C I

Primary data source	Query NIST Bibliographic Database for C I (new
Haris & Kramida 2017	Literature on C I Energy Levels

Configuration	Term	J	Level (cm^{-1})	Uncertainty (cm^{-1})	Lan
$2s^2 2p^2$	^3P	0	0.0000000	0.0013	
		1	16.4167130	0.0013	1.501(
		2	43.4134567	0.0013	1.501(
$2s^2 2p^2$	^1D	2	10 192.657	0.003	
$2s^2 2p^2$	^1S	0	21 648.030	0.003	
$2s2p^3$	$^5S°$	2	33 735.121	0.018	
$2s^2 2p3s$	$^3P°$	0	60 333.4476	0.0005	
		1	60 352.6584	0.0003	
		2	60 393.1693	0.0004	
$2s^2 2p3s$	$^1P°$	1	61 981.83211	0.0004	0.97
$2s2p^3$	$^3D°$	3	64 086.96961	0.00010	
		1	64 089.8990	0.0006	
		2	64 090.99351	0.0003	

O I

Primary data source	Query NIST Bibliographic Database for O I (new window)
Moore 1993	Literature on O I Energy Levels

Configuration	Term	J	Level (cm^{-1})	Uncertainty (cm^{-1})	Reference
$2s^2 2p^4$	^3P	2	0.000		L7288
		1	158.265		
		0	226.977		
$2s^2 2p^4$	^1D	2	15 867.862		
$2s^2 2p^4$	^1S	0	33 792.583		
$2s^2 2p^3(^4S°)3s$	$^5S°$	2	73 768.200		
$2s^2 2p^3(^4S°)3s$	$^3S°$	1	76 794.978		
$2s^2 2p^3(^4S°)3p$	^5P	1	86 625.757		
		2	86 627.778		
		3	86 631.454		
$2s^2 2p^3(^4S°)3p$	^3P	1	88 630.587		
		2	88 631.146		
		0	88 631.303		
$2s^2 2p^3(^4S°)4s$	$^5S°$	2	95 476.728		

Table 1

Configuration	Term	J	Level (cm^{-1})
$2s^2 2p^5$	$^2P°$	$3/2$	0.000
		$1/2$	404.141
$2s^2 2p^4(^3P)3s$	^4P	$5/2$	102 405.71
		$3/2$	102 680.44
		$1/2$	102 840.38
$2s^2 2p^4(^3P)3s$	^2P	$3/2$	104 731.05
		$1/2$	105 056.28
$2s^2 2p^4(^3P)3p$	$^4P°$	$5/2$	115 917.91
		$3/2$	116 040.88
		$1/2$	116 143.58
$2s^2 2p^4(^3P)3p$	$^4D°$	$7/2$	116 987.39
		$5/2$	117 164.01
		$3/2$	117 308.56
		$1/2$	117 391.95
$2s^2 2p^4(^3P)3p$	$^2D°$	$5/2$	117 622.92
		$3/2$	117 872.92
$2s^2 2p^4(^3P)3p$	$^2S°$	$1/2$	118 405.27

Table 2

Configuration	Term	J	Level (cm^{-1})
$3s^2 3p^5$	$^2P°$	$3/2$	0.0000
		$1/2$	882.3515
$3s^2 3p^4(^3P)4s$	^4P	$5/2$	71 958.363
		$3/2$	72 488.568
		$1/2$	72 827.038
$3s^2 3p^4(^3P)4s$	^2P	$3/2$	74 225.846
		$1/2$	74 865.667
$3s^2 3p^4(^3P)4p$	$^4P°$	$5/2$	82 918.893
		$3/2$	83 130.900
		$1/2$	83 364.927
$3s^2 3p^4(^3P)4p$	$^4D°$	$7/2$	83 894.037
		$5/2$	84 132.262
		$3/2$	84 485.309
		$1/2$	84 688.637
$3s^2 3p^4(^1D)4s$	^2D	$5/2$	84 120.263
		$3/2$	84 121.872
$3s^2 3p^4(^3P)4p$	$^2D°$	$5/2$	84 648.100
		$3/2$	84 988.480

