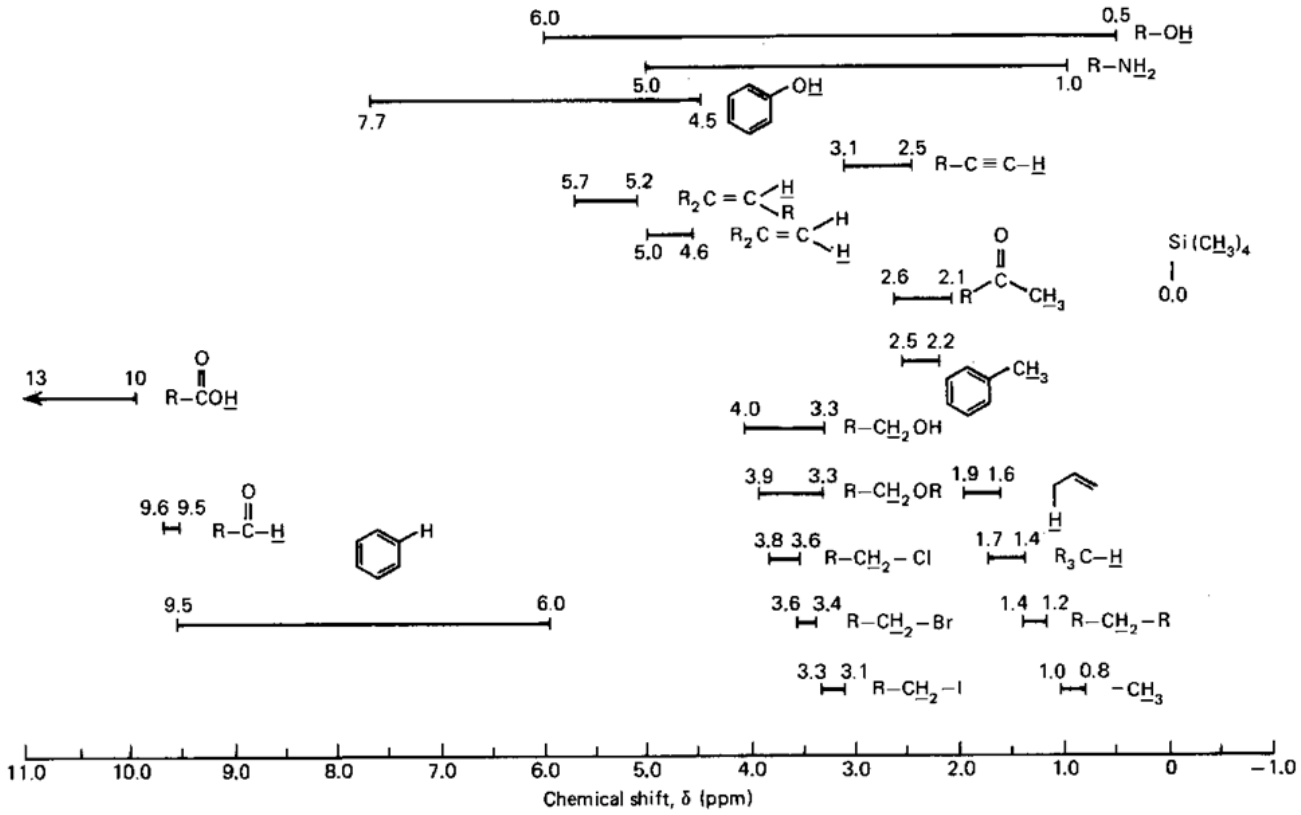
Typical ^{1}H Chemical Shifts



Carbon environment chemical shifts (ppm)

C=O (in ketones)	205 - 220
C=O (in aldehydes)	190 - 200
C=O (in acids and esters)	170 - 185
C in aromatic rings	125 - 150
C=C (in alkenes)	115 - 140
R**C**H_2OH	50 - 65
R**C**H_2Cl	40 - 45
R**C**H_2NH_2	37 - 45
R_3CH	25 - 35
CH_3CO-	20 - 30
R_2CH_2	16 - 25
RCH_3	1

A summary of the principle infrared bands and their assignments

R =aliphatic group

Funct. Group	Type		Frequencies cm^{-1}	Peak Intensity	Examples Figure No.
C-H	sp^3 hybridized	R_3C-H	2850-3000	M(sh)	6, 18, 22
	sp^2 hybridized	=CR-H	3000-3250	M(sh)	7, 13, 42
	sp hybridized	≡C-H	3300	M-S(sh)	13
	aldehyde C-H	H-(C=O)R	2750, 2850	M(sh)	14, 15
N-H	primary amine, amide	RN-H_2, RCONH_2	3300, 3340	S,S(br)	18, 19
	secondary amine, amide	RNR-H, RCONHR	3300-3500	S(br)	20, 21
	tertiary amine, amide	RN(R_3), RCONR_2	none		22, 23
O-H	alcohols, phenols	free O-H	3620-3580	W(sh)	17, 24, 25
		hydrogen bonded	3600-3650	S(br)	24, 25, 28
	carboxylic acids	R(C=O)O-H	3500-2400	S(br)	26, 27, 29, 30
C≡N	nitriles	RC≡N	2280-2200	S(sh)	31
C≡C	acetylenes	R-C≡C-R	2260-2180	W(sh)	32
		R-C≡C-H	2160-2100	M(sh)	13
C=O	aldehydes	R(C=O)H	1740-1720	S(sh)	14
	ketones	R(C=O)R	1730-1710	S(sh)	35
	esters	R(CO_2)R	1750-1735	S(sh)	33, 34
	carboxylic acids	RCO_2H	1720-1680	S(sh)	26,27,30
	amides (Amide I)	RCONH_2, RCONHR	1670-1640	S(sh)	19, 21
	(Amide II)	RCONH_2	1650-1620	S(sh)	19, 21
	(Amide II)	RCONHR	1550	S(sh)	19, 21
	amide	RCONR_2	1650-1620	S(sh)	23
	anhydrides	R(CO_2CO)R	1820, 1750	S, S(sh)	36
	carboxylates	R$(CO_2)^-$, M^+	1600, 1400	S,S(sh)	42
C=C	olefins	$R_2C=CR_2$	1680-1640	W(sh)	10, 39, 40
		$R_2C=CH_2$	1600-1675	M(sh)	9, 35
		R_2C=C(OR)R	1600-1630	S(sh)	41
-NO_2	nitro groups	RNO_2	1550, 1370	S,S(sh)	28

Factorss that influence IR frequencies

1. Hydrogen bonding
2. Resonance
3. Ring strain