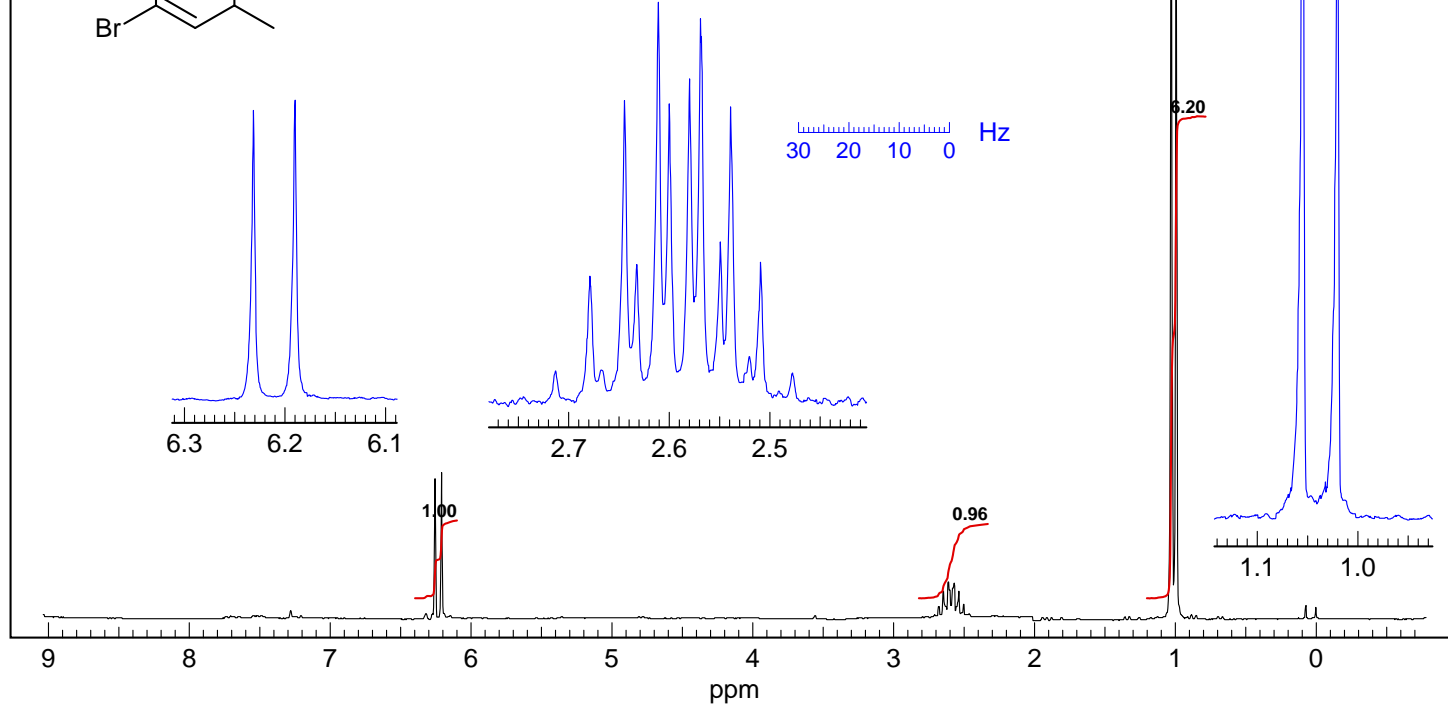
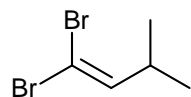


Problem R-12E ($C_5H_8Br_2$)