Table 3

Configuration	Term	J	Level (cm^{-1})
$4s^2 4p^5$	$^2P°$	$3/2$	0.00
		$1/2$	3 685.24
$4s^2 4p^4(^3P_2)5s$	$^2[2]$	$5/2$	63 436.45
		$3/2$	64 907.19
$4s^2 4p^4(^3P_1)5s$	$^2[1]$	$1/2$	66 883.87
		$3/2$	67 183.58
$4s^2 4p^4(^3P_0)5s$	$^2[0]$	$1/2$	68 970.21
$4s^2 4p^4(^3P_2)5p$	$^2[2]°$	$5/2$	74 672.32
		$3/2$	75 009.13
$4s^2 4p^4(^3P_2)5p$	$^2[3]°$	$7/2$	75 521.50
		$5/2$	75 697.05
$4s^2 4p^4(^3P_2)5p$	$^2[1]°$	$1/2$	75 814.00
		$3/2$	76 743.08
$4s^2 4p^4(^1D_2)5s$	$^2[2]$	$5/2$	75 890.33
		$3/2$	75 908.53
$4s^2 4p^4(^3P_1)5p$	$^2[0]°$	$1/2$	78 076.00

Table 4

Configuration	Term	J	Level (cm^{-1})
$5s^2 5p^5$	$^2P°$	$3/2$	0.000
		$1/2$	7 602.970
$5s^2 5p^4(^3P_2)6s$	$^2[2]$	$5/2$	54 633.460
		$3/2$	56 092.881
$5s^2 5p^4(^3P_0)6s$	$^2[0]$	$1/2$	60 896.243
$5s^2 5p^4(^3P_1)6s$	$^2[1]$	$3/2$	61 819.779
		$1/2$	63 186.758
$5s^2 5p^4(^3P_2)6p$	$^2[2]°$	$5/2$	64 906.290
		$3/2$	64 989.994
$5s^2 5p^4(^3P_2)6p$	$^2[3]°$	$5/2$	65 644.476
		$7/2$	65 669.988
$5s^2 5p^4(^3P_2)6p$	$^2[1]°$	$1/2$	65 856.960
		$3/2$	67 062.130
$5s^2 5p^4(^3P_2)5d$	$^2[3]$	$7/2$	66 015.023
		$5/2$	66 020.469

State	T_e	ω_e	$\omega_e x_e$	$\omega_e y_e$	B_e	α_e	γ_e	D_e	β_e	r_e	Trans.	ν_{00}
	(34690) 53	(850) 54	(20) 54		(0.96) 55	(0.026$_2$) 55				(1.48)	(A' → a) 50	(26440)
A' $^3\Delta_u$											A' ← X 56 57 R	(34320) 54

↳missing citation

State	T_e	ω_e	$\omega_e x_e$	$\omega_e y_e$	B_e	α_e	γ_e	D_e	β_e	r_e	Trans.	ν_{00}
	33057.$_3$	794.2$_9$ Z	12.73$_6$ 58	-.244$_4$	0.915$_5$	0.0139$_1$ 58	-7.4$_0$E-4	[7.4E-$_6$]		1.517$_4$	c → a 59	(24782)
c $^1\Sigma_u^-$												
											c ↔ X 60 R	32664.$_1$ Z

↳Richards and Johnson, 1976

↳missing citation; Degen, 1968

	13195.1	1432.77 61Z	14.00 61		1.40037 61	0.01820 61		5.351E-6 62		1.22688	b → a 63	5238.5
b $^1\Sigma_g^+$												
											b ↔ → X 64 65 R	13120.91 66 Z

↳Noxon, 1961

↳missing citation

State	T_e	ω_e	$\omega_e x_e$	$\omega_e y_e$	B_e	α_e	γ_e	D_e	β_e	r_e	Trans.	ν_{00}
	7918.1	[1483.5$_0$] Z	(12.$_9$)		1.4264	0.0171		[4.86E-6]		1.2156$_3$	a ↔ X 67 68 65 R	7882.39 Z
a $^1\Delta_g$												

↳missing citation

| | 0 | 1580.19$_3$ Z | 11.98$_1$ 69 | .0474$_7$ | [1.4376766] 70 | 0.0159$_3$ 71 72 | | [4.839E-6] 70 72 | | 1.20752 73 | | |
| X $^3\Sigma_g^-$ | | | | | | | | | | | | |

↳Crawford, Welsh, et al., 1949; Shapiro and Gush, 1966; McKellar, Rich, et al., 1972

