Quiz 601 (C_{13}H_{24}SeSi_2)

300 MHz $^1$H NMR spectrum in CDCl$_3$

Sample is 100% $^{13}$C enriched at C-H carbon

Source: Bill Sikorski / Reich 33-11

Identify all signals, estimate coupling constants $g$

Me$_3$Si
Me$_3$Si-^{13}CH
PhSe

$^{13}$C enriched

(a)

(b)
**Quiz 601**  \((C_{13}H_{24}SeSi_2)\)

300 MHz \(^1H\) NMR spectrum in CDCl\(_3\)

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Identify all signals, estimate coupling constants

**Me\(_3\)Si**

**Me\(_3\)Si-\(^{13}\)CH**

**PhSe**

\(^{13}C\) enriched

\(^{29}Si\) \(I = 1/2, 4.7\%, 19.87\) MHz

\(^{77}Se\) \(I = 1/2, 7.5\%, 19.07\) MHz

\(^{13}C\) \(I = 1/2, 1.1\%, 25.14\) MHz

\(^1H = 100\) MHz

\(^3J_{H-C} = 2.5\) Hz

\(^1J_{H-C} = 117\) Hz

\(^2J_{H-Si}\) and \(^2J_{H-Se} = 8\) Hz

\((2\times4.7 + 7.5)/2 = 8.45\)

\(^1J_{H-C} = 120\) Hz

\(^2J_{H-Si} = 6\) Hz
Quiz 602 (C_{13}H_{24}SeSi_{2})
75.4 MHz $^{13}$C {$^1$H} NMR spectrum in CDCl$_3$
Sample is 100% $^{13}$C enriched at C-H carbon
Source: Bill Sikorski / Reich 33-11
Identify all signals, estimate coupling constants

$^{29}$Si $I = 1/2$, 4.7%, 19.87 MHz
$^{77}$Se $I = 1/2$, 7.5%, 19.07 MHz
$^{13}$C $I = 1/2$, 1.1%, 25.14 MHz

$^{13}$C enriched
**Quiz 602 (C_{13}H_{28}SeSi_{2})**

75.4 MHz $^{13}$C ($^1$H) NMR spectrum in CDCl$_3$

Sample is 100% $^{13}$C enriched at C-H carbon

Source: Bill Sikorski / Reich 33-11

Identify all signals, estimate coupling constants

The $^{2}J_{C-C}$ is not resolved, the $^{1}J_{C-Se}$ satellites are too small to detect

(c)

More on next page ...
Quiz 602 (C_{13}H_{24}SeSi_2)
75.4 MHz $^{13}$C \{^1\text{H}\} NMR spectrum in CDCl$_3$
Sample is 100% $^{13}$C enriched at C-H carbon
Source: Bill Sikorski / Reich 33-11

Not only does the central peak have satellites due to coupling of the $^{13}$C with the 7.5% of molecules having a $^{77}$Se (green) or the 9.4% having a $^{29}$Si (purple), the satellites in turn have detectable satellites due to the minute fractions of the sample that have both a $^{77}$Se and a $^{29}$Si in it (red), as well as those molecules having two $^{29}$Si atoms (blue), as shown.

$^1J_{CSe} = 70.6$ Hz
$^1J_{CSI} = 43.9$ Hz

$^{13}$C $^{29}$Si

$^{13}$C $^{77}$Se

$^{29}$Si $^{29}$Se

$^{13}$C $^{29}$Si

$^{29}$Si

$^{13}$C $^{77}$Se

$^{13}$C $^{77}$Se

$^{13}$C $^{29}$Si

$^{29}$Si

$^{29}$Si

$^{13}$C $^{77}$Se

$^{13}$C $^{77}$Se

$^{13}$C $^{29}$Si

$^{29}$Si

$^{29}$Si

$^{13}$C $^{77}$Se

$^{13}$C $^{77}$Se

$^{13}$C $^{29}$Si

$^{29}$Si

$^{29}$Si

$^{13}$C $^{77}$Se

$^{13}$C $^{77}$Se

$^{13}$C $^{29}$Si

$^{29}$Si

$^{29}$Si