



Do Not Use Pencil

Do Not Staple, Please!

Course CHEM 345-01

Lecturer Gellman

Day Monday

Date 2/1/16

Notes Taken by Steve

Page 1 of 4 (Total Pages)

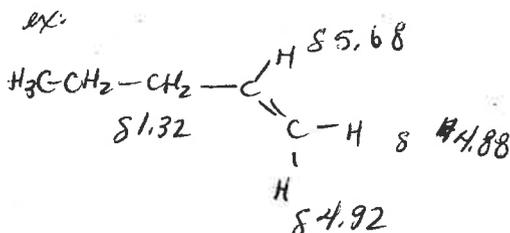
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Recall: <sup>1</sup>H NMR - powerful tool for structure ...

- chemical shift
- integration
- splitting

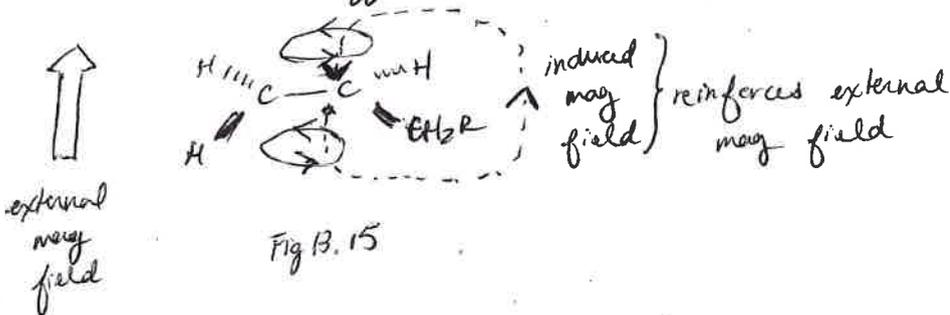
= Characteristics associated w/ common functional groups

① alkenes



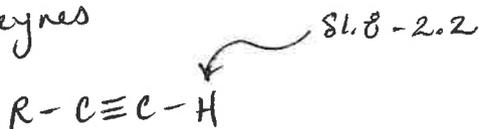
= origin of large  $\delta$  values

$\pi$  electron effects



= Information on alkene geom (eg + cis vs trans) from splitting (see text)

② alkynes



- see text for explanation of shift (pg 686-7, Ch 4)



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Page 3 of 5 (Total Pages)

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## $^{13}\text{C}$ -NMR

note: most abundant carbon isotope is  $^{12}\text{C}$  (not NMR active!)

only ~1% of C at "natural abundance" is  $^{13}\text{C}$

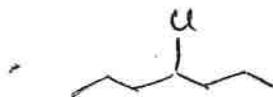
• broad range (~200ppm) vs  $^1\text{H}$ NMR range (~10ppm)

• direct readout on nuclear symmetry

ex:



7  $^{13}\text{C}$  NMR - resonances



4  $^{13}\text{C}$  NMR - resonances

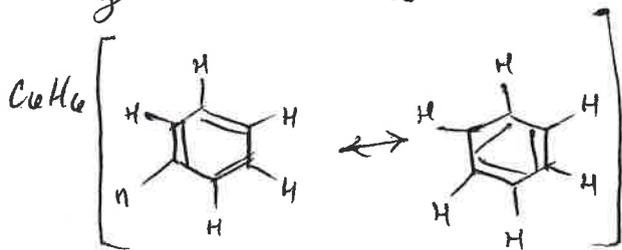
splitting

•  $^{13}\text{C}$ - $^{13}\text{C}$  <sup>splitting</sup> not observed (b/c of low  $^{13}\text{C}$  abundance)

•  $^{13}\text{C}$ - $^1\text{H}$  splitting eliminated by the way the measurement is done

• all  $^{13}\text{C}$  NMR data we consider have single line for each  $^{13}\text{C}$  (no integration)

## Ch 16 - Benzene derivatives



do not draw  
b/c it isn't useful  
when doing mech's

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Course CHEM 315 - 01

Lecturer A. J. M. S. C.

Day MON

Date 2.1.19

Notes Taken by A. J. M. S. C.

Page 4 of 7 (Total Pages)

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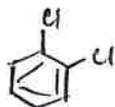
\* Nomenclature:



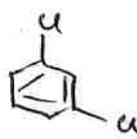
toluene

\* many have common names

substituents:



ortho



meta



para

IR Properties → see text

NMR Properties → next lecture