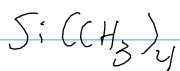
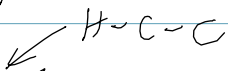


¹H NMR Chemical Shifts (0 - 13 ppm)

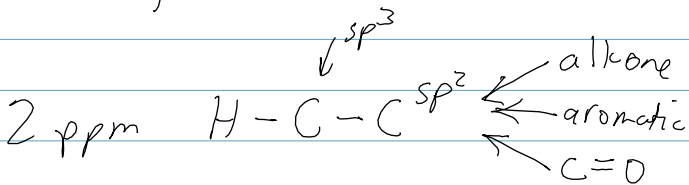
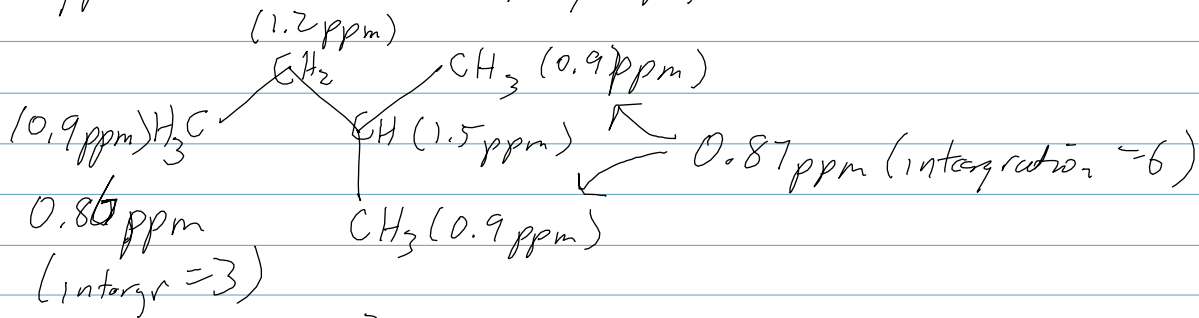
0 ppm TMS (other silanes) H-C-Si



↳ less EN than C
more e⁻ density around H
more shielding ⇒ upfield shift



1 ppm Alkanes (alkyl groups, far from other functional groups)



due to ring current effect (see next page)

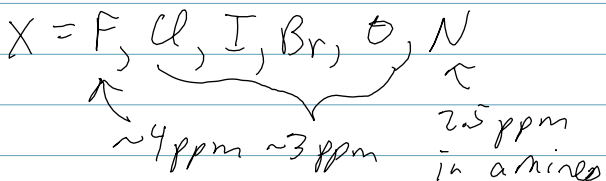
(2.3 - 4.6 ppm)

3 - 4 ppm H-C-X

X pulls e⁻ away from H

less e⁻ around H ⇒ deshielding

↳ downfield shift



See chemical correlation charts

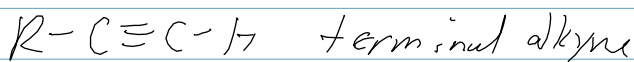
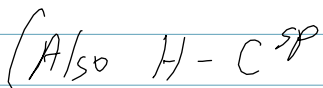
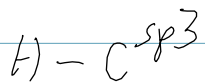
"NMR Chemical Shift Prediction"

↳ grain of salt

↳ fast when have

So far 0 - 4 ppm ← upfield end of NMR spectrum

multiple functional groups



→ 2 to 2.5 ppm

¹H NMR chemical shifts (page 2)

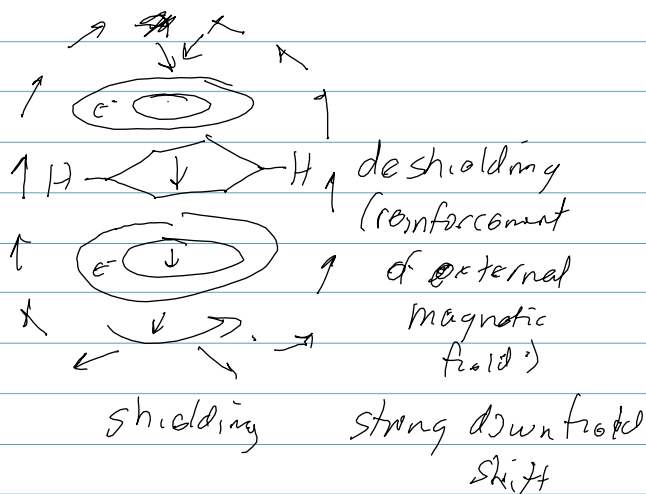
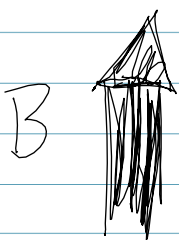
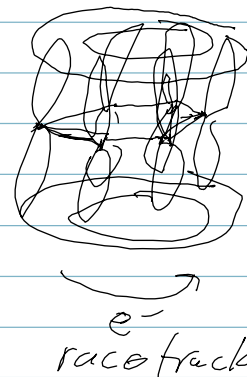
Downfield end: 5-10 ppm H-C^{sp2}

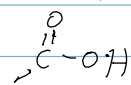
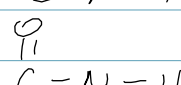
Alkenes: H-C=C 5 to 6 ppm

Aromatics: H- 7 to 8 ppm

Aldehydes: H-C(=O) ← electronegative 9.5 to 10 ppm

Ring currents
when you have π bonds



H-O	Alcohol	C-O-H	1 to 5 ppm
		Ar-O-H	4 to 8 ppm (phenolic OH)
	Carboxylic Acids	 -OH	10 to 13 ppm
H-N	Amines	C-N-H	1 to 3 ppm
	Amide	 -N-H	6 to 8 ppm

Broad peaks. Depend on concentration & on H₂O impurity
Because of H bonding & chemical exchange.
(Amino alcohol one NMR resonance for OH & NH₂)