Yet more...
...combined spectroscopy problems

Spring 2004
Chem 30B

(If you can't figure these out before the final, you may have problems...)
Compound A

Mass Spectrum (molecular ion peak barely visible, would be at $m/z = 101$)

IR Spectrum
13C-NMR Spectrum (4 peaks)

From left to right: quartet (1H), singlet (2H), doublet (3H), singlet (9H)

RELATIVE INTEGRATIONS

1H-NMR Spectrum
Compound B

Mass Spectrum

IR Spectrum
13C-NMR Spectrum (3 peaks)

1H-NMR Spectrum

From left to right: triplet (2H), sextet (2H), triplet (3H)
Compound C

Mass Spectrum

$m/z = 87$

$m/z = 89$

IR Spectrum
Each of the peaks above is actually a doublet with a very small coupling constant (~2 Hz); i.e., the spectrum contains 2 doublets.
Compound D

Mass Spectrum

IR Spectrum
13C-NMR Spectrum (2 peaks)

1H-NMR Spectrum

From left to right: septet (1H), doublet (6H)
Compound E

Mass Spectrum

\[ m/z = 136 \]

\[ m/z = 137 \]

\( \sim 10\% \) intensity

of peak at \( m/z = 136 \)

IR Spectrum
13C-NMR Spectrum (4 peaks above 100 ppm, 3 peaks below 100 ppm)

1H-NMR Spectrum

From left to right: two doublets (2H each), singlet (2H), singlet (1H), quartet (2H), triplet (3H)
Compound F

Mass Spectrum

IR Spectrum
From left to right: very broad singlet (1H), quintet (2H), singlet (3H), triplet (3H)
Compound G

Mass Spectrum

$m/z = 157$

$m/z = 159$

(33% of peak at $m/z = 157$)

IR Spectrum
13C-NMR Spectrum (4 peaks)

1H-NMR Spectrum

From left to right: doublet (1H), doublet (1H)
Compound H

Mass Spectrum

$m/z = 118$

$m/z = 120$

IR Spectrum
13C-NMR Spectrum (3 peaks)

From left to right: singlet (2H), singlet (1H)
Compound J

Mass Spectrum

m/z = 104

IR Spectrum

(9.3% of peak at m/z = 104)
13C-NMR Spectrum (trust me, there are 6 peaks between 100 and 150 ppm)

1H-NMR Spectrum

From left to right: multiplet (5H), doublet of doublets (1H), doublet (1H), doublet (1H)