200 MHz 1H NMR spectrum ($CDCl_3$)

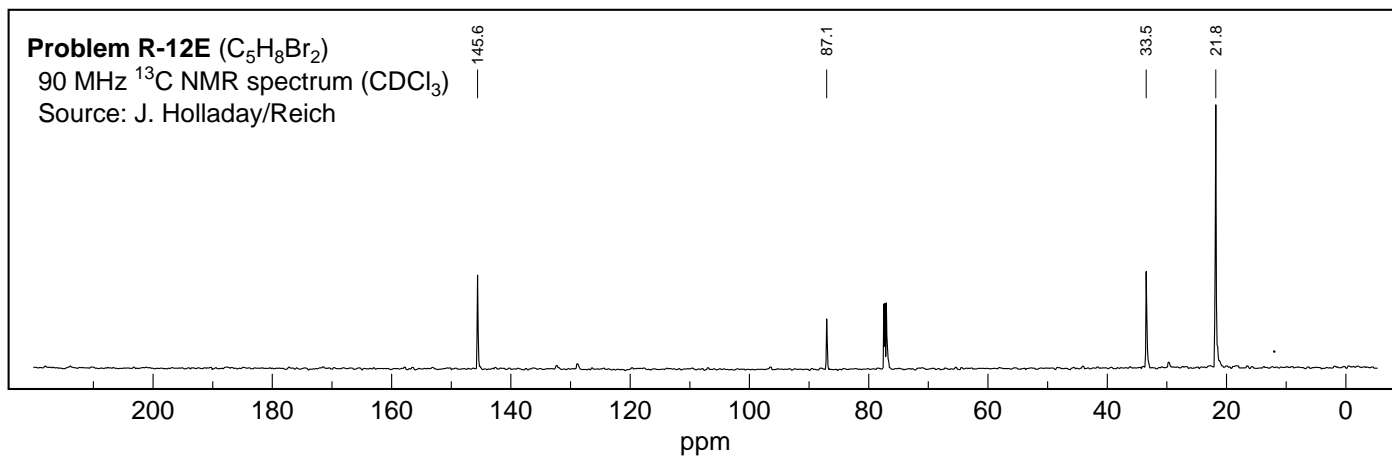
Source: J. Holladay/Reich (digitized hard copy) g



Problem R-12E ($C_5H_8Br_2$)

90 MHz ^{13}C NMR spectrum ($CDCl_3$)

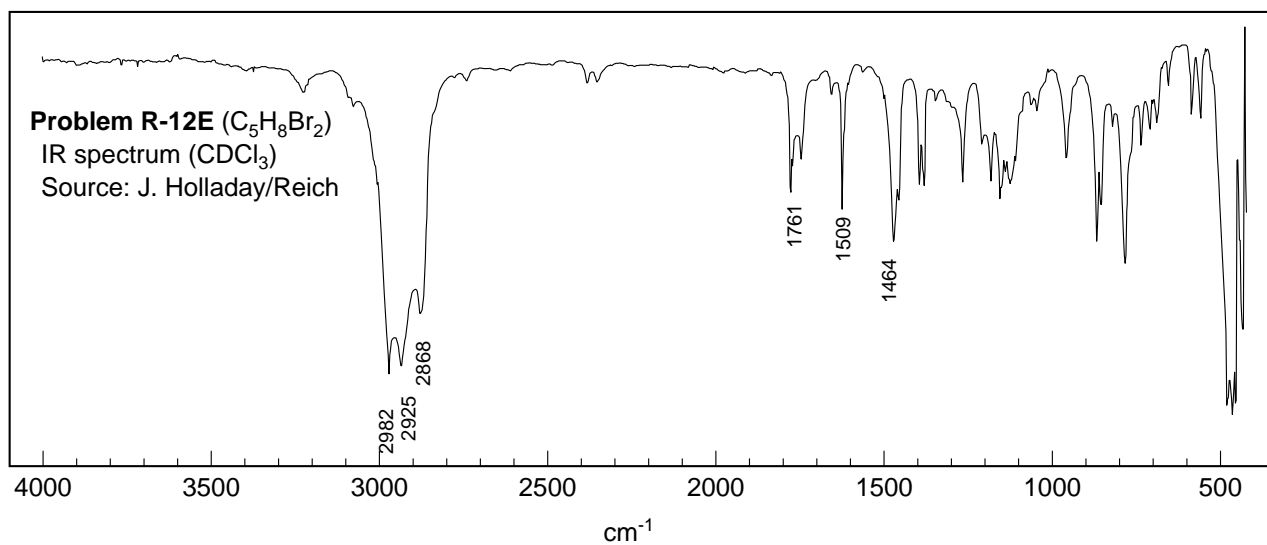
Source: J. Holladay/Reich



Problem R-12E ($C_5H_8Br_2$)

