	35.5	29.5	25.2	22.2	18.8
68	217.4-219.8	21.8	17.9	15.1	12.9	10.9
69	219.8-222.2	13.5	10.9	9.11	7.69	6.48
70	222.2-224.7	8.35	6.64	5.51	4.59	3.84
71	224.7-227.3	5.00	3.95	3.25	2.67	2.19
72	227.3-229.9	2.95	2.29	1.87	1.50	1.25
73	229.9-232.6	1.76	1.34	1.08	0.860	0.677

Table I.3.3.

$CHCl_3$ (Robbins, 1976b)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295 K
174	4850
176	5010
178	4750
180	3900
182	3160
184	2410
186	1780
188	1410
190	1130
192	915
194	761
196	641
198	534
200	429
202	344
204	266
206	206
208	148
210	108
212	77.9
214	54.4
216	37.9
218	25.6
220	17.5
222	12.0
224	7.96
226	5.45

Table I.3.4.

$CHCl_3$ (Hubrich and Stuhl, 1980)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	298 K
160	5120
165	3670
170	3320
175	3670
180	3560
185	2260
190	1140
195	721
200	440
205	243
210	105
215	42.9
220	17.0
225	6.20
230	2.40
235	0.937
240	0.383
245	0.158
250	0.0648
255	0.0202

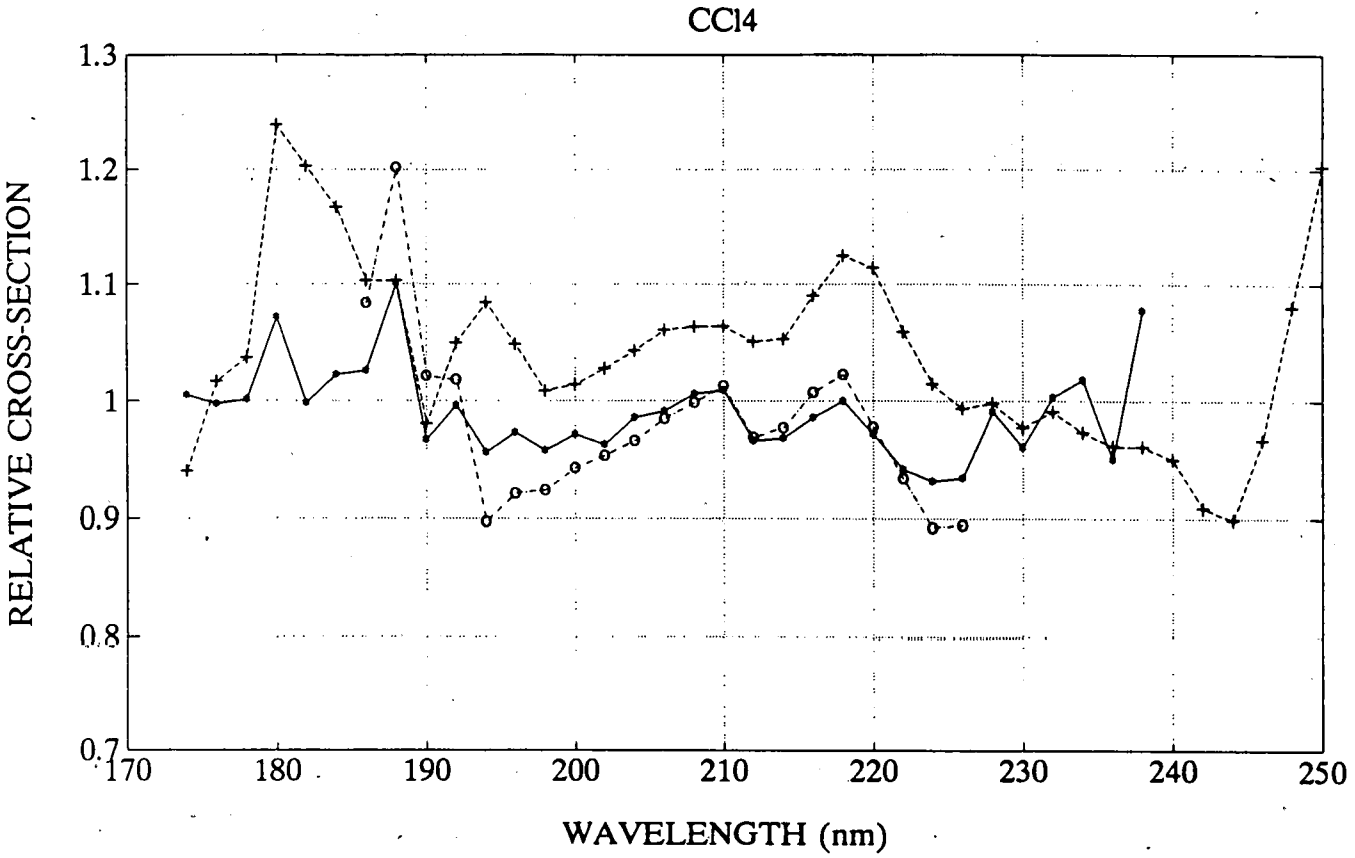

Figure 8. Relative absorption cross-sections of CCl_4 at room temperature, as a function of wavelength.

(——*——) : Robbins, 1976a
(---+---) : Hubrich and Stuhl, 1980
(-.-o-.-) : Molina and Rowland, 1974
Ref. : Simon et al., 1988a

Table I.4.1.

CCl_4 (Simon et al., 1988a)

σ (λ) x 10^{21} (cm^2 $molec.^{-1}$)

λ(nm)	295K	270K	250K	230K	210K
174	9900	9900	9900	9900	9900
176	10100	10100	10100	10100	10100
178	9750	9750	9750	9750	9750
180	7200	7200	7200	7200	7200
182	5900	5900	5900	5900	5900
184	4400	4400	4400	4400	4400
186	3100	3100	3100	3100	3100
188	1980	1980	1980	1980	1980
190	1469	1469	1469	1469	1469
192	992	992	992	992	992
194	767	767	767	767	767
196	695	695	695	695	695
198	680	680	680	680	680
200	660	660	660	660	660
202	638	638	638	638	638
204	610	610	610	610	601
206	570	570	570	561	544
208	525	525	514	504	483
210	469	459	446	434	415
212	410	392	380	367	348
214	345	327	315	295	279
216	278	259	244	230	217
218	221	201	189	172	163
220	175	158	146	135	125
222	136	120	109	98.0	90.0
224	102	88.0	79.5	71.4	64.0
226	76.0	64.5	57.8	50.5	44.5
228	56.5	47.0	41.7	36.2	31.6
230	42.8	34.9	30.4	25.7	22.7
232	30.4	24.8	21.1	17.9	15.2
234	22.0	17.7	14.8	12.5	10.5
236	16.0	12.7	10.5	8.72	7.23
238	11.6	9.06	7.43	6.10	5.00
240	8.30	6.40	5.19	4.22	3.42
242	5.90	4.49	3.62	2.91	2.34
244	4.13	3.11	2.48	1.98	1.58
246	2.90	2.17	1.72	1.36	1.08
248	2.10	1.56	1.23	0.968	0.762
250	1.48	1.09	0.858	0.673	0.528

Table I.4.2.

CCl_4 (Simon et al., 1988a)

(wavenumber intervals : $500cm^{-1}$)

σ (λ) x 10^{21} (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
45	173.9-175.4	10000	10000	10000	10000	10000
46	175.4-177.0	10000	10000	10000	10000	10000
47	177.0-178.6	9800	9800	9800	9800	9800
48	178.6-180.2	8150	8150	8150	8150	8150
49	180.2-181.8	6550	6550	6550	6550	6550
50	181.8-183.5	5350	5350	5350	5350	5350
51	183.5-185.2	4200	4200	4200	4200	4200
52	185.2-186.9	3100	3100	3100	3100	3100
53	186.9-188.7	1999	1999	1999	1999	1999
54	188.7-190.5	1510	1510	1510	1510	1510
55	190.5-192.3	1076	1076	1076	1076	1076
56	192.3-194.2	868	868	868	868	868
57	194.2-196.1	749	749	749	749	749
58	196.1-198.0	687	687	687	687	687
59	198.0-200.0	670	670	670	670	670
60	200.0-202.0	649	649	649	649	649
61	202.0-204.1	619	619	619	619	619
62	204.1-206.2	598	598	598	594	577
63	206.2-208.3	548	544	537	529	513
64	208.3-210.5	483	472	463	451	435
65	210.5-212.8	413	397	386	371	355
66	212.8-215.0	339	321	308	292	277
67	215.0-217.4	270	251	238	222	209
68	217.4-219.8	207	188	176	162	151
69	219.8-222.2	155	138	127	115	105
70	222.2-224.7	113	98.1	88.9	79.4	71.7
71	224.7-227.3	77.9	66.4	59.1	51.9	46.1
72	227.3-229.9	52.7	44.0	38.4	33.2	29.0
73	229.9-232.6	33.4	27.2	23.4	19.8	17.0
74	232.6-235.3	22.6	18.1	15.3	12.8	10.8
75	235.3-238.1	14.2	11.1	9.23	7.61	6.31
76	238.1-241.0	8.83	6.81	5.56	4.52	3.69
77	241.0-243.9	5.30	4.02	3.23	2.59	2.08
78	243.9-246.9	3.24	2.43	1.93	1.53	1.21
79	246.9-250.0	1.93	1.43	1.13	0.886	0.696

Table I.4.3.

CCl_4 (Robbins, 1976b)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295 K
174	9950
176	10100
178	9760
180	7220
182	5890
184	4500
186	3000
188	1980
190	1340
192	965
194	778
196	711
198	673
200	661
202	620
204	614
206	568
208	532
210	471
212	396
214	331
216	272
218	216
220	169
222	129
224	98.9
226	74.1
228	56.0
230	41.1
232	30.5
234	22.4
236	15.2
238	12.5

Table I.4.4.

CCl_4 (Hubrich and Stuhl, 1980)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298 K
160	1800
165	4490
170	6460
175	9910
180	8920
185	4230
190	1440
195	770
200	669
205	622
210	499
215	332
220	185
225	88.0
230	41.8
235	18.1
240	7.88
245	3.18
250	1.78
255	0.661
260	0.253
265	0.126
270	0.0610
275	0.0239

Table I.4.5.

CCl_4 (Molina and Rowland, 1974)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295 K
186	3360
188	2380
190	1500
192	1010
194	688
196	640
198	628
200	622
202	608
204	589
206	561
208	524
210	475
212	397
214	337
216	280
218	226
220	171
222	127
224	91.0
226	68.0

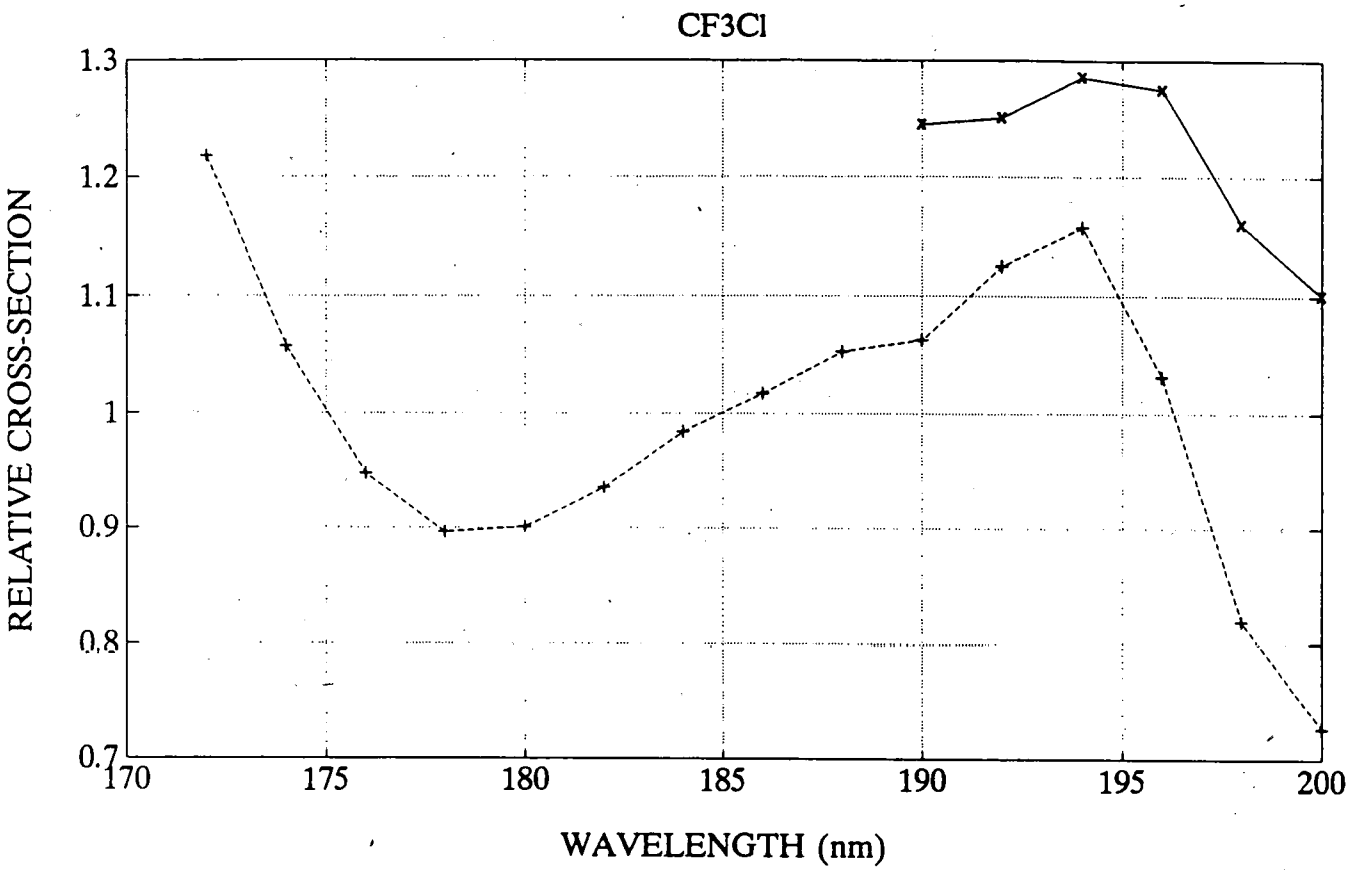

Figure 9. Relative absorption cross-sections of CF_3Cl at room temperature, as a function of wavelength.

(——x——) : Chou et al., 1978
(---+---) : Hubrich and Stuhl, 1980
Ref. : Simon et al., 1988a

Table I.5.1.

CF_3Cl (Simon et al., 1988a)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295K
172	11.0
174	9.70
176	8.25
178	6.81
180	5.42
182	4.25
184	3.26
186	2.44
188	1.75
190	1.28
192	0.900
194	0.610
196	0.410
198	0.280
200	0.190

Table I.5.2.

CF_3Cl (Simon et al., 1988a)

(wavenumber intervals : 500 cm^{-1})

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ(nm)	295K
43	169.5-172.4	11.7
44	172.4-173.9	10.3
45	173.9-175.4	9.25
46	175.4-177.0	8.10
47	177.0-178.6	6.95
48	178.6-180.2	5.80
49	180.2-181.8	4.80
50	181.8-183.5	3.90
51	183.5-185.2	3.10
52	185.2-186.9	2.44
53	186.9-188.7	1.80
54	188.7-190.5	1.36
55	190.5-192.3	0.990
56	192.3-194.2	0.700
57	194.2-196.1	0.480
58	196.1-198.0	0.320
59	198.0-200.0	0.220
60	200.0-202.0	0.150

Table I.5.3.

CF_3Cl (Chou et al., 1978)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	296K
189.6	1.68
191.4	1.26
193.2	0.90
195.1	0.64
197.0	0.41
199.0	0.26
201.0	0.17
203.0	0.12

Table I.5.4.

CF_3Cl (Hubrich and Stuhl, 1980)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	298 K	222 K
160	26.5	25.4
165	19.8	17.3
170	16.5	13.5
175	8.93	7.49
180	4.88	4.10
185	2.84	2.04
190	1.36	0.995
195	0.559	0.344
200	0.138	0.112
205	0.0820	0.0212
210	0.0172	
215	0.00591	
220	0.00192	

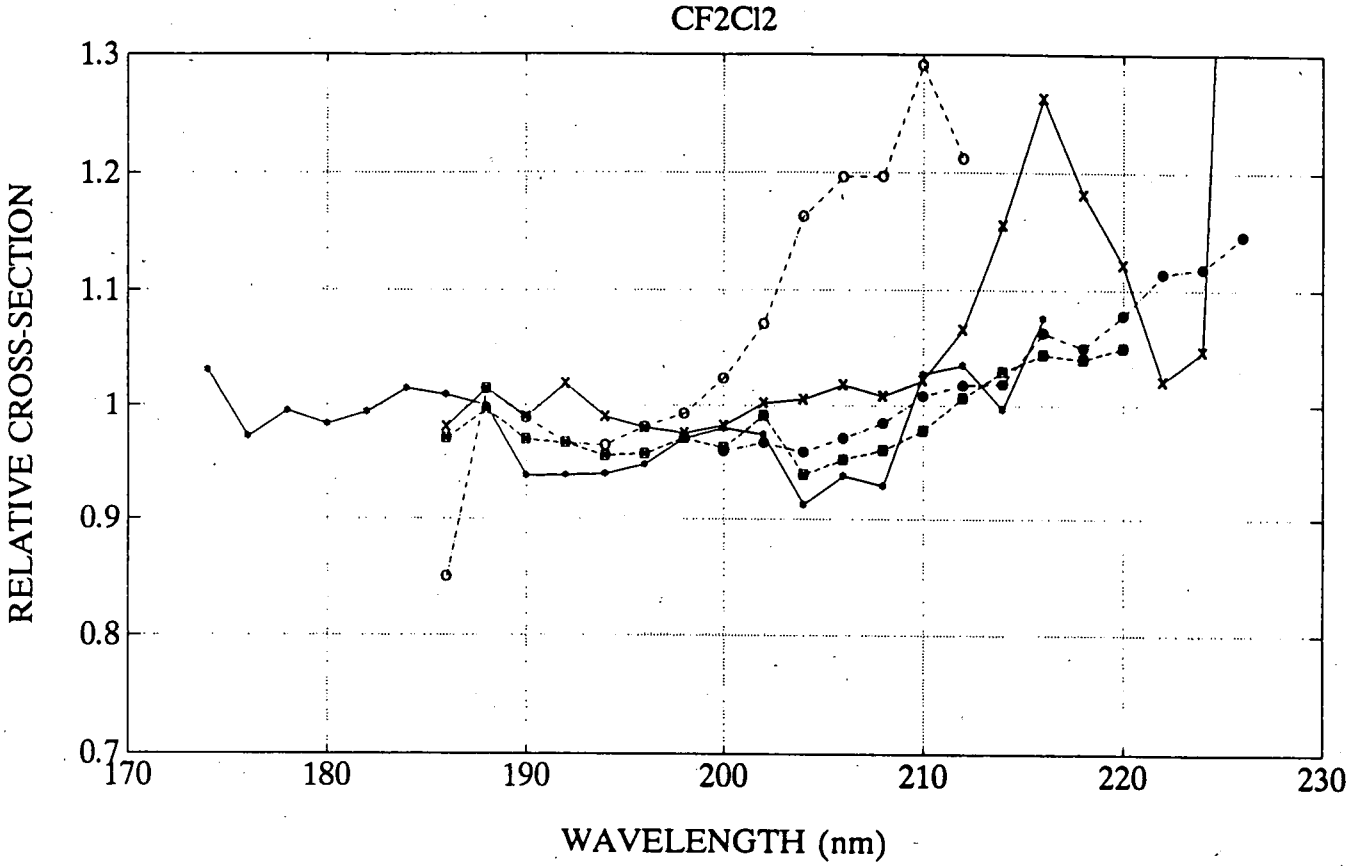

Figure 10. Relative absorption cross-sections of CF_2Cl_2 at room temperature, as a function of wavelength.

(——*——) : Robbins, 1976b
(——x——) : Chou et al., 1977
(-.-o-.-) : Molina and Rowland, 1974
(---⊠---) : Bass and Ledford, 1976
(-.-⊙-.-) : Mérienne et al., 1990
Ref. : Simon et al., 1988a

Table I.6.1.

CF_2Cl_2 (Simon et al., 1988a)

σ (λ) x 10^{21} (cm^2 $molec.^{-1}$)

λ (nm)	295K	270K	250K	230K	210K
174	1620	1620	1620	1620	1620
176	1810	1810	1810	1810	1810
178	1870	1870	1870	1870	1870
180	1790	1790	1790	1790	1790
182	1600	1600	1600	1600	1600
184	1340	1340	1340	1340	1340
186	1070	1070	1070	1070	1070
188	828	828	815	807	793
190	632	600	576	552	529
192	455	419	397	377	358
194	315	286	265	246	228
196	211	188	172	157	144
198	139	121	109	98.1	88.2
200	88.9	75.5	66.3	58.2	51.1
202	55.1	45.9	39.7	34.3	29.7
204	34.4	27.7	23.2	20.0	16.9
206	20.9	16.8	14.1	11.8	9.89
208	12.7	9.94	8.19	6.75	5.57
210	7.59	5.90	4.84	3.96	3.24
212	4.54	3.47	2.80	2.26	1.83
214	2.71	2.05	1.65	1.32	1.06
216	1.58	1.17	0.926	0.731	0.577
218	1.00	0.720	0.550	0.420	0.330
220	0.600	0.420	0.320	0.240	0.180
222	0.360	0.252	0.189	0.140	0.105
224	0.220	0.152	0.112	0.081	0.060
226	0.130	0.092	0.067	0.047	0.034

Table I.6.2.

CF_2Cl_2 (Simon et al., 1988a)

(wavenumber intervals : 500 cm^{-1})

σ (λ) x 10^{21} (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
45	173.9-175.4	1700	1700	1700	1700	1700
46	175.4-177.0	1822	1822	1822	1822	1822
47	177.0-178.6	1860	1860	1860	1860	1860
48	178.6-180.2	1817	1817	1817	1817	1817
49	180.2-181.8	1700	1700	1700	1700	1700
50	181.8-183.5	1528	1528	1528	1528	1528
51	183.5-185.2	1310	1310	1310	1310	1310
52	185.2-186.9	1070	1070	1070	1070	1070
53	186.9-188.7	847	847	827	816	803
54	188.7-190.5	683	642	621	600	580
55	190.5-192.3	502	470	446	424	403
56	192.3-194.2	365	335	313	293	274
57	194.2-196.1	253	227	209	193	177
58	196.1-198.0	171	150	136	123	112
59	198.0-200.0	111	95.2	84.6	75.4	67.1
60	200.0-202.0	70.1	59.1	51.6	45.2	39.6
61	202.0-204.1	43.6	36.0	31.0	26.7	23.0
62	204.1-206.2	26.1	21.1	17.9	15.2	12.8
63	206.1-208.3	15.5	12.3	10.2	8.53	7.11
64	208.3-210.5	8.84	6.88	5.64	4.63	3.81
65	210.5-212.8	5.03	3.85	3.10	2.51	2.03
66	212.8-215.0	2.79	2.09	1.66	1.32	1.05
67	215.0-217.4	1.55	1.14	0.890	0.694	0.545
68	217.4-219.8	0.846	0.606	0.467	0.357	0.275
69	219.8-222.2	0.467	0.326	0.247	0.184	0.139
70	222.2-224.7	0.262	0.177	0.134	0.0954	0.0704
71	224.7-227.3	0.143	0.0927	0.0672	0.0471	0.0337

Table I.6.3.

CF_2Cl_2 (Robbins, 1976b)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295 K
174	1670
176	1760
178	1860
180	1760
182	1590
184	1360
186	1080
188	828
190	593
192	427
194	296
196	200
198	135
200	87.1
202	53.7
204	31.4
206	19.6
208	11.8
210	7.75
212	4.71
214	2.67
216	1.67

Table I.6.4.

CF_2Cl_2 (Chou et al., 1977)

$\sigma(\lambda) \times 10^{21}$ (cm^2 molec.$^{-1}$)

λ(nm)	296K	252 K *	212 K *
186.0	1050		
187.8	865		
189.6	661		
191.4	514		
193.2	367	319	244
195.1	249	212	184
197.0	168	138	118
199.0	109	86.7	71.9
201.0	69.6	54.1	43.6
203.0	43.7	32.6	25.6
205.1	26.6	19.2	14.8
207.3	15.3	10.8	7.79
209.4	9.0	6.12	4.41
211.6	5.3	3.50	2.43
213.9	3.2	2.03	1.38
216.2	1.9	1.21	
218.6	1.0	0.61	
221.0	0.5		
223.5	< 0.5		
226.0	< 0.5		

*calculated from the values of $\sigma(T)/\sigma 296$ given by Chou et al.(1977).

Table I.6.5.

CF_2Cl_2 (Bass and Ledford, 1976)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	298 K	222 K
186	1039	996
188	825	790
190	613	550
192	440	377
194	301	244
196	202	156
198	135	96.4
200	85.6	57.0
202	54.6	33.8
204	32.3	18.8
206	19.9	11.6
208	12.2	6.56
210	7.42	3.83
212	4.57	2.19
214	2.79	1.30
216	1.65	0.72
218	1.04	0.45
220	0.63	0.26

Table I.6.6.

CF_2Cl_2 (Mérienne et al., 1990)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	296 K	240 K	220 K
200	85.3	63.6	57.5
201	67.6	49.5	44.5
202	53.3	38.3	34.2
203	42.0	29.5	26.2
204	33.0	22.6	20.0
205	25.9	17.3	15.22
206	20.3	13.2	11.56
207	15.9	10.1	8.78
208	12.5	7.68	6.66
209	9.78	5.85	5.06
210	7.65	4.46	3.84
211	5.97	3.42	2.93
212	4.62	2.64	2.24
213	3.57	2.02	1.71
214	2.76	1.55	1.30
215	2.14	1.18	0.986
216	1.68	0.904	0.746
217	1.34	0.691	0.565
218	1.05	0.530	0.429
219	0.823	0.407	0.330
220	0.647	0.314	0.251
221	0.509	0.242	0.192
222	0.401	0.187	0.147
223	0.315	0.144	0.112
224	0.246	0.110	0.087
225	0.192	0.085	0.067
226	0.149	0.066	0.052
227	0.116	0.052	0.041
228	0.090	0.040	0.032
229	0.072	0.031	0.025
230	0.057	0.025	0.020
231	0.045	0.020	0.016

Table I.6.7.

CF_2Cl_2 (Molina and Rowland, 1974)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295 K
186	910
188	840
190	625
192	440
194	304
196	207
198	138
200	91.0
202	59.0
204	40.0
206	25.0
208	15.2
210	9.80
212	5.50

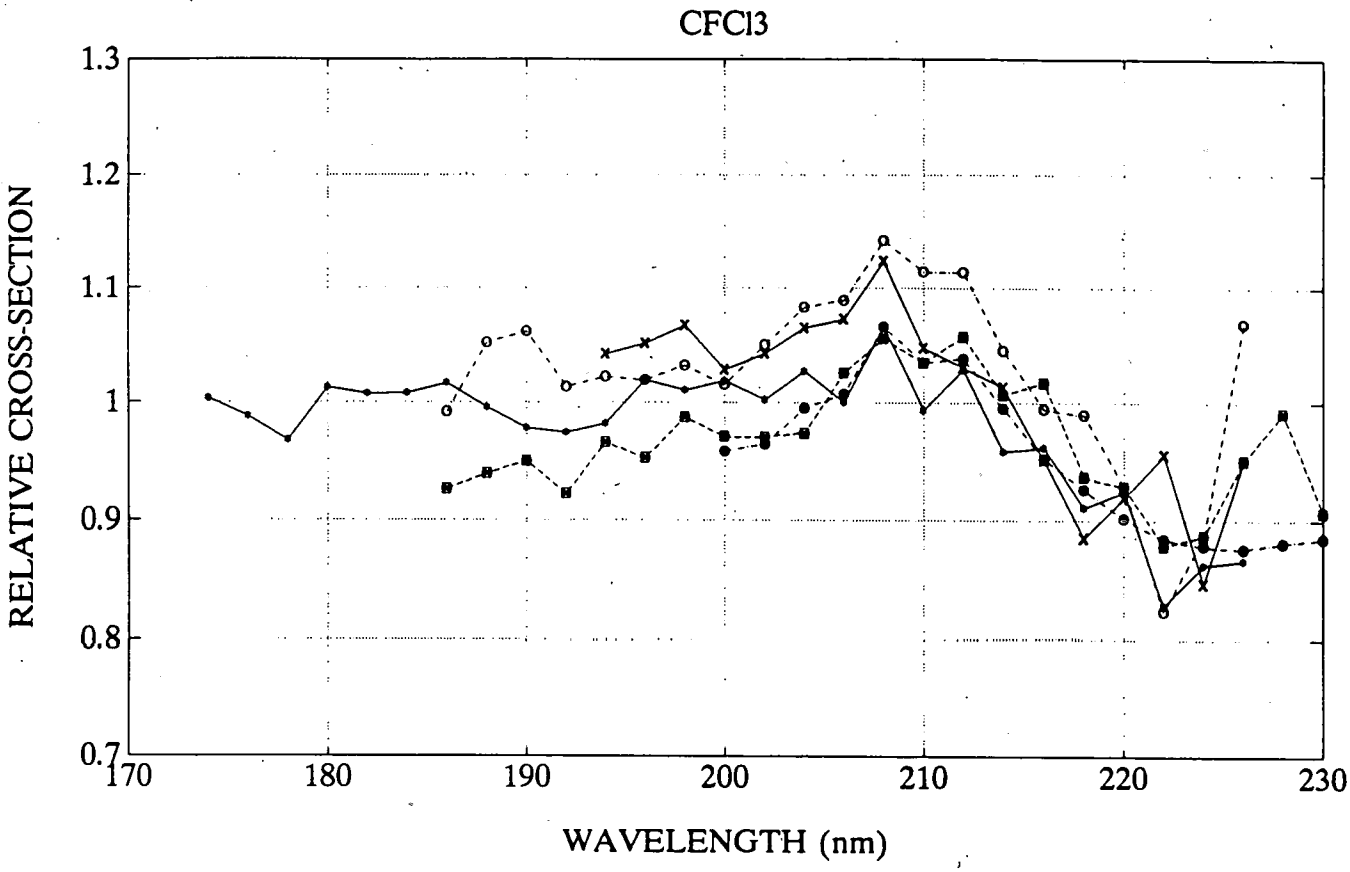

Figure 11. Relative absorption cross-sections of $CFCl_3$ at room temperature, as a function of wavelength.