Rotation sp. 74 75

↳McKnight and Gordy, 1968; Gebbie, Burroughs, et al., 1969

Spin reorientation (fine structure) sp. 74 76

↳Miller and Townes, 1953; Zimmerer and Mizushima, 1961; West and Mizushima, 1966; Wilheit and Barrett, 1970; Amano and Hirota, 1974
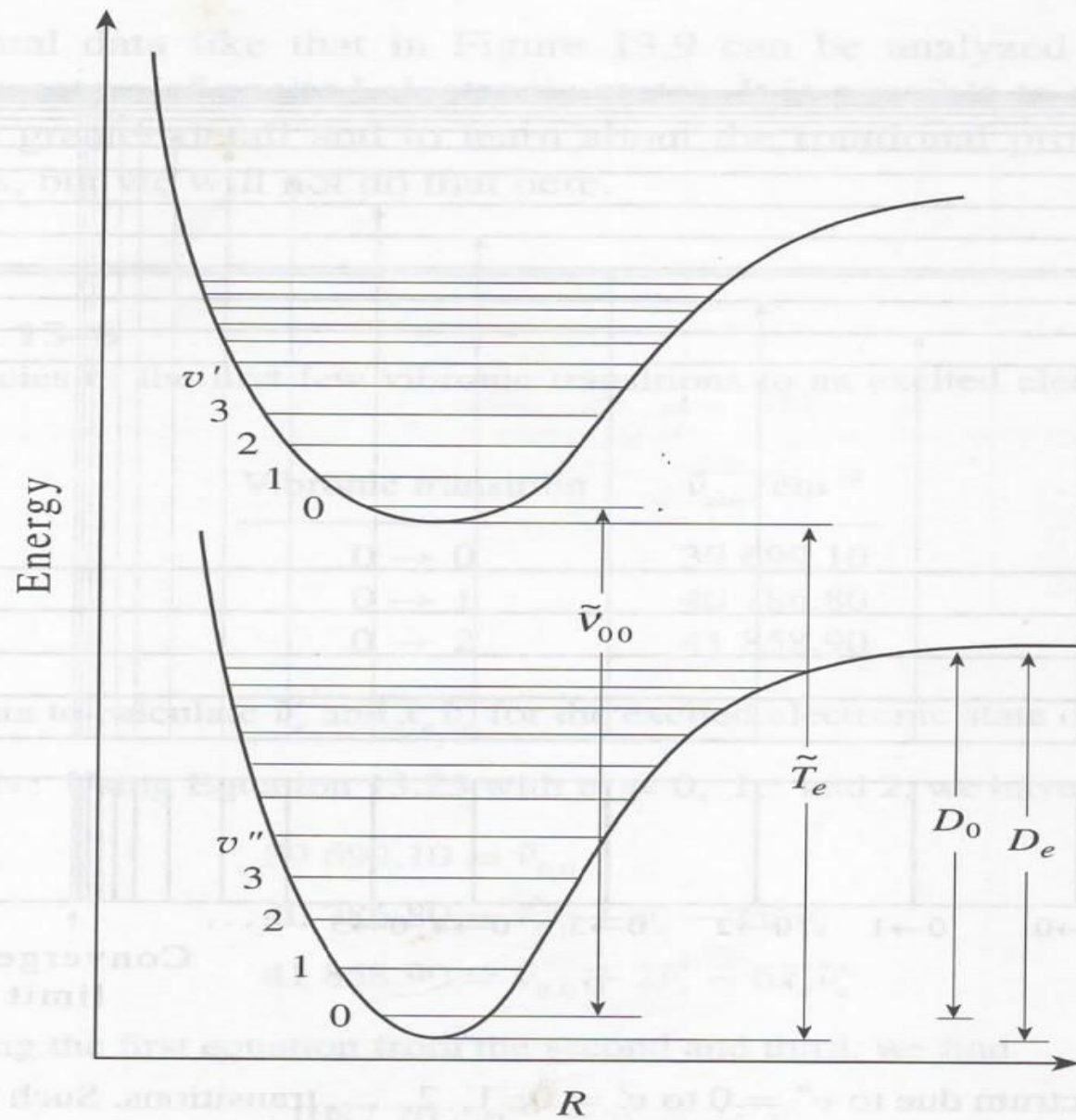
CO