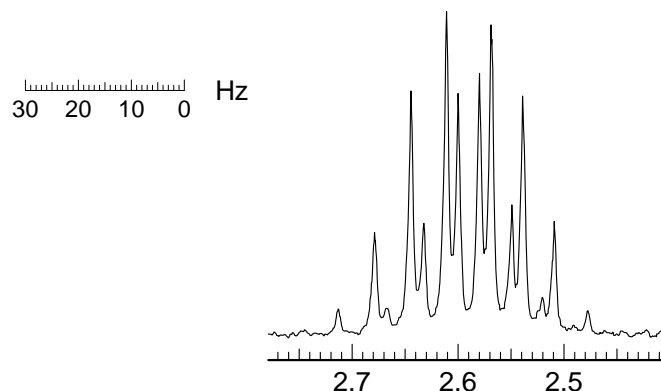
IR spectrum ($CDCl_3$)

Source: J. Holladay/Reich

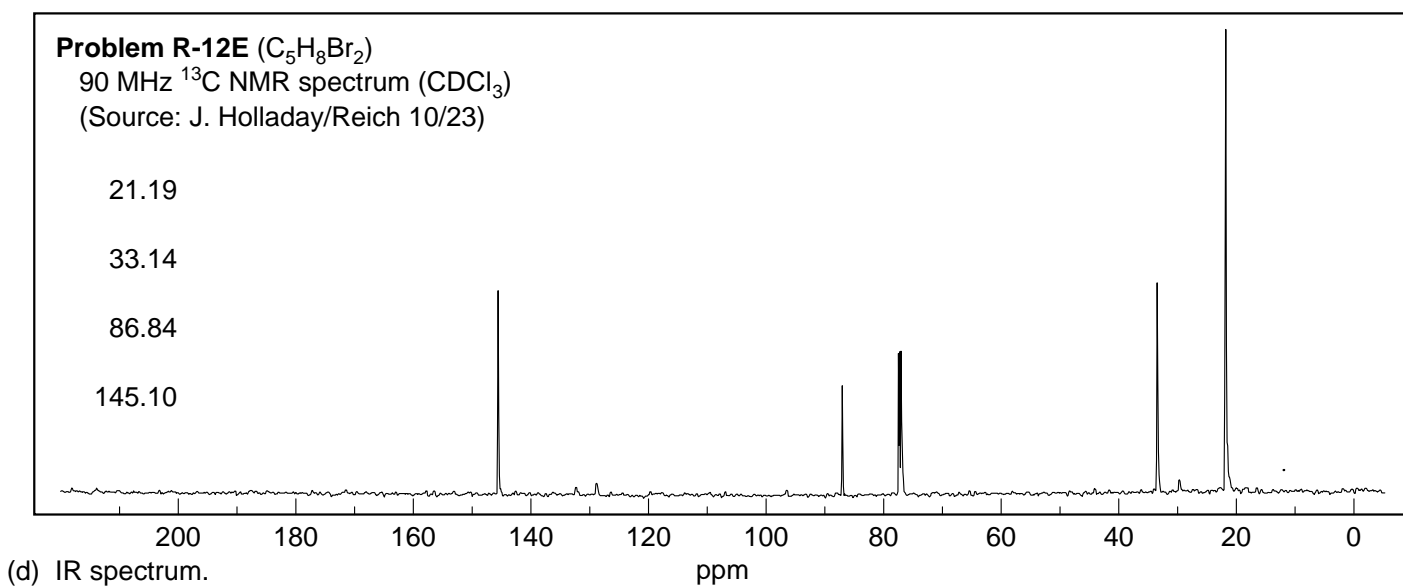


Problem R-12E ($C_5H_8Br_2$). Determine the structure (or part structure) of **R-12E** from the 1H NMR, ^{13}C NMR and IR spectra provided.

