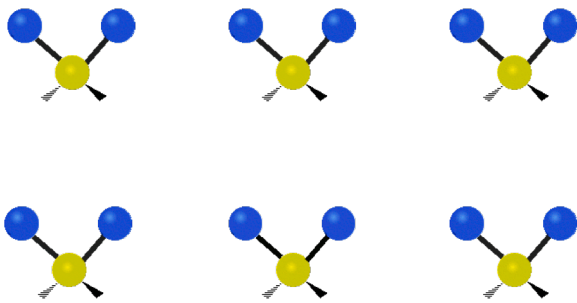


Ro-Vibrational Spectroscopy



Vibrational Bands

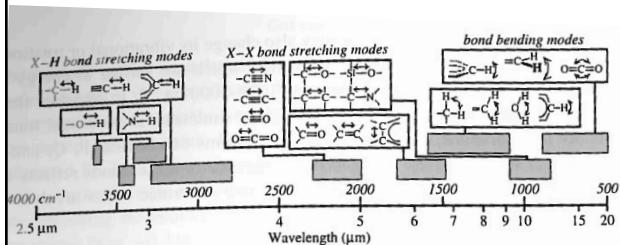
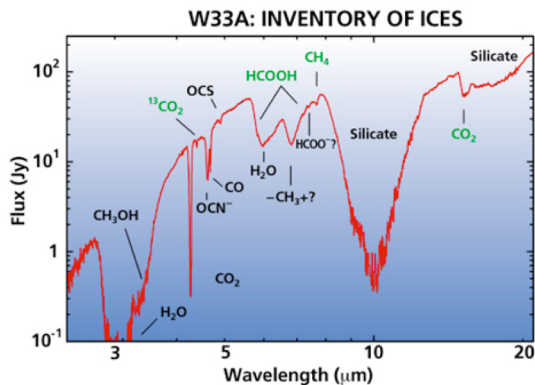


Figure 2.4 Summary of the vibrational frequencies of various molecular groups. The filled boxes indicate the range over which specific molecular groups absorb. The vibrations of these groups are schematically indicated in the linked boxes. Figure kindly provided by D. Hudgins.

Solid State (Ice) Vibrational Features



Ro-vibrational transitions : CO

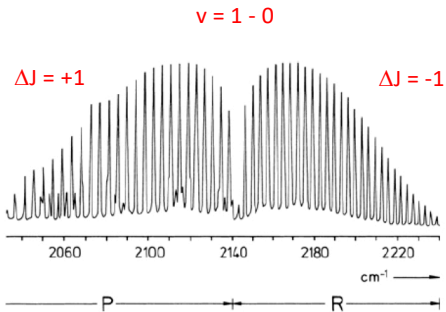
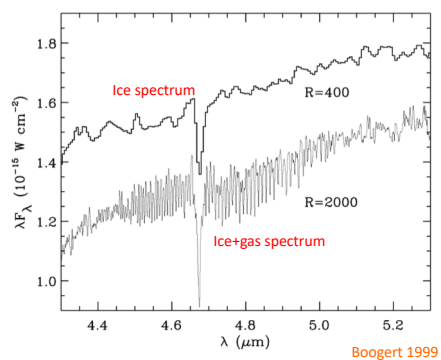
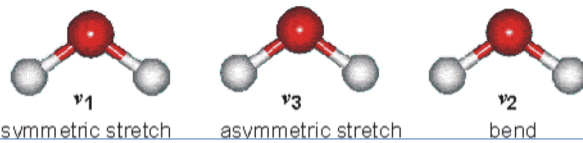


Figure 3.15: Rotational-vibrational spectrum of the CO molecule due to the fundamental vibrational transition, measured at high spectral resolution. Left and right of the center (2143.28 cm⁻¹) are the P and R branches. From Haken & Wolf (2006).

Elias 29 (Protostar) CO ice + gas

H₂O, CO₂, CO

	H ₂ O		
	3657 cm ⁻¹	3756 cm ⁻¹	1595 cm ⁻¹
	2.73 μm	2.65 μm	6.27 μm
		CO ₂	
	x	2347 cm ⁻¹	667 cm ⁻¹
	x	4.26 μm	15 μm
		CO	
	2143 cm ⁻¹	x	x
	4.67 μm	x	x