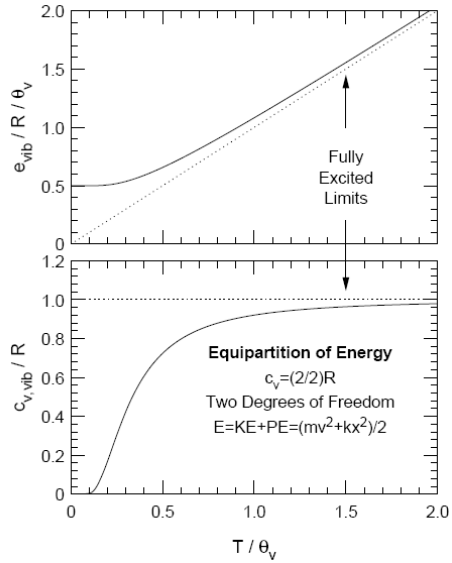


Vibration

- Normalized vibrational energy including zero point energy

$$\frac{e_{vib}}{R\theta_v} = \frac{1}{2} + \frac{1}{e^{\theta_v/T} - 1}$$

$$\frac{c_{v,vib}}{R} = \left(\frac{\theta_v}{T}\right)^2 \frac{e^{\theta_v/T}}{(e^{\theta_v/T} - 1)^2}$$



Electronic Properties-3

Copyright © 2009 by Jerry M. Seltzman. All rights reserved.

AE/ME 6765

Values for Typical Diatomic Molec.

Gas	θ_r (K)	θ_v (K)	Q_{el}
H ₂	85	6300	$1 + e^{-132,000/T}$
OH	27	5370	$2 + 2 e^{-250/T} + 2 e^{-47,000/T}$
N ₂	2.9	3390	$1 + 2 e^{-99,600/T}$
CO	2.8	3120	$1 + 2 e^{-93,500/T}$
NO	2.4(4)	2740	$2 + 2 e^{-174/T} + 2 e^{-63,300/T}$
O ₂	2.1	2270	$3 + 2 e^{-11,400/T}$

m

Electronic Properties-4

Copyright © 2009 by Jerry M. Seltzman. All rights reserved.

AE/ME 6765