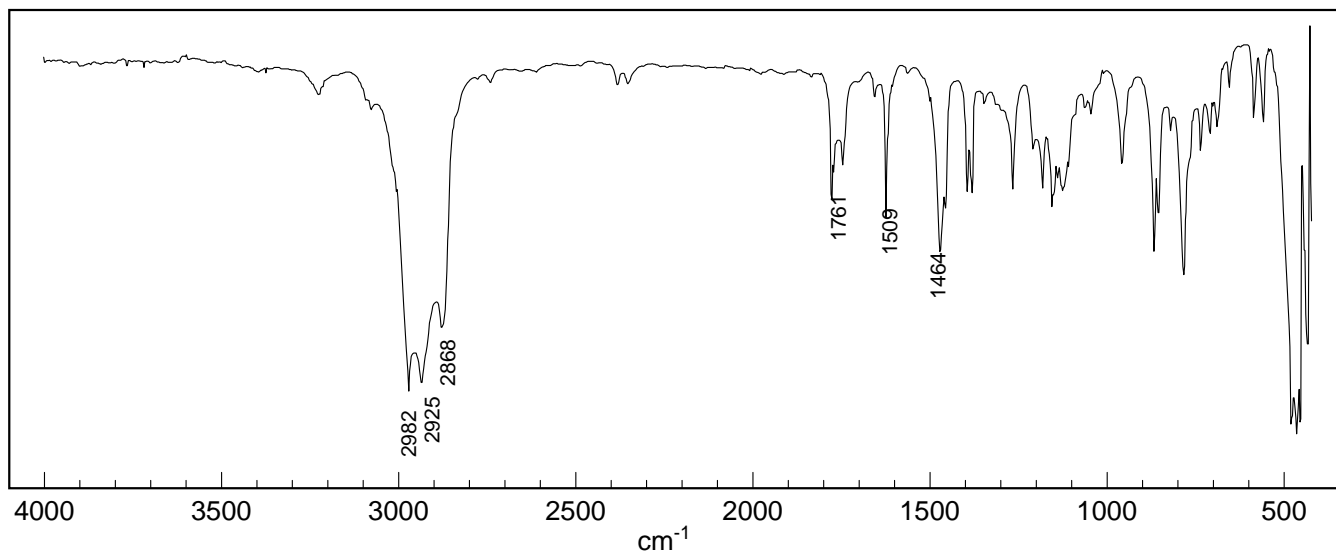
(a) DBE __. (b) Analyze the 1H NMR signals, in particular the multiplet at δ 2.6. Report δ , multiplicities and J values. Show the structure of **R-12E**.



(c) Assign the ^{13}C NMR signals (write them on a structure). Explain the signal at δ 86.8 ppm.



