

ORGANIC CHEMISTRY 1 LECTURE GUIDE 2019

BY RHETT C. SMITH

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# Organic Chemistry 1 Lecture Guide 2019

By Rhett C. Smith, Ph.D.

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Companion Books from the Proton Guru:

*Organic Chemistry 1 Reactions and Practice Problems 2019*

by Rhett C. Smith

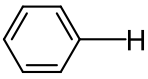
*Organic Chemistry 1 Primer 2019,*

by Rhett C. Smith, Andrew G. Tennyson, and Tania Houjeiry

# Lecture Topic VII.6. Carbon-13 Nuclear Magnetic Resonance Spectrometry

## Carbon-13 NMR table

General trends in  $^{13}\text{C}$  NMR shifts are provided here:

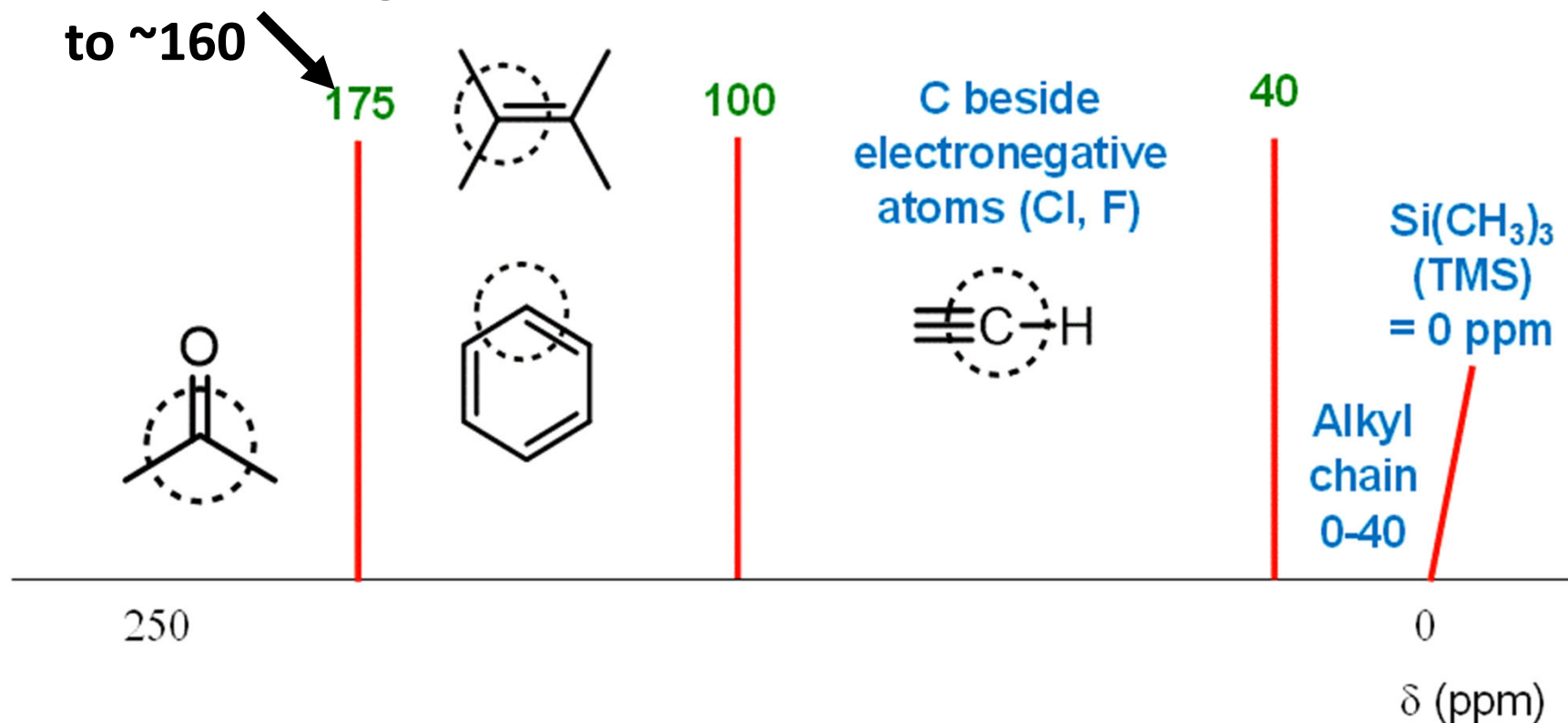
<u>Carbon (Shown)</u>	<u>Chemical Shift</u>	<u>Carbon (Shown)</u>	<u>Chemical Shift</u>
$\text{Si}(\text{CH}_3)_4$	0	$\text{O}-\text{C}$	50-80
$-\text{CH}_3$	10-35	$\text{N}-\text{C}$	40-60
$-\text{CH}_2-$	15-50	$\text{C}-\text{X}$	X = I 0-35
$\begin{array}{c} \text{H} \\   \\ -\text{C}- \\   \end{array}$	20-60		X = Br 20-65
$\begin{array}{c}   \\ -\text{C}- \\   \end{array}$	30-40		X = Cl 35-80
$\begin{array}{c} \diagup \\ \text{C} \\ \diagdown \end{array}$	100-150	$\begin{array}{c} \text{O} \\    \\ \text{C} \\ \diagdown \\ \text{Y} \end{array}$	$\underline{\text{Y}} \equiv$
	110-175		H 190-200
$\equiv\text{C}-$	60-85		R 200-220
			OR 160-180
			OH 175-185
			$\text{NR}_2$ 165-175

Notes

## VII.6. Carbon-13 Nuclear Magnetic Resonance

Carbon-13 NMR typical shifts in a more user-friendly format:

I would change  
to ~160



## VII.6. Carbon-13 Nuclear Magnetic Resonance

Carbon-13 NMR is usually run in such a way as to avoid any splitting, so the signals tend to all be singlets. Using our knowledge of the usual ranges for  $^{13}\text{C}$  NMR resonances, we can infer some structural information from this spectrum:

