

## APPENDIX X: SELECTED INFRARED CORRELATIONS

### Hydrocarbons

Alkyl C-H stretch	3000–2850 $\text{cm}^{-1}$	medium–strong
Aromatic C-H stretch	~ 3030 $\text{cm}^{-1}$	variable
Alkenyl C-H stretch	3100–3010 $\text{cm}^{-1}$	medium
Alkynyl C-H stretch	~ 3300 $\text{cm}^{-1}$	strong
Alkyl C-C stretch	~ 1200 $\text{cm}^{-1}$	weak
Aromatic C-C stretch	1600, 1580, 1500, 1450 $\text{cm}^{-1}$	variable
Isolated Alkenyl C=C stretch	1680–1640 $\text{cm}^{-1}$	medium
Conjugated Alkenyl C=C stretch	1640–1620 $\text{cm}^{-1}$	weak
Internal Alkynyl C≡C stretch	2260–2190 $\text{cm}^{-1}$	weak
Terminal Alkynyl C≡C stretch	2140–2100 $\text{cm}^{-1}$	medium

### Alkyl Halides

C-F stretch	1400–1000 $\text{cm}^{-1}$	strong
C-Cl stretch	800–600 $\text{cm}^{-1}$	strong
C-Br stretch	600–500 $\text{cm}^{-1}$	strong
C-I stretch	~ 500 $\text{cm}^{-1}$	strong

### Alcohols

O-H stretch	3650–3200 $\text{cm}^{-1}$	strong, broad
C-O stretch	1470–1250, 1220–1000 $\text{cm}^{-1}$	strong

### Ethers

C-O stretch	1300–1000 $\text{cm}^{-1}$	strong
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### Amines

N-H stretch (1° amine)	3500, 3400 $\text{cm}^{-1}$	medium
N-H stretch (2° amine)	3500–3310 $\text{cm}^{-1}$	medium
Aromatic C-N stretch	1360–1250 $\text{cm}^{-1}$	strong
Aliphatic C-N stretch	1410, 1220–1020 $\text{cm}^{-1}$	weak

**Imines**

C=N stretch	~ 1690–1630 cm <sup>-1</sup>	variable
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**Nitriles**

C≡N stretch	2260–2220 cm <sup>-1</sup>	medium
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**Carbonyl Compounds**

C=O stretch	1870–1630 cm <sup>-1</sup>	strong
ketone	1750–1660 cm <sup>-1</sup>	
aldehyde	1740–1660 cm <sup>-1</sup>	
ester	1800–1720 cm <sup>-1</sup>	
lactone	1820–1730 cm <sup>-1</sup>	
carboxylic acid	1730–1680 cm <sup>-1</sup>	
acid anhydride	1870–1780, 1830–1720 cm <sup>-1</sup>	
acid chloride	1800–1720 cm <sup>-1</sup>	
amide	1700–1630 cm <sup>-1</sup>	
lactam	1780–1680 cm <sup>-1</sup>	
C-H stretch (aldehyde)	2900–2820, 2780–2700 cm <sup>-1</sup>	weak
O-H stretch (carboxylic acid)	~ 3000 cm <sup>-1</sup>	very broad
N-H stretch (1° amide)	3500–3350, 3400–3180 cm <sup>-1</sup>	medium
N-H stretch (2° amide)	3430–3140 cm <sup>-1</sup>	medium

**Notes:**

1. The effect of conjugation is to decrease a functional group's absorption maximum to a lower wavenumber. The effect of angle strain is to increase a functional group's absorption maximum to a higher wavenumber.
2. See the Chemistry 333 textbook for much more detailed infrared correlation tables.