(——*——) : Robbins, 1976
(——x——) : Chou et al., 1977
(-.-o-.-) : Molina and Rowland, 1974
(---⊠---) : Bass and Ledford, 1976
(-.-◔-.-) : Mérienne et al., 1990
Ref. : Simon et al., 1988a

Table I.7.1.

$CFCl_3$ (Simon et al., 1988a)

$\bar{\sigma}$ (λ) x 10^{21} (cm^2 $molec.^{-1}$)

λ (nm)	295K	270K	250K	230K	210K
174	3130	3130	3130	3130	3130
176	3240	3240	3240	3240	3240
178	3235	3235	3235	3235	3235
180	3140	3140	3140	3140	3140
182	2960	2960	2960	2960	2960
184	2720	2720	2720	2720	2720
186	2430	2385	2360	2335	2300
188	2130	2090	2070	2045	2020
190	1790	1760	1745	1725	1705
192	1540	1495	1465	1440	1412
194	1243	1218	1198	1174	1151
196	991	959	945	925	905
198	780	762	747	733	718
200	645	622	600	579	558
202	500	476	454	441	420
204	374	348	330	316	300
206	280	256	241	225	216
208	197	182	170	159	149
210	148	133	120	110	99.4
212	105	91.8	82.6	76.7	66.3
214	75.6	64.1	56.2	49.2	43.1
216	53.8	44.3	37.9	32.4	27.8
218	37.9	30.3	25.3	21.2	17.7
220	26.4	20.5	16.8	13.8	11.3
222	18.2	13.8	11.1	8.90	7.14
224	12.4	9.25	7.30	5.76	4.54
226	8.42	6.16	4.79	3.73	2.91
228	5.65	4.08	3.15	2.43	1.88
230	3.75	2.70	2.08	1.60	1.23

Table I.7.2.

$CFCl_3$ (Simon et al., 1988a)

(wavenumber intervals : 500 cm^{-1})

N°	λ (nm)	σ (λ) x 10^{21} (cm^2 $molec.^{-1}$) 295K	270K	250K	230K	210K
45	173.9-175.4	3180	3180	3180	3180	3180
46	175.4-177.0	3240	3240	3240	3240	3240
47	177.0-178.6	3238	3238	3238	3238	3238
48	178.6-180.2	3160	3160	3160	3160	3160
49	180.2-181.8	3050	3050	3050	3050	3050
50	181.8-183.5	2880	2880	2880	2880	2880
51	183.5-185.2	2670	2670	2670	2670	2670
52	185.2-186.9	2430	2385	2360	2335	2300
53	186.9-188.7	2155	2123	2114	2097	2079
54	188.7-190.5	1894	1871	1858	1843	1827
55	190.5-192.3	1612	1590	1577	1563	1548
56	192.3-194.2	1360	1339	1325	1312	1296
57	194.2-196.1	1118	1097	1081	1068	1052
58	196.1-198.0	905	882	865	851	834
59	198.0-200.0	712	689	671	656	638
60	200.0-202.0	552	528	510	494	477
61	202.0-204.1	422	398	380	365	348
62	204.1-206.2	313	291	274	260	244
63	206.2-208.3	229	209	194	181	167
64	208.3-210.5	163	145	132	121	110
65	210.5-212.8	114	99.3	88.7	79.7	71.0
66	212.8-215.0	77.6	65.7	57.4	50.5	44.0
67	215.0-217.4	52.1	42.9	36.6	31.4	26.8
68	217.4-219.8	34.0	27.1	22.6	18.9	15.7
69	219.8-222.2	21.8	16.9	13.8	11.3	9.15
70	222.2-224.7	13.9	10.5	8.33	6.66	5.30
71	224.7-227.3	8.42	6.16	4.79	3.73	2.91
72	227.3-229.9	5.00	3.60	2.77	2.12	1.64

Table I.7.3.

$CFCl_3$ (Robbins, 1976)

$\sigma(\lambda) \times 10^{21}$ (cm^2 molec.$^{-1}$)

λ (nm)	295 K
174	3140
176	3200
178	3130
180	3180
182	2980
184	2740
186	2470
188	2120
190	1750
192	1500
194	1220
196	1010
198	788
200	657
202	501
204	384
206	280
208	210
210	147
212	108
214	72.4
216	51.7
218	34.5
220	24.4
222	15.1
224	10.7
226	7.29

Table I.7.4.

$CFCl_3$ (Chou et al., 1977)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	296 K	252 K*	232 K*	212 K*
193.2	1410	1410	1368	
195.1	1150	1133	1104	
197.0	932	911	885	
199.0	743	719	691	
201.0	590	563	543	531
203.0	457	430	411	402
205.1	341	319	297	286
207.3	248	226	211	198
209.4	173	152	142	133
211.6	116	99.0	90.0	85.0
213.9	78	64.0	57.9	
216.2	49	39.2	34.9	
218.6	30	23.4	20.4	
221.0	21			
223.5	12			
226.0	8			

*calculated from the values of $\sigma(T)/\sigma 296$ given by Chou et al.(1977).

Table I.7.5.

$CFCl_3$ (Bass and Ledford, 1976)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298 K	222 K
186	2250	2330
188	2000	1990
190	1700	1640
192	1420	1340
194	1200	1100
196	944	885
198	770	708
200	626	556
202	485	445
204	364	333
206	287	243
208	208	178
210	153	121
212	111	80
214	76.1	52.8
216	54.7	34.4
218	35.5	22.3
220	24.5	13.8
222	16.0	9.2
224	11.0	5.8
226	8.0	4.0
228	5.6	2.7
230	3.4	1.5

Table I.7.6.

$CFCl_3$ (Mérienne et al., 1990)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	296 K	240 K	220 K
200	618	592	575
201	547	524	508
202	482	460	445
203	424	401	387
204	372	347	335
205	325	299	287
206	282	255	244
207	244	216	206
208	210	182	173
209	180	152	144
210	153	127	119
211	129	105	98.0
212	109	86.4	80.2
213	90.6	70.9	65.3
214	75.2	58.0	53.0
215	62.1	47.4	43.0
216	51.2	38.6	34.8
217	42.4	31.3	28.1
218	35.1	25.2	22.8
219	29.0	20.3	18.1
220	23.8	16.3	14.5
221	19.6	13.1	11.6
222	16.1	10.6	9.33
223	13.2	8.60	7.50
224	10.9	6.99	6.03
225	8.96	5.65	4.84
226	7.38	4.57	3.90
227	6.07	3.69	3.14
228	4.98	2.98	2.53
229	4.07	2.40	2.03
230	3.32	1.93	1.64
231	2.70	1.55	1.31
232	2.20	1.25	1.05
233	1.80	1.00	0.843
234	1.47	0.806	0.675
235	1.20	0.649	0.541
236	0.978	0.524	0.435
237	0.795	0.421	0.349
238	0.654	0.330	0.273

Table I.7.7.

$CFCl_3$ (Molina and Rowland, 1974)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295 K
186	2410
188	2240
190	1900
192	1560
194	1270
196	1010
198	805
200	655
202	525
204	405
206	305
208	225
210	165
212	117
214	79.0
216	53.5
218	37.5
220	24.5
222	15.0
224	11.0
226	9.00

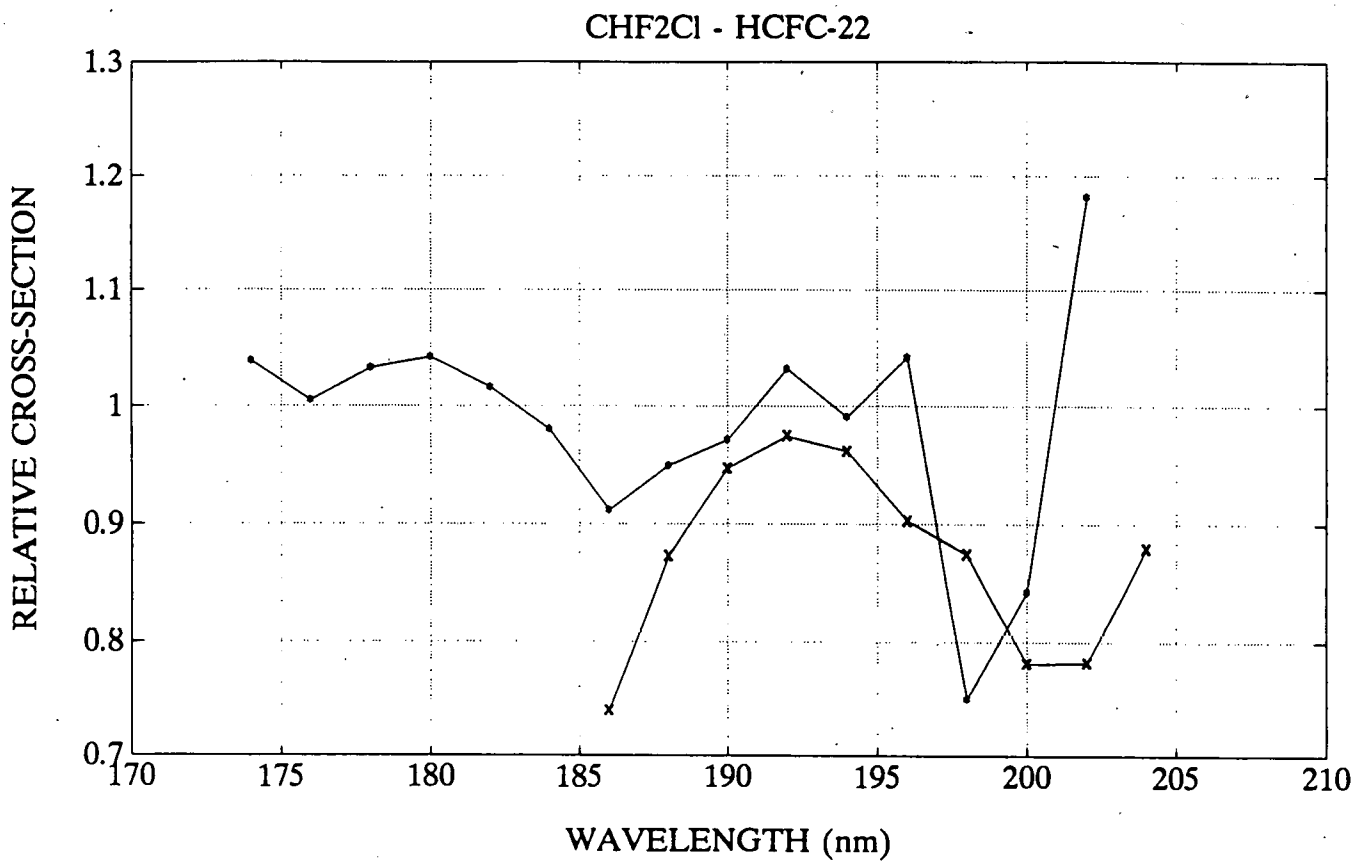

Figure 12. Relative absorption cross-sections of CHF_2Cl at room temperature, as a function of wavelength.

(——*——) : Robbins, 1976b
(——x——) : Chou et al., 1976
Ref. : Simon et al., 1988a

Table I.8.1.

CHF_2Cl (Simon et al., 1988a)

$\sigma(\lambda) \times 10^{21}$ (cm2 molec.$^{-1}$)

λ (nm)	295K	270K	250K	230K	210K
174	57.2	57.2	57.2	57.2	57.2
176	40.4	40.4	40.4	40.4	40.4
178	27.6	27.6	27.6	27.6	27.6
180	19.1	19.1	19.1	19.1	19.1
182	12.8	12.8	12.8	12.8	12.8
184	8.42	8.42	8.42	8.42	8.42
186	5.76	5.76	5.76	5.76	5.76
188	3.72	3.72	3.72	3.72	3.72
190	2.45	2.45	2.45	2.45	2.42
192	1.56	1.56	1.56	1.52	1.48
194	1.03	1.02	0.99	0.96	0.93
196	0.72	0.69	0.67	0.64	0.62
198	0.48	0.45	0.43	0.41	0.39
200	0.32	0.29	0.278	0.259	0.246
202	0.220	0.192	0.184	0.169	0.159
204	0.142	0.121	0.114	0.104	0.096

Table I.8.2.

CHF_2Cl (Simon et al., 1988a)

(wavenumber intervals : 500 cm^{-1})

σ (λ) x 10^{21} (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
45	173.9-175.4	51.7	51.7	51.7	51.7	51.7
46	175.4-177.0	38.0	38.0	38.0	38.0	38.0
47	177.0-178.6	28.8	28.8	28.8	28.8	28.8
48	178.6-180.2	21.2	21.2	21.2	21.2	21.2
49	180.2-181.8	15.5	15.5	15.5	15.5	15.5
50	181.8-183.5	11.3	11.3	11.3	11.3	11.3
51	183.5-185.2	8.03	8.03	8.03	8.03	8.03
52	185.2-186.9	5.65	5.65	5.65	5.65	5.65
53	186.9-188.7	3.88	3.88	3.88	3.88	3.88
54	188.7-190.5	2.72	2.72	2.72	2.72	2.72
55	190.5-192.3	1.83	1.82	1.80	1.77	1.72
56	192.3-194.2	1.26	1.24	1.22	1.19	1.15
57	194.2-196.1	0.850	0.825	0.806	0.778	0.747
58	196.1-198.0	0.576	0.548	0.532	0.508	0.484
59	198.0-200.0	0.385	0.357	0.344	0.324	0.307
60	200.0-202.0	0.259	0.233	0.223	0.207	0.194
61	202.0-204.1	0.177	0.153	0.144	0.132	0.123

Table I.8.3.

CHF_2Cl (Robbins, 1976b)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	295 K
174	59.4
176	40.6
178	28.5
180	19.9
182	13.0
184	8.25
186	5.25
188	3.53
190	2.38
192	1.61
194	1.02
196	0.75
198	0.36
200	0.27
202	0.26

Table I.8.4.

CHF_2Cl (Chou et al., 1976)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	296 K
186	4.26
188	3.25
190	2.32
192	1.52
194	0.99
196	0.65
198	0.42
200	0.25
202	0.172
204	0.125

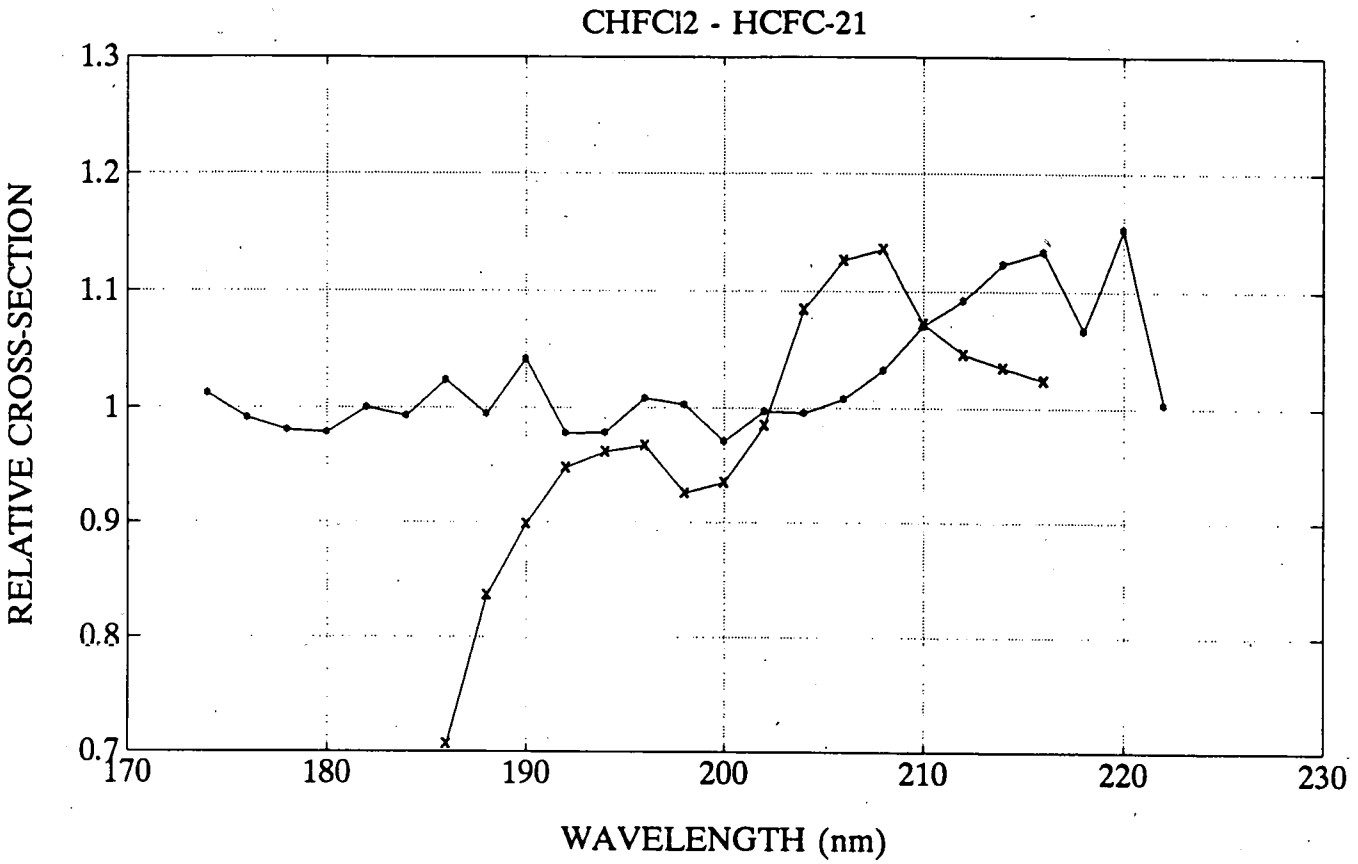

Figure 13. Relative absorption cross-sections of $CHFCl_2$ at room temperature, as a function of wavelength.

(——*——) : Robbins and Stolarski, 1976
(——x——) : Chou et al., 1976
Ref. : Simon et al., 1988a

Table I.9.1.

$CHFCl_2$ (Simon et al., 1988a)

σ (λ) x 10^{21} (cm^2 $molec.^{-1}$)

λ(nm)	295K	270K	250K	230K	210K
174	1660	1660	1660	1660	1660
176	1645	1645	1645	1645	1645
178	1550	1550	1550	1550	1550
180	1380	1380	1380	1380	1380
182	1160	1160	1160	1160	1160
184	924	924	924	924	924
186	715	715	715	715	715
188	532	532	529	525	520
190	384	381	376	371	365
192	269	264	259	254	247
194	184	179	173	168	162
196	123	118	113	109	104
198	81.0	76.2	72.4	68.9	65.0
200	52.4	48.5	45.6	42.9	39.9
202	33.5	30.5	28.3	26.3	24.2
204	21.2	19.0	17.4	15.9	14.5
206	13.4	11.7	10.6	9.61	8.67
208	8.36	7.20	6.45	5.78	5.16
210	5.22	4.43	3.92	3.47	3.08
212	3.25	2.72	2.39	2.10	1.84
214	2.03	1.68	1.46	1.27	1.11
216	1.27	1.04	0.904	0.782	0.681
218	0.797	0.654	0.564	0.487	0.423
220	0.503	0.414	0.357	0.308	0.268
222	0.319	0.266	0.229	0.199	0.174

Table I.9.2.

$CHFCl_2$ (Simon et al., 1988a)

(wavenumber intervals : 500 cm^{-1})

σ (λ) x 10^{21} (cm^2 molec.$^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
45	173.9-175.4	1660	1660	1660	1660	1660
46	175.4-177.0	1640	1640	1640	1640	1640
47	177.0-178.6	1565	1565	1565	1565	1565
48	178.6-180.2	1435	1435	1435	1435	1435
49	180.2-181.8	1270	1270	1270	1270	1270
50	181.8-183.5	1090	1090	1090	1090	1090
51	183.5-185.2	896	896	896	896	896
52	185.2-186.9	715	715	715	715	715
53	186.9-188.7	550	548	544	540	535
54	188.7-190.5	419	415	410	405	398
55	190.5-192.3	301	296	290	285	278
56	192.3-194.2	215	210	204	199	192
57	194.2-196.1	148	143	137	133	127
58	196.1-198.0	100	95.1	90.8	86.9	82.5
59	198.0-200.0	65.2	61.0	57.6	54.5	51.2
60	200.0-202.0	41.9	38.6	36.0	33.7	31.2
61	202.0-204.1	26.7	24.1	22.2	20.5	18.8
62	204.1-206.2	16.4	14.6	13.3	12.1	11.0
63	206.2-208.3	10.1	8.75	7.88	7.09	6.35
64	208.3-210.5	6.01	5.12	4.55	4.04	3.59
65	210.5-212.8	3.58	3.00	2.64	2.31	2.04
66	212.8-215.0	2.08	1.72	1.50	1.30	1.14
67	215.0-217.4	1.21	0.995	0.860	0.744	0.647
68	217.4-219.8	0.695	0.569	0.490	0.423	0.368

Table I.9.3.

$CHFCl_2$ (Robbins and Stolarski, 1976)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295K
174	1690
176	1630
178	1520
180	1290
182	1160
184	949
186	732
188	529
190	400
192	263
194	180
196	124
198	80.8
200	50.9
202	33.4
204	21.1
206	13.5
208	8.62
210	5.59
212	3.55
214	2.28
216	1.44
218	0.85
220	0.58
222	0.32

Table I.9.4.

$CHFCl_2$ (Chou et al., 1976)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	296 K
186	505
188	445
190	345
192	255
194	177
196	119
198	75
200	49
202	33
204	23
206	15.1
208	9.5
210	5.6
212	3.4
214	2.1
216	1.3

Table I.10.1.

CH_2FCl (Chou et al., 1976)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	296 K
186.0	25.6
187.8	21.3
189.6	15.4
191.4	10.9
193.2	7.67
195.1	5.10
197.0	3.39
199.0	2.36
201.0	1.44
203.0	0.97
205.1	0.55
207.3	0.36
209.4	0.18
211.6	0.10

Table I.10.2.

CH_2FCl (Hubrich and Stuhl, 1980)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298 K	208 K
160	479	470
165	559	558
170	430	382
175	233	198
180	125	81.6
185	42.0	26.9
190	19.5	11.5
195	5.44	3.54
200	2.09	0.988
205	0.698	
210	0.188	
215	0.0560	
220	0.0215	
225	0.00485	
230	0.00257	

II. Chloro- and chlorofluoro- ethanes and ethylenes.

1. CH_3CCl_3
2. $C_2F_3Cl_3$ (CFC-113)
3. $C_2F_4Cl_2$ (CFC-114)
4. C_2F_5Cl (CFC-115)
5. CF_3CHCl_2 (HCFC-123)
6. CF_3CHFCl (HCFC-124)
7. CF_3CH_2Cl (HCFC-133a)
8. CH_3CFCl_2 (HCFC-141b)
9. CH_3CF_2Cl (HCFC-142b)
10. CH_3CH_2Cl
11. C_2HCl_3
12. $CH_3CH_2ClCH_3$

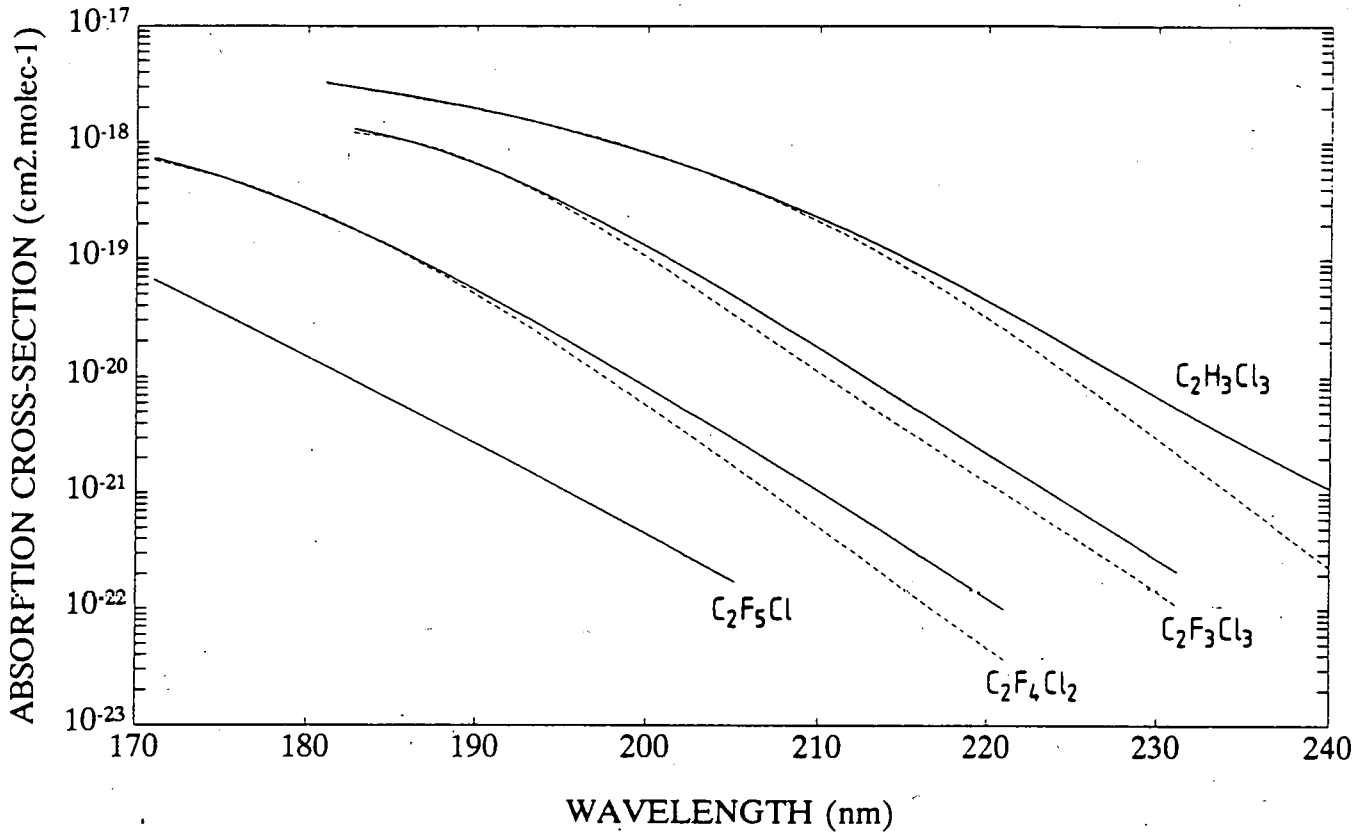

Figure 14. U.V. Absorption cross-sections of chloro- and chlorofluoroethanes as a function of wavelength.

