

Common IR frequencies	
Functional Group	Characteristic Absorptions (cm ⁻¹)
Alcohol O-H	3200-3550 (broad)
Carboxylic Acid O-H	2400-3400 (very broad)
Amine N-H	3200-3500 (may be broad)
Alkyne C-H	3200-3300
Alkene, benzene C-H	3010-3100
Alkane C-H	2850-2950
Nitrile C≡N	2200-2260
Alkyne C≡C	2100-2260
Ester C=O	1730-1750
Aldehyde, Ketone, Carboxylic acid C=O	1680-1730
Amide C=O	1630-1690
Alkene C=C	1620-1680
Benzene C=C	1500-1620

Common ¹ H NMR Chemical Shifts		
Functional Group	Structure	Characteristic Chemical Shifts (ppm)
Alkyl (primary)	-CH ₃	0.7-1.3
Alkyl (secondary)	-CH ₂ -	1.2-1.6
Alkyl (tertiary)	-CH-	1.4-1.8
Allylic	C=C-CH	1.6-2.2
Adjacent to carbonyl	O=C-CH	2.0-2.4
Adjacent to benzene	Benzene-CH	2.4-2.7
Alkynyl	C≡C-H	2.5-3.0
Alkyl halide, alcohol, amine	X-C-H, N-C-H, O-C-H	2.5-4.5
Vinyl	C=C-H	4.5-6.5
Aryl	Benzene-H	6.5-8.0
Aldehyde	RC(O)-H	9.7-10.0
Carboxylic acid	RC(O)-O-H	10.0-12.0
Amine, alcohol	OH, NH	Variable

Common ¹³ C NMR Chemical Shifts		
Functional Group	Structure	Characteristic Chemical Shifts (ppm)
Alkyl (primary)	-CH ₃	10-30
Alkyl (secondary)	-CH ₂ -	25-50
Alkyl (tertiary)	-CH-	35-60
Alkyl halide, alcohol, amine	X-C, N-C, O-C	40-80
Alkynyl	C≡C	80-100
Vinyl, aryl, nitrile	C=C, benzene, C≡N	110-150
Carbonyl (all)	C=O	160-220

hydrogen 1 H 1.0079																				helium 2 He 4.0026																																																																										
lithium 3 Li 6.941					beryllium 4 Be 9.0122															boron 5 B 10.811					carbon 6 C 12.011					nitrogen 7 N 14.007					oxygen 8 O 15.999					fluorine 9 F 18.998					neon 10 Ne 20.180																																																	
sodium 11 Na 22.990					magnesium 12 Mg 24.305															aluminium 13 Al 26.982					silicon 14 Si 28.086					phosphorus 15 P 30.974					sulfur 16 S 32.065					chlorine 17 Cl 35.453					argon 18 Ar 39.948																																																	
potassium 19 K 39.098					calcium 20 Ca 40.078					scandium 21 Sc 44.956					titanium 22 Ti 47.867					vanadium 23 V 50.942					chromium 24 Cr 51.996					manganese 25 Mn 54.938					iron 26 Fe 55.845					cobalt 27 Co 58.933					nickel 28 Ni 58.693					copper 29 Cu 63.546					zinc 30 Zn 65.39					gallium 31 Ga 69.723					germanium 32 Ge 72.61					arsenic 33 As 74.922					selenium 34 Se 78.96					bromine 35 Br 79.904					krypton 36 Kr 83.80									
rubidium 37 Rb 85.468					strontium 38 Sr 87.62					yttrium 39 Y 88.906					zirconium 40 Zr 91.224					niobium 41 Nb 92.906					molybdenum 42 Mo 95.94					technetium 43 Tc [98]					ruthenium 44 Ru 101.07					rhodium 45 Rh 102.91					palladium 46 Pd 106.42					silver 47 Ag 107.87					cadmium 48 Cd 112.41					indium 49 In 114.82					tin 50 Sn 118.71					antimony 51 Sb 121.76					tellurium 52 Te 127.60					iodine 53 I 126.90					xenon 54 Xe 131.29									
caesium 55 Cs 132.91					barium 56 Ba 137.33					57-70 ★					lutetium 71 Lu 174.97					hafnium 72 Hf 178.49					tantalum 73 Ta 180.95					tungsten 74 W 183.84					rhenium 75 Re 186.21					osmium 76 Os 190.23					iridium 77 Ir 192.22					platinum 78 Pt 195.08					gold 79 Au 196.97					mercury 80 Hg 200.59					thallium 81 Tl 204.38					lead 82 Pb 207.2					bismuth 83 Bi 208.98					polonium 84 Po [209]					astatine 85 At [210]					radon 86 Rn [222]				
francium 87 Fr [223]					radium 88 Ra [226]					89-102 ★ ★					lawrencium 103 Lr [262]					rutherfordium 104 Rf [261]					dubnium 105 Db [262]					seaborgium 106 Sg [266]					bohrium 107 Bh [264]					hassium 108 Hs [269]					meitnerium 109 Mt [268]					ununnilium 110 Uun [271]					unununium 111 Uuu [272]					ununbium 112 Uub [277]										ununquadium 114 Uuq [289]																								

*Lanthanide series

* * Actinide series

lanthanum 57	cerium 58	praseodymium 59	neodymium 60	promethium 61	samarium 62	europium 63	gadolinium 64	terbium 65	dysprosium 66	holmium 67	erbium 68	thulium 69	ytterbium 70
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
138.91	140.12	140.91	144.24	[145]	150.36	151.96	157.25	158.93	162.50	164.93	167.26	168.93	173.04
actinium 89	thorium 90	protactinium 91	uranium 92	neptunium 93	plutonium 94	americium 95	curium 96	berkelium 97	californium 98	einsteinium 99	fermium 100	mendelevium 101	nobelium 102
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No
[227]	232.04	231.04	238.03	[237]	[244]	[243]	[247]	[247]	[251]	[252]	[257]	[258]	[259]