

Important IR Absorbance Frequencies

Vibration	Wavenumber, cm^{-1}
Major Peaks – very important	
sp^3 C-H stretch	2960-2850 (<3000)
sp^2 C-H stretch	3100-3020 (>3000)
C=O	frequency depends on type of carbonyl and whether or not it is conjugated- strong, sharp peak ~1850-1630 (often ~ 1725)
O-H	typically very broad, strong peak 3650-3400 (Carboxylic acid O-H centers ~3000)
aromatic overtones	a few weak absorbance peaks that occur in a group 2000-1600
Minor Peaks – less important but still helpful in determining structures	
sp C-H stretch	3333-3267
N-H	often appear as multiple bands – more sharp than an O-H 3400-3250
C-C triple bond or C-N triple bond	almost nothing else absorbs in this range ~2260-2100
C-H of aldehyde	usually a small peak just to the right of the other C-H stretches 2830-2695
C-O	1150-1050
C=C	weaker intensity peak as compared to C=O 1680-1620

Helpful “how to” hints for interpreting IR spectra:

Look for evidence of major functional groups.

- 1) Is a C=O present?
- 2) If a C=O is present, check for complementary absorbances to help determine what type of carbonyl compound you have. For instance, carboxylic acid would also have an O-H. Amides may have a N-H. Esters would have a C-O. Anhydrides have 2 peaks in the carbonyl region (1810 cm^{-1} and 1760 cm^{-1}). Aldehydes have weak absorbances near 2850 and 2750. Ketones are the only carbonyl functional group left!
- 3) If there isn't a C=O, do you see evidence of alcohols/phenols, amines, ethers?
- 4) See any aromatic peaks or C=C evidence? (Check for aromatic overtones and sp^2 C-H stretches.
- 5) Is there a triple bond?

Note: the helpful hints are not my own! Introduction to Spectroscopy: A Guide for Students in Organic Chemistry, Pavia, Lampman, and Kriz, Saunders College Publishing, 1979.