(———) : T = 295 K
(-----) : T = 210 K

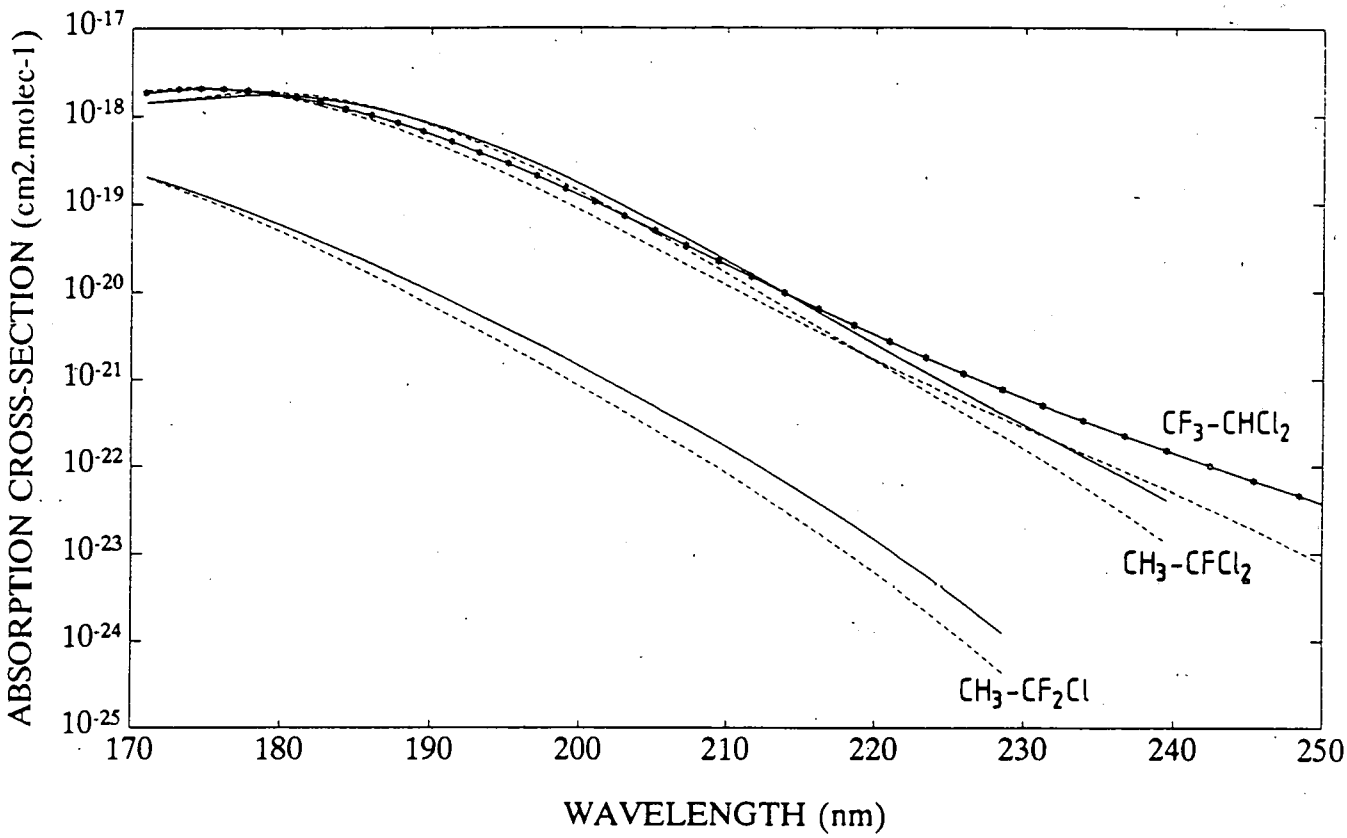

Figure 15. U.V. Absorption cross-sections of hydrochlorofluoroethanes as a function of wavelength.

(———) : T = 295 K
(-----) : T = 210 K

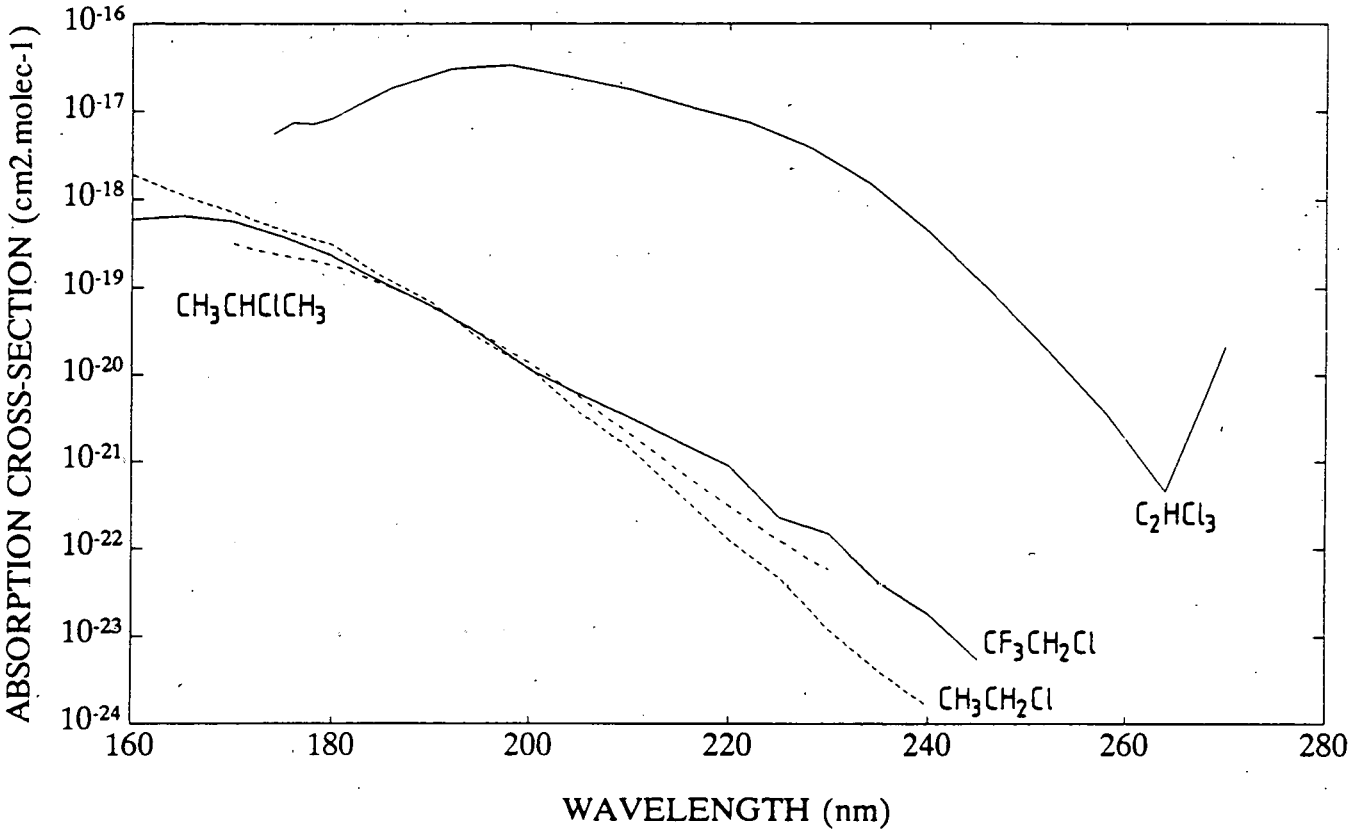

Figure 16. U.V. Absorption cross-sections of chlorofluoro-ethanes, chloroethylenes and chloropropane at ambiant temperature as a function of wavelength.

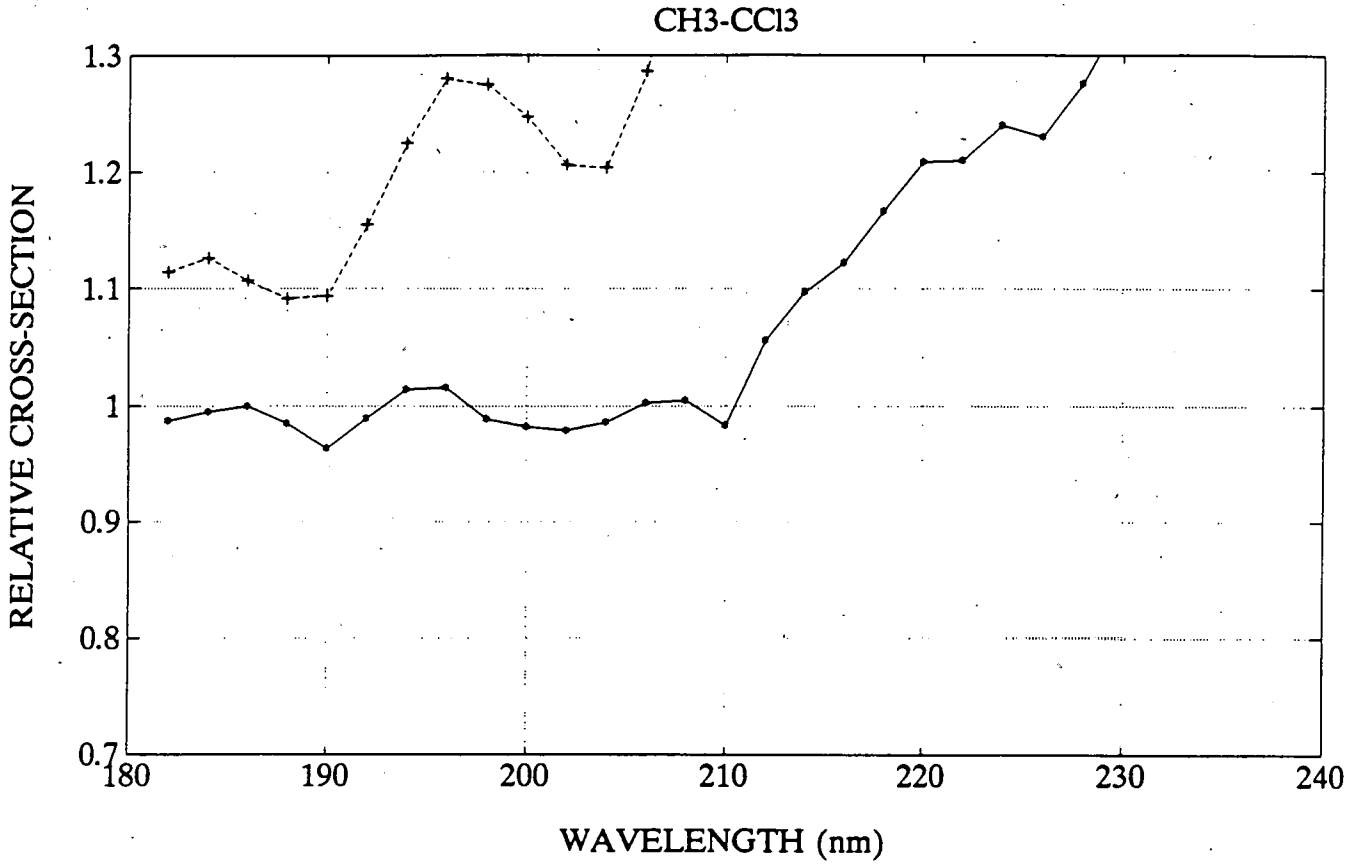

Figure 17. Relative absorption cross-sections of CH_3CCl_3 at room temperature, as a function of wavelength.

(——*——) : Robbins, 1976b
(---+---) : Hubrich and Stuhl, 1980
Ref. : Vanlaethem et al., 1979

Table II.1.1.

CH_3CCl_3 (Vanlaethem et al., 1979)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	296K	270K	250K	230K	210K
182	3150	3150	3150	3150	3150
184	2800	2800	2800	2800	2800
186	2500	2500	2500	2500	2500
188	2200	2200	2200	2200	2200
190	1920	1920	1920	1920	1920
192	1635	1635	1635	1635	1635
194	1400	1400	1400	1400	1400
196	1180	1180	1180	1180	1180
198	990	990	990	990	990
200	810	810	810	810	810
202	658	658	658	658	658
204	520	520	520	520	520
206	400	400	400	400	400
208	308	308	308	308	308
210	240	240	240	235	229
212	168	165	161	156	151
214	120	115	111	107	103
216	86.0	80.0	76.5	72.7	68.8
218	60.0	54.6	51.0	48.0	45.0
220	41.5	36.5	34.0	31.3	29.0
222	29.5	25.4	23.0	20.9	19.2
224	20.5	17.1	15.4	12.6	12.3
226	14.8	12.0	10.5	9.18	8.07
228	10.2	8.06	6.88	5.86	5.10
230	7.00	5.35	4.48	3.74	3.11
232	4.90	3.63	2.94	2.40	1.91
234	3.35	2.41	1.88	1.47	1.14
236	2.30	1.59	1.22	0.920	0.670
238	1.53	1.02	0.760	0.550	0.370
240	1.02	0.650	0.470	0.340	0.200

Table II.1.2.

CH_3CCl_3 (Vanlaethem et al., 1979)

(wavenumber intervals : 500 cm^{-1}.)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
50	181.8-183.5	3050	3050	3050	3050	3050
51	183.5-185.2	2780	2780	2780	2780	2780
52	185.2-186.9	2500	2500	2500	2500	2500
53	186.9-188.7	2250	2250	2250	2250	2250
54	188.7-190.5	2000	2000	2000	2000	2000
55	190.5-192.3	1750	1750	1750	1750	1750
56	192.3-194.2	1520	1520	1520	1520	1520
57	194.2-196.1	1290	1290	1290	1290	1290
58	196.1-198.0	1080	1080	1080	1080	1080
59	198.0-200.0	880	880	880	880	880
60	200.0-202.0	725	725	725	725	725
61	202.0-204.1	590	590	590	590	590
62	204.1-206.2	460	460	460	460	460
63	206.2-208.3	355	355	355	355	355
64	208.3-210.5	258	258	258	257	251
65	210.5-212.8	190	187	184	179	174
66	212.8-215.0	128	123	119	114	109
67	215.0-217.4	84.0	78.1	74.8	70.6	66.8
68	217.4-219.8	54.0	48.6	45.6	42.7	39.7
69	219.8-222.2	35.8	31.1	28.6	26.3	24.2
70	222.2-224.7	23.3	19.6	17.7	15.8	14.2
71	224.7-227.3	14.8	12.0	10.5	9.18	8.14
72	227.3-229.9	9.00	7.02	5.94	5.04	4.32
73	229.9-232.6	5.60	4.20	3.44	2.86	2.30
74	232.6-235.3	3.30	2.38	1.86	1.48	1.14
75	235.3-238.1	1.96	1.33	1.02	0.75	0.53
76	238.1-241.0	1.15	0.75	0.48	0.37	0.23

Table II.1.3.

CH_3CCl_3 (Robbins, 1976b)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295K
174	4280
178	3990
182	3110
186	2500
190	1850
194	1420
198	979
202	644
206	401
210	236
218	70.0
226	18.2
234	5.39
242	1.23

Table II.1.4.

CH_3CCl_3 (Hubrich and Stuhl, 1980)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298K
160	4200
165	4110
170	3800
175	3940
180	3780
185	2960
190	2100
195	1620
200	1010
205	563
210	387
215	202
220	103
225	43.6
230	17.5
235	6.14
240	2.11
245	0.878
250	0.412
255	0.0162

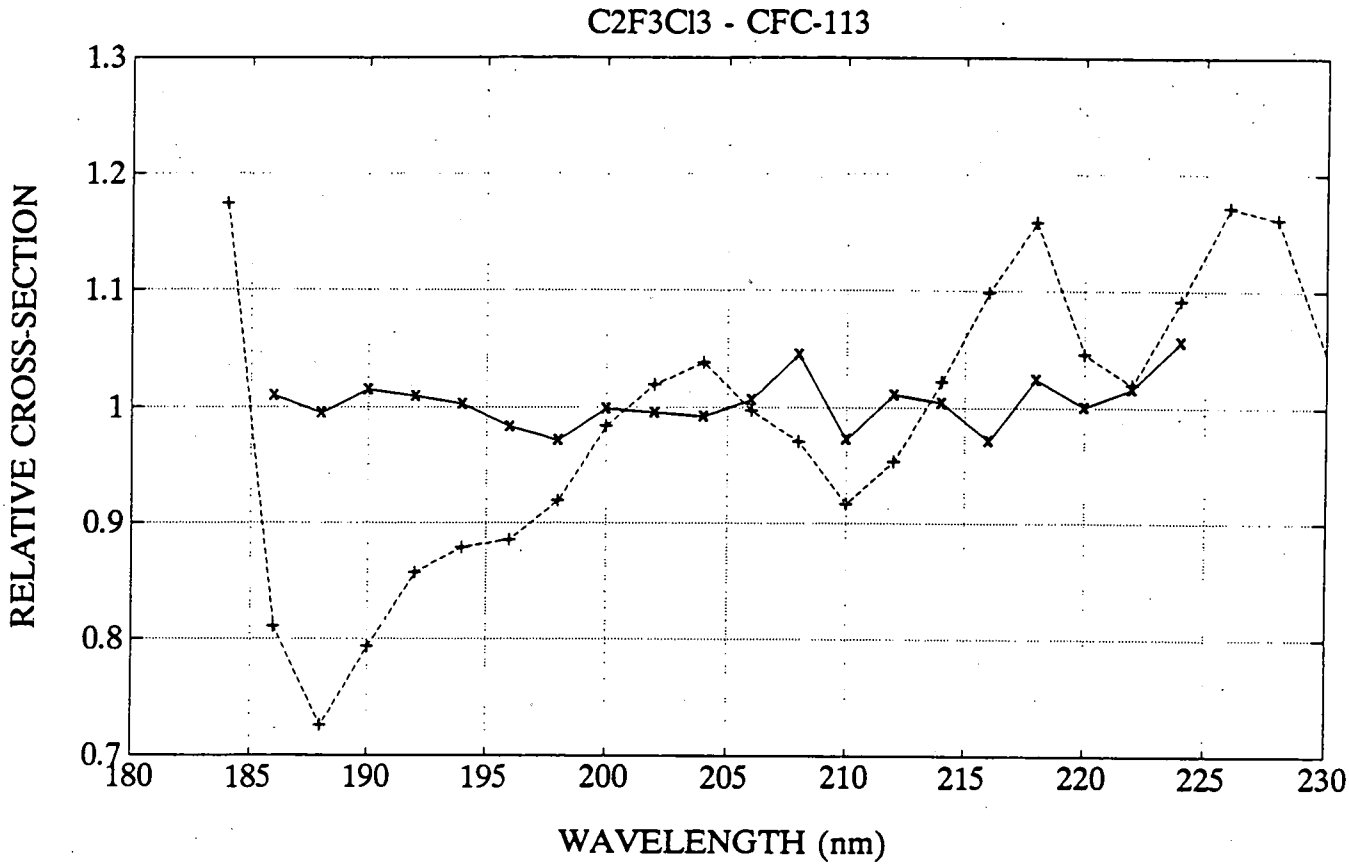

Figure 18. Relative absorption cross-sections of $C_2F_3Cl_3$ at room temperature, as a function of wavelength.

(——x——) : Chou et al., 1978
(---+---) : Hubrich and Stuhl, 1980
Ref. : Simon et al., 1988b

Table II.2.1.

$C_2F_3Cl_3$ (Simon et al., 1988b)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	295K	270K	250K	230K	210K
184	1180	1180	1180	1180	1180
186	1040	1040	1040	1040	1040
188	835	835	835	835	835
190	645	645	645	645	645
192	488	488	488	488	488
194	360	360	360	360	360
196	260	260	259	250	243
198	183	183	174	166	159
200	125	119	113	107	101
202	86.0	79.6	74.4	69.7	65.4
204	58.0	52.5	48.4	44.7	40.9
206	40.0	35.6	32.2	29.6	26.6
208	26.5	22.8	20.7	18.9	16.8
210	18.0	15.5	13.9	12.6	11.2
212	11.5	9.89	8.74	7.93	6.96
214	7.60	6.50	5.78	5.13	4.52
216	5.05	4.29	3.79	3.36	2.98
218	3.18	2.69	2.38	2.10	1.84
220	2.20	1.86	1.63	1.43	1.25
222	1.45	1.23	1.07	0.930	0.810
224	0.950	0.800	0.697	0.610	0.530
226	0.630	0.529	0.461	0.396	0.341
228	0.410	0.344	0.299	0.255	0.220
230	0.270	0.226	0.196	0.168	0.144

Table II.2.2.

$C_2F_3Cl_3$ (Simon et al., 1988b)

(wavenumber intervals : 500 cm^{-1})

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
52	185.2-186.9	1040	1040	1040	1040	1040
53	186.9-188.7	860	860	860	860	860
54	188.7-190.5	700	700	700	700	700
55	190.5-192.3	547	547	547	547	547
56	192.3-194.2	415	415	415	415	415
57	194.2-196.1	310	310	310	307	299
58	196.1-198.0	225	225	218	209	202
59	198.0-200.0	158	154	146	138	132
60	200.0-202.0	108	101.5	95.0	89.6	84.2
61	202.0-204.1	73.0	67.0	62.0	57.3	53.3
62	204.1-206.2	48.0	43.0	39.1	36.0	31.7
63	206.2-208.3	31.8	27.8	25.1	23.0	20.7
64	208.3-210.5	19.8	17.1	15.3	14.0	12.4
65	210.5-212.8	12.5	10.7	9.56	8.62	7.56
66	212.8-215.0	7.70	6.58	5.85	5.31	4.58
67	215.0-217.4	4.80	4.08	3.60	3.19	2.83
68	217.4-219.8	2.95	2.49	2.20	1.92	1.70
69	219.8-222.2	1.80	1.50	1.31	1.15	1.00
70	222.2-224.7	1.08	0.900	0.788	0.690	0.600
71	224.7-227.3	0.630	0.529	0.461	0.396	0.341
72	227.3-229.9	0.360	0.302	0.262	0.229	0.192

Table II.2.3.

$C_2F_3Cl_3$ (Chou et al., 1978)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	296K
186.0	1050
187.8	850
189.6	689
191.4	538
193.2	410
195.1	300
197.0	213
199.0	149
201.0	104
203.0	70
205.1	47
207.3	32
209.4	20.5
211.6	12.6
213.9	7.8
216.2	4.7
218.6	2.9
221.0	1.8
223.5	1.1

Table II.2.4.

$C_2F_3Cl_3$ (Hubrich and Stuhl, 1980)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298K	208K
160	2700	2600
165	2600	2450
170	2180	1930
175	1920	1980
180	1550	1480
185	1070	1090
190	512	493
195	270	203
200	123	99.1
205	49.2	32.6
210	16.5	10.7
215	6.61	
220	2.30	
225	0.883	
230	0.282	
235	0.121	
240	0.0487	
245	0.0181	
250	0.00832	

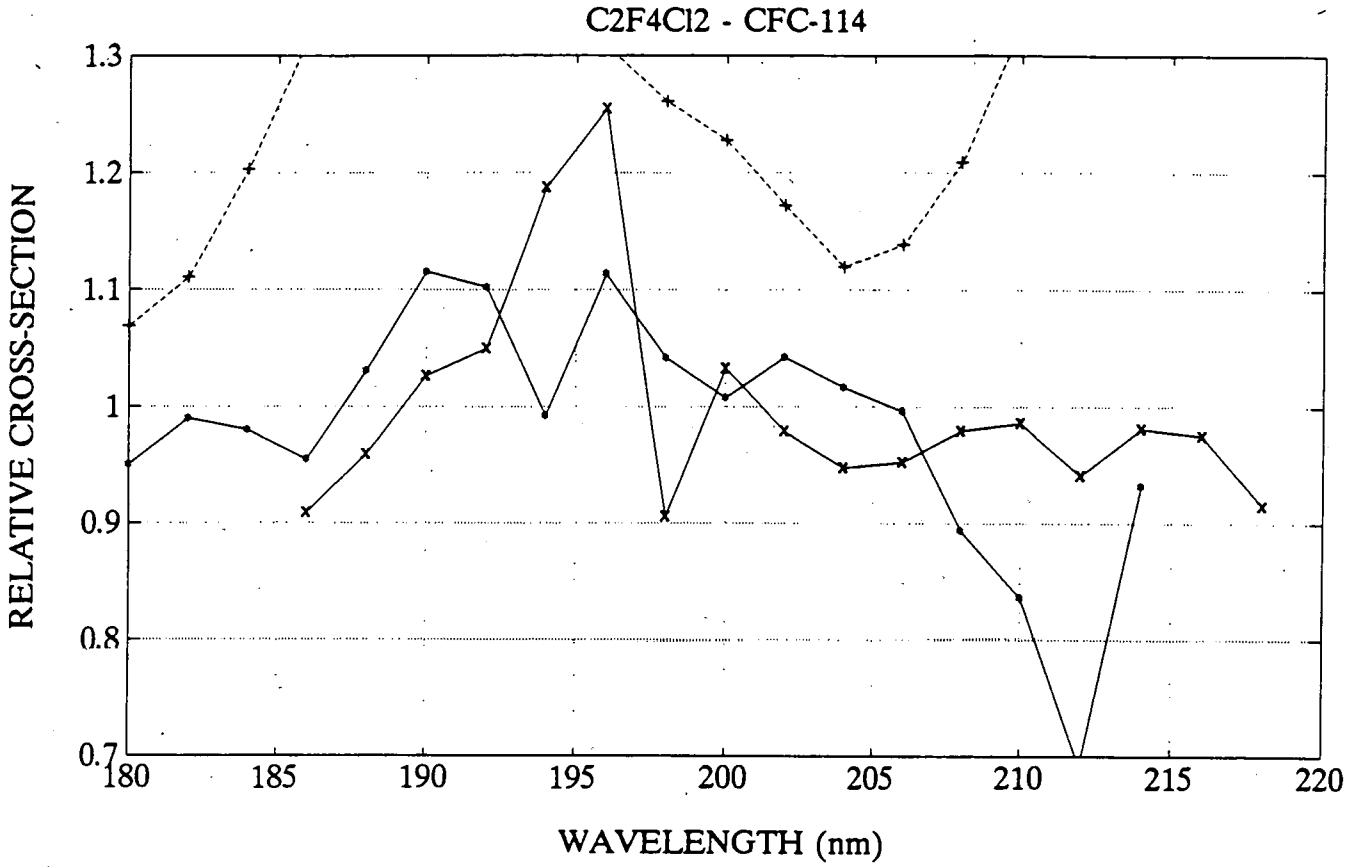

Figure 19. Relative absorption cross-sections of $C_2F_4Cl_2$ at room temperature, as a function of wavelength.

(——*——) : Robbins, 1976b
(——x——) : Chou et al., 1978
(---+---) : Hubrich and Stuhl, 1980
Ref. : Simon et al., 1988b

Table II.3.1.

$C_2F_4Cl_2$ (Simon et al., 1988b)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	295K	270K	250K	230K	210K
172	690	690	690	690	690
174	550	550	550	550	550
176	430	430	430	430	430
178	340	340	340	340	340
180	262	262	262	262	262
182	198	198	198	198	198
184	150	150	150	150	150
186	110	110	110	110	110
188	78.0	78.0	78.0	78.0	77.2
190	53.5	53.5	53.5	51.9	50.3
192	37.0	37.0	35.7	34.0	32.8
194	25.6	24.8	23.7	22.4	21.3
196	17.5	16.4	15.5	14.7	13.9
198	12.0	10.9	10.2	9.45	8.80
200	8.00	7.12	6.55	6.03	5.50
202	5.40	4.67	4.21	3.81	3.43
204	3.70	3.12	2.80	2.46	2.18
206	2.45	2.02	1.76	1.54	1.35
208	1.60	1.32	1.13	0.970	0.840
210	1.04	0.837	0.715	0.605	0.510
212	0.680	0.548	0.455	0.380	0.315
214	0.440	0.343	0.287	0.237	0.196
216	0.290	0.223	0.182	0.148	0.120
218	0.190	0.144	0.115	0.0930	0.0740
220	0.122	0.0920	0.0720	0.0570	0.0450

Table II.3.2.

$C_2F_4Cl_2$ (Simon et al., 1988b)

(wavenumber intervals : 500 cm^{-1})

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
44	172.4-173.9	610	610	610	610	610
45	173.9-175.4	518	518	518	518	518
46	175.4-177.0	421	421	421	421	421
47	177.0-178.6	347	347	347	347	347
48	178.6-180.2	281	281	281	281	281
49	180.2-181.8	228	228	228	228	228
50	181.8-183.5	182	182	182	182	182
51	183.5-185.2	143	143	143	143	143
52	185.2-186.9	110	110	110	110	110
53	186.9-188.7	80.0	80.0	80.0	80.0	80.0
54	188.7-190.5	58.2	58.2	58.2	57.0	55.3
55	190.5-192.3	42.1	42.1	41.3	39.4	37.9
56	192.3-194.2	30.0	29.4	28.2	26.9	25.7
57	194.2-196.1	20.5	19.6	18.6	17.5	16.5
58	196.1-198.0	14.5	13.4	12.6	11.7	10.9
59	198.0-200.0	9.80	8.82	8.13	7.50	6.91
60	200.0-202.2	6.60	5.77	5.28	4.78	4.03
61	202.0-204.1	4.08	3.49	3.12	2.77	2.49
62	204.1-206.2	2.95	2.46	2.30	1.90	1.68
63	206.2-208.3	1.90	1.56	1.35	1.16	1.01
64	208.3-210.5	1.19	0.963	0.821	0.690	0.595
65	210.5-212.8	0.740	0.588	0.492	0.411	0.348
66	212.8-215.0	0.450	0.351	0.290	0.238	0.198
67	215.0-217.4	0.278	0.214	0.174	0.142	0.114
68	217.4-219.8	0.165	0.124	0.0990	0.0790	0.0630

Table II.3.3.

$C_2F_4Cl_2$ (Robbins, 1976b)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295 K
174	500
176	409
178	315
180	249
182	196
184	147
186	105
188	80.4
190	59.7
192	40.8
194	25.4
196	19.5
198	12.5
200	8.06
202	5.63
204	3.76
206	2.44
208	1.43
210	0.87
212	0.47
214	0.41

Table II.3.4.