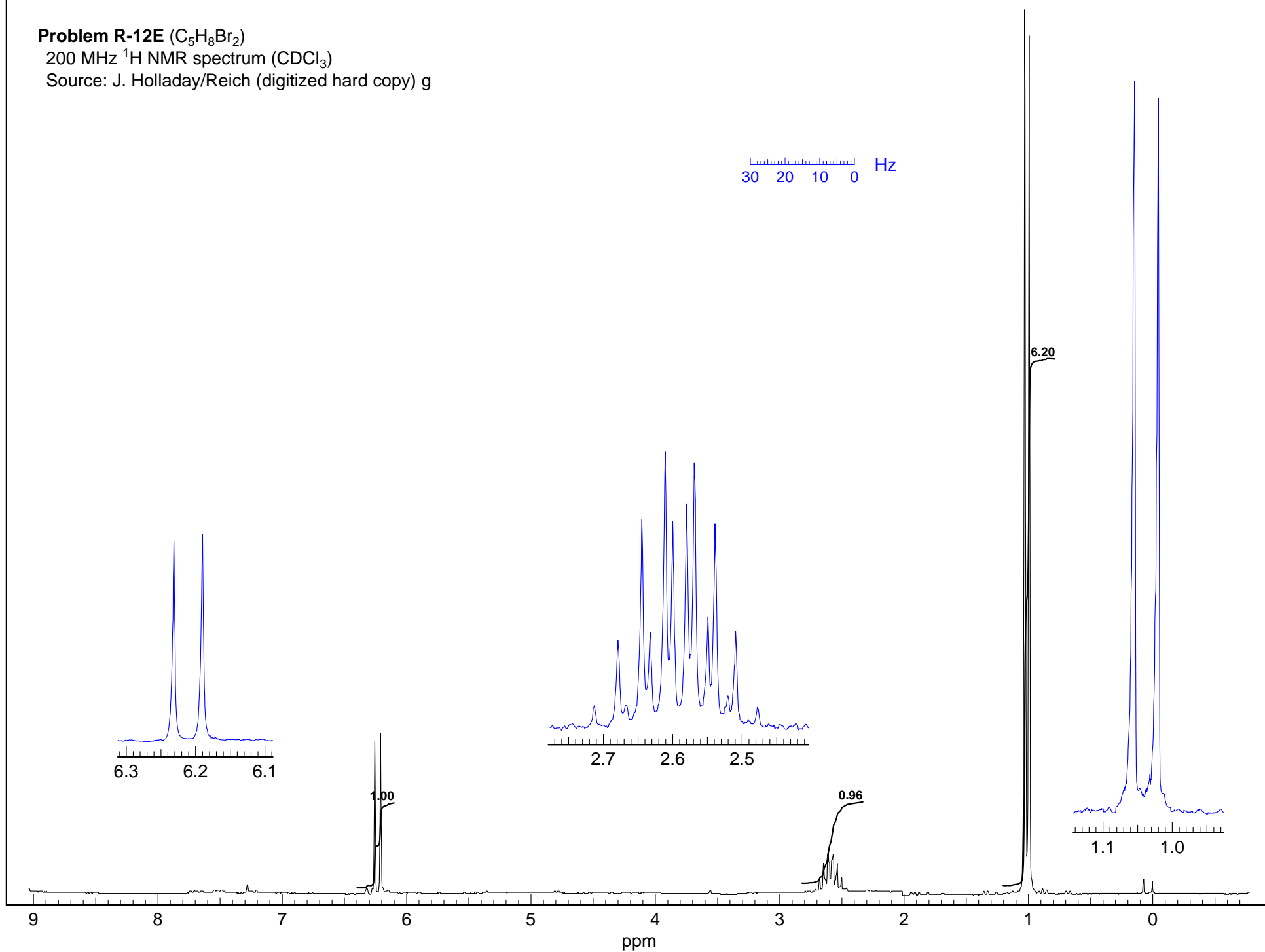
Problem R-12E ($C_5H_8Br_2$)
IR spectrum ($CDCl_3$)
(Source: J. Holladay/Reich 10/23)



Problem R-12E ($\text{C}_5\text{H}_8\text{Br}_2$)

200 MHz ^1H NMR spectrum (CDCl_3)

Source: J. Holladay/Reich (digitized hard copy) g



Problem R-12E ($C_5H_8Br_2$). Determine the structure (or part structure) of **R-12E** from the 1H NMR, ^{13}C NMR and IR spectra provided.

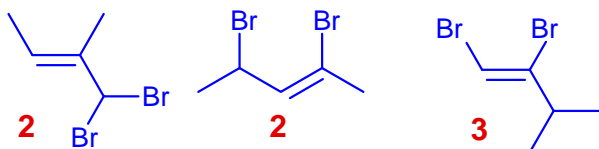
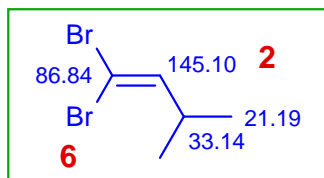
2

(a) DBE 1. (b) Analyze the 1H NMR signals, in particular the multiplet at δ 2.6. Report δ , multiplicities and J values. Show the structure of **R-12E**.

