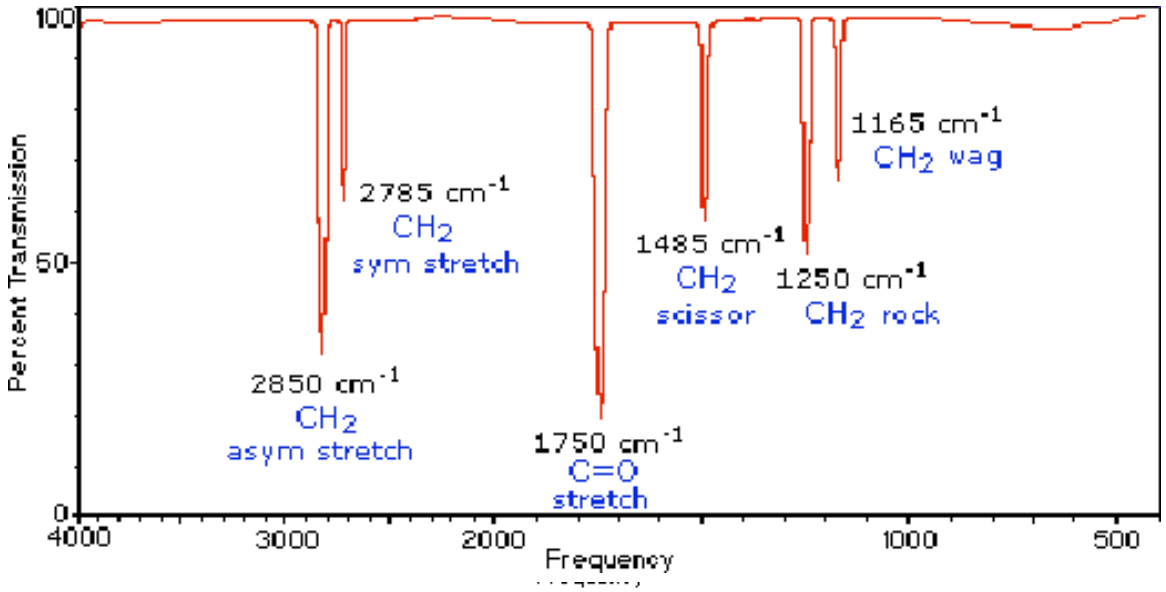
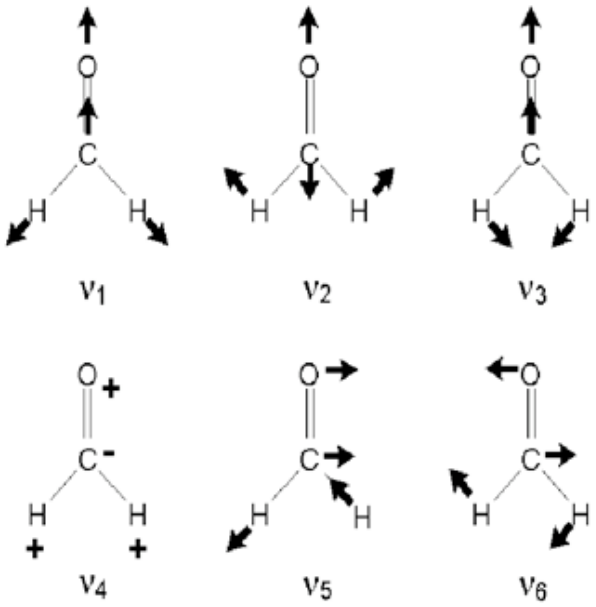
Infrared resonances of formaldehyde (methanal) H_2CO

copied from tutorial pages by Department of Chemistry at Michigan State University





Landau and Lifshitz p.71 describe the normal modes of a planar molecule. There are 2n in-plane modes. Two are translations, one is a rotation, leaving 2n-3 = 5 vibrations. There are n out-of-plane modes, of which one is a translation and two are rotations, leaving n-3 = 1 out-of-plane vibration, shown here as ν_4.

All six vibrations have accompanying oscillating dipole moments, and therefore are excited by infrared light if the frequency is tuned to the resonance. In the figure, frequency is given in units cm^{-1}, and is plotted backwards, as is common in chemical literature. 1000 cm^{-1} is the frequency corresponding to light of wavelength 0.001 cm, or 10 μm. The energy is about 0.1eV. The term "wavenumber" is used for the unit cm^{-1}. If means the reciprocal of the wavelength of light that has the same frequency as the resonance under discussion.