$C_2F_4Cl_2$ (Chou et al., 1978)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	296K
186.0	100
187.8	77.1
189.6	58.4
191.4	43.6
193.2	31.8
195.1	28.1
197.0	14.4
199.0	9.7
201.0	6.6
203.0	4.3
205.1	2.8
207.3	1.8
209.4	1.2
211.6	0.70
213.9	0.44
216.2	0.27
218.6	0.15

Table II.3.5.

$C_2F_4Cl_2$ (Hubrich and Stuhl, 1980)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	298K	208K
160	1430	1370
165	1220	1180
170	837	801
175	541	531
180	280	263
185	163	150
190	73.7	67.0
195	27.9	24.3
200	9.82	9.00
205	3.39	3.22
210	1.38	1.07
215	0.532	
220	0.190	
225	0.0685	
230	0.0261	
235	0.00892	

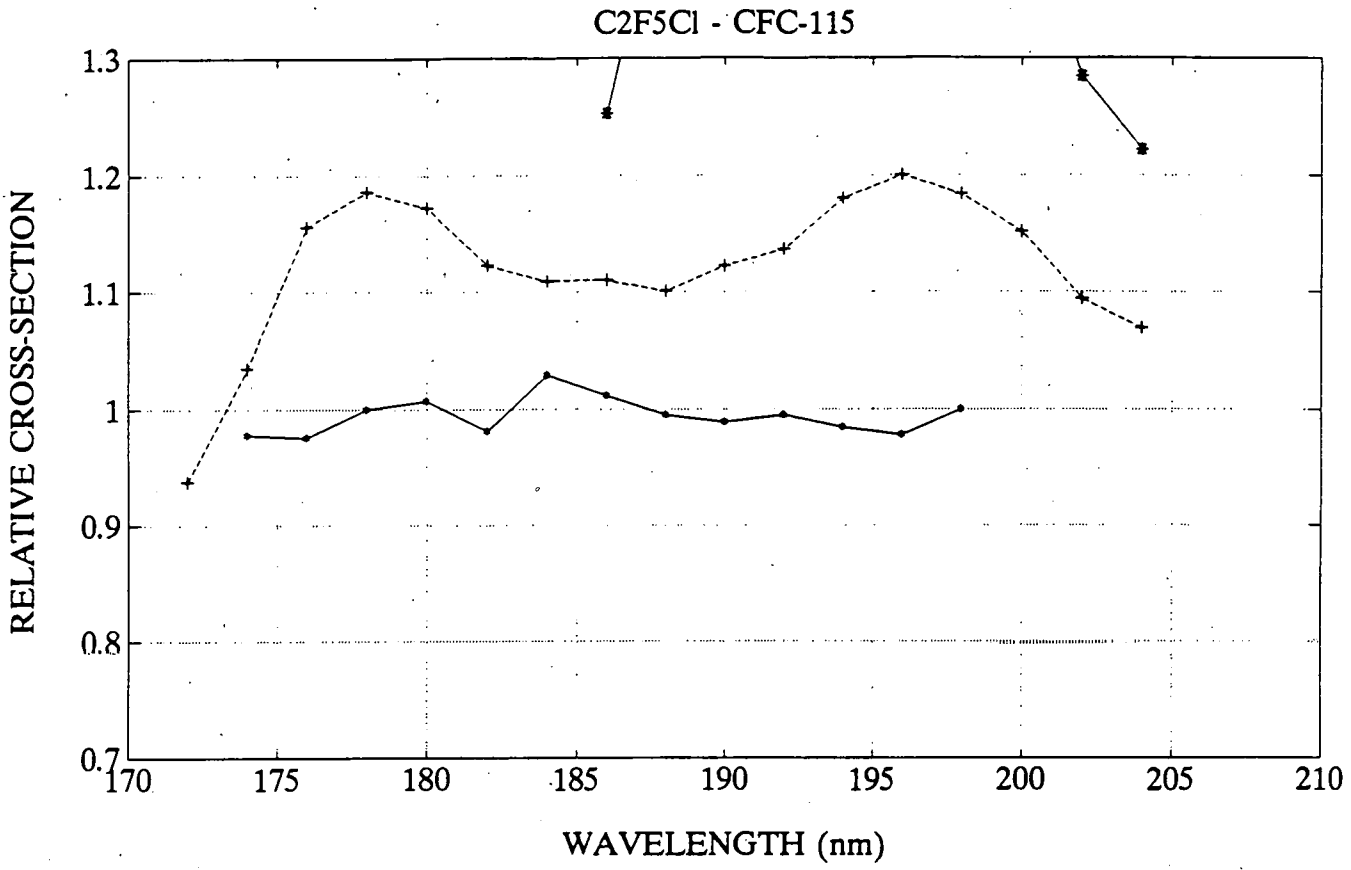

Figure 20. Relative absorption cross-sections of C_2F_5Cl at room temperature, as a function of wavelength.

(——*——) : Robbins, 1976b
(——x——) : Chou et al., 1978
(---+---) : Hubrich and Stuhl, 1980
Ref. : Simon et al., 1988b

Table II.4.1.

C_2F_5Cl (Simon et al., 1988b)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295K
172	56.5
174	40.5
176	28.5
178	20.5
180	14.5
182	10.5
184	7.50
186	5.35
188	3.85
190	2.70
192	1.90
194	1.30
196	0.900
198	0.630
200	0.440
202	0.310
204	0.210

Table II.4.2.

C_2F_5Cl (Simon et al., 1988b)

(wavenumber intervals : 500 cm^{-1})

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K
44	172.4-173.9	47.0
45	173.9-175.4	36.2
46	175.4-177.0	27.5
47	177.0-178.6	20.5
48	178.6-180.2	16.0
49	180.2-181.8	12.5
50	181.8-183.5	9.40
51	183.5-185.2	8.20
52	185.2-186.9	5.35
53	186.9-188.7	4.00
54	188.7-190.5	4.95
55	190.5-192.3	2.15
56	192.3-194.2	1.50
57	194.2-196.1	1.06
58	196.1-198.0	0.750
59	198.0-200.0	0.520
60	200.0-202.0	0.360
61	202.0-204.1	0.250

Table II.4.3.

C_2F_5Cl (Robbins, 1976b)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	295K
174	39.6
176	27.9
178	
180	14.6
182	10.3
184	7.72
186	5.41
188	3.83
190	2.67
192	1.89
194	1.28
196	0.88
198	0.63

Table II.4.4.

C_2F_5Cl (Chou et al., 1978)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	296K
186.0	6.7
187.8	5.8
189.6	4.4
191.4	3.3
193.2	2.4
195.1	1.7
197.0	1.1
199.0	0.77
201.0	0.50
203.0	0.32
205.1	0.20
207.3	0.12

Table II.4.5.

C_2F_5Cl (Hubrich and Stuhl, 1980)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	298K	208K
160	216	220
165	149	138
170	70.7	70.9
175	37.4	33.3
180	17.0	14.3
185	7.03	6.51
190	3.03	2.66
195	1.29	0.991
200	0.507	0.443
205	0.182	0.139
210	0.0596	
215	0.0209	
220	0.00740	
225	0.00335	
230	0.00114	

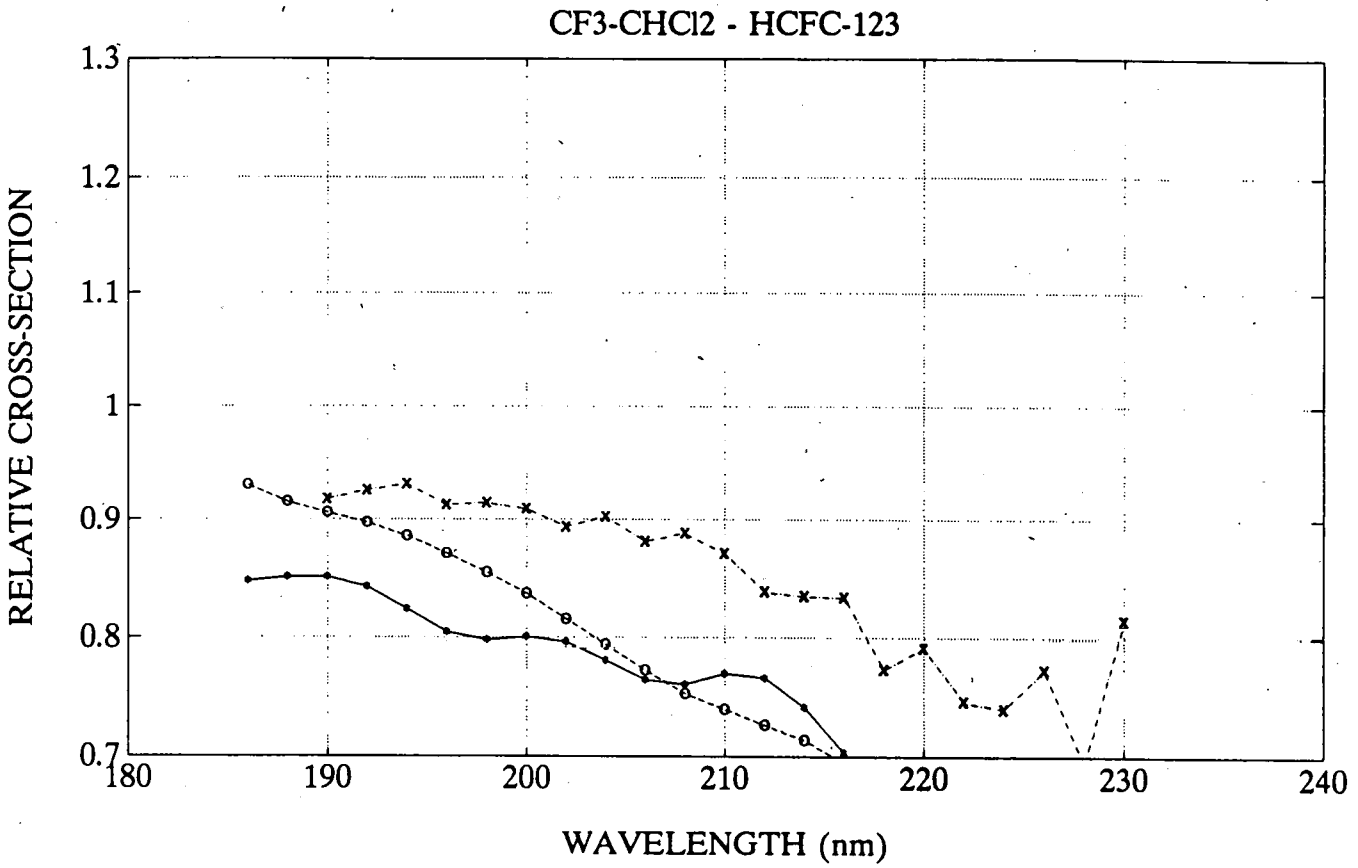

Figure 21. Relative absorption cross-sections of CF_3-$CHCl_2$ at room temperature, as a function of wavelength.

(——*——) : Allied-Signal Corporation, 1989
(---o---) : Molina and Molina, 1989
(-.-x-.-) : Orlando et al., 1990
Ref. : Gillotay and Simon, 1990

Table II.5.1

CF_3-$CHCl_2$ (Gillotay and Simon, 1990)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	295 K	270 K	250 K	230 K	210 K
170	1747	1767	1783	1799	1815
172	1935	1959	1978	1997	2017
174	2024	2046	2063	2080	2098
176	2010	2023	2034	2044	2055
178	1901	1903	1904	1905	1907
180	1720	1709	1701	1692	1684
182	1496	1474	1456	1439	1422
184	1254	1224	1201	1178	1155
186	1017	983	957	931	905
188	802	767	740	713	688
190	616	582	557	533	509
192	462	433	410	389	368
194	341	315	296	278	261
196	247	226	210	196	182
198	176	159	147	136	126
200	124	111	102	93.5	85.7
202	86.9	77.2	70.2	63.8	58.0
204	60.4	53.2	48.0	43.3	39.0
206	41.8	36.4	32.7	29.3	26.2
208	28.8	24.9	22.2	19.8	17.6
210	19.9	17.1	15.1	13.3	11.8
212	13.7	11.7	10.3	9.03	7.94
214	9.47	8.01	7.01	6.13	5.36
216	6.57	5.52	4.80	4.18	3.63
218	4.58	3.82	3.31	2.86	2.47
220	3.21	2.66	2.29	1.97	1.69
222	2.26	1.86	1.59	1.36	1.17
224	1.61	1.31	1.12	0.951	0.809
226	1.15	0.934	0.789	0.667	0.564
228	0.832	0.668	0.561	0.471	0.395
230	0.605	0.482	0.401	0.334	0.278
232	0.444	0.350	0.288	0.238	0.196
234	0.329	0.255	0.209	0.170	0.139
236	0.245	0.188	0.152	0.122	0.0987
238	0.184	0.139	0.110	0.0879	0.0700
240	0.140	0.103	0.0806	0.0632	0.0495
242	0.106	0.0766	0.0589	0.0453	0.0349
244	0.0815	0.0572	0.0430	0.0324	0.0244
246	0.0628	0.0427	0.0314	0.0230	0.0169
248	0.0484	0.0318	0.0227	0.0162	0.0116
250	0.0375	0.0236	0.0164	0.0113	0.00783

Table II.5.2.

CF_3-$CHCl_2$ (Gillotay and Simon, 1990)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ (nm)	295 K	270 K	250 K	230 K	210 K
43	169.5-172.4	1848	1870	1888	1906	1925
44	172.4-173.9	1999	2022	2041	2060	2079
45	173.9-175.4	2031	2050	2066	2081	2097
46	175.4-177.0	2003	2015	2025	2035	2045
47	177.0-178.6	1915	1918	1921	1923	1926
48	178.6-180.2	1780	1773	1768	1762	1756
49	180.2-181.8	1612	1595	1582	1569	1556
50	181.8-183.5	1418	1393	1373	1354	1339
51	183.5-185.2	1212	1181	1156	1133	1110
52	185.2-186.9	1012	977	951	925	900
53	186.9-188.7	822	787	760	734	708
54	188.7-190.5	659	625	599	574	550
55	190.5-192.3	505	474	450	428	407
56	192.3-194.2	383	355	335	316	298
57	194.2-196.1	283	260	244	228	213
58	196.1-198.0	207	188	175	162	150
59	198.0-200.0	148	133	123	113	104
60	200.0-202.0	104	92.8	84.7	77.3	70.6
61	202.0-204.1	71.9	63.5	57.5	52.1	47.2
62	204.1-206.2	48.9	42.8	38.5	34.6	31.1
63	206.2-208.3	33.1	28.8	25.7	22.9	20.4
64	208.3-210.5	22.2	19.1	16.9	15.0	13.3
65	210.5-212.8	14.6	12.5	11.0	9.67	8.51
66	212.8-215.0	9.65	8.16	7.14	6.25	5.47
67	215.0-217.4	6.34	5.32	4.62	4.02	3.49
68	217.4-219.8	4.11	3.43	2.96	2.56	2.21
69	219.8-222.2	2.69	2.22	1.91	1.64	1.41
70	222.2-224.7	1.77	1.45	1.23	1.05	0.894
71	224.7-227.3	1.15	0.934	0.789	0.667	0.564
72	227.3-229.9	0.755	0.605	0.507	0.424	0.355
73	229.9-232.6	0.498	0.394	0.326	0.270	0.224
74	232.6-235.3	0.331	0.257	0.210	0.172	0.140
75	235.3-238.1	0.222	0.169	0.136	0.109	0.0875
76	238.1-241.0	0.150	0.111	0.0872	0.0686	0.0540
77	241.0-243.9	0.100	0.0718	0.0549	0.0421	0.0322
78	243.9-246.9	0.0679	0.0466	0.0345	0.0255	0.0189
79	246.9-250.0	0.0454	0.0295	0.0209	0.0148	0.0105
80	250.0-253.2	0.0309	0.0189	0.0127	0.00856	0.00576

Table II.5.3

CF_3-$CHCl_2$ (Orlando et al., 1990)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295 K	263 K	243 K	223 K	203 K
190	565	527	518	509	487
191	482	456	442	433	413
192	428	397	389	376	361
193	361	336	324	314	300
194	317	292	280	271	260
195	267	244	233	225	214
196	225	204	195	187	178
197	197	173	165	158	150
198	161	145	137	130	123
199	134	119	112	107	101
200	113	100	93.8	88.8	85.3
201	93.9	82.9	76.7	72.6	69.7
202	77.7	68.0	62.8	59.3	56.9
203	66.0	57.6	53.0	50.0	47.7
204	54.5	47.7	43.3	40.9	39.0
205	44.5	38.7	35.3	33.3	31.7
206	36.8	32.1	29.0	27.2	26.0
207	30.4	26.8	23.5	22.2	21.3
208	25.6	22.3	19.9	18.6	18.0
209	20.8	18.5	16.2	15.2	14.7
210	17.3	15.6	13.2	12.5	12.2
211	14.1	12.5	10.7	10.3	10.1
212	11.5	10.8	8.90	8.54	8.39
213	9.53	8.95	7.25	7.01	6.90
214	7.91	7.39	6.18	6.04	5.94
215	6.51	5.94	4.63	5.00	5.03
216	5.48	5.27	3.84	4.20	4.31
217	4.38	4.16	2.99	3.60	3.75
218	3.54	3.35	2.43	3.10	3.16
219	3.01	2.86	2.04	2.60	2.76
220	2.54	2.52	1.74	2.28	2.51
221	2.04	1.81	1.38	2.05	2.25
222	1.69	1.62	1.18	1.82	2.04
223	1.44	1.51	1.01	1.61	1.88
224	1.19	1.23	0.833	1.48	1.74
225	0.987	1.09	0.701	1.36	1.36
226	0.890	1.13	0.643	1.29	1.28
227	0.742	1.01	0.536	1.17	1.23
228	0.576	0.737	0.430	1.08	1.17
229	0.527	0.745	0.391	1.05	1.09
230	0.493	0.904	0.387	0.967	1.00

Table II.5.4

CF_3-$CHCl_2$ (Molina and Molina, 1989)

λ (nm)	$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)
185	1067
190	558
195	225
200	104
205	39.4
210	14.7
215	5.57
220	1.98
225	0.730

Table II.5.5

CF_3-$CHCl_2$ (Allied-Signal Corporation, 1989)

λ (nm)	$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)
185	960
190	524
195	236
200	99.5
205	38.8
210	15.3
215	5.70
220	2.10
225	0.790

Table II.6.1

CF_3-CHFCl (Orlando et al., 1990)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	295 K	283 K	263 K	243 K	223 K	203 K
190	7.35	5.78	5.27	5.17	4.79	4.49
191	6.16	4.89	4.61	4.33	4.02	3.88
192	5.29	4.30	4.05	3.80	3.52	3.38
194	3.79	3.16	2.95	2.75	2.53	2.44
195	3.16	2.62	2.44	2.27	2.09	2.01
196	2.61	2.20	2.04	1.89	1.73	1.66
197	2.21	1.88	1.74	1.60	1.47	1.40
198	1.83	1.56	1.44	1.33	1.21	1.14
199	1.51	1.30	1.19	1.10	0.991	0.933
200	1.28	1.10	1.00	0.923	0.831	0.779
201	1.05	0.909	0.826	0.758	0.677	0.630
202	0.860	0.748	0.676	0.619	0.549	0.507
203	0.723	0.631	0.569	0.520	0.457	0.422
204	0.592	0.519	0.466	0.425	0.371	0.339
205	0.482	0.424	0.379	0.345	0.297	0.269
206	0.395	0.348	0.309	0.281	0.239	0.216
207	0.322	0.284	0.252	0.230	0.193	0.172
208	0.262	0.239	0.210	0.193	0.159	0.141
209	0.221	0.197	0.172	0.158	0.128	0.111
210	0.182	0.161	0.141	0.130	0.103	0.0880
211	0.148	0.133	0.115	0.107	0.0825	0.0696
212	0.122	0.1100	0.9460	0.8920	0.0676	0.0554
213	0.100	0.0913	0.0782	0.0746	0.0544	0.0435
214	0.0829	0.0789	0.0668	0.0653	0.0457	0.0354
215	0.0720	0.0664	0.0563	0.0557	0.0380	0.0284
216	0.0605		0.0475	0.0476	0.0317	0.0230
217	0.0503	0.0522	0.0420	0.0439	0.0281	0.0190
218	0.0433	0.0463	0.0370	0.0395	0.0242	0.0148
219	0.0377	0.0404	0.0325	0.0348	0.0210	0.0127
220	0.0322	0.0366	0.0294	0.0323	0.0188	0.0111
221	0.0284	0.0334	0.0262	0.0300	0.0190	0.00837
222	0.0258	0.0332	0.0254	0.0279	0.0173	0.00746
223	0.0231	0.0307	0.0234	0.0259	0.0257	0.00620
224	0.0203	0.0287	0.0217	0.0248	0.0147	0.00525
225	0.0201	0.0270	0.0206	0.0254	0.0138	0.00481
226	0.0185	0.0250	0.0194	0.0239	0.0127	0.00455
227	0.0164	0.0239	0.0183	0.0230	0.0121	0.00441
228	0.0151	0.0236	0.0189	0.0230	0.0112	0.00364
229	0.0149	0.0220	0.0183	0.0219	0.0107	0.00359
230	0.0143	0.0230	0.0177	0.0209	0.0102	0.00348

Table II.7.1.

CF_3-CH_2Cl (Hubrich and Stuhl, 1980)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298K	208K
160	594	733
165	646	619
170	564	466
175	373	318
180	228	184
185	116	93.2
190	62.0	
195	29.5	
200	11.4	
205	5.98	
210	3.28	
215	1.69	
220	0.887	
225	0.226	
230	0.147	
235	0.0404	
240	0.0181	
245	0.00541	

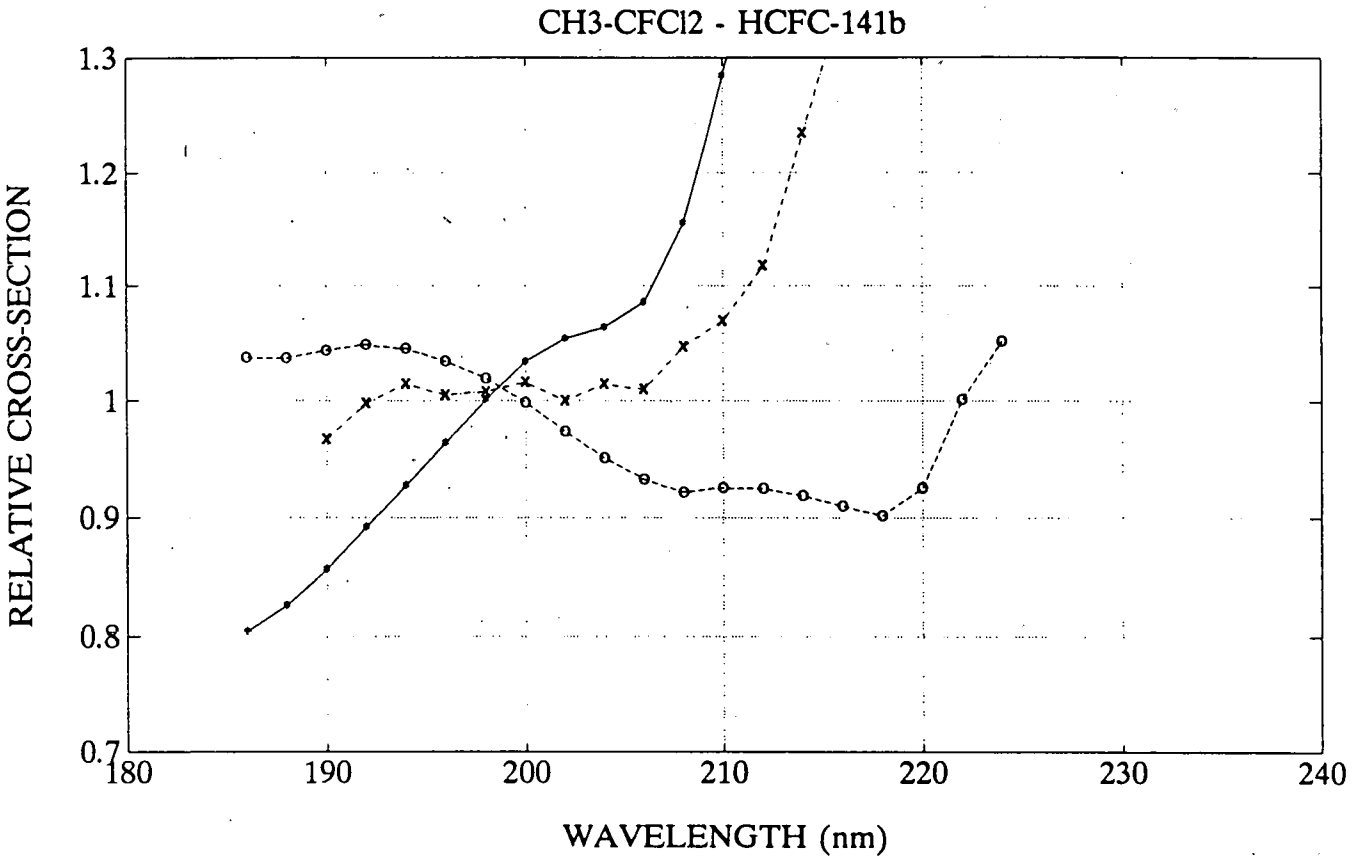

Figure 22. Relative absorption cross-sections of CH_3-$CFCl_2$ at room temperature, as a function of wavelength.

