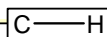
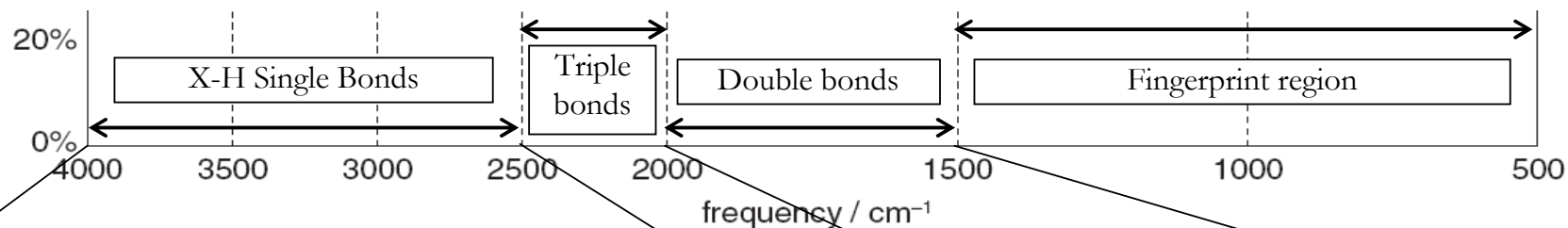


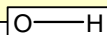
IR Spectroscopy



Usually around 2900 - 3200 cm^{-1}

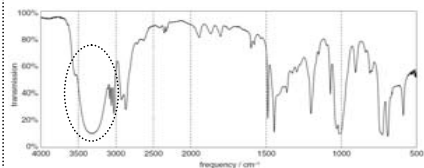
-CH₃ is just less than 3000 cm^{-1}

C≡C—H
gives a sharp peak at 3300 cm^{-1}

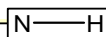
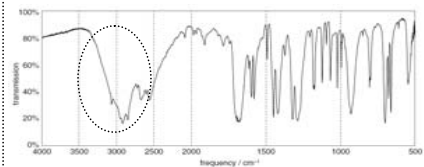


Peak at about 3200-3600 cm^{-1}

H-bonding alters the strength of the O—H bond and therefore broadens the range of O—H frequencies. O—H peaks are therefore usually broad

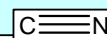
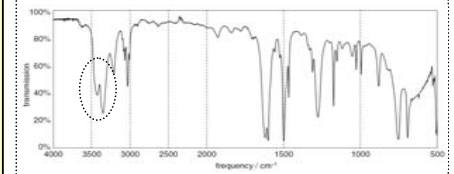


The O—H peaks in acid derivatives are typically more 'V' shaped

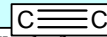


Sharp peak at about 3300 cm^{-1}

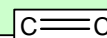
Often shows up as two peaks due to symmetric (~3300 cm^{-1}) and antisymmetric (~3400 cm^{-1}) stretches



Strong peak at ~2250 cm^{-1}



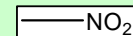
Weak (because there is no dipole) peak at ~2100 - 2250 cm^{-1}



Weak peak (because there is no dipole) at ~1635 - 1690 cm^{-1}



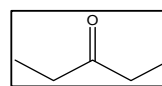
A number of medium-weak peaks in the region ~1625 - 1450 cm^{-1}



Two strong peaks at 1350 cm^{-1} (symmetric stretching) and 1530 cm^{-1} (antisymmetric stretching)

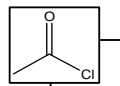
Carbonyl Groups (C=O) [Strong peaks]

The **stronger** the bond the **higher** the frequency



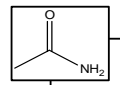
Simple ketone

1715 cm^{-1}



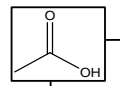
Acyl chloride

~1750 - 1820 cm^{-1}



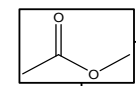
Amide

~1640 - 1690 cm^{-1}



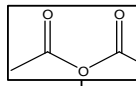
Carboxylic acid

~1730 cm^{-1}



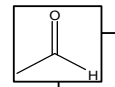
Ester

~1745 cm^{-1}



Acid anhydride

~1820 cm^{-1} (symmetric)
~1750 cm^{-1} (antisymmetric)



Aldehyde

~1730 cm^{-1}

CH₃ in ketone is e-donating. Aldehyde doesn't have it, so stronger bond.

Conjugation

Weakens C=O bond and **lowers** frequency by ~20-30 cm^{-1}

Presence in a Ring

Stiffer structure - adds ~35 cm^{-1} for each C from 5 C downwards