

Supplementary Materials: Stepwise Introduction of Different Substituents to α -Chloro- ω -hydrooligosilanes: Convenient Synthesis of Unsymmetrically Substituted Oligosilanes

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Spectral Data

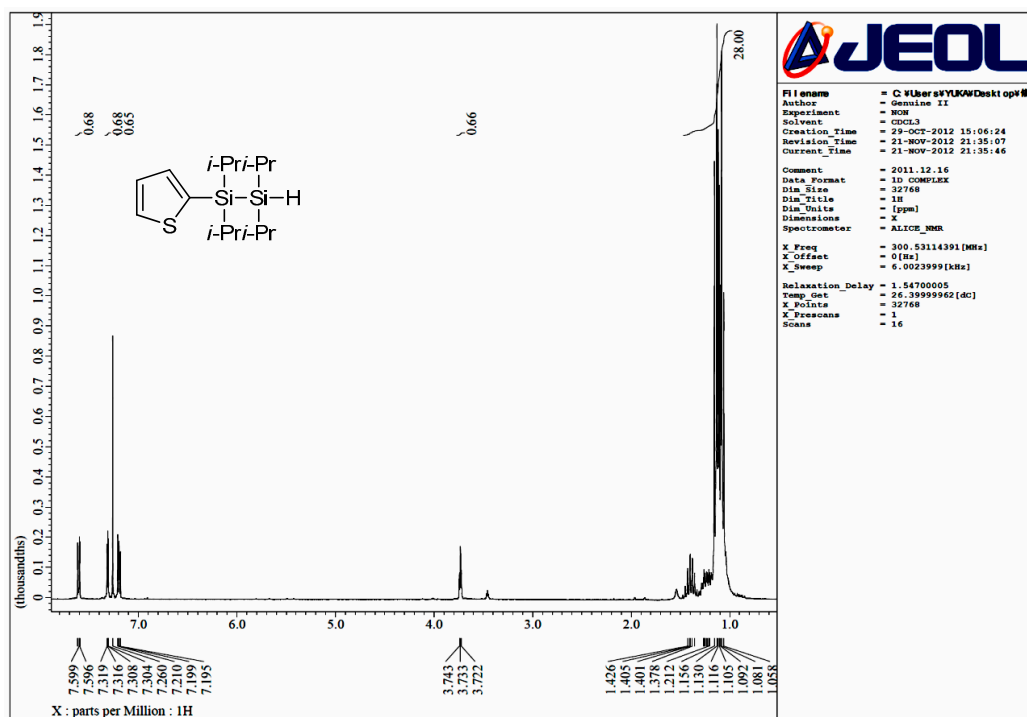
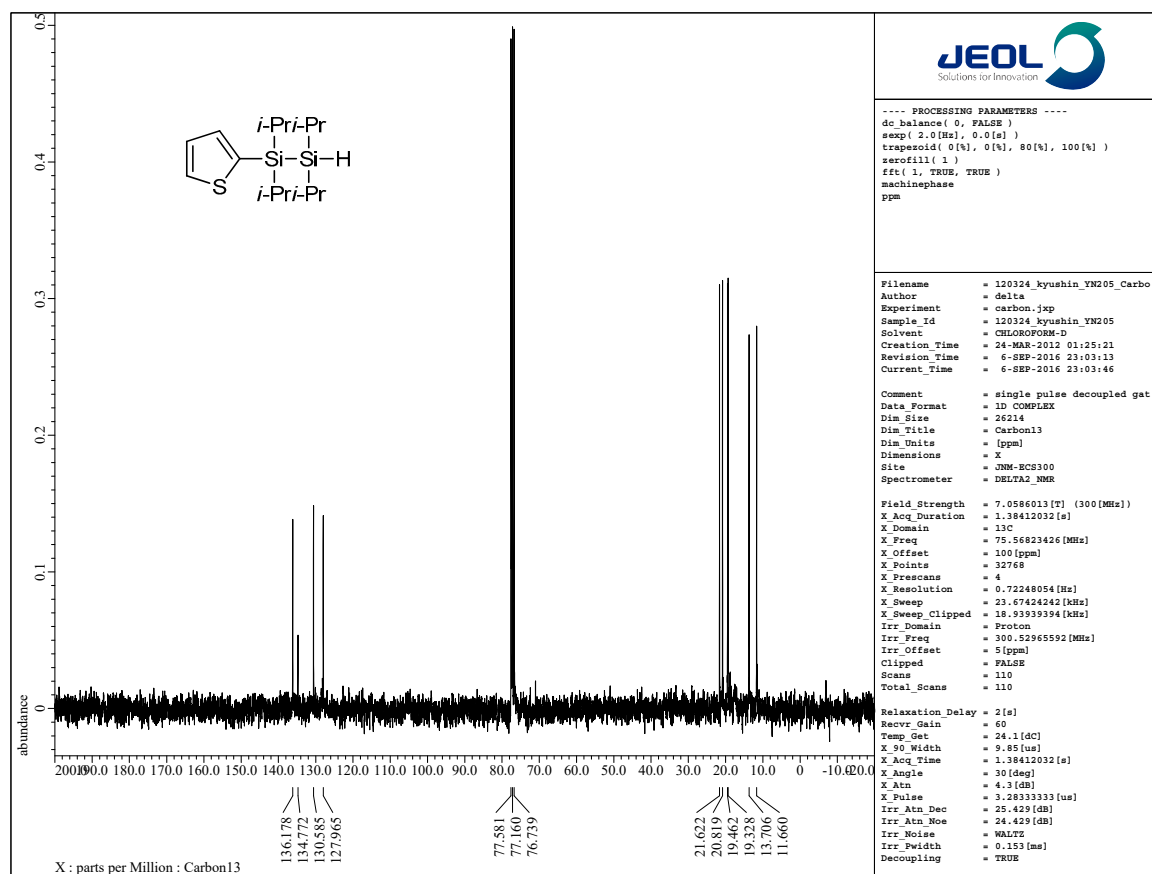
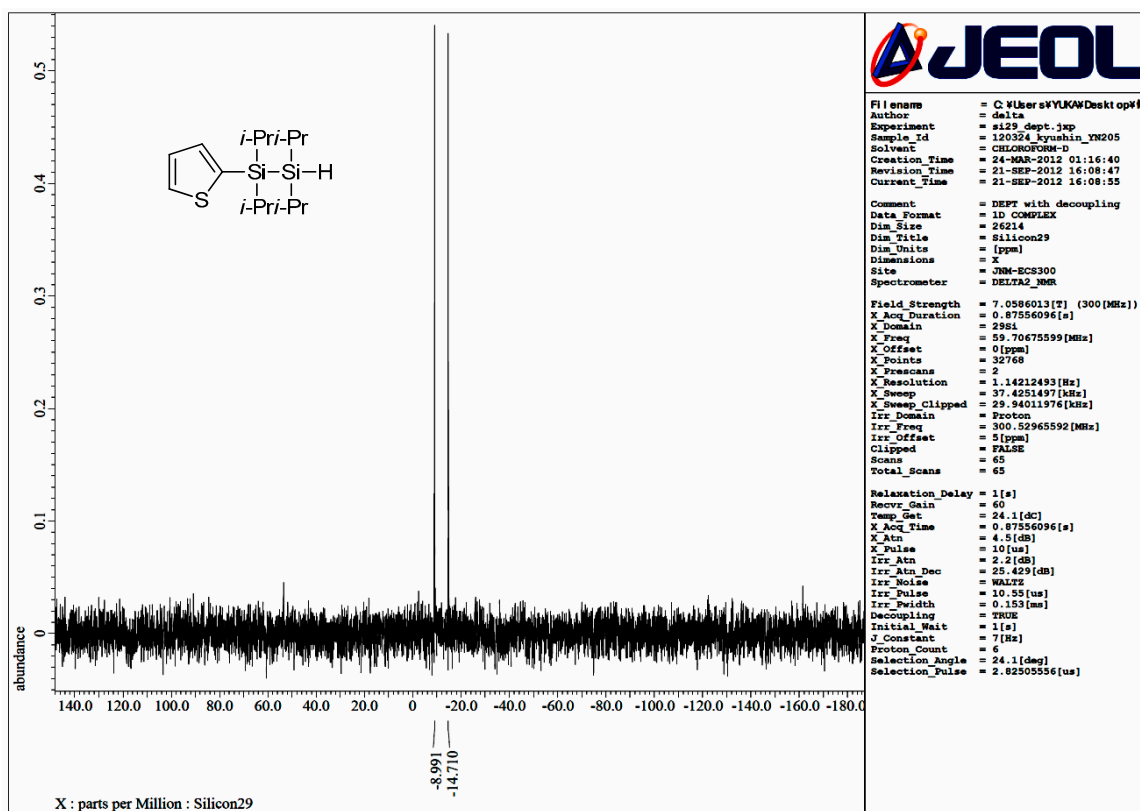