(——*——) : Allied-Signal Corporation, 1989
(---o---) : Molina and Molina, 1989
(-.-x-.-) : Orlando et al., 1990
Ref. : Gillotay and Simon, 1990

Table II.8.1

CH_3-$CFCl_2$ (Gillotay and Simon, 1990)

	$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)				
λ (nm)	295 K	270 K	250 K	230 K	210 K
170	1431	1428	1418	1409	1399
172	1451	1451	1452	1452	1452
174	1542	1549	1556	1562	1568
176	1629	1655	1675	1696	1717
178	1726	1763	1792	1822	1852
180	1723	1762	1794	1826	1858
182	1629	1662	1690	1718	1746
184	1464	1488	1507	1526	1546
186	1257	1270	1279	1289	1299
188	1036	1038	1039	1040	1042
190	822	816	811	806	801
192	631	620	612	603	595
194	470	458	448	438	428
196	341	329	319	309	300
198	242	231	222	214	206
200	168	159	152	145	138
202	115	108	102	96.7	91.7
204	77.5	71.9	67.7	63.7	60.0
206	51.6	47.5	44.4	41.6	38.9
208	34.0	31.1	28.9	26.9	25.0
210	22.3	20.2	18.7	17.3	16.0
212	14.5	13.1	12.0	11.1	10.2
214	9.40	8.42	7.72	7.07	6.48
216	6.08	5.42	4.94	4.50	4.10
218	3.93	3.48	3.16	2.86	2.60
220	2.54	2.23	2.02	1.82	1.64
222	1.64	1.43	1.29	1.15	1.03
224	1.07	0.922	0.820	0.730	0.650
226	0.693	0.593	0.523	0.461	0.407
228	0.452	0.381	0.333	0.290	0.253
230	0.296	0.245	0.211	0.182	0.156
232	0.194	0.158	0.133	0.113	0.0957
234	0.128	0.101	0.0840	0.0697	0.0579
236	0.0841	0.0647	0.0525	0.0425	0.0345
238	0.0556	0.0412	0.0325	0.0256	0.0202
240	0.0368	0.0261	0.0199	0.0151	0.0115

Table III.8.2

CH_3-$CFCl_2$ (Gillotay and Simon, 1990)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ (nm)	295 K	270 K	250 K	230 K	210 K
43	169.5-172.4	1426	1424	1421	1417	1414
44	172.4-173.9	1501	1504	1507	1510	1513
45	173.9-175.4	1570	1583	1593	1603	1614
46	175.4-177.0	1640	1666	1688	1710	1732
47	177.0-178.6	1720	1755	1784	1813	1843
48	178.6-180.2	1736	1775	1806	1838	1871
49	180.2-181.8	1686	1723	1753	1784	1815
50	181.8-183.5	1582	1612	1637	1663	1689
51	183.5-185.2	1430	1452	1469	1487	1505
52	185.2-186.9	1252	1264	1273	1283	1293
53	186.9-188.7	1058	1061	1063	1065	1067
54	188.7-190.5	874	870	866	862	859
55	190.5-192.3	686	676	668	660	653
56	192.3-194.2	527	515	505	495	486
57	194.2-196.1	392	379	369	360	350
58	196.1-198.0	286	274	264	255	247
59	198.0-200.0	202	192	184	176	169
60	200.0-202.0	139	131	125	119	113
61	202.0-204.1	93.6	87.2	82.4	77.8	73.5
62	204.1-206.2	61.4	56.7	53.2	49.9	46.8
63	206.2-208.3	39.8	36.5	34.0	31.7	29.5
64	208.3-210.5	25.3	23.0	21.3	19.8	18.3
65	210.5-212.8	15.6	14.1	13.0	12.0	11.0
66	212.8-215.0	9.60	8.61	7.89	7.23	6.62
67	215.0-217.4	5.82	5.18	4.72	4.30	3.92
68	217.4-219.8	3.44	3.05	2.76	2.50	2.26
69	219.8-222.2	2.04	1.79	1.61	1.45	1.30
70	222.2-224.7	1.20	1.04	0.928	0.828	0.738
71	224.7-227.3	0.693	0.593	0.523	0.461	0.407
72	227.3-229.9	0.398	0.334	0.290	0.252	0.219
73	229.9-232.6	0.227	0.186	0.159	0.135	0.115
74	232.6-235.3	0.129	0.102	0.0849	0.0706	0.0586
75	235.3-238.1	0.0728	0.0553	0.0444	0.0357	0.0286
76	238.1-241.0	0.0408	0.0293	0.0225	0.0173	0.0133

Table II.8.3

CH_3-$CFCl_2$ (Orlando et al., 1990)

	$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)				
λ (nm)	295 K	263 K	243 K	223 K	203 K
190	795	752	751	741	716
191	705	661	655	645	624
192	630	588	581	570	551
193	540	501	492	482	462
194	477	441	430	406	401
195	404	369	358	346	331
196	343	311	300	288	276
197	294	265	255	243	233
198	244	218	208	197	188
199	202	178	169	159	152
200	171	150	141	132	126
201	140	121	114	106	101
202	115	97.8	91.6	84.9	80.6
203	96.7	81.3	75.8	70.1	66.5
204	78.6	65.1	60.6	55.9	53.1
205	63.8	52.1	48.4	44.4	42.3
206	52.1	41.8	38.6	35.5	33.8
207	42.4	33.3	30.9	28.2	27.1
208	35.6	27.4	25.7	23.3	22.4
209	29.1	21.9	20.6	18.6	18.1
210	23.8	17.5	16.5	15.0	14.6
211	19.5	13.9	13.4	12.0	12.0
212	16.2	11.2	10.8	9.83	9.86
213	13.4	8.84	8.81	7.91	8.15
214	11.6	7.30	7.51	6.67	7.09
215	9.74	6.09	6.10	5.56	6.00
216	8.20	4.80	4.89	4.59	5.15
217	7.11	3.61	4.41	3.78	4.51
218	6.34	3.06	3.81	2.71	3.61
219	5.41	2.53	3.03	2.30	3.18
220	4.82	2.06	2.66	1.92	2.89
221	4.51	1.70	2.54	1.62	2.68
222	4.05	1.54	2.18	1.40	2.49
223	3.47	1.25	1.81	1.18	2.28
224	3.51	1.07	1.82	1.06	2.17
225	3.26	1.01	1.68	1.25	2.08
226	2.83	0.899	1.35	1.14	1.94
227	2.69	0.684	1.37	0.996	1.89
228	2.91	0.636	1.56	0.962	1.93
229	2.14	0.686	1.33	1.01	1.84
230	1.79	0.596	1.07	0.947	1.75

Table II.8.4

CH_3-$CFCl_2$ (Molina and Molina, 1989)

λ (nm)	$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)
185	1423
190	858
195	418
200	168
205	59.6
210	20.6
215	6.92
220	2.35
225	0.83

Table II.8.5

CH_3-$CFCl_2$ (Allied-Signal Corporation, 1989)

λ (nm)	$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)
185	1090
190	705
195	380
200	174
205	61.8
210	28.6
215	12.4
220	5.10

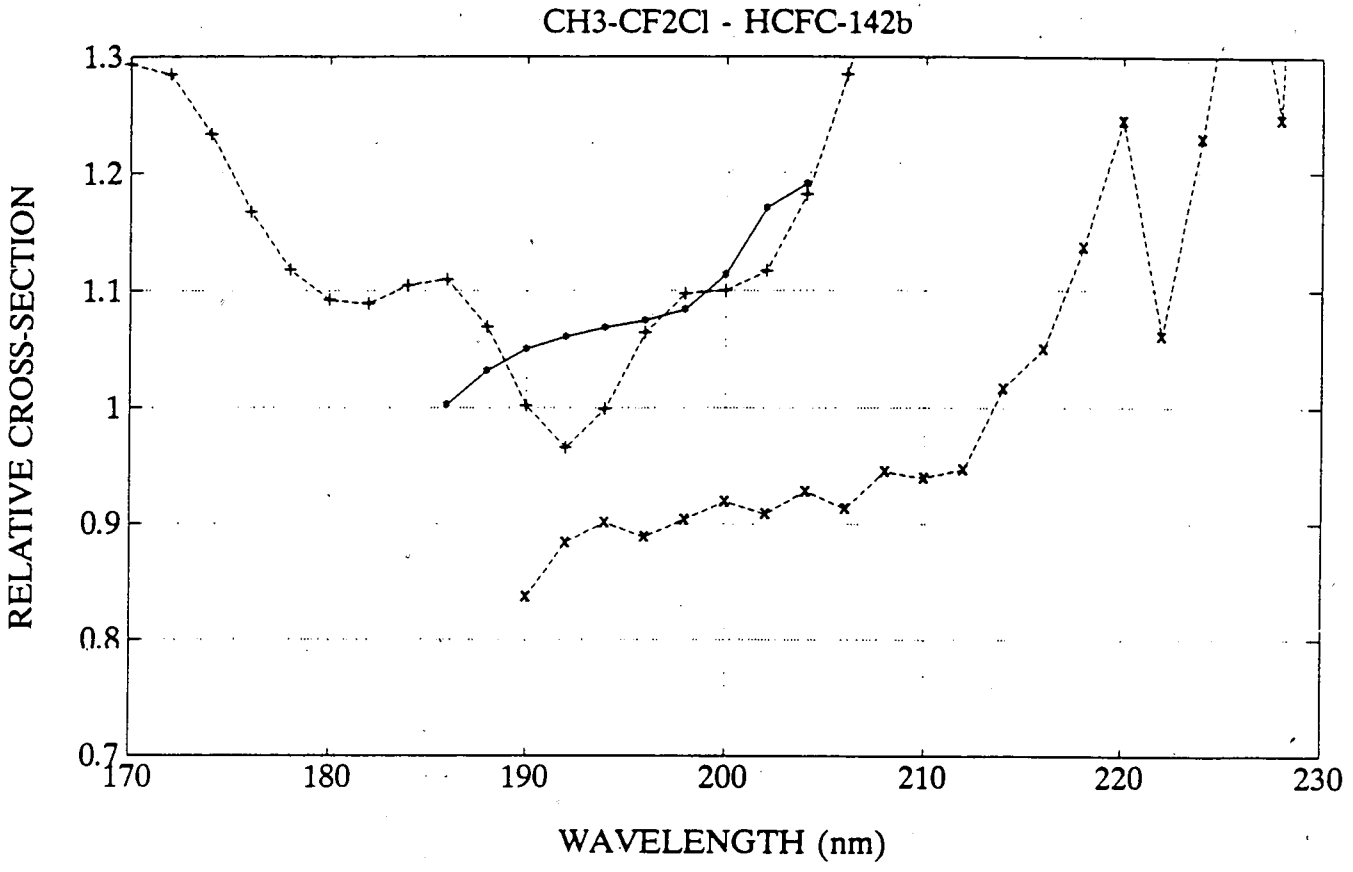

Figure 23. Relative absorption cross-sections of CH_3-CF_2Cl at room temperature, as a function of wavelength.

(——*——) : Allied-Signal Corporation, 1989
(---+---) : Hubrich and Stuhl, 1980
(-.-x-.-) : Orlando et al., 1990
Ref. : Gillotay and Simon, 1990

Table II.9.1

CH_3-CF_2Cl (Gillotay and Simon, 1990)

[$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)]

λ (nm)	295 K	270 K	250 K	230 K	210 K
170	229	229	228	228	228
172	181	179	177	176	174
174	140	137	135	133	130
176	106	103	100	97.8	95.5
178	78.8	75.7	73.2	70.9	68.7
180	57.8	55.9	52.7	50.6	48.6
182	41.8	39.3	37.4	35.6	33.9
184	29.8	27.7	26.2	24.7	23.3
186	21.1	19.4	18.1	17.0	15.9
188	14.7	13.4	12.4	11.5	10.7
190	10.2	9.18	8.45	7.77	7.15
192	6.99	6.23	5.69	5.19	4.73
194	4.76	4.20	3.80	3.44	3.11
196	3.22	2.81	2.52	2.26	2.03
198	2.16	1.86	1.66	1.48	1.31
200	1.44	1.23	1.08	0.957	0.845
202	0.949	0.804	0.704	0.616	0.539
204	0.622	0.521	0.453	0.393	0.342
206	0.404	0.336	0.289	0.249	0.215
208	0.260	0.214	0.183	0.156	0.134
210	0.166	0.135	0.115	0.0972	0.0825
212	0.105	0.0844	0.0710	0.0598	0.0503
214	0.0652	0.0521	0.0435	0.0363	0.0303
216	0.0401	0.0317	0.0262	0.0217	0.0180
218	0.0243	0.0190	0.0156	0.0128	0.0105
220	0.0145	0.0112	0.00911	0.00741	0.00604
222	0.00845	0.00647	0.00522	0.00421	0.00340
224	0.00484	0.00366	0.00293	0.00234	0.00187
226	0.00271	0.00202	0.00160	0.00127	0.00100
228	0.00148	0.00109	0.000854	0.000670	0.000525
230	0.000783	0.000570	0.000442	0.000343	0.000226

Table II.9.2

CH_3-CF_2Cl (Gillotay and Simon, 1990)

[$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)]

N°	λ (nm)	295 K	270 K	250 K	230 K	210 K
43	169.5-172.4	205	204	203	202	201
44	172.4-173.9	156	154	152	150	148
45	173.9-175.4	128	125	123	120	118
46	175.4-177.0	103	99.6	97.2	94.8	92.4
47	177.0-178.6	81.2	78.1	75.6	73.3	71.0
48	178.6-180.2	63.5	60.5	58.3	56.1	54.0
49	180.2-181.8	49.2	46.5	44.5	42.5	40.6
50	181.8-183.5	37.5	35.1	33.3	31.7	30.1
51	183.5-185.2	28.1	26.1	24.6	23.2	21.8
52	185.2-186.9	20.9	19.2	18.0	16.8	15.7
53	186.9-188.7	15.3	13.9	12.9	12.0	11.1
54	188.7-190.5	11.2	10.1	9.31	8.58	7.92
55	190.5-192.3	7.83	7.01	6.41	5.86	5.36
56	192.3-194.2	5.50	4.88	4.42	4.02	3.64
57	194.2-196.1	3.80	3.34	3.00	2.70	2.44
58	196.1-198.0	2.61	2.27	2.03	1.81	1.62
59	198.0-200.0	1.76	1.51	1.34	1.19	1.05
60	200.0-202.0	1.17	0.995	0.874	0.769	0.676
61	202.0-204.1	0.761	0.641	0.559	0.487	0.425
62	204.1-206.2	0.486	0.405	0.350	0.303	0.262
63	206.2-208.3	0.307	0.254	0.217	0.186	0.160
64	208.3-210.5	0.190	0.155	0.132	0.112	0.0954
65	210.5-212.8	0.114	0.0917	0.0773	0.0651	0.0549
66	212.8-215.0	0.0668	0.0553	0.0445	0.0372	0.0311
67	215.0-217.4	0.0382	0.0301	0.0249	0.0206	0.0171
68	217.4-219.8	0.0208	0.0162	0.0133	0.0109	0.00892
69	219.8-222.2	0.0111	0.00853	0.00691	0.00560	0.00454
70	222.2-224.7	0.00565	0.00429	0.00344	0.00276	0.00221
71	224.7-227.3	0.00271	0.00202	0.00160	0.00127	0.00101

Table II.9.3.

CH_3CClF_2 (Hubrich and Stuhl, 1980)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298K	208K
160	661	630
165	455	432
170	296	285
175	146	140
180	63.1	56.3
185	27.9	23.8
190	10.2	9.96
195	4.05	3.88
200	1.58	1.47
205	0.618	0.579
210	0.254	
215	0.108	
220	0.0405	
225	0.0162	
230	0.00565	

Table II.9.4

CH_3-CF_2Cl (Orlando et al., 1990)

	$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)				
λ (nm)	295 K	263 K	243 K	223 K	203 K
190	8.53	7.53	6.94	6.39	5.82
191	7.16	6.29	5.72	5.27	4.79
192	6.18	5.37	4.85	4.48	4.07
193	5.01	4.36	3.92	3.61	3.28
194	4.29	3.70	3.32	3.05	2.76
195	3.49	3.01	2.68	2.46	2.25
196	2.86	2.44	2.17	1.99	1.82
197	2.39	2.03	1.79	1.65	1.52
198	1.95	1.65	1.44	1.33	1.24
199	1.58	1.33	1.16	1.07	1.00
200	1.32	1.11	0.953	0.882	0.843
201	1.07	0.892	0.761	0.706	0.686
202	0.862	0.715	0.605	0.563	0.552
203	0.716	0.595	0.498	0.467	0.475
204	0.577	0.480	0.397	0.372	0.384
205	0.463	0.382	0.314	0.297	0.319
206	0.369	0.308	0.147	0.241	0.277
207	0.299	0.250	0.196	0.193	0.232
208	0.246	0.204	0.161	0.161	0.198
209	0.195	0.165	0.127	0.132	0.181
210	0.156	0.134	0.100	0.108	0.156
211	0.124	0.108	0.0807	0.0894	
212	0.0991	0.0904	0.0651	0.0758	
213	0.0796	0.0725	0.0519	0.0629	
214	0.0663	0.0603	0.0442	0.0554	
215	0.0518	0.0514	0.0356	0.0496	
216	0.0421	0.0440	0.0260	0.0456	
217	0.0349	0.0359	0.0230	0.0399	
218	0.0276	0.0318	0.0193	0.0375	
219	0.0209	0.0295	0.0160	0.0350	
220	0.0180	0.0261	0.0140	0.0322	
221	0.0149	0.0230	0.0128	0.0301	
222	0.00897	0.0217	0.0110	0.0282	
223	0.00758	0.0201	0.00980	0.0270	
224	0.00595	0.0195	0.00912	0.0257	
225	0.00416	0.0194	0.00834	0.0251	
226	0.00388	0.0186	0.00769	0.0244	
227	0.00348	0.0178	0.00714	0.0224	
228	0.00181	0.0157	0.00694	0.0212	
229	0.00150	0.0168	0.00639	0.0224	
230	0.00168	0.0166	0.00582	0.0216	

Table II.9.5

CH_3-CF_2Cl (Allied-Signal Corporation, 1989)

λ (nm)	$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)
185	24.7
190	10.7
195	4.2
200	1.6
205	0.46

Table II.10.1.

CH_3CH_2Cl (Hubrich and Stuhl, 1980)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298K
160	1890
165	1100
170	705
175	444
180	304
185	136
190	68.5
195	25.6
200	11.7
205	3.75
210	1.47
215	0.433
220	0.127
225	0.0463
230	0.0117
235	0.00395
240	0.00156

Table II.11.1.

C_2HCl_3 (Robbins, 1976b)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295K
174	5450
176	7340
178	7130
180	8260
182	11100
186	18500
192	30200
198	33300
204	24600
210	17800
216	11300
222	7310
228	3790
234	1490
240	427
246	98.6
252	19.4
258	3.59
264	0.45
270	21.0

Table II.12.1

$CH_3CH_2ClCH_3$ (Gillotay, 1989)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295K
170	317
172	270
174	243
176	221
178	203
180	180
182	150
184	122
186	99.9
188	79.3
190	60.6
192	46.7
194	34.9
196	25.8
198	18.8
200	13.4
202	9.54
204	6.71
206	4.63
208	3.11
210	2.14
212	1.44
214	0.965
216	0.652
218	0.444
220	0.308
222	0.212
224	0.144
226	0.107
228	0.0752
230	0.0580

III. Brominated methanes and ethanes.

1. CH_3Br
2. CH_2Br_2
3. $CHBr_3$
4. CF_3Br
5. CF_2Br_2
6. CF_2BrCl
7. $C_2F_4Br_2$
8. C_2F_5Br
9. CF_3-CHBrCl

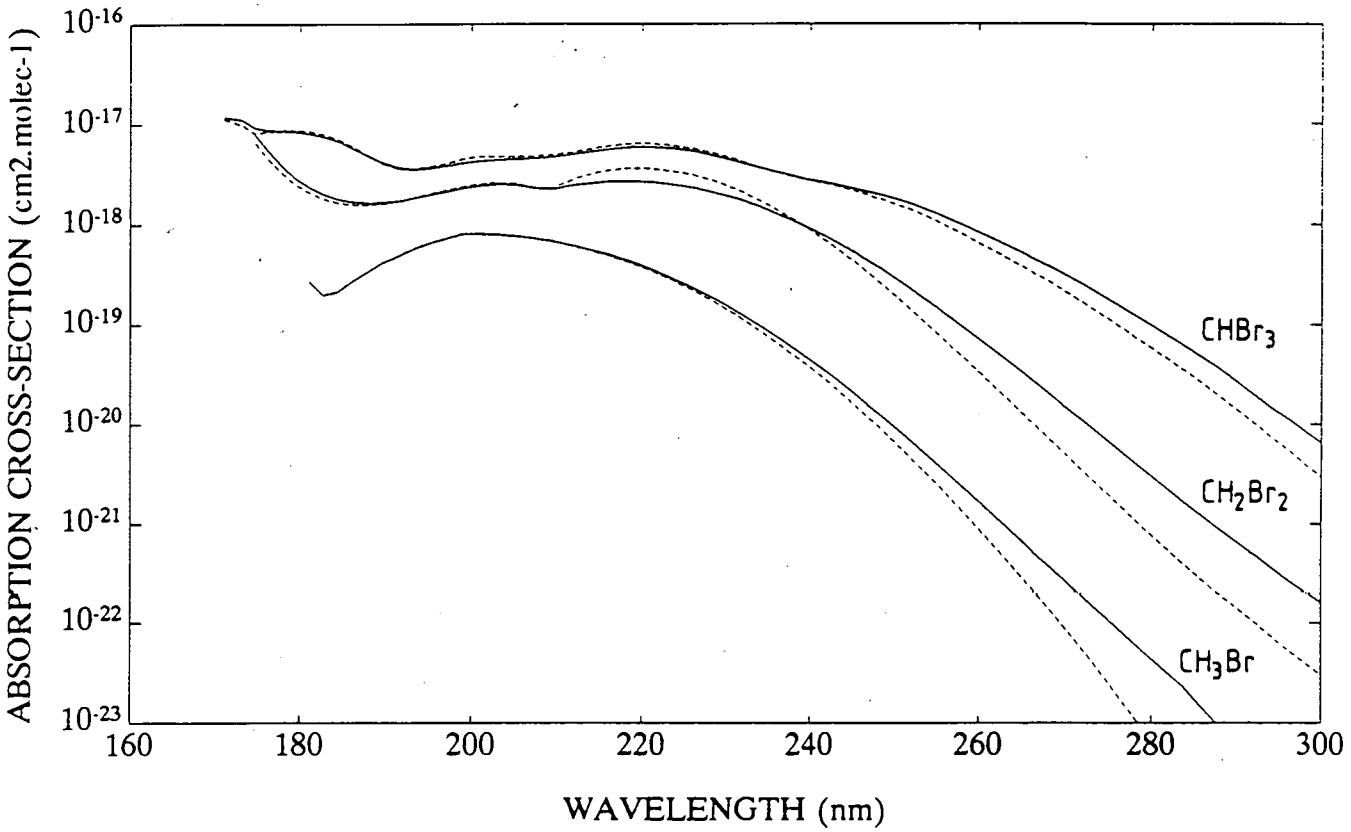

Figure 24. U.V. Absorption cross-sections of bromomethanes as a function of wavelength.

(———) : T = 295 K
(-----) : T = 210 K

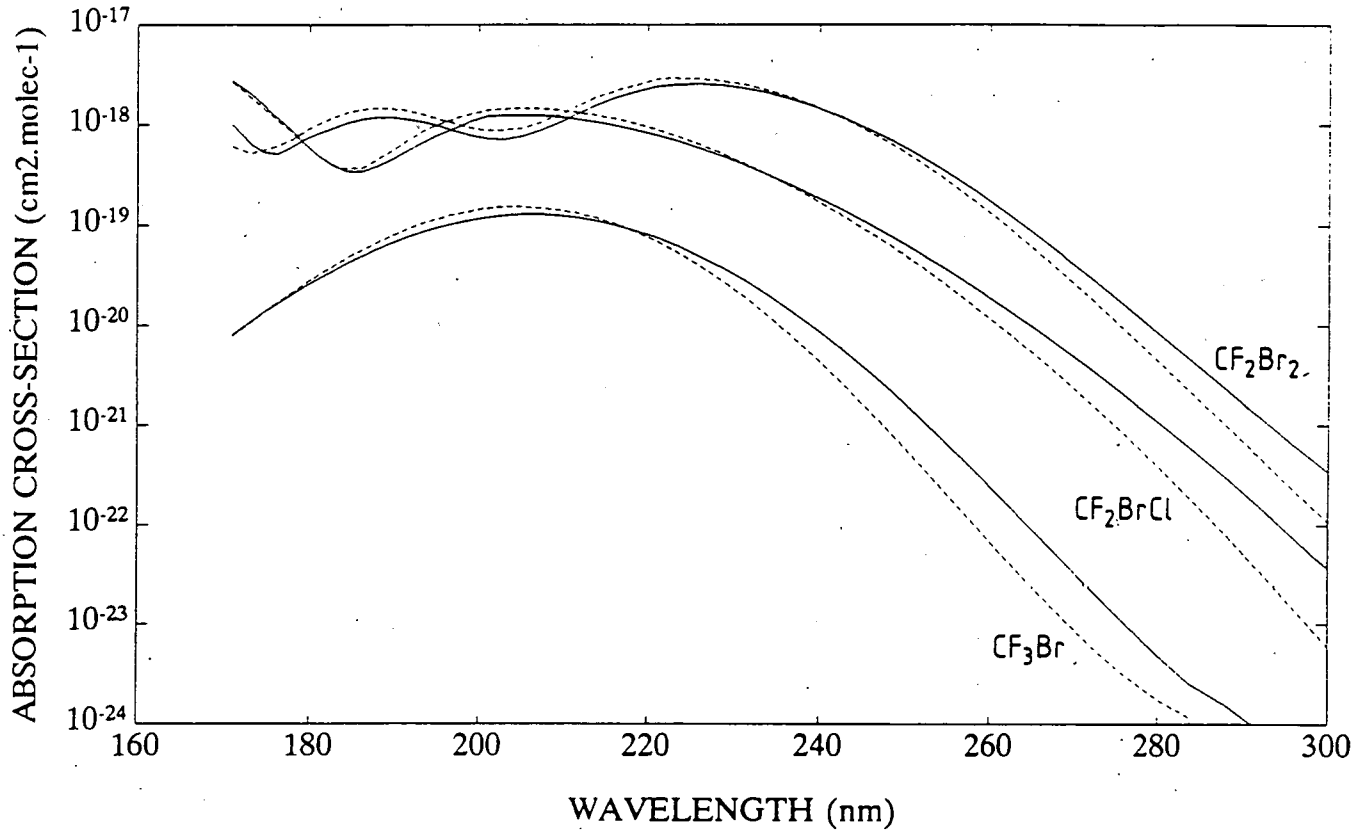

Figure 25. U.V. Absorption cross-sections of bromofluoromethanes as a function of wavelength.

(———) : T = 295 K
(-----) : T = 210 K

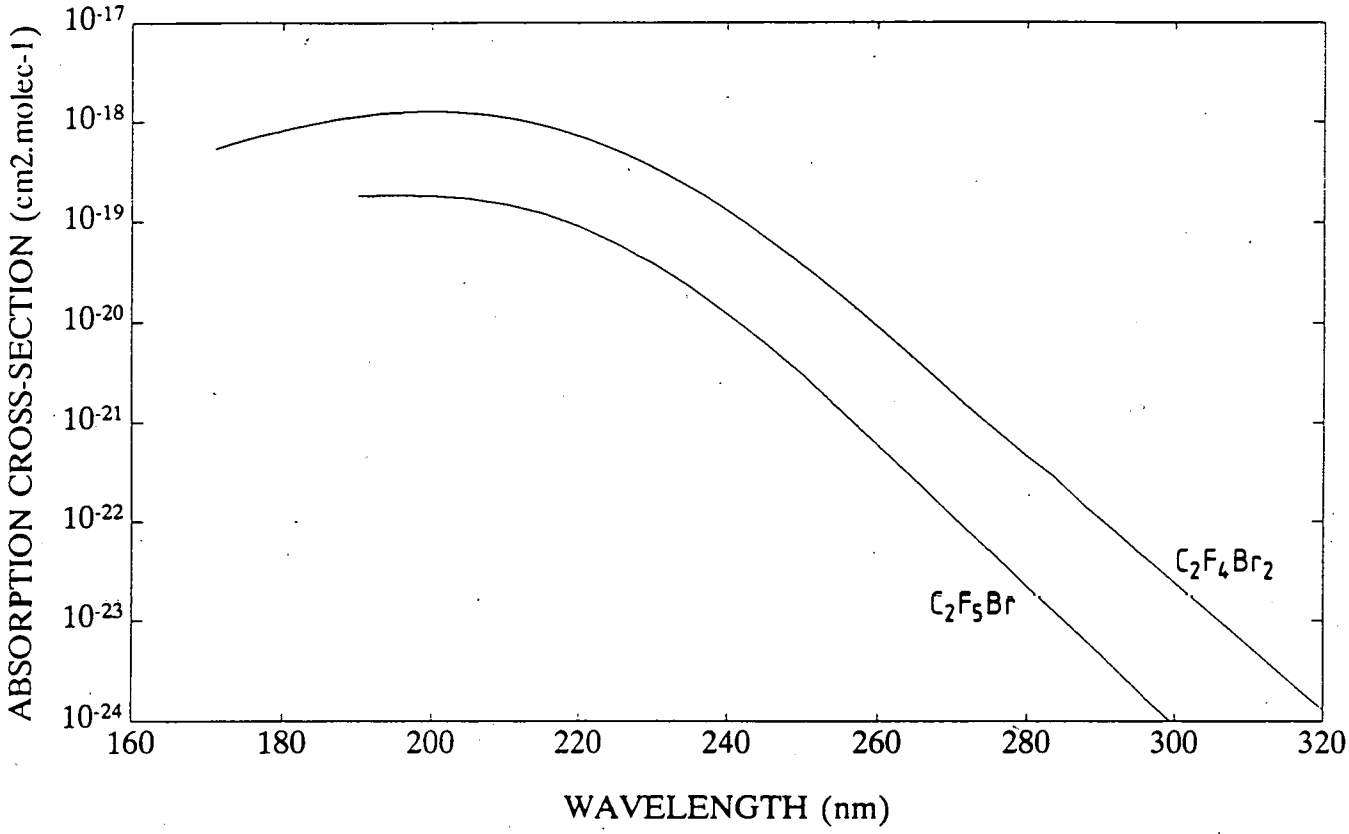

Figure 26. U.V. Absorption cross-sections of bromoethanes as a function of wavelength.

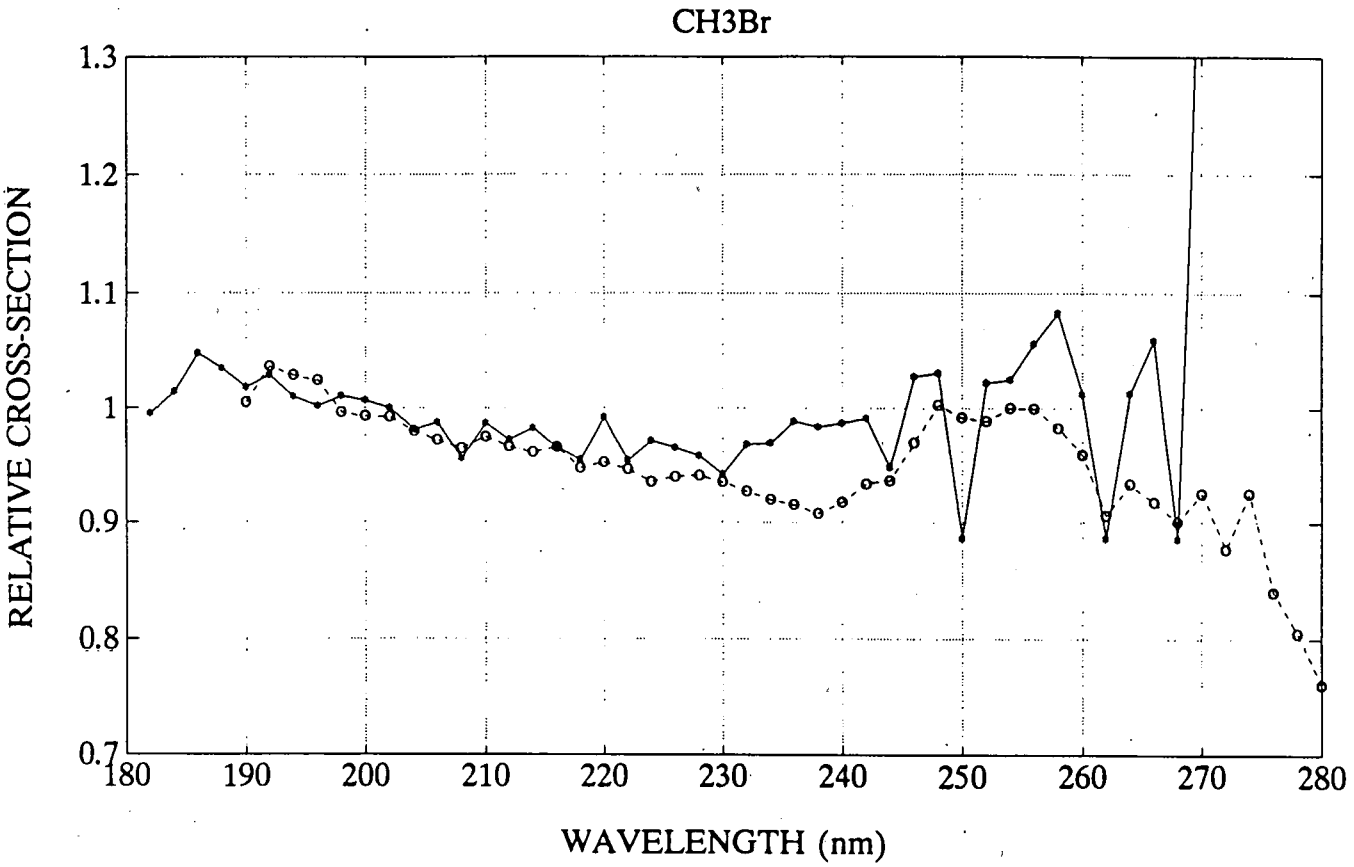

Figure 27. Relative absorption cross-sections of CH_3Br at room temperature, as a function of wavelength.

