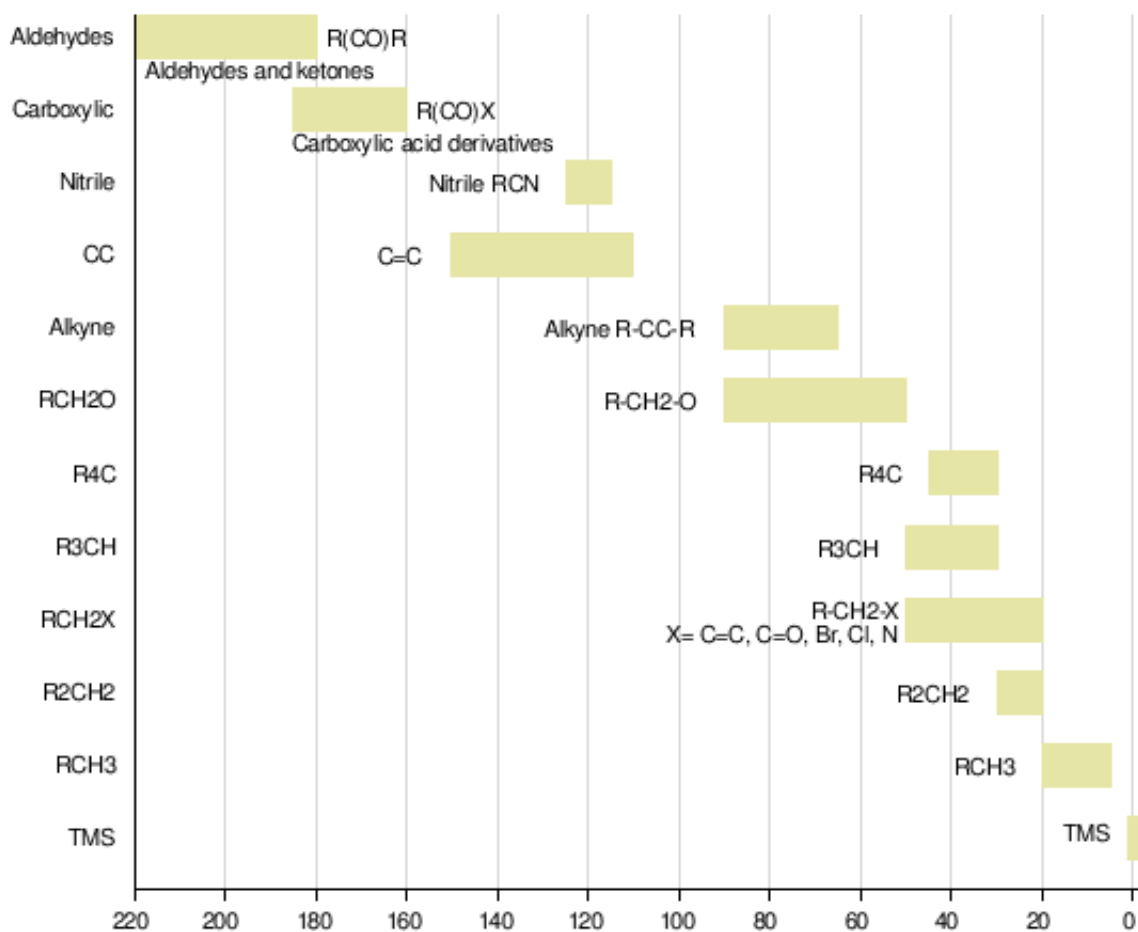
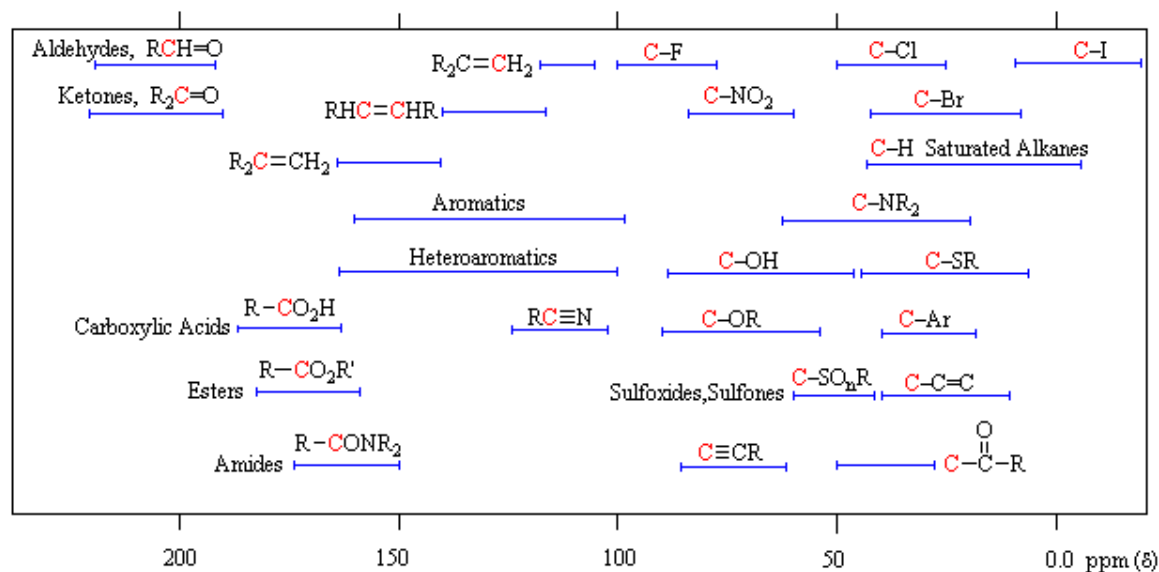
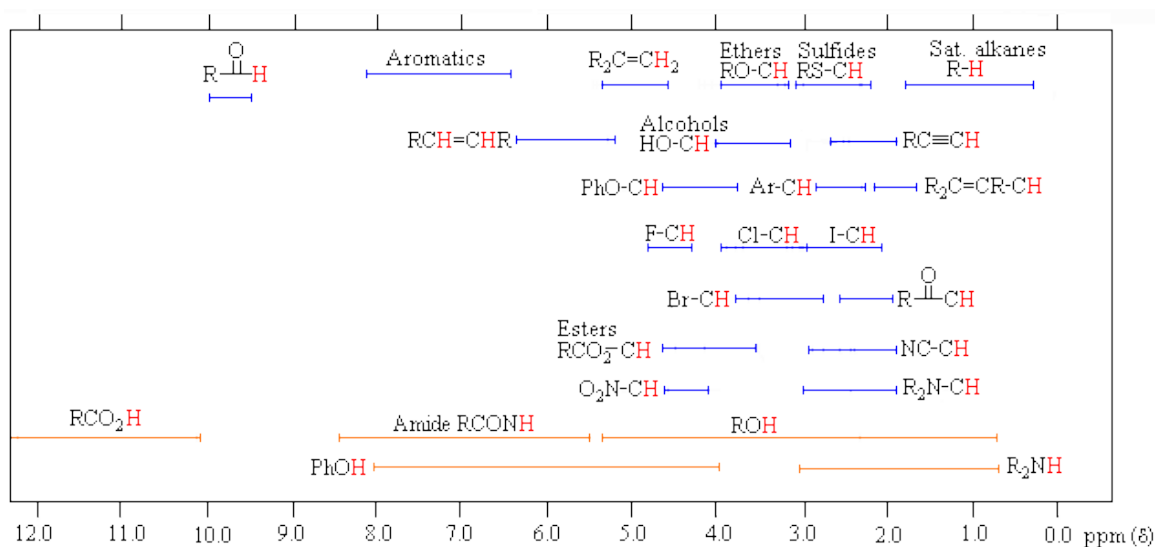