Figure S1. ¹H NMR spectrum of **4** in CDCl₃ at room temperature.

Figure S2. ^{13}C NMR spectrum of **4** in CDCl_3 at room temperature.Figure S3. ^{29}Si NMR spectrum of **4** in CDCl_3 at room temperature.

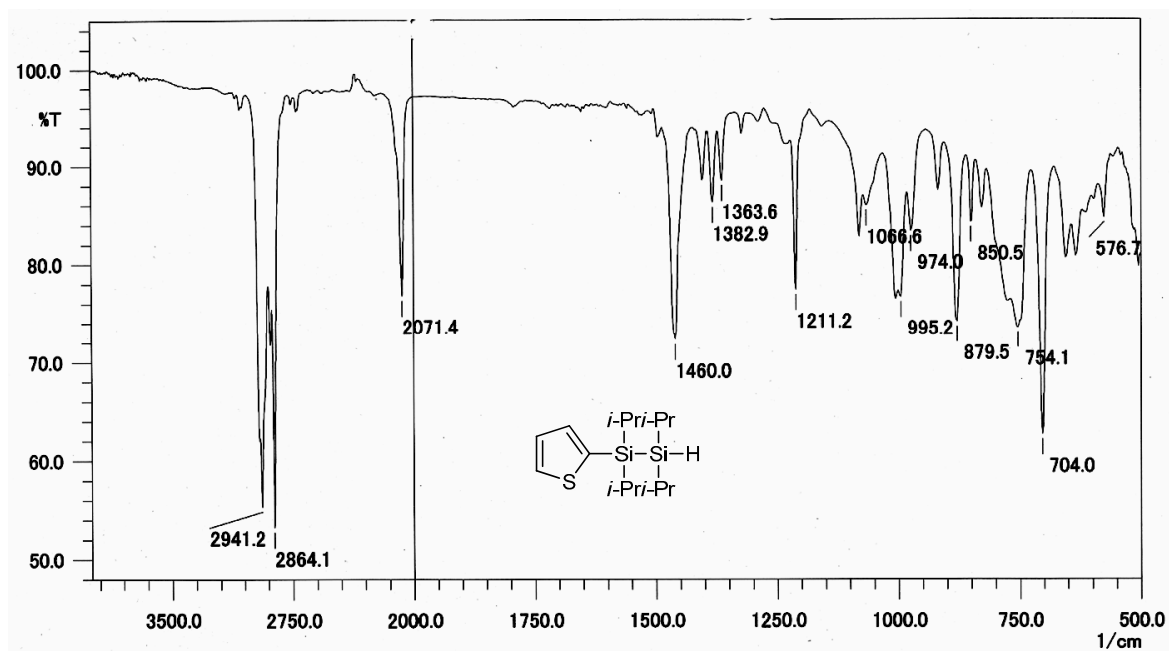


Figure S4. IR spectrum of 4 (NaCl).