(——*——) : Robbins, 1976a
(---o---) : Molina et al., 1982
Ref. : Gillotay and Simon, 1988

Table III.1.1

CH_3Br (Gillotay and Simon, 1988)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295K	270K	250K	230K	210K
180	500	500	500	500	500
182	198	198	198	198	198
184	208	208	208	208	208
186	271	271	271	271	271
188	346	346	346	346	346
190	439	439	439	439	439
192	529	529	529	529	529
194	620	620	620	620	620
196	691	691	691	691	691
198	760	760	760	760	760
200	791	791	791	791	791
202	797	797	797	797	797
204	793	793	793	793	793
206	767	767	767	767	767
208	727	727	727	727	727
210	666	666	666	666	666
212	614	613	613	613	613
214	557	557	556	556	556
216	493	493	492	492	492
218	440	438	436	434	432
220	378	374	372	369	367
222	325	321	318	316	313
224	278	273	268	264	260
226	231	226	222	218	214
228	190	187	184	181	179
230	155	152	149	147	144
232	125	122	120	117	115
234	99.2	96.1	93.7	91.3	89.0
236	77.3	74.2	71.7	69.3	67.1
238	59.7	56.6	54.3	52.0	49.9
240	44.8	42.7	41.0	39.4	37.9
242	33.3	31.6	30.2	28.9	27.7
244	25.1	23.3	22.0	20.8	19.6
246	18.2	16.9	15.9	15.0	14.1
248	13.0	12.0	11.2	10.5	9.81
250	9.57	8.65	7.98	7.37	6.80
252	6.89	6.09	5.52	5.01	4.54
254	4.83	4.26	3.85	3.48	3.14
256	3.39	2.93	2.61	2.32	2.07
258	2.40	2.02	1.75	1.52	1.32

Table III.1.1 (cont.)

λ(nm)	295K	270K	250K	230K	210K
260	1.70	1.43	1.24	1.07	0.932
262	1.23	0.946	0.800	0.678	0.573
264	0.810	0.638	0.529	0.439	0.364
266	0.557	0.429	0.348	0.282	0.229
268	0.384	0.287	0.227	0.180	0.142
270	0.255	0.191	0.147	0.114	0.0875
272	0.183	0.127	0.0953	0.0713	0.0533
274	0.118	0.0847	0.0614	0.0444	0.0322
276	0.0880	0.0567	0.0394	0.0275	0.0193
278	0.0616	0.0375	0.0253	0.0170	0.0114
280	0.0434	0.0251	0.0162	0.0104	0.00672

Table III.1.2.

CH_3Br (Gillotay et al., 1988)

(wavenumber intervals : 500 cm^{-1})

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
49	180.2-181.8	275	275	275	275	275
50	181.8-183.5	199	199	199	199	199
51	183.5-185.2	214	214	214	214	214
52	185.2-186.9	273	273	273	273	273
53	186.9-188.7	338	338	338	338	338
54	188.7-190.5	415	415	415	415	415
55	190.5-192.3	491	491	491	491	491
56	192.3-194.2	576	576	576	576	576
57	194.2-196.1	656	656	656	656	656
58	196.1-198.0	730	730	730	730	730
59	198.0-200.0	790	790	790	790	790
60	200.0-202.0	799	799	799	799	799
61	202.0-204.1	795	795	795	795	795
62	204.1-206.2	781	781	781	781	781
63	206.2-208.3	743	743	743	743	743
64	208.3-210.5	682	682	682	682	682
65	210.5-212.8	623	623	623	623	623
66	212.8-215.0	560	560	559	559	558
67	215.0-217.4	494	493	491	490	488
68	217.4-219.8	425	422	420	418	416
69	219.8-222.2	357	354	351	349	346
70	222.2-224.7	293	289	286	283	281
71	224.7-227.3	233	229	226	223	220
72	227.3-229.9	180	176	173	170	167
73	229.9-232.6	135	131	129	126	123
74	232.6-235.3	98.5	95.2	92.7	90.3	87.9
75	235.3-238.1	69.6	66.8	64.7	62.6	60.6
76	238.1-241.0	47.8	45.4	43.7	41.9	40.3
77	241.0-243.9	31.4	29.5	28.1	26.7	25.4
78	243.9-246.9	20.1	18.6	17.5	16.5	15.6
79	246.9-250.0	12.3	11.2	10.4	9.67	8.99
80	250.0-253.2	7.48	6.69	6.12	5.60	5.13
81	253.2-256.4	4.24	3.70	3.32	2.98	2.67
82	256.4-259.7	2.41	2.04	1.79	1.57	1.37
83	259.7-263.2	1.28	1.04	0.887	0.755	0.642
84	263.2-266.7	0.671	0.524	0.430	0.353	0.289
85	266.7-270.3	0.350	0.259	0.204	0.160	0.126
86	270.3-274.0	0.180	0.125	0.0933	0.0697	0.0520
87	274.0-277.8	0.0899	0.0576	0.0403	0.0282	0.0198
88	277.8-281.7	0.0449	0.0261	0.0169	0.0110	0.00710

Table III.1.3.

CH_3Br (Robbins, 1976a)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295K	(nm)	295K
174	5330	224	270
176	10100	226	223
178	12800	228	182
180	391	230	146
182	197	232	121
184	211	234	96.1
186	284	236	76.4
188	358	238	58.7
190	447	240	44.2
192	544	242	33.0
194	626	244	23.8
196	692	246	18.7
198	768	248	13.4
200	796	250	8.48
202	797	252	7.04
204	778	254	4.95
206	757	256	3.58
208	695	258	2.60
210	657	260	1.72
212	597	262	1.09
214	547	264	0.82
216	476	266	0.59
218	420	268	0.34
220	375	270	0.37
222	310		

Table III.1.4.

CH_3Br (Molina et al., 1982)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298 K
190	441
195	675
200	785
205	763
210	649
215	506
220	360
225	238
230	145
235	80.5
240	41.1
245	20.4
250	9.49
255	4.05
260	1.63
265	0.622
270	0.236
275	0.09
280	0.033
285	0.011
290	0.003

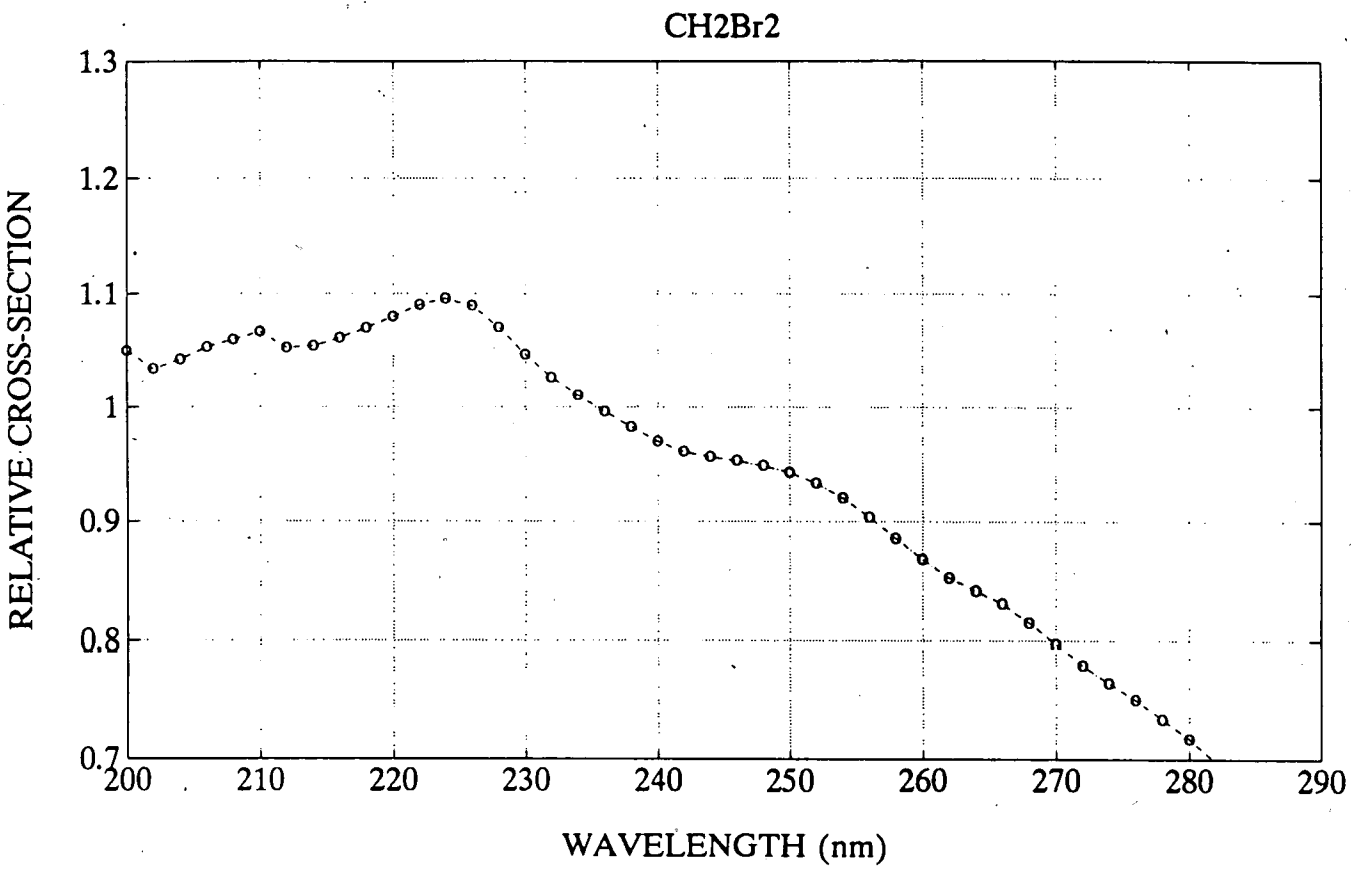

Figure 28. Relative absorption cross-sections of CH_2Br_2 at room temperature, as a function of wavelength.

(---o---) : Molina et al., 1982
Ref. : Gillotay et al., 1988a

Table III.2.1.

CH_2Br_2 (Gillotay et al., 1988a)

σ (λ) x 10^{21} (cm^2 $molec.^{-1}$)

λ (nm)	295K	270K	250K	230K	210K
174	11709				
176	6624	6352	6143	5940	5744
178	3772	3594	3458	3326	3200
180	2410	2331	2270	2211	2153
182	1784	1714	1660	1608	1557
184	1544	1469	1412	1357	1303
186	1535	1487	1450	1414	1379
188	1661	1646	1634	1623	1611
190	1870	1879	1887	1894	1902
192	2093	2115	2133	2151	2170
194	2225	2270	2306	2343	2381
196	2283	2322	2354	2387	2419
198	2260	2291	2317	2342	2368
200	2201	2209	2216	2223	2230
202	2143	2133	2126	2119	2111
204	2101	2087	2075	2064	2052
206	2112	2101	2092	2084	2075
208	2175	2186	2195	2205	2214
210	2269	2307	2339	2370	2402
212	2428	2530	2614	2702	2792
214	2548	2706	2839	2979	3126
216	2622	2825	2998	3182	3377
218	2647	2879	3080	3294	3524
220	2621	2868	3082	3311	3558
222	2547	2792	3005	3234	3481
224	2430	2659	2859	3073	3304
226	2276	2479	2656	2844	3046
228	2094	2264	2411	2566	2732
230	1893	2026	2140	2261	2388
232	1682	1779	1861	1946	2035
234	1470	1533	1585	1639	1695
236	1264	1297	1324	1352	1380
238	1070	1079	1086	1094	1101
240	892	883	876	868	861
242	733	711	694	678	662
244	594	565	542	521	500
246	475	442	417	394	372
248	375	342	317	294	273
250	293	261	238	217	197
252	226	197	176	158	141
254	172	147	129	114	100
256	130	109	93.9	81.2	70.1
258	97.8	79.7	67.7	57.5	48.8

Table III.2.1.(Cont).

λ(nm)	295K	270K	250K	230K	210K
260	72.7	58.0	48.5	40.5	33.8
262	53.7	42.0	34.5	28.3	23.2
264	39.4	30.2	24.4	19.7	15.9
266	28.8	21.6	17.2	13.7	10.9
268	20.9	15.4	12.1	9.47	7.42
270	15.2	11.0	8.48	6.55	5.06
272	11.0	7.81	5.95	4.53	3.45
274	7.93	5.55	4.17	3.14	2.36
276	5.73	3.95	2.93	2.18	1.62
278	4.15	2.82	2.07	1.52	1.12
280	3.01	2.02	1.47	1.07	0.773
282	2.19	1.45	1.04	0.750	0.539
284	1.60	1.05	0.747	0.532	0.379
286	1.18	0.764	0.540	0.381	0.269
288	0.877	0.562	0.393	0.275	0.193
290	0.656	0.416	0.290	0.201	0.140

Table III.2.2.

CH_2Br_2 (Gillotay et al., 1988b)

(wavenumber intervals : 500 cm^{-1})

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
46	175.4-177.0	6370	6000	5710	5650	5344
47	177.0-178.6	3920	3810	3680	3520	3380
48	178.6-180.2	2765	2610	2560	2480	2400
49	180.2-181.8	2100	1980	1930	1909	1855
50	181.8-183.5	1680	1640	1630	1550	1320
51	183.5-185.2	1530	1440	1400	1360	1320
52	185.2-186.9	1535	1490	1450	1415	1380
53	186.9-188.7	1645	1632	1610	1603	1595
54	188.7-190.5	1830	1820	1820	1820	1820
55	190.5-192.3	2020	2050	2070	2083	2100
56	192.3-194.2	2190	2220	2250	2270	2295
57	194.2-196.1	2265	2295	2330	2365	2403
58	196.1-198.0	2275	2300	2335	2364	2394
59	198.0-200.0	2230	2250	2266	2283	2297
60	200.0-202.0	2172	2172	2171	2171	2170
61	202.0-204.1	2122	2110	2100	2092	2081
62	204.1-206.2	2105	2095	2084	2076	2063
63	206.2-208.3	2144	2144	2144	2145	2145
64	208.3-210.5	2220	2266	2290	2321	2353
65	210.5-212.8	2403	2494	2569	2647	2727
66	212.8-215.0	2543	2698	2829	2967	3111
67	215.0-217.4	2627	2833	3010	3197	3396
68	217.4-219.8	2644	2883	3089	3310	3546
69	219.8-222.2	2590	2838	3053	3284	3533
70	222.2-224.7	2466	2701	2905	3125	3361
71	224.7-227.3	2276	2479	2656	2844	3046
72	227.3-229.9	2035	2195	2331	2477	2631
73	229.9-232.6	1762	1872	1966	2064	2167
74	232.6-235.3	1475	1539	1592	1646	1703
75	235.3-238.1	1195	1219	1238	1258	1278
76	238.1-241.0	935	930	926	922	917
77	241.0-243.9	700	676	658	640	622
78	243.9-246.9	509	476	452	429	407
79	246.9-250.0	353	320	295	273	252

Table III.2.2 (cont.)

N°	λ (nm)	295K	270K	250K	230K	210K
80	250.0-253.2	241	211	190	171	154
81	253.2-256.4	154	130	114	99.4	86.8
82	256.4-259.7	97.8	79.7	67.7	57.5	48.8
83	259.7-263.2	58.0	45.5	37.5	31.0	25.5
84	263.2-266.7	33.7	25.6	20.5	16.4	13.2
85	266.7-270.3	19.3	14.2	11.1	8.64	6.74
86	270.3-274.0	10.8	7.68	5.84	4.45	3.39
87	274.0-277.8	5.83	4.02	2.99	2.22	1.65
88	277.8-281.7	3.11	2.09	1.52	1.10	0.801
89	281.7-285.7	1.68	1.10	0.785	0.560	0.399
90	285.7-289.9	0.903	0.579	0.406	0.284	0.199
91	289.9-294.1	0.497	0.312	0.215	0.149	0.103

Table III.2.3.

CH_2Br_2 (Molina et al., 1982)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	298 K
200	2310
205	2200
210	2420
215	2740
220	2830
225	2580
230	1980
235	1370
240	865
245	508
250	276
255	137
260	63.1
265	28.2
270	12.1
275	5.11
280	2.16
285	0.91
290	0.35
295	0.12
300	0.03

Table III.3.1

$CHBr_3$ (Gillotay et al., 1989)

$[\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)]

λ(nm)	295 K	270 K	250 K	230 K*	210 K*
170	16038	16063	16083	16103	16123
172	11732	11542	11392	11245	11099
174	9696	9261	8927	8606	8296
176	8720	8628	8555	8483	8412
178	8576	8566	8558	8550	8542
180	8313	8420	8506	8596	8682
182	7703	7839	7950	8062	8176
184	6833	6922	6994	7067	7140
186	5704	5784	5849	5915	5982
188	4708	4735	4756	4777	4780
190	3991	3972	3956	3941	3925
192	3602	3574	3551	3529	3507
194	3513	3519	3524	3529	3534
196	3661	3710	3749	3788	3828
198	3936	4017	4083	4150	4217
200	4164	4303	4418	4536	4657
202	4336	4454	4552	4651	4753
204	4406	4501	4579	4658	4738
206	4450	4514	4566	4618	4671
208	4514	4572	4619	4666	4714
210	4685	4748	4799	4850	4902
212	4934	5020	5089	5159	5230
214	5242	5337	5415	5494	5574
216	5535	5649	5742	5836	5932
218	5739	5873	5983	6095	6209
220	5826	5971	6090	6210	6334
222	5780	5910	6015	6123	6232
224	5578	5691	5784	5878	5973
226	5272	5371	5451	5533	5616
228	4868	4949	5017	5091	5161
230	4412	4481	4538	4595	4652
232	3974	4016	4042	4062	4088
234	3618	3619	3619	3619	3619
236	3239	3238	3237	3236	3235
238	2947	2947	2948	2948	2948
240	2728	2726	2723	2721	2718
242	2533	2523	2516	2508	2501
244	2337	2315	2291	2269	2244
246	2144	2107	2077	2046	2016
248	1939	1892	1854	1817	1777
250	1741	1686	1643	1599	1569

Table III.3.1 (cont.)

λ(nm)	295 K	270 K	250 K	230 K*	210 K*
252	1577	1516	1468	1423	1378
254	1361	1298	1249	1202	1157
256	1164	1100	1052	1006	962
258	986	924	878	834	792
260	828	770	727	686	647
262	689	636	597	559	525
264	569	521	486	453	422
266	467	424	393	364	337
268	380	343	316	290	267
270	308	275	252	230	211
272	248	220	200	181	165
274	198	174	157	142	128
276	158	138	124	111	99.4
278	125	108	96.5	86.0	76.6
280	98.8	84.8	75.1	66.4	58.8
282	77.7	66.2	58.2	51.1	45.0
284	61.0	51.5	44.9	39.2	34.2
286	47.7	39.9	34.6	30.0	26.0
288	37.2	30.9	26.6	22.9	19.7
290	29.0	23.8	20.4	17.4	14.9
292	21.7				
294	16.7				
296	12.7				
298	9.60				
300	7.18				
302	5.37				
304	3.99				
306	2.96				
308	2.18				
310	1.59				

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* : Extrapolated values.

Table III.3.2

$CHBr_3$ (Gillotay et al., 1989)

(wavelength intervals : 500 cm^{-1}

$[\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)]

N°	λ (nm)	295 K	270 K	250 K	230 K*	210 K*
43	169.5-172.4	11764	11610	11487	11364	11243
44	172.4-173.9	10916	10574	10311	10056	9810
45	173.9-175.4	9213	8853	8576	8309	8050
46	175.4-177.0	8718	8640	8579	8517	8456
47	177.0-178.6	8588	8575	8565	8555	8544
48	178.6-180.2	8393	8469	8530	8592	8654
49	180.2-181.8	8029	8159	8264	8371	8479
50	181.8-183.5	7469	7592	7691	7792	7895
51	183.5-185.2	6694	6781	6851	6922	6994
52	185.2-186.9	5689	5769	5834	5900	5966
53	186.9-188.7	4766	4796	4821	4845	4870
54	188.7-190.5	4122	4110	4101	4092	4082
55	190.5-192.3	3686	3657	3635	3612	3590
56	192.3-194.2	3528	3520	3515	3509	3503
57	194.2-196.1	3589	3621	3647	3673	3700
58	196.1-198.0	3806	3870	3922	3974	4027
59	198.0-200.0	4054	4166	4258	4352	4448
60	200.0-202.0	4255	4387	4496	4608	4723
61	202.0-204.1	4377	4484	4570	4659	4749
62	204.1-206.2	4433	4508	4570	4633	4696
63	206.2-208.3	4487	4546	4594	4642	4691
64	208.3-210.5	4636	4696	4746	4795	4845
65	210.5-212.8	4900	4983	5050	5118	5187
66	212.8-215.0	5233	5328	5406	5484	5564
67	215.0-217.4	5550	5666	5760	5856	5953
68	217.4-219.8	5768	5906	6019	6134	6252
69	219.8-222.2	5813	5951	6064	6177	6296
70	222.2-224.7	5631	5748	5843	5940	6038
71	224.7-227.3	5272	5371	5451	5533	5616
72	227.3-229.9	4751	4830	4895	4966	5033
73	229.9-232.6	4122	4174	4211	4244	4281
74	232.6-235.3	3624	3624	3624	3624	3624
75	235.3-238.1	3141	3140	3140	3139	3139
76	238.1-241.0	2771	2769	2767	2765	2763
77	241.0-243.9	2498	2486	2476	2466	2456
78	243.9-246.9	2194	2161	2132	2103	2074
79	246.9-250.0	1898	1849	1810	1771	1733

Table III.3.2 (cont.)

N°	λ (nm)	295 K	270 K	250 K	230 K*	210 K*
80	250.0-253.2	1612	1552	1505	1460	1418
81	253.2-256.4	1285	1221	1173	1126	1081
82	256.4-259.7	986	924	878	834	792
83	259.7-263.2	716	662	622	584	549
84	263.2-266.7	517	472	438	407	378
85	266.7-270.3	365	329	302	278	255
86	270.3-274.0	246	218	198	180	164
87	274.0-277.8	159	139	125	112	100
88	277.8-281.7	100	86.2	76.3	67.6	59.9
89	281.7-285.7	62.6	52.9	46.2	40.3	35.2
90	285.7-289.9	37.2	30.9	26.6	22.6	19.7

* Extrapolated values

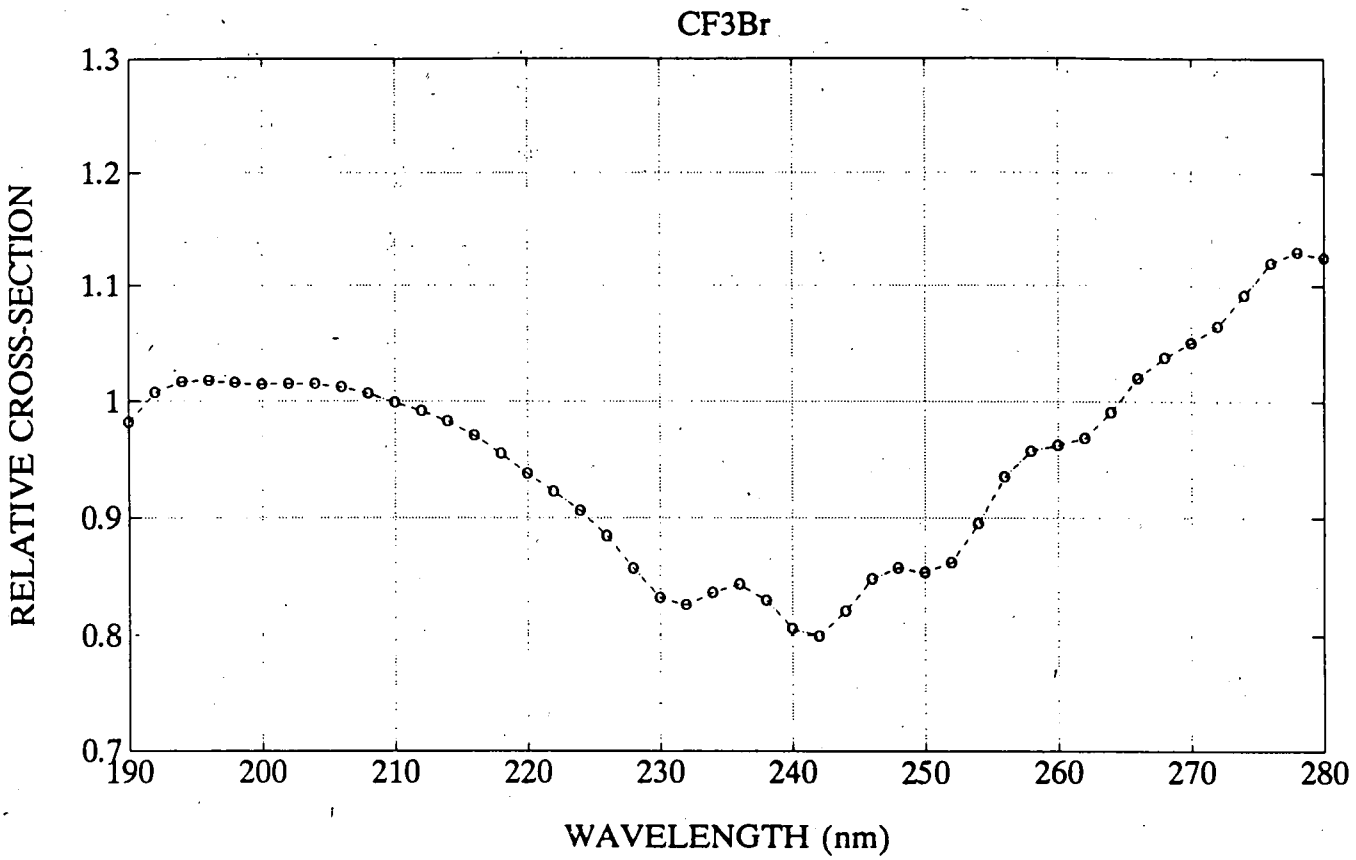

Figure 29. Relative absorption cross-sections of CF_3Br at room temperature, as a function of wavelength.

(---o---) : Molina et al., 1982
Ref. : Gillotay and Simon, 1989

Table III.4.1.

CF_3Br (Gillotay and Simon, 1989)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295 K	270K	250K	230K	210K
168	5.17	5.09	5.04	4.98	4.93
170	6.96	6.89	6.84	6.79	6.73
172	9.28	9.24	9.21	9.17	9.14
174	12.2	12.3	12.3	12.3	12.3
176	16.0	16.1	16.2	16.3	16.4
178	20.5	20.8	21.1	21.3	21.6
180	26.1	26.6	27.1	27.5	28.0
182	32.6	33.5	34.3	35.0	35.8
184	40.2	41.6	42.7	43.9	45.1
186	48.8	50.8	52.4	54.1	55.9
188	58.2	60.9	63.2	65.5	67.9
190	68.4	71.9	74.8	77.8	81.0
192	78.8	83.2	86.9	90.7	94.7
194	89.3	94.6	99.0	104	108
196	99.4	105	110	116	121
198	109	115	121	127	133
200	116	123	129	136	142
202	122	130	136	142	149
204	126	133	139	146	152
206	128	134	140	146	152
208	127	132	137	142	148
210	123	128	132	136	140
212	117	121	124	127	130
214	110	112	114	116	118
216	101	102	102	103	104
218	90.6	90.3	90.1	89.9	89.7
220	79.9	78.6	77.6	76.6	75.6
222	69.2	67.1	65.4	63.8	62.3
224	58.8	56.1	54.1	52.1	50.1
226	49.1	46.1	43.8	41.6	39.5
228	40.3	37.1	34.7	32.5	30.5
230	32.4	29.3	27.0	25.0	23.0
232	25.7	22.8	20.7	18.8	17.1
234	20.0	17.4	15.6	13.9	12.4
236	15.3	13.1	11.5	10.1	8.88
238	11.6	9.66	8.35	7.22	6.24
240	8.62	7.04	5.98	5.09	4.33
242	6.33	5.06	4.23	3.54	2.96
244	4.59	3.59	2.95	2.43	2.00
246	3.28	2.52	2.04	1.65	1.33
248	2.32	1.75	1.39	1.11	0.881

Table III.4.1 (cont.)