FIGURE 13.7
Two electronic states of a diatomic molecule, illustrating the two quantities $\tilde{T}_e$ and $\tilde{v}_{0,0}$.
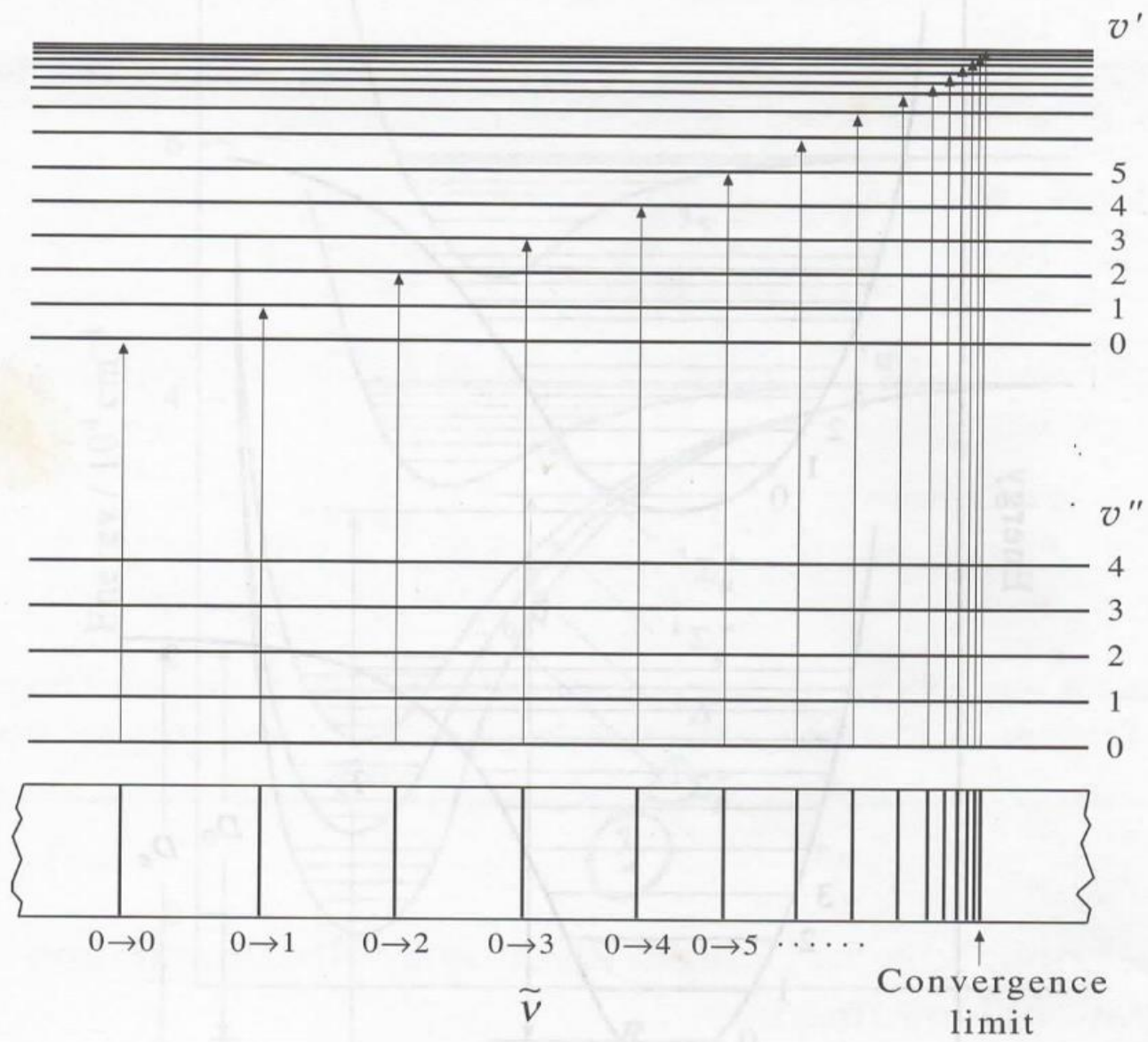
FIGURE 13.8
The electronic spectrum due to $v'' = 0$ to $v' = 0, 1, 2, \ldots$ transitions. Such a set of transitions is called an v' *progression*.
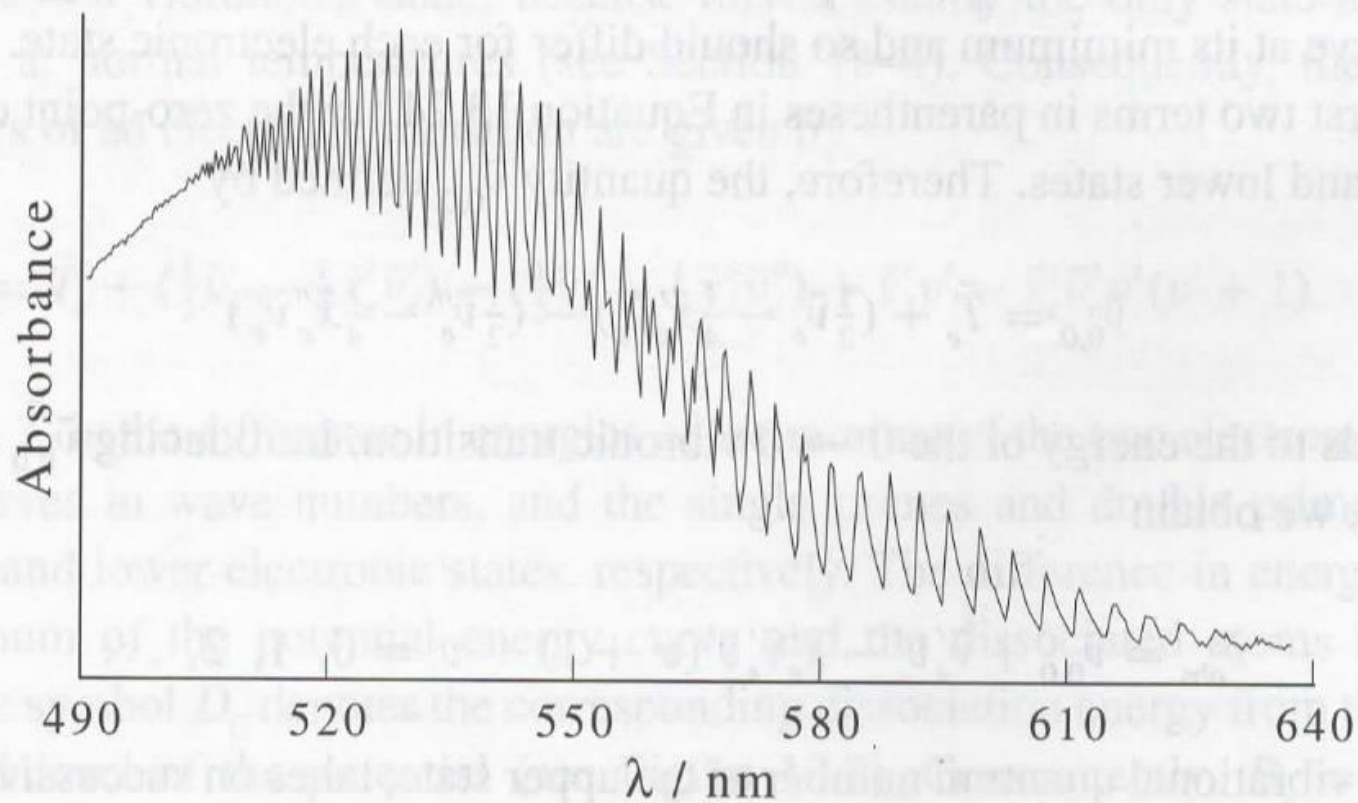
FIGURE 13.9