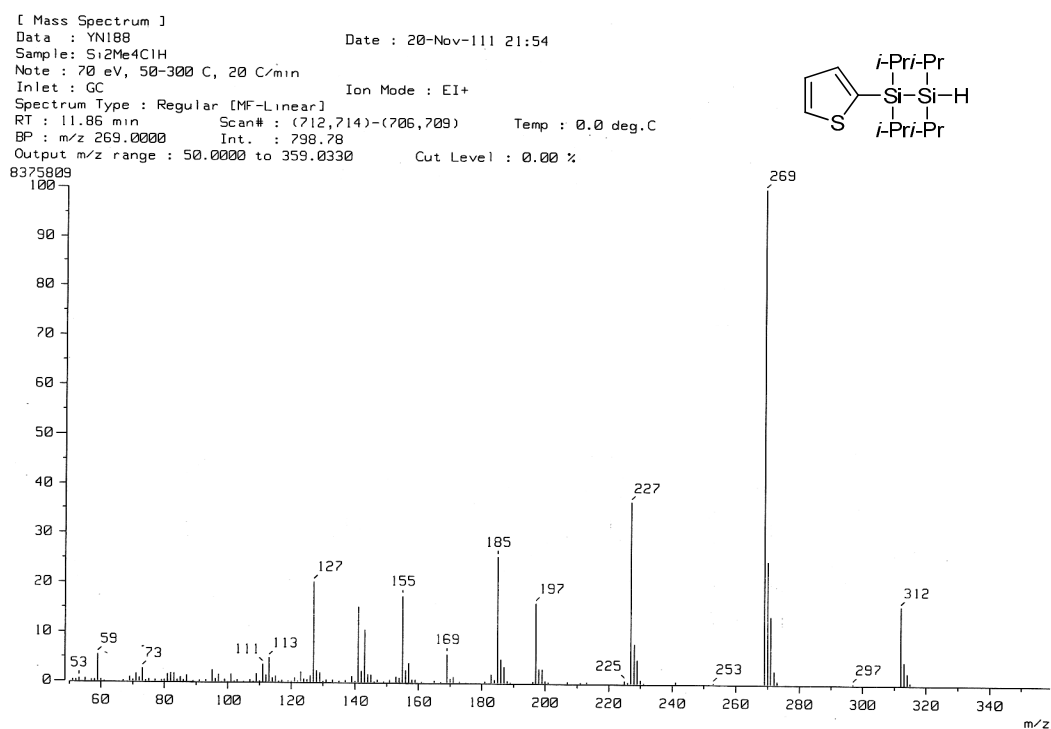
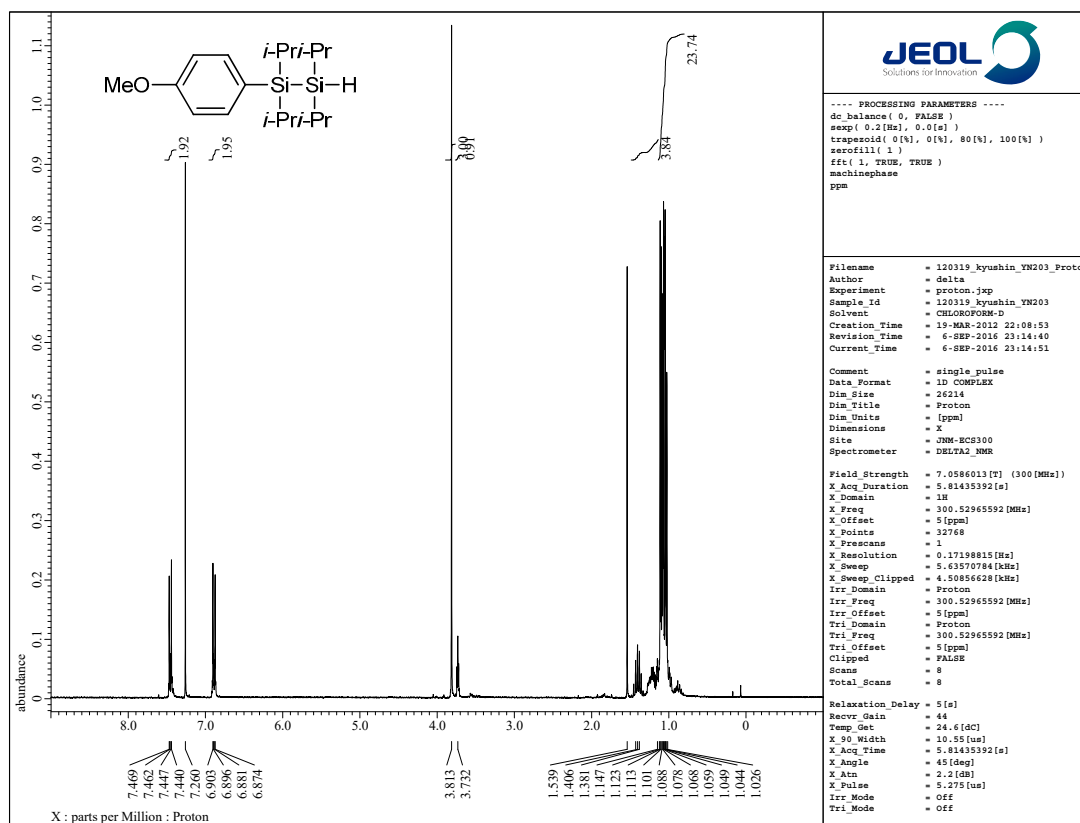
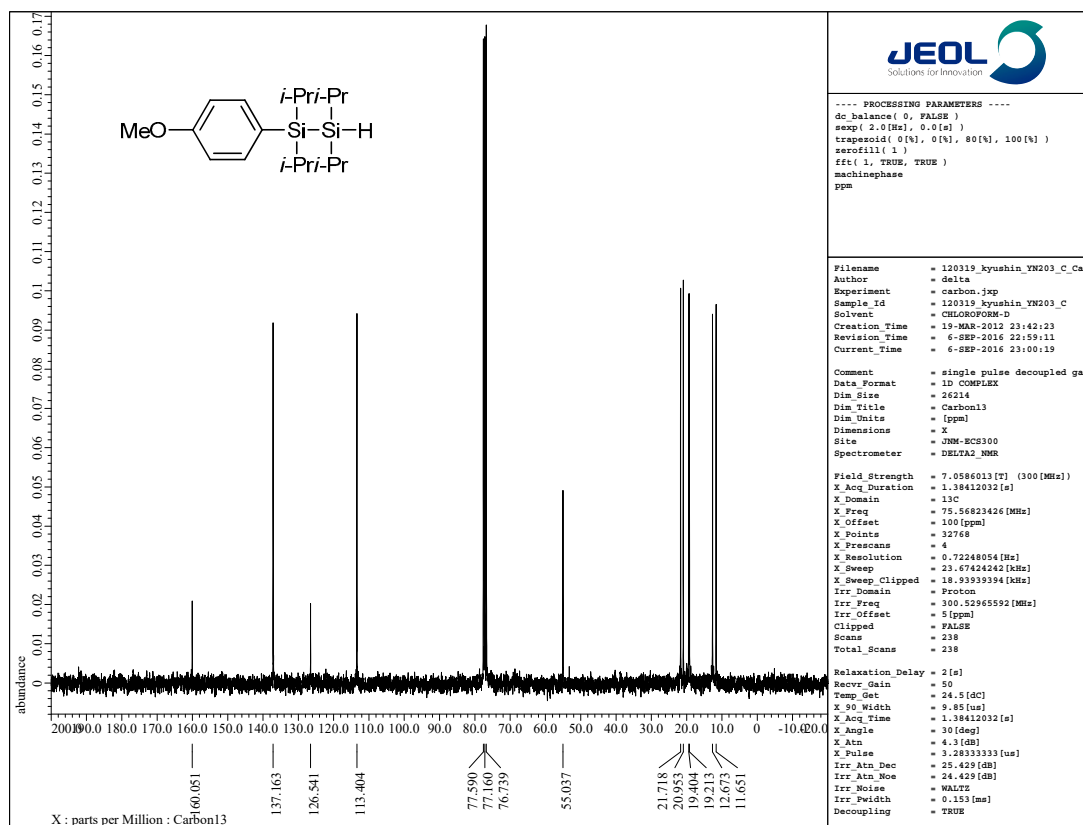


Figure S5. Mass spectrum of 4 (EI, 70 eV).

