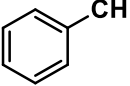
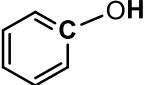
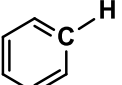


**NMR Characteristic Chemical Shift Table**

Structural Residue	Name	H-1 $\delta$ (ppm)	C-13* $\delta$ (ppm)
R-CH <sub>3</sub>	Primary alkyl	~ 0.9	5 – 20
R <sub>2</sub> -CH <sub>2</sub>	Secondary alkyl	~ 1.3	20 – 30
R <sub>3</sub> -CH	Tertiary alkyl	~ 1.5	30 – 50
R <sub>4</sub> C	Quaternary alkyl	N.A.	30 – 45
C=C-CH	Allylic	~1.7	20 – 40
$\begin{array}{c} \text{O} \\ \parallel \\ \text{R}-\text{C}-\text{CH} \end{array}$	$\alpha$ to Carbonyl	2 – 2.7	30 – 50
C $\equiv$ C-H	Alkynyl	2 – 3	65 – 95
CH-I	Alkyl Iodide	2 – 4	-20 – 10 (can be less than zero ppm!)
	Benzylic	2.2 – 3	10 – 40
CH-N	Amine	2.4 – 3.4	20 – 65
CH-Br	Alkyl Bromide	2.5 – 4	20 – 40
CH-Cl	Alkyl Chloride	3 – 4	25 – 50
CH-O	Alcohol or Ether	3.3 – 4	50 – 90
CH-F	Alkyl Fluoride	4 – 4.5	70 – 80
R-OH	Hydroxyl	0.5 – 5 (often broad)	N.A.
R-NH	Amino	0.5 – 5 (often broad)	N.A.
	Phenol	4 – 8	~ 160
C=C-H	Alkenyl (Vinyl)	4.5 – 6	100 – 160
$\begin{array}{c} \text{O} \\ \parallel \\ \text{R}-\text{C}-\text{NH} \end{array}$	Amide	5 – 8	150 – 185
	Aromatic	6 – 9	100 – 160
$\begin{array}{c} \text{O} \\ \parallel \\ \text{R}-\text{C}-\text{H} \end{array}$	Aldehyde	9 – 10	190 – 210 (aldehyde or <b>ketone</b> carbon)
$\begin{array}{c} \text{O} \\ \parallel \\ \text{R}-\text{C}-\text{OH} \end{array}$	Carboxyl	10 – 12	160 – 180 (acid or ester carboxyl carbon)