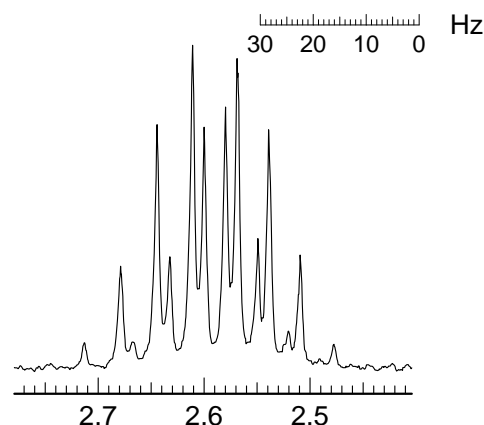
5 δ 2.6, 1H, d septets, $J = 8.5, 7$ Hz

δ 6.2, 1H, d, $J = 8.5$ Hz

δ 1.0, 6H, d, $J = 7$ Hz



4 other structures, none fit the data



(c) Assign the ^{13}C NMR signals (write them on a structure). Explain the signal at δ 86.8 ppm.

Problem R-12E ($C_5H_8Br_2$)

90 MHz ^{13}C NMR spectrum ($CDCl_3$)

Source: J. Holladay/Reich

21.19

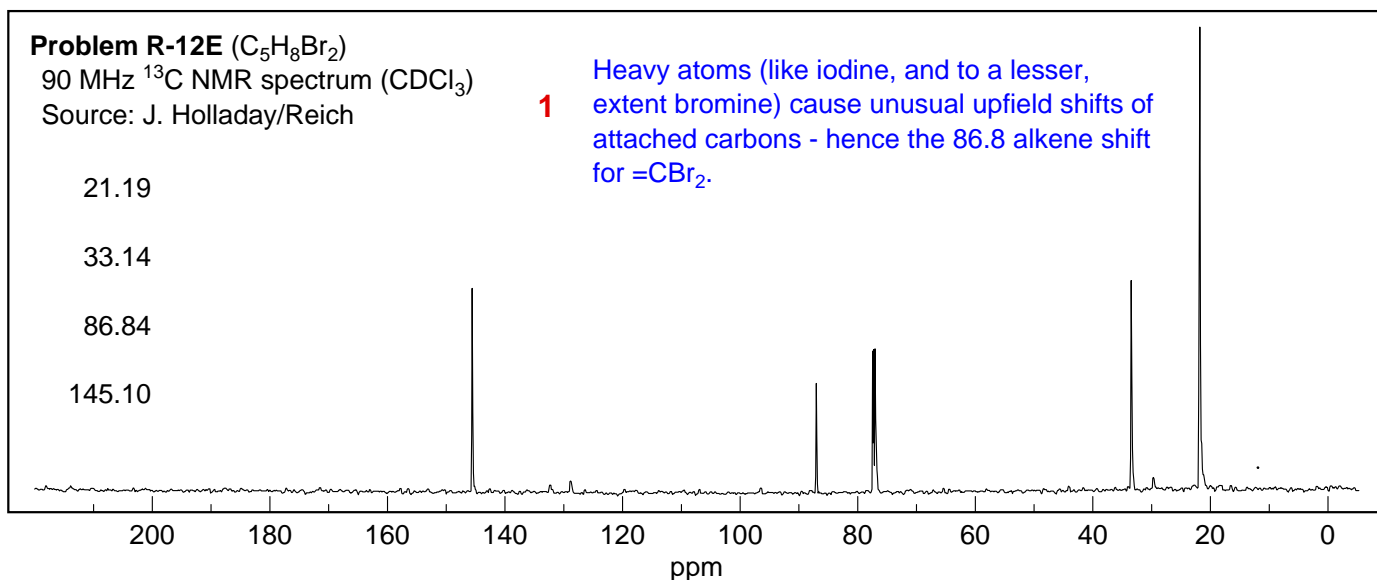
33.14

86.84

145.10

1

Heavy atoms (like iodine, and to a lesser, extent bromine) cause unusual upfield shifts of attached carbons - hence the 86.8 alkene shift for $=CBr_2$.



(d) IR spectrum.

Problem R-12E ($C_5H_8Br_2$)

IR spectrum ($CDCl_3$)

Source: J. Holladay/Reich