Figure S6. ¹H NMR spectrum of **5** in CDCl₃ at room temperature.Figure S7. ¹³C NMR spectrum of **5** in CDCl₃ at room temperature.

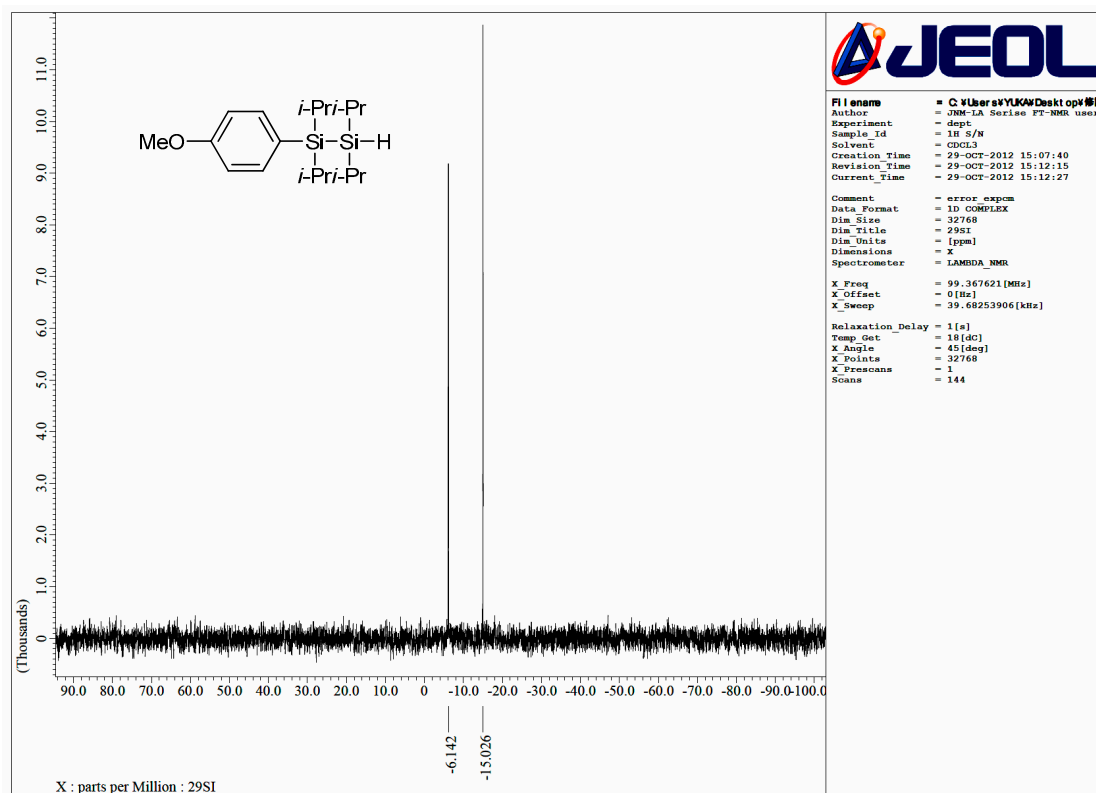


Figure S8. ²⁹Si NMR spectrum of 5 in CDCl₃ at room temperature.

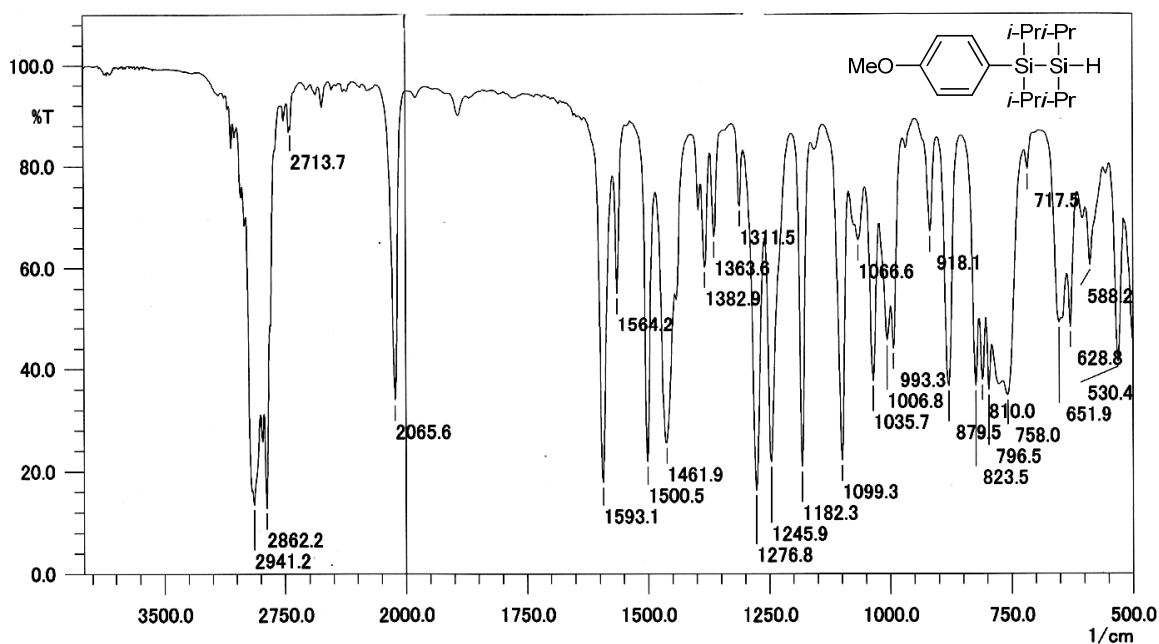


Figure S9. IR spectrum of 5 (NaCl).