λ (nm)	295K	270K	250K	230K	210K
250	1.63	1.20	0.941	0.738	0.579
252	1.13	0.818	0.632	0.489	0.378
254	0.777	0.554	0.422	0.322	0.246
256	0.530	0.373	0.281	0.212	0.160
258	0.360	0.250	0.186	0.139	0.104
260	0.243	0.167	0.123	0.0911	0.0674
262	0.164	0.111	0.0817	0.0600	0.0440
264	0.110	0.0742	0.0542	0.0396	0.0290
266	0.0736	0.0496	0.0362	0.0264	0.0192
268	0.0494	0.0333	0.0243	0.0177	0.0129
270	0.0331	0.0225	0.0164	0.0120	0.00882
272	0.0223	0.0153	0.0112	0.00829	0.00611
274	0.0151	0.0105	0.00779	0.00580	0.00432
276	0.0103	0.00725	0.00547	0.00414	0.00313
278	0.00706	0.00509	0.00392	0.00301	0.00232
280	0.00489	0.00363	0.00286	0.00225	0.00177

Table III.4.2.

CF_3Br (Gillotay and Simon, 1989)

(wavenumber intervals : 500 cm^{-1})

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
43	169.5-172.4	7.99	7.93	7.98	7.84	7.79
44	172.4-173.9	10.9	10.9	10.9	10.9	10.9
45	173.9-175.4	13.4	13.4	13.4	13.5	13.5
46	175.4-177.0	16.4	16.5	16.6	16.7	16.8
47	177.0-178.6	20.0	20.3	20.5	20.8	21.0
48	178.6-180.2	24.3	24.8	25.2	25.5	25.9
49	180.2-181.8	29.2	29.9	30.5	31.1	31.7
50	181.8-183.5	35.0	36.0	36.9	37.8	38.7
51	183.5-185.2	41.6	43.1	44.4	45.6	46.9
52	185.2-186.9	49.0	51.0	52.7	54.4	56.2
53	186.9-188.7	57.3	59.9	62.1	64.3	66.7
54	188.7-190.5	65.8	69.1	71.8	74.7	77.7
55	190.5-192.3	75.7	79.8	83.2	86.8	90.6
56	192.3-194.2	85.4	90.3	94.5	98.8	103
57	194.2-196.1	95.2	101	106	111	116
58	196.1-198.0	104	111	116	122	128
59	198.0-200.0	113	120	125	132	138
60	200.0-202.0	120	127	133	139	146
61	202.0-204.1	125	132	138	144	151
62	204.1-206.2	127	134	140	146	152
63	206.2-208.3	127	133	139	144	150
64	208.3-210.5	124	130	134	138	143
65	210.5-212.8	119	122	125	129	132
66	212.8-215.0	110	113	114	116	118
67	215.0-217.4	99.7	101	101	102	103
68	217.4-219.8	87.4	86.8	86.4	85.9	85.4
69	219.8-222.2	74.6	72.8	71.5	70.1	68.8
70	222.2-224.7	61.6	59.1	57.1	55.2	53.3
71	224.7-227.3	49.1	46.1	43.8	41.6	39.5
72	227.3-229.9	37.8	34.6	32.3	30.1	28.1
73	229.9-232.6	28.1	25.4	22.9	20.9	19.1
74	232.6-235.3	20.1	17.5	15.7	14.0	12.5
75	235.3-238.1	13.9	11.8	10.3	8.99	7.86
76	238.1-241.0	9.29	7.63	6.51	5.56	4.75
77	241.0-243.9	5.89	4.69	3.90	3.25	2.71
78	243.9-246.9	3.63	2.80	2.28	1.85	1.51
79	246.9-250.0	2.13	1.59	1.26	1.00	0.794

Table III.4.2 (cont.)

N°	λ(nm)	295K	270K	250K	230K	210K
80	250.0-253.2	1.24	0.901	0.699	0.542	0.421
81	253.2-256.4	0.667	0.473	0.359	0.272	0.207
82	256.4-259.7	0.360	0.250	0.186	0.139	0.104
83	259.7-263.2	0.181	0.123	0.0905	0.0666	0.0490
84	263.2-266.7	0.0899	0.0607	0.0443	0.0323	0.0236
85	266.7-270.3	0.0447	0.0301	0.0220	0.0161	0.0117
86	270.3-274.0	0.0219	0.0150	0.0110	0.00814	0.00600
87	274.0-277.8	0.0105	0.00738	0.00557	0.00421	0.00317
88	277.8-281.7	0.00507	0.00375	0.00294	0.00231	0.00182

Table III.4.3.

CF_3Br (Molina et al., 1982)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298 K
190	67.1
195	96.1
200	118
205	129
210	123
215	103
220	75.0
225	48.3
230	27.0
235	14.8
240	6.95
245	3.25
250	1.39
255	0.589
260	0.234
265	0.0905
270	0.0348
275	0.0138
280	0.0055
285	0.0022
290	0.0008
295	0.0003
300	0.0001

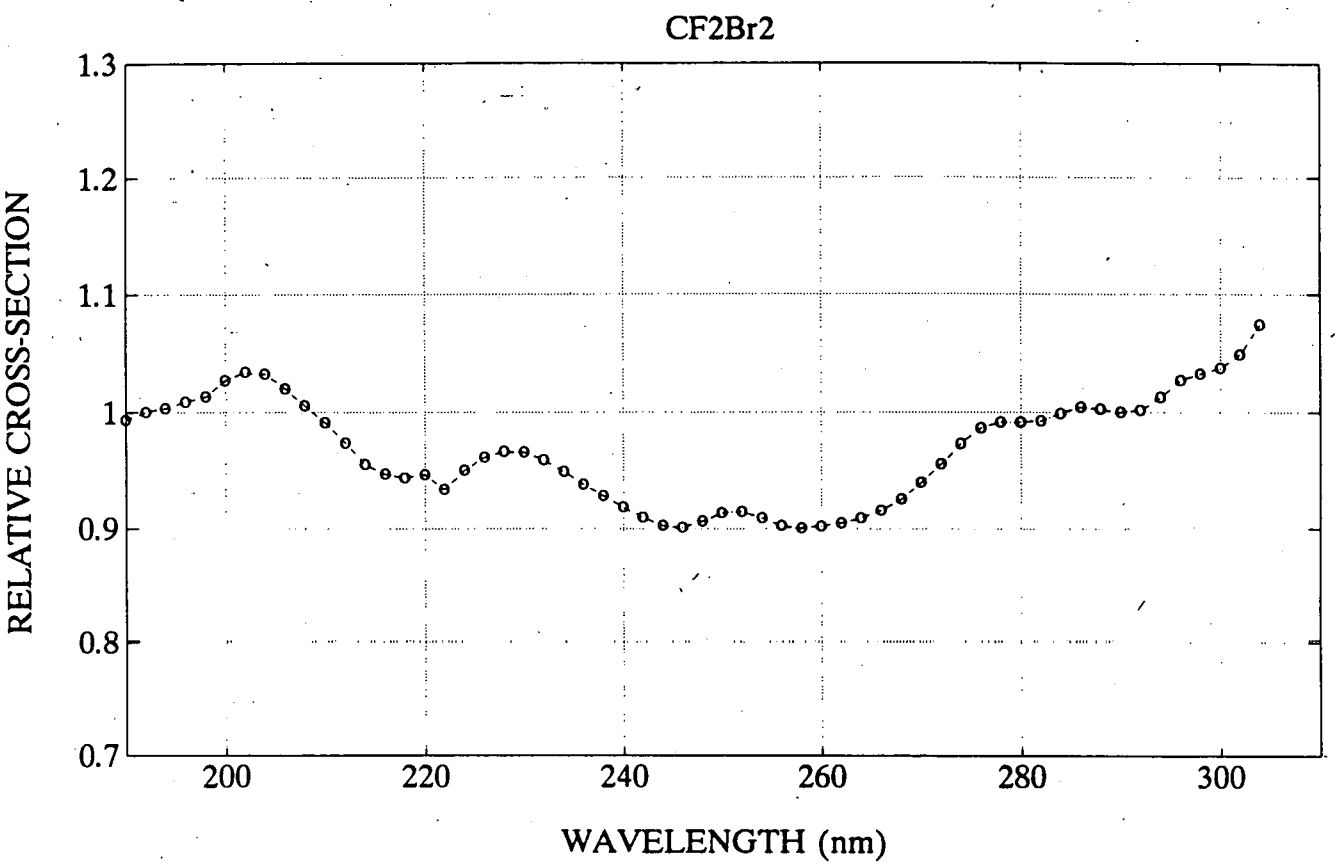

Figure 30. Relative absorption cross-sections of CF_2Br_2 at room temperature, as a function of wavelength.

(---o---) : Molina et al., 1982
Ref. : Gillotay and Simon, 1989

Table III.5.1.

CF_2Br_2 (Gillotay and Simon, 1989)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295 K	270 K	250 K	230 K	210 K
170	1245	1108	1000	891	782
172	781	696	629	560	493
174	553	551	550	549	548
176	495	523	546	568	590
178	603	641	671	700	730
180	750	791	824	857	890
182	866	939	997	1056	1114
184	1009	1086	1148	1210	1272
186	1118	1204	1272	1341	1409
188	1180	1262	1327	1392	1458
190	1168	1252	1319	1387	1454
192	1109	1185	1245	1306	1366
194	1022	1085	1135	1185	1235
196	920	973	1016	1058	1100
198	825	869	905	941	976
200	748	792	827	862	898
202	716	758	791	825	858
204	735	778	812	846	880
206	810	853	887	921	955
208	936	989	1033	1076	1119
210	1110	1173	1223	1273	1323
212	1331	1408	1466	1525	1583
214	1586	1670	1738	1806	1873
216	1841	1935	2011	2086	2162
218	2081	2186	2270	2353	2437
220	2281	2394	2482	2577	2676
222	2477	2585	2675	2767	2863
224	2540	2643	2729	2817	2909
226	2545	2640	2718	2800	2883
228	2493	2577	2646	2717	2790
230	2390	2461	2519	2578	2639
232	2246	2302	2347	2394	2442
234	2068	2109	2143	2177	2212
236	1869	1897	1918	1941	1964
238	1659	1674	1686	1698	1710
240	1448	1452	1455	1459	1463
242	1243	1238	1235	1232	1229
244	1050	1039	1031	1023	1015
246	875	860	848	836	825
248	718	701	687	674	661

Table III.5.1. (Cont.)

λ(nm)	295K	270K	250K	230K	210K
250	582	564	549	535	521
252	466	447	433	419	406
254	369	351	337	325	312
256	289	272	260	248	237
258	224	209	198	189	178
260	172	159	150	141	132
262	130	119	112	104	97.3
264	98.7	89.6	82.9	76.7	71.0
266	74.0	66.5	61.0	56.0	51.3
268	55.1	48.9	44.5	40.5	36.8
270	40.8	35.9	32.3	29.1	26.3
272	30.1	26.1	23.3	20.8	18.6
274	22.1	18.9	16.7	14.8	13.1
276	16.1	13.7	12.0	10.5	9.17
278	11.7	9.81	8.51	7.38	6.39
280	8.52	7.04	6.04	5.18	4.44
282	6.17	5.03	4.27	3.62	3.08
284	4.47	3.59	3.02	2.53	2.13
286	3.23	2.56	2.13	1.77	1.47
288	2.34	1.83	1.50	1.23	1.01
290	1.69	1.30	1.06	0.856	0.695
292	1.22	0.928	0.744	0.596	0.478
294	0.876	0.663	0.525	0.415	0.329
296	0.645	0.474	0.370	0.290	0.226
298	0.470	0.340	0.262	0.202	0.156
300	0.343	0.244	0.186	0.142	0.108
302	0.252	0.176	0.132	0.0993	0.0746
304	0.185	0.1274	0.0944	0.0699	0.0518

Table III.5.2.

CF_2Br_2 (Gillotay and Simon, 1989)

(wavenumber intervals : 500 cm^{-1})

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
43	169.5-172.4	1001	870	775	692	602
44	172.4-173.9	632	602	572	542	513
45	173.9-175.4	527	535	543	545	552
46	175.4-177.0	503	538	559	577	601
47	177.0-178.6	596	631	660	684	703
48	178.6-180.2	715	752	793	817	847
49	180.2-181.8	810	861	909	960	1001
50	181.8-183.5	912	993	1040	1105	1165
51	183.5-185.2	1025	1103	1180	1235	1300
52	185.2-186.9	1120	1209	1275	1343	1411
53	186.9-188.7	1170	1254	1324	1380	1454
54	188.7-190.5	1175	1253	1322	1389	1455
55	190.5-192.3	1115	1210	1270	1337	1385
56	192.3-194.2	1055	1130	1175	1215	1273
57	194.2-196.1	970	1015	1060	1100	1148
58	196.1-198.0	864	918	952	991	1035
59	198.0-200.0	780	827	861	898	922
60	200.0-202.0	721	768	801	838	872
61	202.0-204.1	712	768	803	836	869
62	204.1-206.2	766	824	842	873	915
63	206.2-208.3	882	932	968	999	1050
64	208.3-210.5	1054	1112	1157	1200	1250
65	210.5-212.8	1285	1354	1412	1476	1527
66	212.8-215.0	1562	1640	1714	1795	1850
67	215.0-217.4	1855	1952	2015	2096	2175
68	217.4-219.8	2144	2226	2305	2399	2486
69	219.8-222.2	2424	2533	2623	2717	2814
70	222.2-224.7	2529	2634	2721	2811	2904
71	224.7-227.3	2545	2640	2719	2800	2883
72	227.3-229.9	2467	2547	2613	2681	2750
73	229.9-232.6	2304	2366	2416	2468	2520
74	232.6-235.3	2073	2115	2149	2183	2218
75	235.3-238.1	1796	1819	1838	1857	1876
76	238.1-241.0	1500	1507	1512	1518	1524
77	241.0-243.9	1198	1192	1188	1183	1179
78	243.9-246.9	925	912	901	890	879
79	246.9-250.0	682	664	650	637	623

Table III.5.2.(cont.)

N°	λ(nm)	295K	270K	250K	230K	210K
80	250.0-253.2	493	475	460	446	433
81	253.2-256.4	335	318	305	292	280
82	256.4-259.7	224	209	198	188	178
83	259.7-263.2	140	129	120	113	105
84	263.2-266.7	85.6	77.3	71.2	65.6	60.4
85	266.7-270.3	51.2	45.3	41.1	37.3	33.9
86	270.3-274.0	29.6	25.7	22.9	20.5	18.3
87	274.0-277.8	16.4	13.9	12.2	10.7	9.33
88	277.8-281.7	8.80	7.27	6.25	5.37	4.61
89	281.7-285.7	4.69	3.78	3.18	2.67	2.25
90	285.7-289.9	2.41	1.89	1.55	1.28	1.05
91	289.9-294.1	1.22	0.928	0.744	0.596	0.478
92	294.1-298.5	0.615	0.451	0.352	0.274	0.214
93	298.5-303.0	0.303	0.214	0.162	0.123	0.0930
94	303.0-307.7	0.131	0.0883	0.0644	0.0469	0.0342

Table III.5.3.

CF_2Br_2 (Molina et al., 1982)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298 K
190	1160
195	977
200	768
205	786
210	1100
215	1630
220	2160
225	2440
230	2310
235	1860
240	1330
245	865
250	532
255	296
260	155
265	78.1
270	38.4
275	18.5
280	8.45
285	3.81
290	1.69
295	0.733
300	0.356
305	0.174
310	0.092
315	0.055
320	0.029
325	0.013
330	0.007
335	0.004
340	0.002

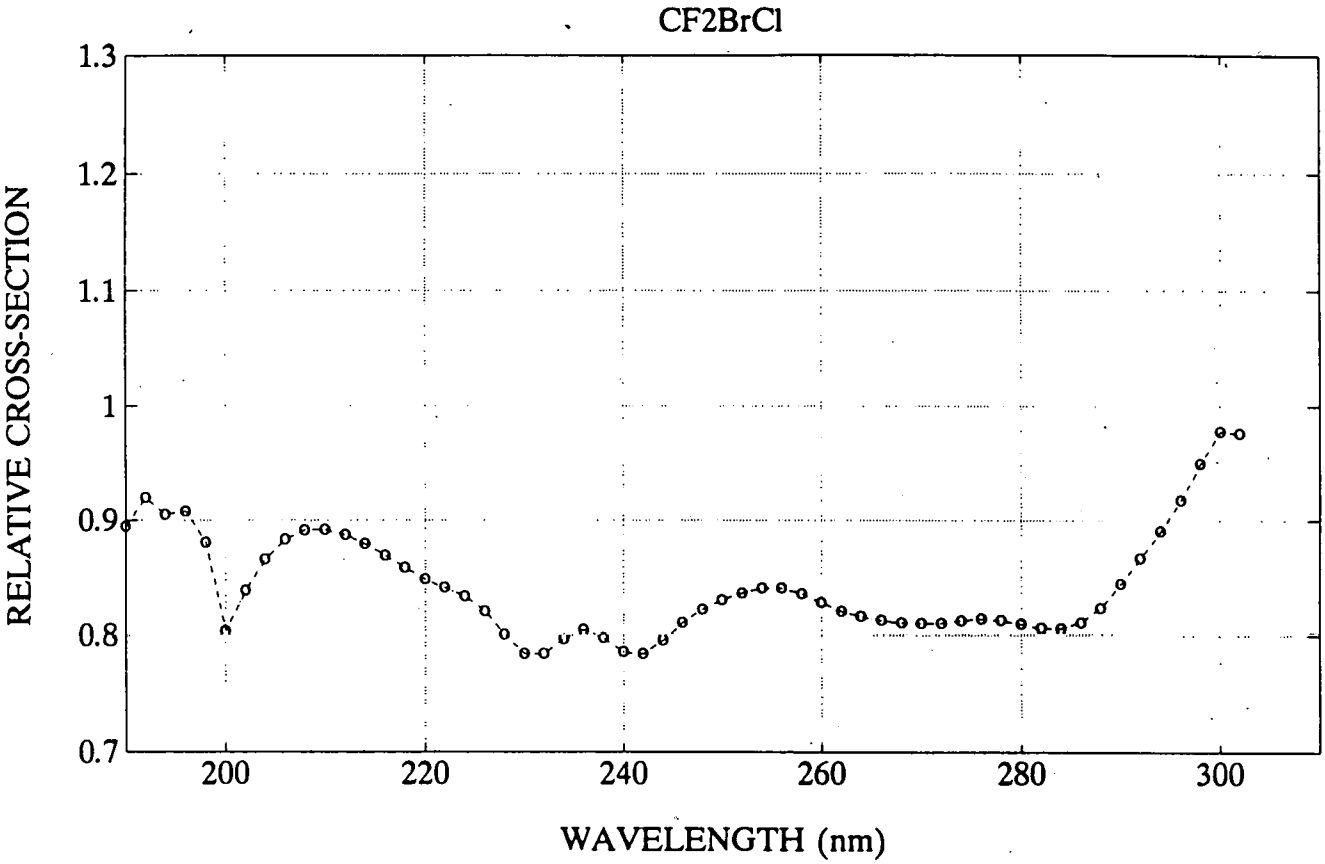

Figure 31. Relative absorption cross-sections of CF_2BrCl at room temperature, as a function of wavelength.

(---o---) : Molina et al., 1982
Ref. : Gillotay and Simon, 1989

Table III.6.1.

CF_2BrCl (Gillotay and Simon, 1989)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295 K	270 K	250 K	230 K	210 K
170	3230	3200	3180	3160	3150
172	2342	2300	2285	2250	2227
174	1760	1720	1680	1660	1660
176	1209	1180	1175	1170	1160
178	847	840	834	830	825
180	581	580	579	579	578
182	419	419	418	418	418
184	350	353	356	359	362
186	341	347	353	359	366
188	389	405	420	437	456
190	474	500	524	548	573
192	584	626	666	707	748
194	722	768	816	866	922
196	845	919	974	1020	1078
198	990	1041	1090	1139	1190
200	1197	1244	1284	1324	1366
202	1230	1283	1328	1374	1422
204	1244	1302	1350	1400	1452
206	1239	1299	1350	1402	1457
208	1216	1277	1328	1381	1435
210	1177	1237	1286	1337	1391
212	1124	1180	1227	1276	1326
214	1060	1111	1154	1198	1245
216	986	1032	1070	1110	1151
218	907	947	980	1014	1049
220	824	858	885	914	943
222	741	768	790	813	836
224	659	680	697	714	732
226	580	595	608	620	633
228	505	516	524	533	541
230	436	442	447	452	457
232	373	376	378	380	382
234	316	316	316	316	316
236	266	264	262	260	259
238	222	218	215	212	210
240	183	179	175	172	168
242	150	145	141	138	134
244	123	117	113	109	106
246	99.2	94.0	90.0	86.1	82.5
248	79.7	74.7	70.9	67.3	63.9

Table III.6.1. (Cont.)

λ(nm)	295K	270K	250K	230K	210K
250	63.7	59.0	55.5	52.2	49.1
252	50.5	46.2	43.1	40.2	37.5
254	39.8	36.0	33.3	30.7	28.3
256	31.2	27.9	25.5	23.3	21.3
258	24.3	21.4	19.4	17.5	15.9
260	18.8	16.4	14.7	13.1	11.7
262	14.5	12.4	11.0	9.73	8.61
264	11.1	9.39	8.21	7.18	6.28
266	8.46	7.05	6.09	5.26	4.54
268	6.42	5.26	4.49	3.83	3.26
270	4.84	3.90	3.29	2.77	2.33
272	3.63	2.88	2.39	1.99	1.65
274	2.71	2.11	1.73	1.42	1.16
276	2.01	1.54	1.24	1.00	0.810
278	1.48	1.11	0.887	0.706	0.562
280	1.09	0.803	0.629	0.493	0.386
282	0.796	0.576	0.444	0.342	0.264
284	0.579	0.410	0.311	0.236	0.179
286	0.419	0.290	0.216	0.161	0.120
288	0.301	0.204	0.149	0.109	0.0802
290	0.215	0.143	0.103	0.0737	0.0530
292	0.153	0.0990	0.0698	0.4927	0.0348
294	0.108	0.0683	0.0472	0.0327	0.0226
296	0.0761	0.0468	0.0317	0.0215	0.0146
298	0.0532	0.0318	0.0211	0.0140	0.00929
300	0.0369	0.0215	0.0139	0.00905	0.00587
302	0.0255	0.0144	0.00914	0.00579	0.00367

Table III.6.2.

CF_2BrCl (Gillotay and Simon., 1989)

(wavenumber intervals : 500 cm^{-1})

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
43	169.5-172.4	2770	2738	2710	2686	2661
44	172.4-173.9	1999	1960	1920	1880	1841
45	173.9-175.4	1575	1535	1498	1478	1449
46	175.4-177.0	1165	1147	1131	1115	1100
47	177.0-178.6	878	866	855	845	837
48	178.6-180.2	643	642	641	641	641
49	180.2-181.8	487	487	487	487	487
50	181.8-183.5	388	390	391	391	392
51	183.5-185.2	341	347	352	357	361
52	185.2-186.9	342	350	356	362	367
53	186.9-188.7	384	399	415	430	444
54	188.7-190.5	448	472	492	515	538
55	190.5-192.3	550	587	620	653	703
56	192.3-194.2	665	717	760	805	852
57	194.2-196.1	799	840	893	947	1000
58	196.1-198.0	917	970	1030	1090	1150
59	198.0-200.0	1080	1131	1177	1223	1269
60	200.0-202.0	1196	1266	1309	1352	1397
61	202.0-204.1	1239	1296	1343	1391	1441
62	204.1-206.2	1243	1303	1353	1404	1458
63	206.2-208.3	1227	1288	1339	1391	1446
64	208.3-210.5	1191	1251	1300	1352	1406
65	210.5-212.8	1135	1191	1238	1288	1339
66	212.8-215.0	1063	1115	1158	1203	1249
67	215.0-217.4	979	1024	1062	1101	1141
68	217.4-219.8	882	920	951	984	1017
69	219.8-222.2	783	813	837	863	889
70	222.2-224.7	681	704	722	741	760
71	224.7-227.3	580	595	608	620	633
72	227.3-229.9	484	493	500	508	515
73	229.9-232.6	396	400	403	406	409
74	232.6-235.3	318	318	318	318	318
75	235.3-238.1	250	247	245	243	241
76	238.1-241.0	192	188	185	181	178
77	241.0-243.9	144	139	135	131	127
78	243.9-246.9	106	101	96.5	92.6	88.9
79	246.9-250.0	75.4	70.5	66.8	63.2	59.9

Table III.6.2.(cont.)

N°	λ (nm)	295K	270K	250K	230K	210K
80	250.0-253.2	53.5	49.2	46.0	42.9	40.1
81	253.2-256.4	36.1	32.5	29.9	27.5	25.3
82	256.4-259.7	24.3	21.4	19.4	17.5	15.9
83	259.7-263.2	15.5	13.3	11.8	10.5	9.31
84	263.2-266.7	9.70	8.14	7.08	6.15	5.35
85	266.7-270.3	5.98	4.88	4.15	3.53	3.00
86	270.3-274.0	3.58	2.83	2.35	1.95	1.62
87	274.0-277.8	2.04	1.56	1.26	1.02	0.825
88	277.8-281.7	1.12	0.830	0.652	0.511	0.401
89	281.7-285.7	0.608	0.431	0.328	0.249	0.190
90	285.7-289.9	0.311	0.211	0.155	0.114	0.0835
91	289.9-294.1	0.153	0.0990	0.0698	0.0493	0.0348
92	294.1-298.5	0.0721	0.0442	0.0298	0.0202	0.0136
93	298.5-303.0	0.0318	0.0183	0.0118	0.00758	0.00487

Table III.6.3.

CF_2BrCl (Molina et al., 1982)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298 K
190	424
195	711
200	962
205	1090
210	1050
215	896
220	700
225	513
230	342
235	233
240	144
245	88.7
250	52.9
255	29.7
260	15.6
265	7.91
270	3.92
275	1.90
280	0.883
285	0.398
290	0.182
295	0.0821
300	0.0361
305	0.0165
310	0.0066
315	0.0026
320	0.00098
325	0.00037
330	0.00015

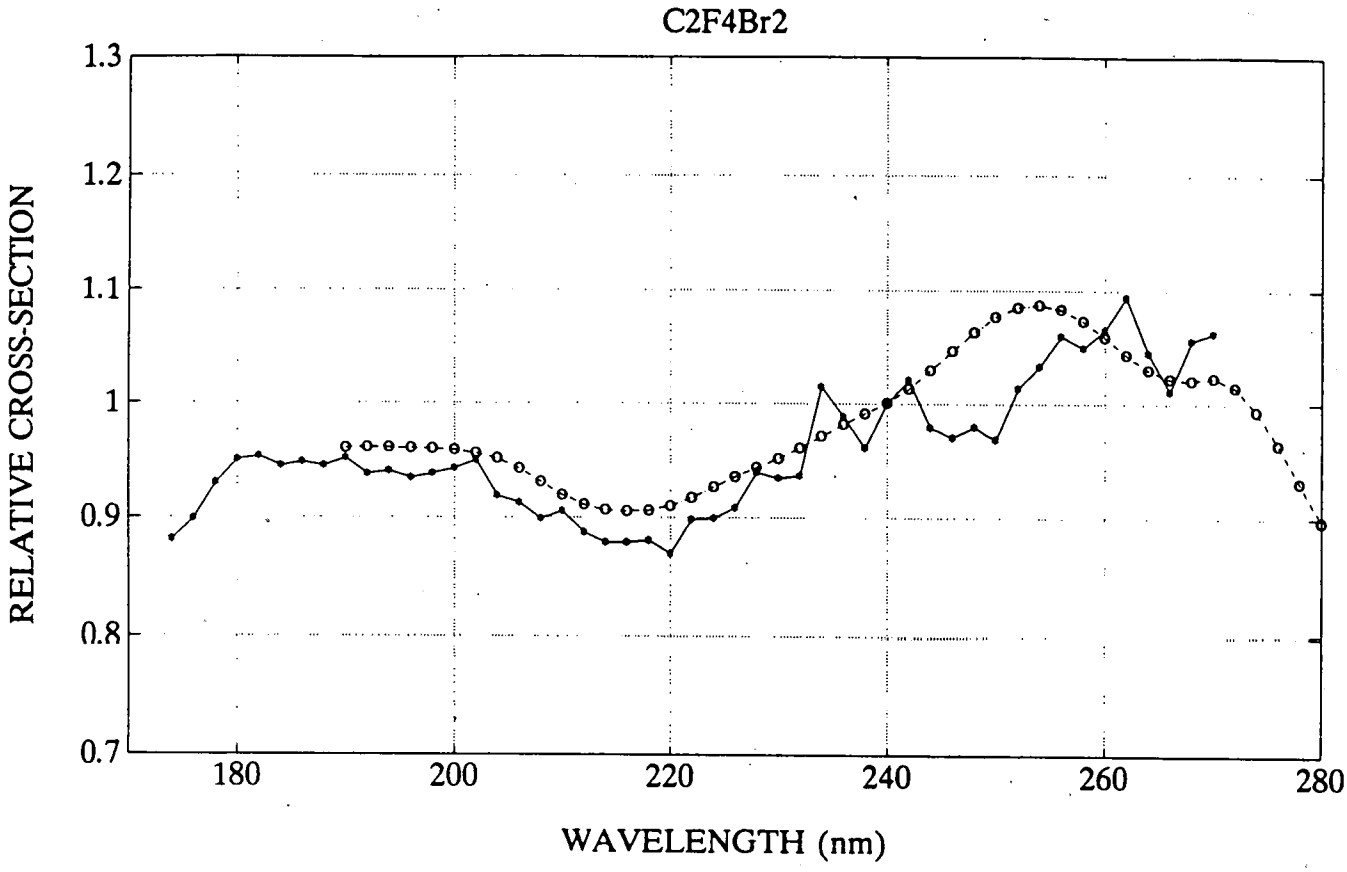

Figure 32. Relative absorption cross-sections of $C_2F_4Br_2$ at room temperature, as a function of wavelength.

