TYPICAL RANGES OF IR FREQUENCIES

3600-3200	O-H (alcohol -broad, U-shaped)
3600-3200	N-H (2° amine, HNR_2, V-shaped)
3600-3200	N-H (1° amine, H_2NR, W-shaped)
3500-2500	O-H (carboxylic acid)
~3300	sp C-H (terminal alkyne, sharp peak)
3100-3000	sp^2 C-H (alkene or aromatic ring)
3000-2800	sp^3 C-H (alkane or alkyl group)
2830-2810 AND 2740-2720	sp^2 C-H (aldehyde)
2300-2100	C≡C or C≡N (more intense than C≡C)
1850-1780 AND 1710-1770	C=O (2 – anhydride)
1810-1775	C=O (acid halide)
1750-1730	C=O (ester)
1725-1705	C=O (ketone)
1725-1695	C=O (aldehyde)
1710-1680	C=O (carboxylic acid)
1680-1640	C=O (amide)
1620-1680	C=C (alkene)
1600-1500 AND 1390-1300	N-O/N=O (nitro)
1450-1600	pseudo C=C (aromatic ring, 2-3 stretches)
1420-1400	1° amide C-N
1310-1290	2° amide C-N
1300-1100	C-O (ester)
1250-1050	C-O (alcohol, ether, carboxylic acid)
1190-1070	sp^3 C-N (amines, amides)
1340-1250	sp^2C-N (amines, amides)
920-830	C-N (nitro)
850-550	C-Cl
650-550	C-Br

Aromatic Rings: Substitution Patterns:

Mono	690-710 AND 730-770
Ortho	735-770
Meta	680-725 AND 750-810
Para	800-860

Proton NMR Chemical Shift Values:

0-2 ppm	sp^3C-H alkyl group, no EWG nearby
1.8-3 ppm	sp^3C-H, next to unsaturation
3-5 ppm	sp^3C-H with O, N or X attached
5-7 ppm	vinyl protons (H-C=C)
6.3-8.7 ppm	aromatic protons
8.5-10 ppm	aldehyde proton
10-14 ppm	carboxylic acid proton

Alcohol proton: 2-5 ppm
Phenol proton: 6-10 ppm

Amine proton: 0.5-3 ppm
Aniline proton: 1-5 ppm
Amide proton: 5.5-8 ppm

Carbon-13 NMR Chemical Shift Values:

0-50 ppm	alkyl type sp^3 carbons, including those next to unsaturations
45-90 ppm	sp^3C with O, N, X attached
100-150 ppm	alkene C's
110-160 ppm	aromatic C's
115-130 ppm	nitrile C's
170-220 ppm	carbonyl carbons