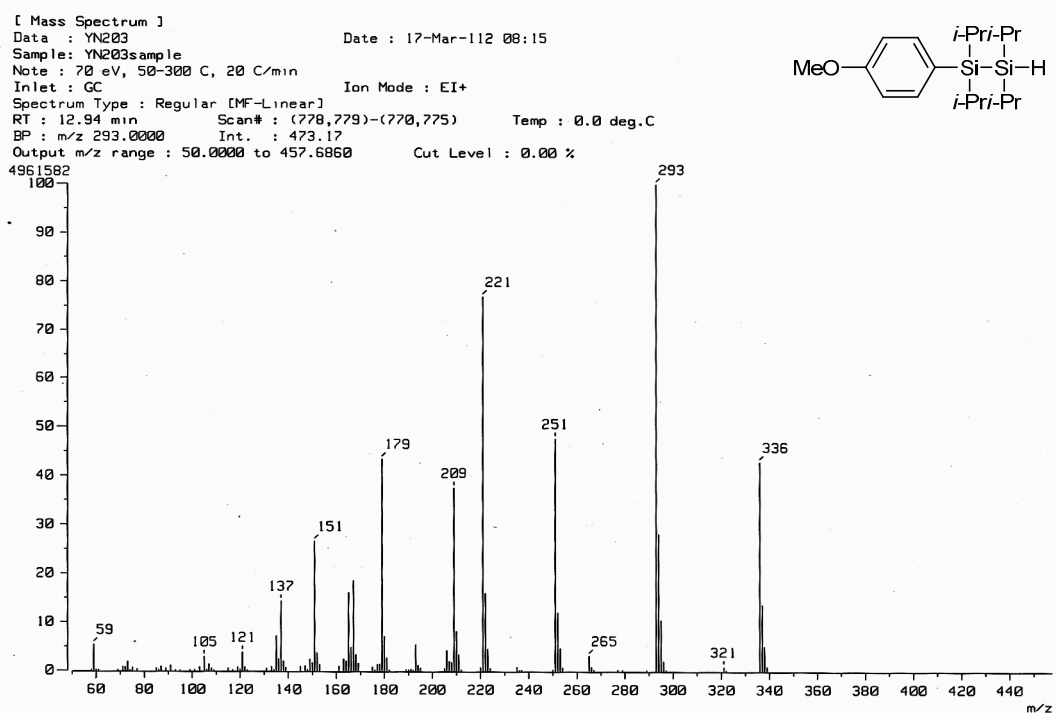
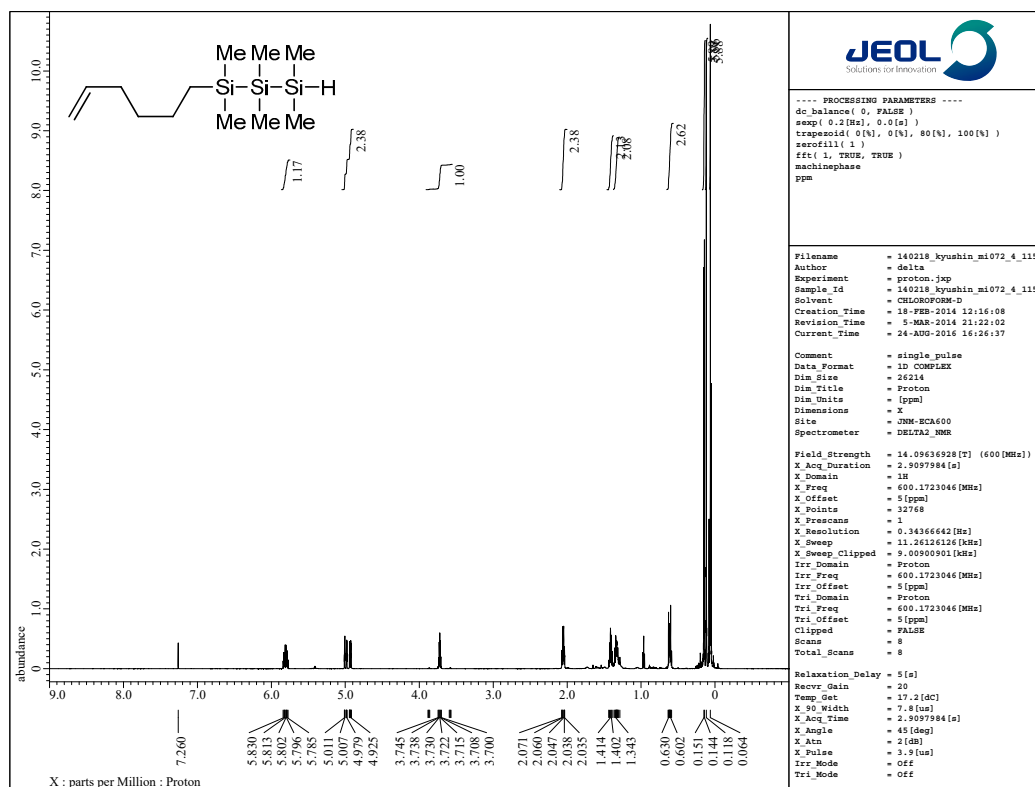
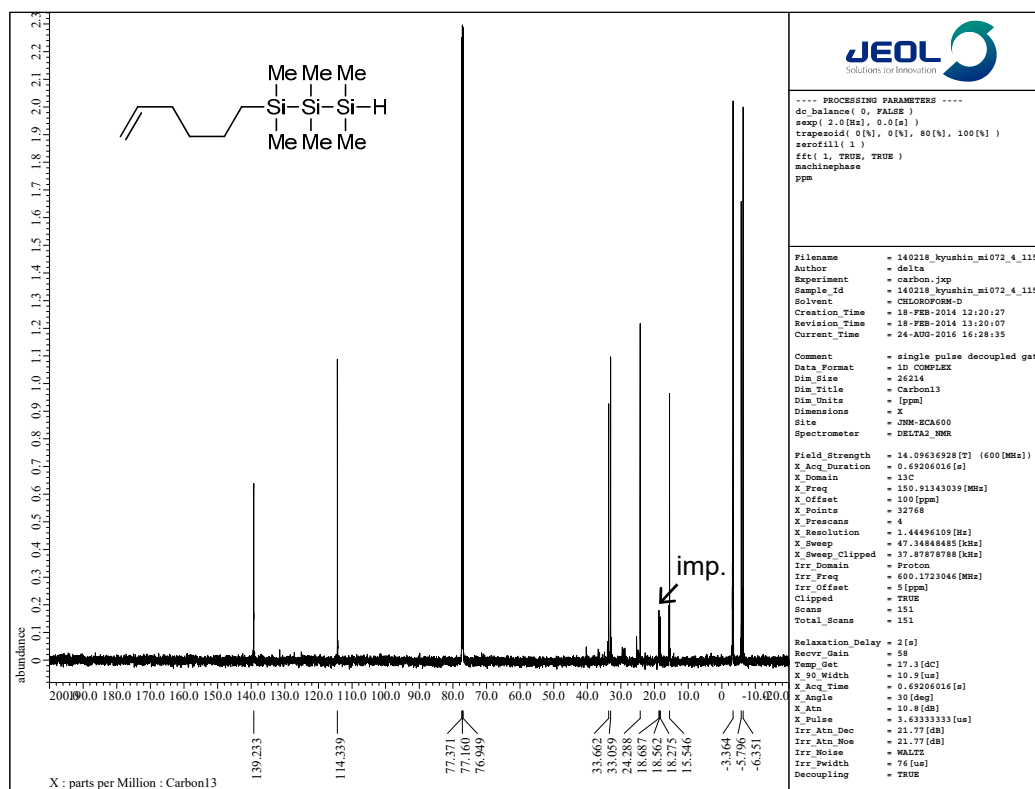