(---o---) : Molina et al., 1982
(——*——) : Robbins, 1976b
Ref. : Gillotay et al., 1988a

Table III.7.1.

$C_2F_4Br_2$ (Gillotay et al., 1988a)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ(nm)	295K	270K	250K	230K	210K
170	509	539	564	590	618
172	564	594	620	646	674
174	623	653	678	705	732
176	685	715	740	765	791
178	751	779	802	826	851
180	818	844	866	888	911
182	886	909	929	949	969
184	953	973	990	1007	1024
186	1018	1035	1048	1062	1076
188	1080	1092	1102	1112	1122
190	1135	1143	1149	1155	1161
192	1184	1186	1188	1190	1192
194	1223	1221	1219	1217	1214
196	1252	1245	1238	1233	1227
198	1269	1257	1247	1237	1228
200	1273	1257	1244	1231	1218
202	1264	1244	1228	1212	1197
204	1241	1218	1200	1182	1165
206	1205	1180	1160	1141	1122
208	1157	1131	1110	1090	1070
210	1099	1072	1051	1030	1010
212	1031	1004	983	963	943
214	957	931	910	890	871
216	877	852	833	814	795
218	795	772	753	735	718
220	712	690	673	657	641
222	630	611	595	580	566
224	551	534	520	506	493
226	477	461	449	437	425
228	408	394	383	372	362
230	345	332	323	314	305
232	288	278	269	261	253
234	239	229	222	215	208
236	195	187	181	175	169
238	158	151	146	140	135
240	127	121	116	111	107
242	101	95.5	91.3	87.4	83.6
244	79.5	74.8	71.2	67.8	64.5
246	62.1	58.0	54.9	52.0	49.2
248	48.1	44.5	41.9	39.4	37.1

Table III.7.1.(Cont.)

λ(nm)	295K	270K	250K	230K	210K
250	37.0	33.9	31.6	29.5	27.6
252	28.2	25.6	23.7	21.9	20.3
254	21.4	19.2	17.6	16.1	14.7
256	16.1	14.2	12.9	11.7	10.6
258	12.1	10.5	9.38	8.38	7.49
260	9.04	7.70	6.77	5.96	5.24
262	6.72	5.61	4.85	4.20	3.63
264	4.99	4.06	3.45	2.93	2.49
266	3.69	2.93	2.43	2.02	1.68
268	2.73	2.10	1.71	1.39	1.13
270	2.01	1.50	1.19	0.942	0.745
272	1.49	1.07	0.825	0.634	0.488
274	1.10	0.763	0.569	0.424	0.316
276	0.816	0.542	0.390	0.281	0.203
278	0.607	0.385	0.267	0.185	0.129
280	0.454	0.273	0.182	0.121	0.0809

Table III.7.2.

$C_2F_4Br_2$ (Gillotay et al., 1988b)

(wavenumber intervals : 500 cm^{-1})

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
43	169.5-172.4	534	564	590	616	644
44	172.4-173.9	597	627	653	679	706
45	173.9-175.4	642	672	698	723	750
46	175.4-177.0	691	721	745	771	797
47	177.0-178.6	743	772	795	820	845
48	178.4-180.2	797	824	846	869	893
49	180.2-181.8	851	876	897	918	940
50	181.8-183.5	907	930	949	968	987
51	183.5-185.2	964	984	1000	1017	1033
52	185.2-186.9	1019	1036	1049	1063	1077
53	186.9-188.7	1073	1086	1096	1107	1117
54	188.7-190.5	1094	1105	1114	1123	1132
55	190.5-192.3	1170	1174	1177	1180	1183
56	192.3-194.2	1209	1209	1208	1207	1207
57	195.2-196.1	1241	1235	1231	1227	1222
58	196.1-198.0	1262	1252	1244	1236	1228
59	198.0-200.0	1272	1258	1246	1235	1224
60	200.0-202.0	1270	1251	1237	1223	1208
61	202.0-204.1	1253	1231	1214	1198	1181
62	204.1-206.2	1222	1197	1178	1160	1141
63	206.2-208.3	1176	1150	1130	1110	1090
64	208.3-210.5	1117	1090	1069	1049	1028
65	210.5-212.8	1044	1017	996	975	955
66	212.8-215.0	960	934	914	894	874
67	215.0-217.4	869	844	825	806	787
68	217.4-219.8	770	747	729	712	695
69	219.8-222.2	671	650	634	618	603
70	222.2-224.7	573	554	540	526	513
71	224.7-227.3	477	461	449	437	425
72	227.3-229.9	388	375	364	354	344
73	229.9-232.6	309	297	289	280	272
74	232.6-235.3	240	230	223	216	209
75	235.3-238.1	182	174	168	162	156
76	238.1-241.0	134	128	123	118	114
77	241.0-243.9	95.7	90.4	86.4	82.6	78.9
78	243.9-246.9	66.9	62.6	59.4	56.3	53.4
79	246.9-250.0	45.1	41.6	39.1	36.7	34.5

Table III.7.2.(cont.)

N°	λ (nm)	295K	270K	250K	230K	210K
80	250.0-253.2	30.2	27.5	25.5	23.6	21.9
81	253.2-256.4	19.1	17.0	15.5	14.2	12.9
82	256.4-259.7	12.1	10.5	9.39	8.39	7.49
83	259.7-263.2	7.25	6.08	5.28	4.59	3.99
84	263.2-266.7	4.29	3.46	2.90	2.44	2.05
85	266.7-270.3	2.53	1.94	1.56	1.26	1.02
86	270.3-274.0	1.47	1.06	0.811	0.623	0.479
87	274.0-277.8	0.830	0.553	0.399	0.288	0.208
88	277.8-281.7	0.468	0.284	0.190	0.127	0.0850

Table III.7.3.

$C_2F_4Br_2$ (Robbins, 1976b)

$\sigma(\lambda) \times 10^{21}$ (cm^2 molec.$^{-1}$)

λ (nm)	295K	(nm)	295K
174	549	224	496
176	616	226	433
178	698	228	383
180	777	230	322
182	844	232	270
184	900	234	242
186	965	236	193
188	1020	238	152
190	1080	240	127
192	1110	242	103
194	1150	244	77.8
196	1170	246	60.2
198	1190	248	47.1
200	1200	250	35.8
202	1200	252	28.6
204	1140	254	22.1
206	1100	256	17.1
208	1040	258	12.7
210	995	260	9.63
212	915	262	7.36
214	841	264	5.21
216	771	266	3.73
218	700	268	2.88
220	619	270	2.14
222	566		

Table III.7.4.

$C_2F_4Br_2$ (Molina et al., 1982)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298 K
190	1090
195	1190
200	1220
205	1160
210	1010
215	831
220	648
225	478
230	328
235	211
240	127
245	73.0
250	39.8
255	20.2
260	9.57
265	4.40
270	2.06
275	0.928
280	0.407
285	0.175
290	0.074
295	0.033
300	0.016
305	0.008
310	0.004
315	0.002
320	0.001

Table III.8.1.

C_2F_5Br (Molina et al., 1982)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	298 K
190	181
195	184
200	181
205	169
210	148
215	120
220	89.4
225	61.3
230	38.3
235	22.2
240	12.0
245	6.20
250	3.05
255	1.35
260	0.590
265	0.260
270	0.112
275	0.0505
280	0.0218
285	0.0100
290	0.0045
295	0.0020
300	0.0009

Table III.9.1

CF_3-CHBrCl (Gillotay et al. 1988a)

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

λ (nm)	295K	270K	250K	230K	210K
170	7026	7014	7005	6996	6987
172	6146	6058	5988	5919	5851
174	4968	4849	4756	4665	4575
176	3798	3682	3592	3504	3418
178	2811	2715	2640	2567	2496
180	2061	1988	1932	1877	1823
182	1533	1481	1441	1401	1363
184	1184	1148	1120	1093	1067
186	971	948	929	912	894
188	866	853	842	832	822
190	906	905	903	902	901
192	985	988	991	994	997
194	1052	1061	1069	1076	1084
196	1105	1120	1132	1145	1157
198	1143	1163	1180	1197	1214
200	1164	1190	1210	1232	1253
202	1169	1199	1223	1247	1272
204	1158	1190	1217	1244	1272
206	1132	1166	1194	1223	1253
208	1092	1127	1156	1186	1216
210	1041	1076	1104	1134	1164
212	981	1014	1042	1070	1099
214	913	945	971	998	1025
216	842	871	894	919	944
218	768	794	815	837	859
220	694	716	734	753	773
222	621	640	655	671	687
224	551	566	579	592	605
226	484	496	506	516	527
228	422	431	439	447	454
230	365	372	377	383	388
232	313	318	321	325	329
234	267	269	272	274	276
236	226	227	228	229	230
238	190	190	190	190	190
240	159	158	157	156	155
242	132	130	129	128	126
244	109	107	105	103	102
246	89.2	86.9	85.1	83.4	81.7
248	72.7	70.4	68.5	66.8	65.0

Table III.9.1

λ (nm)	295K	270K	250K	230K	210K
250	58.9	56.6	54.8	53.1	51.4
252	47.5	45.3	43.6	42.0	40.4
254	38.1	36.1	34.5	33.0	31.6
256	30.4	28.6	27.2	25.8	24.5
258	24.2	22.5	21.2	20.1	18.9
260	19.1	17.6	16.5	15.5	14.6
262	15.0	13.7	12.8	11.9	11.1
264	11.7	10.6	9.85	9.12	8.45
266	9.11	8.21	7.55	6.94	6.38
268	7.05	6.30	5.75	5.26	4.80
270	5.42	4.81	4.36	3.96	3.59
272	4.16	3.65	3.29	2.97	2.68
274	3.17	2.76	2.47	2.21	1.98
276	2.40	2.07	1.85	1.64	1.46
278	1.80	1.55	1.37	1.21	1.07
280	1.35	1.15	1.01	0.892	0.785
282	1.01	0.852	0.746	0.652	0.571
284	0.745	0.627	0.545	0.475	0.413
286	0.548	0.458	0.397	0.344	0.298
288	0.401	0.333	0.287	0.247	0.213
290	0.291	0.240	0.206	0.177	0.152

Table III.9.2.

$CF_3CHBrCl$ (Gillotay et al., 1988b)

(wavenumber intervals : 500 cm^{-1})

$\sigma(\lambda) \times 10^{21}$ (cm^2 $molec.^{-1}$)

N°	λ (nm)	295K	270K	250K	230K	210K
43	169.5-172.4	6668	6614	6571	6529	6487
44	172.4-173.9	5483	5372	5285	5199	5115
45	173.9-175.4	4576	4455	4361	4268	4178
46	175.4-177.0	3690	3575	3486	3399	3315
47	177.0-178.6	2899	2801	2724	2650	2577
48	178.6-180.2	2261	2182	2120	2059	2001
49	180.2-181.8	1772	1710	1662	1615	1570
50	181.8-183.5	1402	1356	1320	1285	1251
51	183.5-185.2	1137	1104	1078	1053	1028
52	185.2-186.9	967	944	926	908	891
53	186.9-188.7	872	858	847	836	825
54	188.7-190.5	885	882	880	878	875
55	190.5-192.3	962	964	966	967	969
56	192.3-194.2	1028	1035	1041	1047	1053
57	194.2-196.1	1084	1097	1107	1117	1128
58	196.1-198.0	1127	1145	1160	1174	1189
59	198.0-200.0	1156	1179	1198	1217	1236
60	200.0-202.0	1169	1196	1219	1242	1265
61	201.0-204.1	1165	1196	1222	1248	1275
62	204.1-206.2	1145	1178	1206	1234	1263
63	206.2-208.3	1108	1143	1172	1201	1232
64	208.3-210.5	1057	1092	1121	1151	1181
65	210.5-212.8	992	1025	1053	1082	1112
66	212.8-215.0	917	948	975	1001	1029
67	215.0-217.4	834	863	887	911	936
68	217.4-219.8	746	770	791	812	833
69	219.8-222.2	657	678	694	712	730
70	222.2-224.7	569	586	599	613	627
71	224.7-227.3	484	496	506	516	527
72	227.3-229.9	404	413	420	427	434
73	229.9-232.6	332	337	342	346	350
74	232.6-235.3	268	271	273	275	277
75	235.3-238.1	213	214	214	215	215
76	238.1-241.0	166	165	165	164	163
77	241.0-243.9	126	125	123	122	120
78	243.9-246.9	94.7	92.5	90.7	89.0	87.3
79	246.9-250.0	69.0	66.7	64.8	63.1	61.4

Table III.9.2.(cont.)

N°	λ(nm)	295K	270K	250K	230K	210K
80	250.0-253.2	50.2	47.9	46.2	44.6	43.0
81	253.2-256.4	34.9	32.9	31.4	29.9	28.6
82	256.4-259.7	24.2	22.5	21.2	20.1	18.9
83	259.7-263.2	15.9	14.6	13.6	12.7	11.9
84	263.2-266.7	10.3	9.35	8.63	7.96	7.35
85	266.7-270.3	6.61	5.89	5.37	4.90	4.47
86	270.3-274.0	4.10	3.60	3.25	2.93	2.64
87	274.0-277.8	2.43	2.10	1.87	1.67	1.49
88	277.8-281.7	1.39	1.19	1.05	0.920	0.810
89	281.7-285.7	0.780	0.656	0.572	0.498	0.434
90	285.7-289.9	0.413	0.344	0.296	0.256	0.221

IV Parametrical coefficients for absorption cross-sections.

Table IV.1. Parameters A_i and B_i for polynomial expression of $\sigma(\lambda,T)$ of chloro- and chlorofluoromethanes.

CH_3Cl (Simon et al., 1988a)

$A_0 = -299.796165$	$B_0 = -7.172742$
$A_1 = 5.104685$	$B_1 = 1.483679\ 10^{-1}$
$A_2 = -3.363002\ 10^{-2}$	$B_2 = -1.146290\ 10^{-3}$
$A_3 = 9.580545\ 10^{-5}$	$B_3 = 3.918805\ 10^{-6}$
$A_4 = -1.013456\ 10^{-7}$	$B_4 = -4.999362\ 10^{-9}$

T range : 210 - 300 K
λ range : 174 - 216 nm

CH_2Cl_2 (Simon et al., 1988a)

$A_0 = -1431.823933$	$B_0 = -3.117067$
$A_1 = 27.395312$	$B_1 = 6.787419\ 10^{-2}$
$A_2 = -1.980732\ 10^{-1}$	$B_2 = -5.499963\ 10^{-4}$
$A_3 = 6.346759\ 10^{-4}$	$B_3 = 1.964936\ 10^{-6}$
$A_4 = -7.629833\ 10^{-7}$	$B_4 = -2.610089\ 10^{-9}$

T range : 210 - 300 K
λ range : 176 - 220 nm

$CHCl_3$ (Simon et al., 1988a)

$A_0 = 269.801817$	$B_0 = 3.797261$
$A_1 = -6.090842$	$B_1 = -7.091315\ 10^{-2}$
$A_2 = 4.782958\ 10^{-2}$	$B_2 = 4.939696\ 10^{-4}$
$A_3 = -1.642660\ 10^{-4}$	$B_3 = -1.522643\ 10^{-6}$
$A_4 = 2.068225\ 10^{-7}$	$B_4 = 1.755462\ 10^{-9}$

T range : 210 - 300 K
λ range : 190 - 240 nm

Table IV.1. (Cont.)

CCl_4 (Simon et al., 1988a)

$A_0 = -37.104170$	$B_0 = 1.073919$
$A_1 = -5.821802\ 10^{-1}$	$B_1 = -1.627543\ 10^{-2}$
$A_2 = 9.997399\ 10^{-3}$	$B_2 = 8.814085\ 10^{-5}$
$A_3 = -4.676527\ 10^{-5}$	$B_3 = -1.981057\ 10^{-7}$
$A_4 = 6.850102\ 10^{-8}$	$B_4 = 1.502234\ 10^{-10}$

T range : 210 - 300 K
λ range : 194 - 250 nm

CF_3Cl (Simon et al., 1988a)

$A_0 = -134.884364$	$B_0 = 0$
$A_1 = 2.099295$	$B_1 = 0$
$A_2 = -1.048617\ 10^{-2}$	$B_2 = 0$
$A_3 = 1.671825\ 10^{-5}$	$B_3 = 0$

T range : 210 - 300 K
λ range : 172 - 200 nm

CF_2Cl_2 (Simon et al., 1988a)

$A_0 = -712.018312$	$B_0 = 6.164825$
$A_1 = 12.490330$	$B_1 = -1.209343\ 10^{-1}$
$A_2 = -8.286544\ 10^{-2}$	$B_2 = 8.858675\ 10^{-4}$
$A_3 = 2.409069\ 10^{-4}$	$B_3 = -2.874315\ 10^{-6}$
$A_4 = -2.611256\ 10^{-7}$	$B_4 = 3.490357\ 10^{-9}$

T range : 210 - 300 K
λ range : 174 - 226 nm

Table IV.1.(Cont.)

$CFCl_3$ (Simon et al., 1988a)

A_0 =	- 84.611192	B_0 =	- 5.791224
A_1 =	7.955133 10^{-1}	B_1 =	1.168934 10^{-1}
A_2 =	- 2.054989 10^{-3}	B_2 =	- 8.806946 10^{-4}
A_3 =	- 4.481189 10^{-6}	B_3 =	2.933531 10^{-6}
A_4 =	1.583832 10^{-8}	B_4 =	- 3.642051 10^{-9}

T range : 210 - 300 K
λ range : 174 - 230 nm

CHF_2Cl (Simon et al., 1988a)

A_0 =	- 106.029241	B_0 =	- 1.339882 10^{-1}
A_1 =	1.503771	B_1 =	2.740485 10^{-3}
A_2 =	- 8.247614 10^{-3}	B_2 =	- 1.802848 10^{-5}
A_3 =	1.420607 10^{-5}	B_3 =	3.853998 10^{-8}

T range : 210 - 300 K
λ range : 174 - 204 nm

$CHFCl_2$ (Simon et al., 1988a)

A_0 =	- 514.560794	B_0 =	- 3.057716
A_1 =	8.794041	B_1 =	6.653915 10^{-2}
A_2 =	- 5.683969 10^{-2}	B_2 =	- 5.396404 10^{-4}
A_3 =	1.589443 10^{-4}	B_3 =	1.932182 10^{-6}
A_4 =	- 1.634528 10^{-7}	B_4 =	- 2.575370 10^{-9}

T range : 210 - 300 K
λ range : 174 - 222 nm

Table IV.2. Parameters A_i and B_i for polynomial expression of $\sigma(\lambda,T)$ of chloro- and chlorofluoroethanes.

$C_2F_3Cl_3$ (Simon et al., 1988b)

$A_0 = -1087.881207$	$B_0 = 12.493465$
$A_1 = 20.004100$	$B_1 = -2.393714\ 10^{-1}$
$A_2 = -1.391989\ 10^{-1}$	$B_2 = 1.714214\ 10^{-3}$
$A_3 = 4.282793\ 10^{-4}$	$B_3 = -5.439298\ 10^{-6}$
$A_4 = -4.938351\ 10^{-7}$	$B_4 = 6.454833\ 10^{-9}$

T range : 210 - 300 K
λ range : 182 - 230 nm

$C_2F_4Cl_2$ (Simon et al., 1988b)

$A_0 = -160.495098$	$B_0 = -1.529573$
$A_1 = 2.480670$	$B_1 = 3.524763\ 10^{-2}$
$A_2 = -1.520180\ 10^{-2}$	$B_2 = -2.995072\ 10^{-4}$
$A_3 = 3.841242\ 10^{-5}$	$B_3 = 1.112950\ 10^{-6}$
$A_4 = -3.437259\ 10^{-8}$	$B_4 = -1.525877\ 10^{-9}$

T range : 210 - 300 K
λ range : 172 - 220 nm

C_2F_5Cl (Simon et al., 1988b)

$A_0 = 5.828075$	$B_0 = 0$
$A_1 = -2.989990\ 10^{-1}$	$B_1 = 0$
$A_2 = 1.352465\ 10^{-3}$	$B_2 = 0$
$A_3 = -2.685086\ 10^{-6}$	$B_3 = 0$

T range : 210 - 300 K
λ range : 172 - 204 nm

Table IV.2. (cont)

CF_3-$CHCl_2$ (Gillotay and Simon, 1990)

$A_0 = -513.996354$	$B_0 = 1.757133$
$A_1 = 9.089141$	$B_1 = -3.499205\ 10^{-2}$
$A_2 = -6.136794\ 10^{-2}$	$B_2 = 2.593563\ 10^{-4}$
$A_3 = 1.814826\ 10^{-4}$	$B_3 = -8.489357\ 10^{-7}$
$A_4 = -1.999514\ 10^{-7}$	$B_4 = 1.037756\ 10^{-9}$

T range : 210 - 300 K
λ range : 182 - 250 nm

CH_3-$CFCl_2$ (Gillotay and Simon, 1990)

$A_0 = -682.913042$	$B_0 = 4.074747$
$A_1 = 12.122290$	$B_1 = -8.053899\ 10^{-2}$
$A_2 = -8.187699\ 10^{-2}$	$B_2 = 5.946552\ 10^{-4}$
$A_3 = 2.437244\ 10^{-4}$	$B_3 = -1.945048\ 10^{-6}$
$A_4 = -2.719103\ 10^{-7}$	$B_4 = 2.380143\ 10^{-9}$

T range : 210 - 300 K
λ range : 172 - 240 nm

CH_3-CF_2Cl (Gillotay and Simon, 1990)

$A_0 = -328.092008$	$B_0 = 4.289533\ 10^{-1}$
$A_1 = 6.342799$	$B_1 = -9.042817\ 10^{-3}$
$A_2 = -4.810362\ 10^{-2}$	$B_2 = 7.018009\ 10^{-5}$
$A_3 = 1.611991\ 10^{-4}$	$B_3 = -2.389065\ 10^{-7}$
$A_4 = -2.042613\ 10^{-7}$	$B_4 = 3.039799\ 10^{-10}$

T range : 210 - 300 K
λ range : 172 - 230 nm

Table IV.2. (Cont.)

CH_3CCl_3 (Vanlaethem-Meuree et al., 1979)

$A_0 = 341.085191$	$B_0 = -1.660090$
$A_1 = -7.273362$	$B_1 = 3.079969\ 10^{-2}$
$A_2 = 5.498387\ 10^{-2}$	$B_2 = -2.106719\ 10^{-4}$
$A_3 = -1.827552\ 10^{-4}$	$B_3 = 6.264984\ 10^{-7}$
$A_4 = 2.238640\ 10^{-7}$	$B_4 = -6.781342\ 10^{-10}$

T range : 210 - 300 K

λ range : 182 - 240 nm

Table IV.3. Parameters A_i and B_i for polynomial expression of $\sigma(\lambda,T)$ of brominated methanes and ethanes.

CH_3Br (Gillotay and Simon, 1988a)

$A_0 = 46.520000$	$B_0 = 9.340858\ 10^{-1}$
$A_1 = -1.457962$	$B_1 = -1.688734\ 10^{-2}$
$A_2 = 1.146929\ 10^{-2}$	$B_2 = 1.148689\ 10^{-4}$
$A_3 = -3.762666\ 10^{-5}$	$B_3 = -3.488086\ 10^{-7}$
$A_4 = 4.326408\ 10^{-8}$	$B_4 = 3.994462\ 10^{-10}$

T range : 210 - 300 K
λ range : 200 - 280 nm

CH_2Br_2 (Gillotay et al., 1988b)

$A_0 = -70.211776$	$B_0 = 2.899280$
$A_1 = 1.940326\ 10^{-1}$	$B_1 = -4.327724\ 10^{-2}$
$A_2 = 2.726152\ 10^{-3}$	$B_2 = 2.391599\ 10^{-4}$
$A_3 = -1.695472\ 10^{-5}$	$B_3 = -5.807506\ 10^{-7}$
$A_4 = 2.500066\ 10^{-8}$	$B_4 = 5.244883\ 10^{-10}$

T range : 210 - 300 K
λ range : 210 - 290 nm

$CHBr_3$ (Gillotay et al., 1989)

$A_0 = -110.278167$	$B_0 = -1.531205\ 10^{-1}$
$A_1 = 1.028073$	$B_1 = 1.610947\ 10^{-3}$
$A_2 = -3.662563\ 10^{-3}$	$B_2 = -5.807523\ 10^{-6}$
$A_3 = 4.122594\ 10^{-6}$	$B_3 = 7.289335\ 10^{-9}$

T range : 210 - 300 K
λ range : 240 - 310 nm

Table IV.3. (cont.)

CF_3Br (Gillotay and Simon, 1989)

$A_0 = 62.563060$	$B_0 = -9.175482\ 10^{-1}$
$A_1 = -2.006832$	$B_1 = 1.857479\ 10^{-2}$
$A_2 = 1.659204\ 10^{-2}$	$B_2 = -1.385710\ 10^{-4}$
$A_3 = -5.646547\ 10^{-5}$	$B_3 = 4.506561\ 10^{-7}$
$A_4 = 6.745870\ 10^{-8}$	$B_4 = -5.380311\ 10^{-10}$

T range : 210 - 300 K

λ range : 168 - 280 nm

CF_2Br_2 (Gillotay and Simon, 1989)

$A_0 = -206.277266$	$B_0 = 1.046031\ 10^{-1}$
$A_1 = 2.372628$	$B_1 = -1.412392\ 10^{-3}$
$A_2 = -1.052660\ 10^{-2}$	$B_2 = 6.901548\ 10^{-6}$
$A_3 = 1.923890\ 10^{-5}$	$B_3 = -1.516396\ 10^{-8}$
$A_4 = -1.224154\ 10^{-8}$	$B_4 = 1.398990\ 10^{-11}$

T range : 210 - 300 K

λ range : 222 - 304 nm

CF_2BrCl (Gillotay and Simon, 1989)

$A_0 = -134.797197$	$B_0 = 3.306975\ 10^{-1}$
$A_1 = 1.708389$	$B_1 = -5.095714\ 10^{-3}$
$A_2 = -9.153990\ 10^{-3}$	$B_2 = 2.936073\ 10^{-5}$
$A_3 = 2.164407\ 10^{-5}$	$B_3 = -7.619773\ 10^{-8}$
$A_4 = -1.986293\ 10^{-8}$	$B_4 = 7.682522\ 10^{-11}$

T range : 210 - 300 K

λ range : 200 - 302 nm

Table IV.3. (cont.)

$C_2F_4Br_2$ (Gillotay et al., 1988b)

$A_0 = 34.026000$	$B_0 = 4.010664\ 10^{-1}$
$A_1 = -1.152616$	$B_1 = -8.358968\ 10^{-3}$
$A_2 = 8.959798\ 10^{-3}$	$B_2 = 6.415741\ 10^{-5}$
$A_3 = -2.908879\ 10^{-5}$	$B_3 = -2.157554\ 10^{-7}$
$A_4 = 3.307212\ 10^{-8}$	$B_4 = 2.691871\ 10^{-10}$

T range : 210 - 300 K

λ range : 170 - 280 nm

CF_3-CHBrCl (Gillotay et al., 1988b)

$A_0 = -127.157358$	$B_0 = -7.959828\ 10^{-2}$
$A_1 = 1.635435$	$B_1 = 1.978026\ 10^{-3}$
$A_2 = -9.002683\ 10^{-3}$	$B_2 = -1.627866\ 10^{-5}$
$A_3 = 2.190678\ 10^{-5}$	$B_3 = 5.480744\ 10^{-8}$
$A_4 = -2.062651\ 10^{-8}$	$B_4 = -6.480935\ 10^{-11}$

T range : 210 - 300 K

λ range : 190 - 290 nm

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