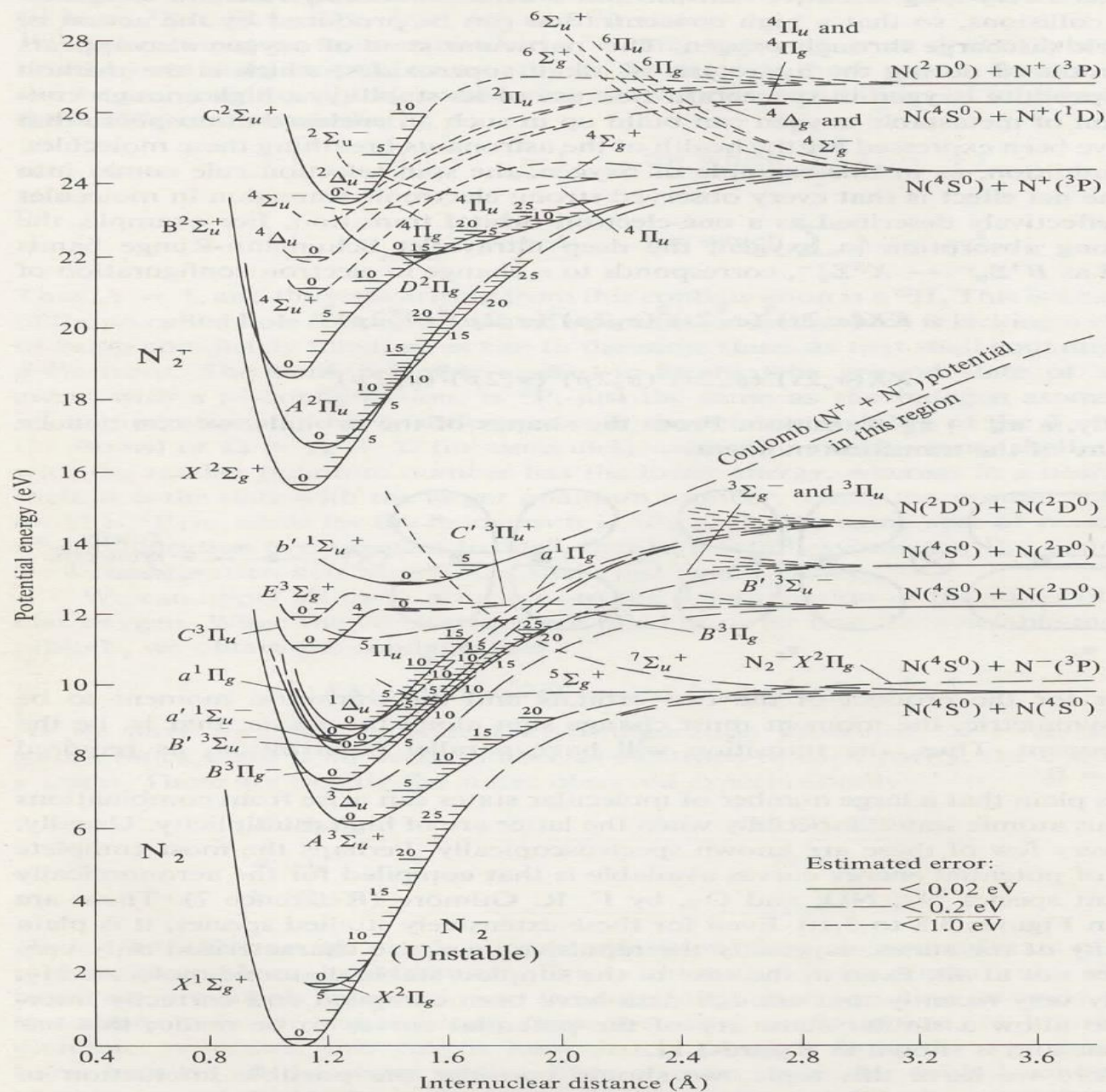The absorption spectrum of $I_2(g)$ in the visible region. This spectrum is a v' progression.