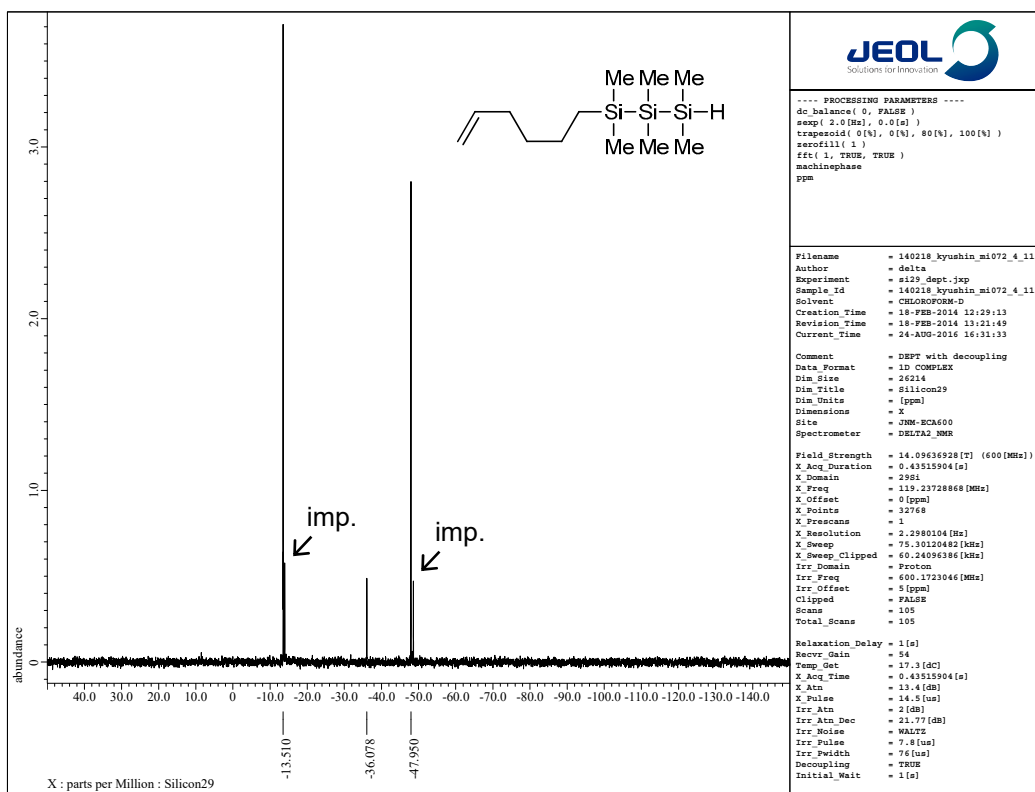
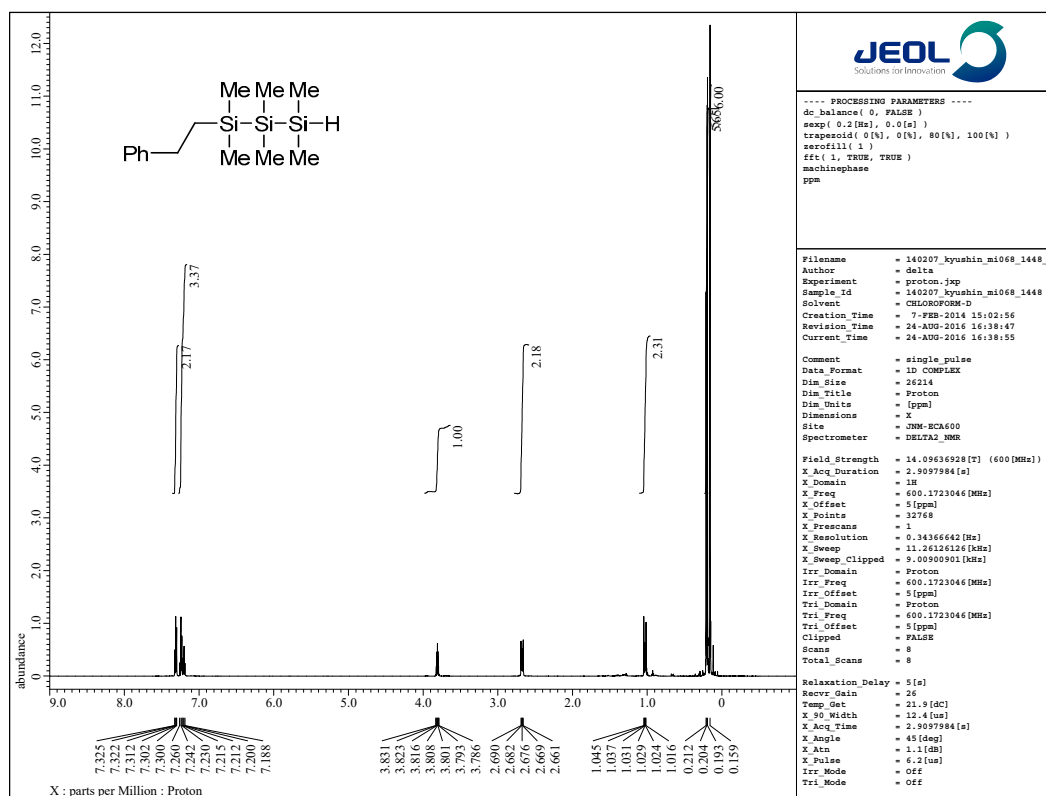
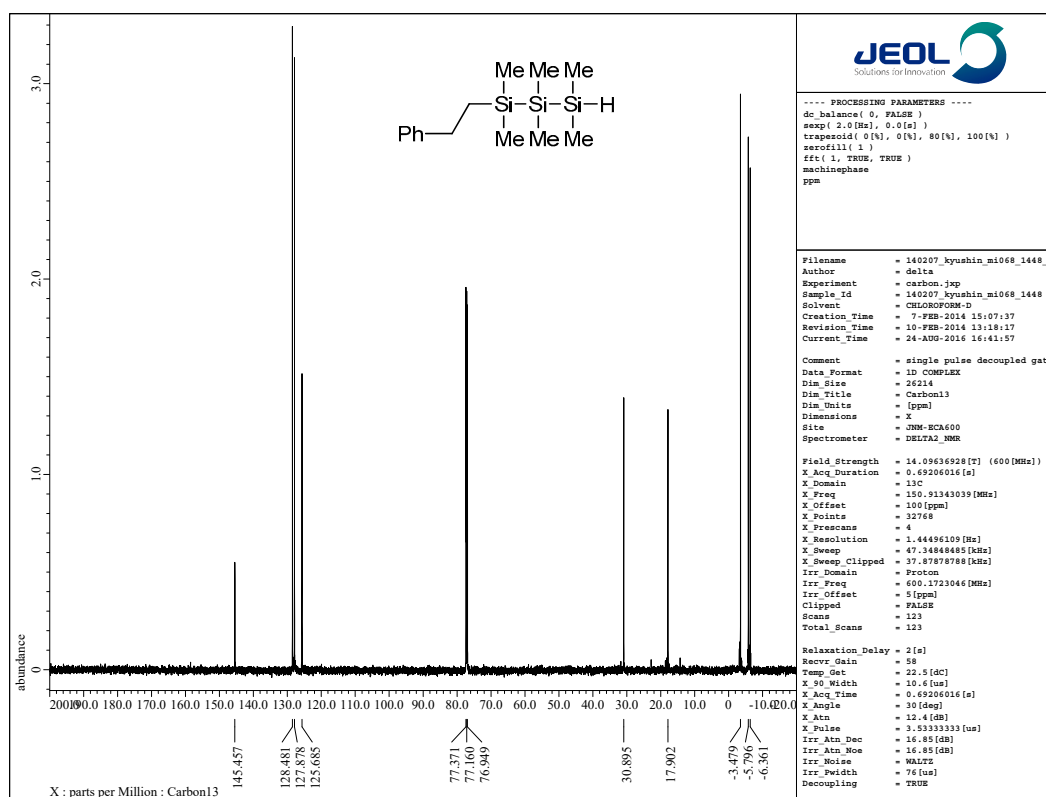


