

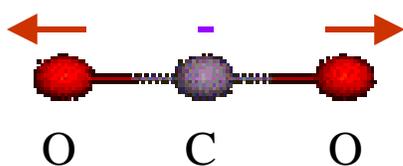
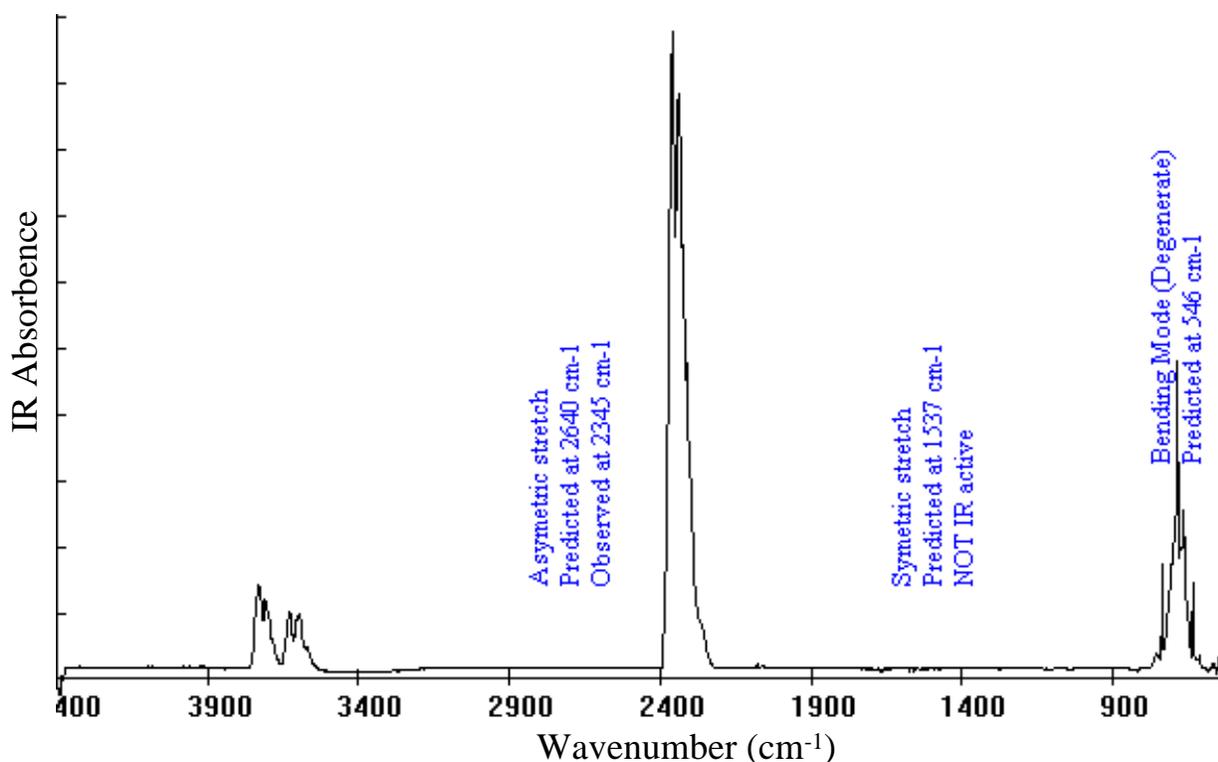


# What can we learn from IR spectroscopy?

- Atoms vibrate with frequencies in the IR range
- **Chemical Analysis:**
  - Match spectra to known databases (determining an unknown, Forensics etc.)
  - Monitor chemical reactions *in-situ*
- **Structural ideas:**
  - Can determine what chemical groups are in a specific compound
  - Can help determine atomic structure of molecules or crystals.
- **Electronic Information:**
  - Measure frequency dependant conductivity
    - Determine if Metal, Insulator, Superconductor, Semiconductor
    - Band Gaps, Drude model



# An Example: CO<sub>2</sub>



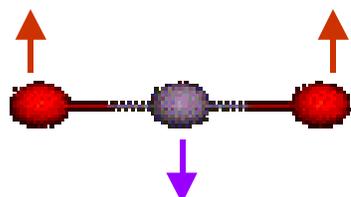
Symmetric Stretch

(Dipole moment = 0 so not IR active)



Asymmetric Stretch

(Has dipole moment so IR active)



Bending Mode

(Has dipole moment so IR active)