Figure 3.8 Potential energy diagram for N₂ compiled by F. R. Gilmore (Reference 7). [Reproduced with permission of F. R. Gilmore, The Rand Corporation.]
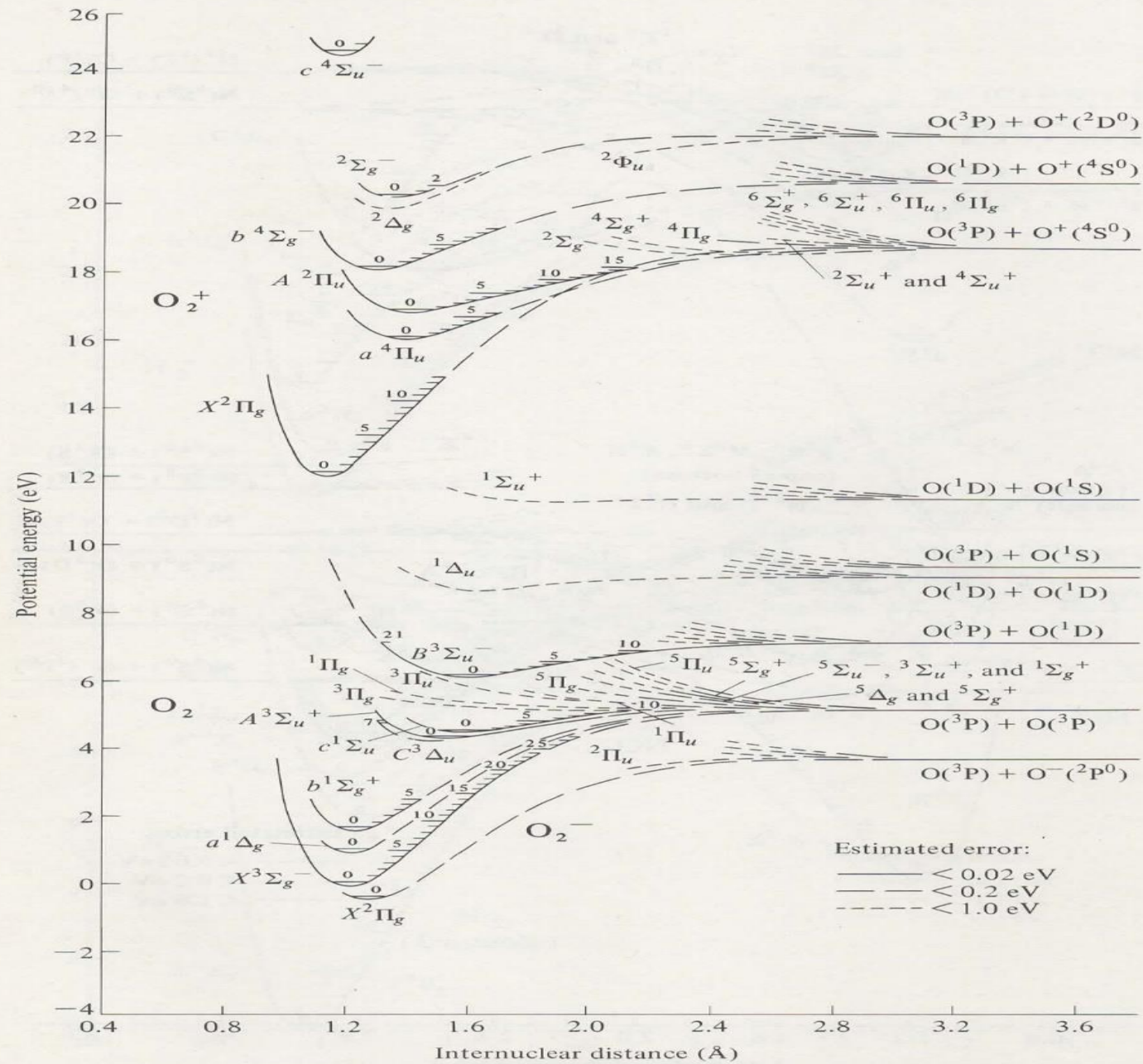
Figure 3.10 Potential energy diagram for O_2 compiled by F. R. Gilmore (Refere
[Reproduced with permission of F. R. Gilmore, The Rand Corporation.]