¹³C-NMR



¹H-NMR



Characteristic Proton Chemical Shifts

Type of Proton		Chemical Shift, ppm
Cyclopropane		0.2
primary	RCH_3	0.9
secondary	R_2CH_2	1.3
tertiary	R_3CH	1.5
vinyl	$\text{C}=\text{C}-\text{H}$	4.6-5.9
acetylenic	$\text{C}\equiv\text{C}-\text{H}$	2-3
Aromatic	$\text{Ar}-\text{H}$	6-8.5
Benzylic	$\text{Ar}-\text{C}-\text{H}$	2.2-3
allylic	$\text{C}=\text{C}-\text{CH}_3$	1.7
Halides	$\text{HC}-\text{X}$	2-4.5
alcohols	$\text{HC}-\text{O}$	3.4-4
ethers	$\text{HC}-\text{OR}$	3.3-4
esters	$\text{HC}-\text{CO}_2\text{R}$	2-2.2
esters	$\text{HC}-\text{O}_2\text{CR}$	3.7-4.1
acids	$\text{HC}-\text{CO}_2$	2-2.6
carbonyl	$\text{HC}-\text{C}=\text{O}$	2-2.7
aldehydic	RCHO	9-10
hydroxlic	ROH	1-5.5
phenolic	ArOH	4-12
enolic	$\text{C}=\text{C}-\text{OH}$	15-17
carboxlic	RCO_2H	10.5-12
amino	RNH_2	1-5