Figure S10. Mass spectrum of 5 (EI, 70 eV)

Figure S11. ¹H NMR spectrum of 6 in CDCl₃ at room temperature.

Figure S12. ^{13}C NMR spectrum of 6 in CDCl_3 at room temperature.Figure S13. ^{29}Si NMR spectrum of 6 in CDCl_3 at room temperature.



Figure S16. ¹H NMR spectrum of 7 in CDCl₃ at room temperature.Figure S17. ¹³C NMR spectrum of 7 in CDCl₃ at room temperature.

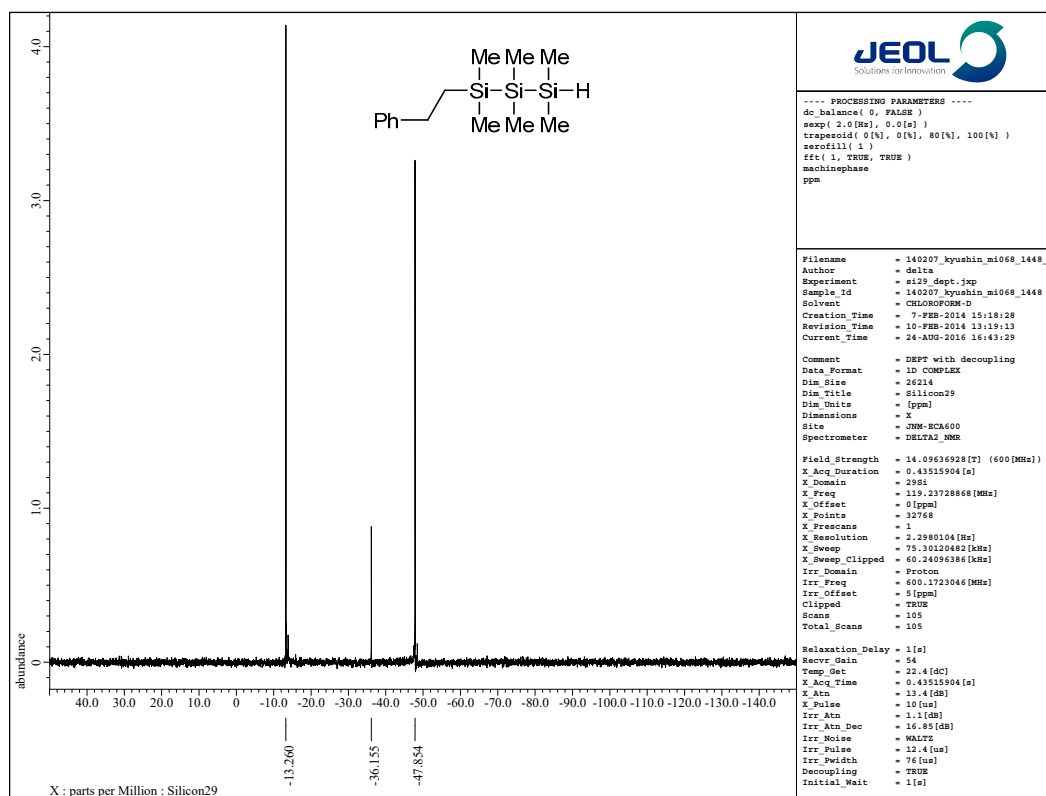
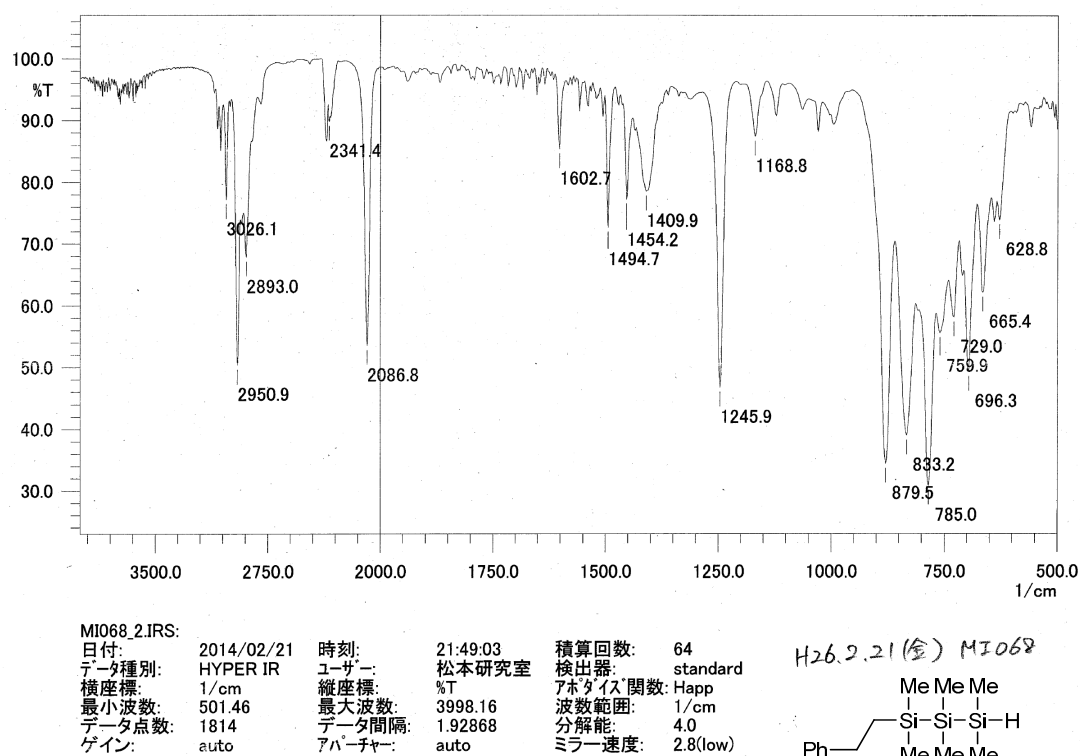
Figure S18. ^{29}Si NMR spectrum of 7 in CDCl_3 at room temperature.