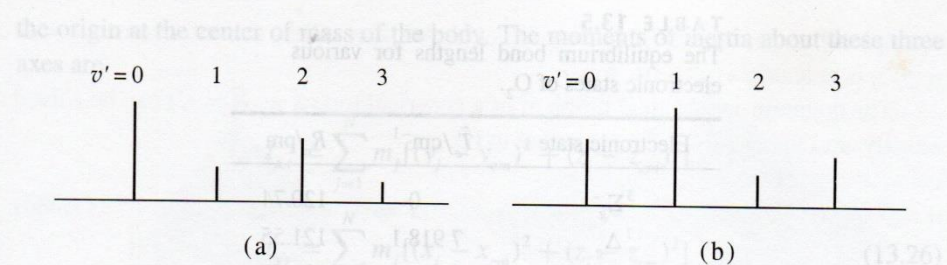$v' = 0$ 1   2   3 $v' = 0$ 1   2   3

(a)   (b)

FIGURE 13.11
The distribution of intensities of the vibronic transitions for the case shown in (a) Figure 13.10 and (b) Figure 13.12.
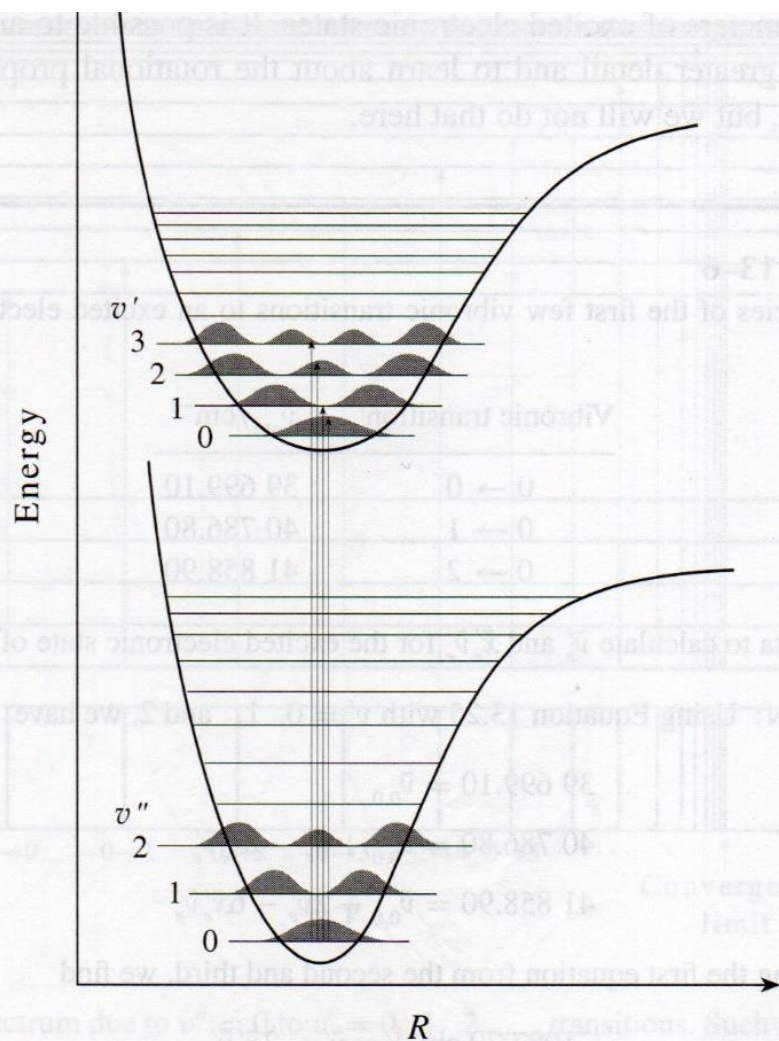
FIGURE 13.10
Two electronic potential energy curves showing the vibrational states associated with each electronic state. The minimum of the upper curve lies almost directly over the minimum of the lower curve. The shaded areas represent the harmonic-oscillator probability densities for each vibrational state. The vertical lines represent a series of $0 \rightarrow v'$ vibronic transitions.

Energy

v'
3
2
1
0

v''
2
1
0

R

$v' = 0$ 1   2   3 $v' = 0$ 1   2   3

(a)   (b)

FIGURE 13.11
The distribution of intensities of the vibronic transitions for the case shown in (a) Figure 13.10 and (b) Figure 13.12.
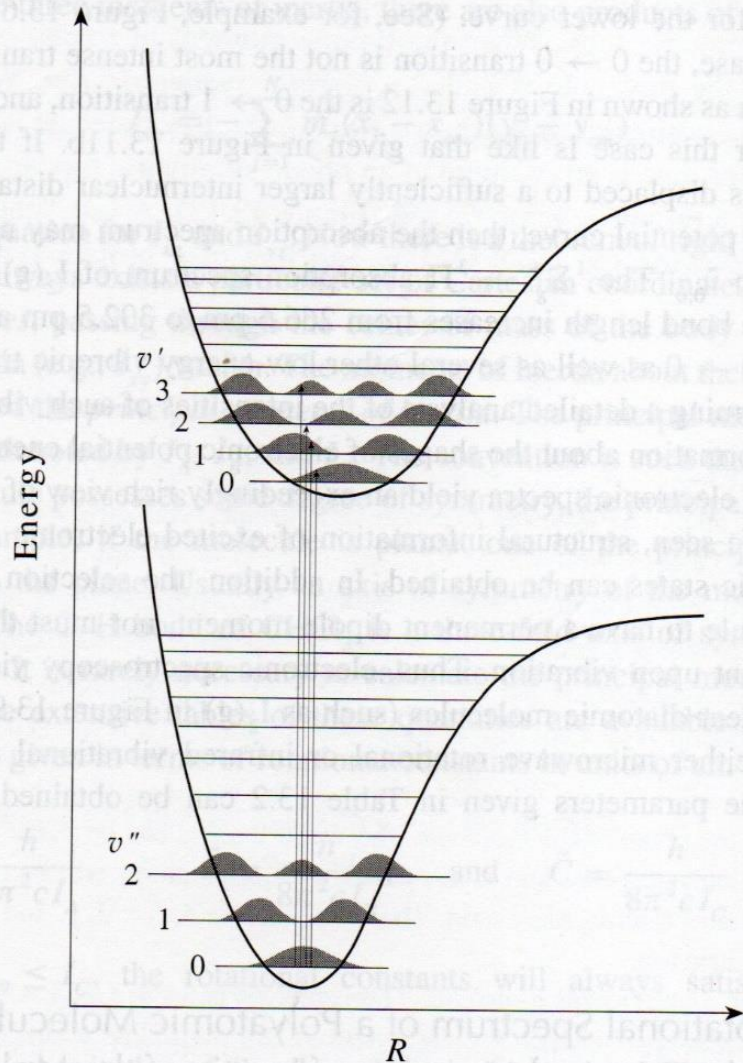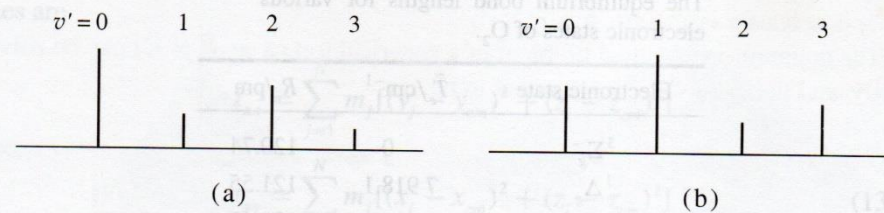
FIGURE 13.12
Two electronic potential energy curves showing the vibrational states and the harmonic-oscillator probability densities as in Figure 13.10. In this case, however, the minimum of the upper curve occurs at a somewhat greater value of the internuclear separation than for the lower curve. The vertical lines represent the $0 \rightarrow v'$ vibronic transitions.