Figure S19. IR spectrum of 7 (NaCl).

GC

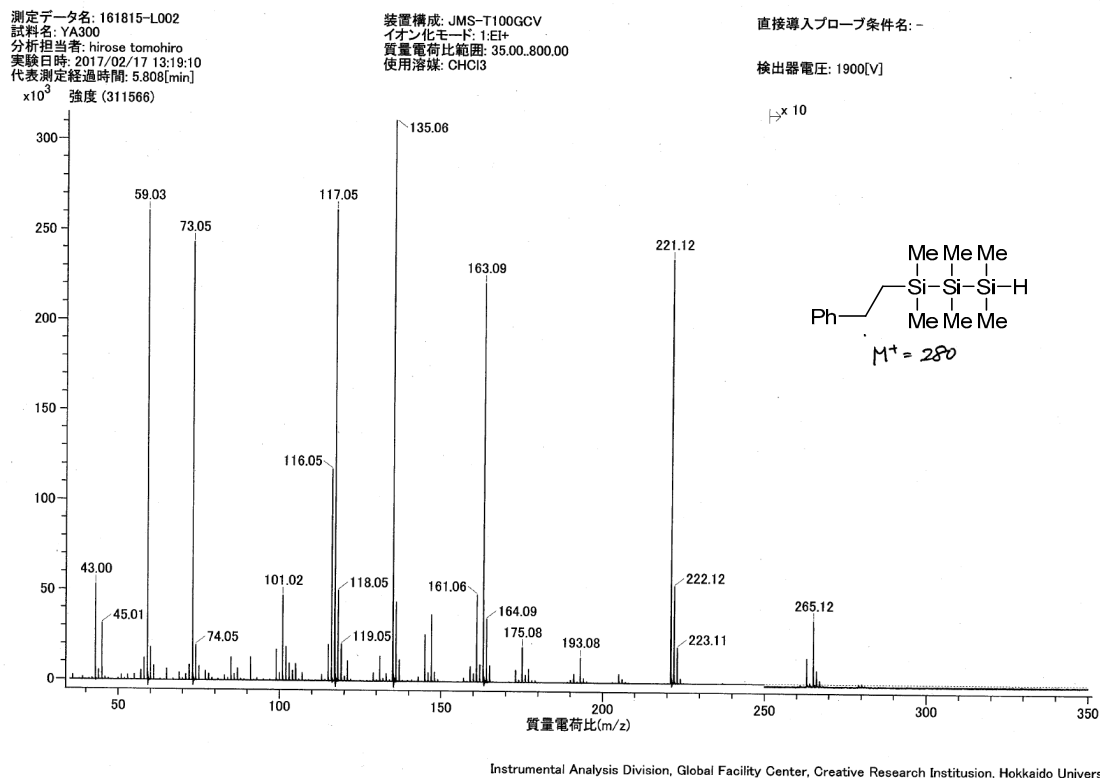
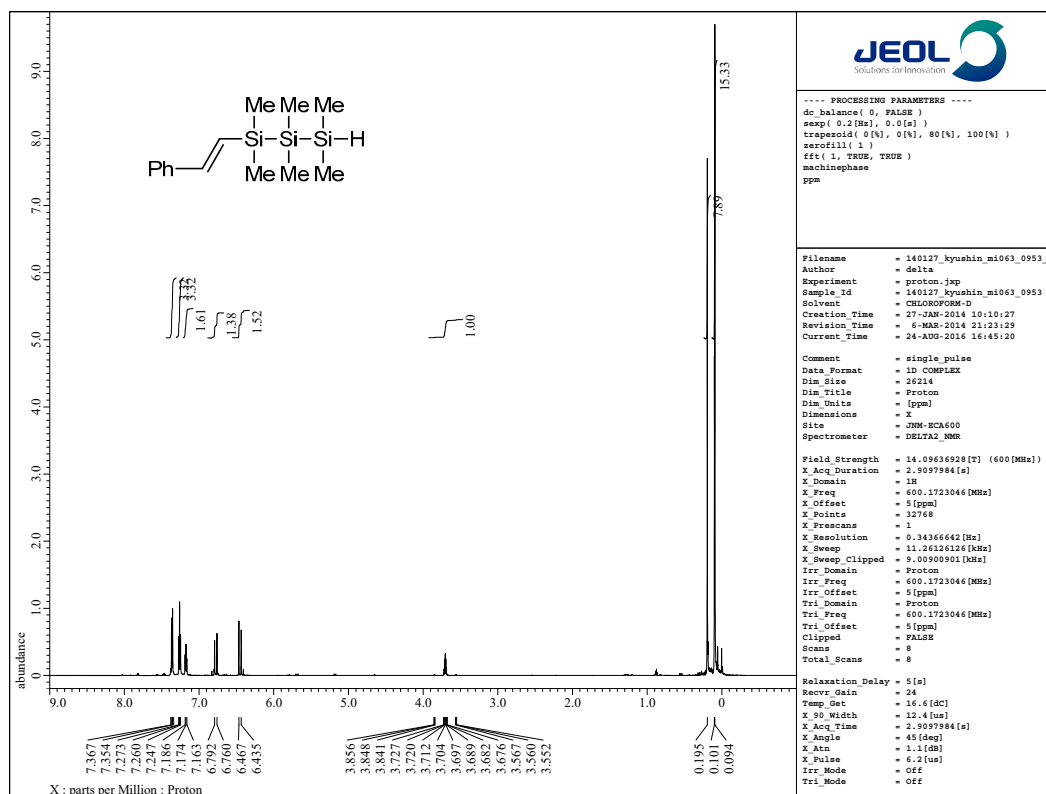
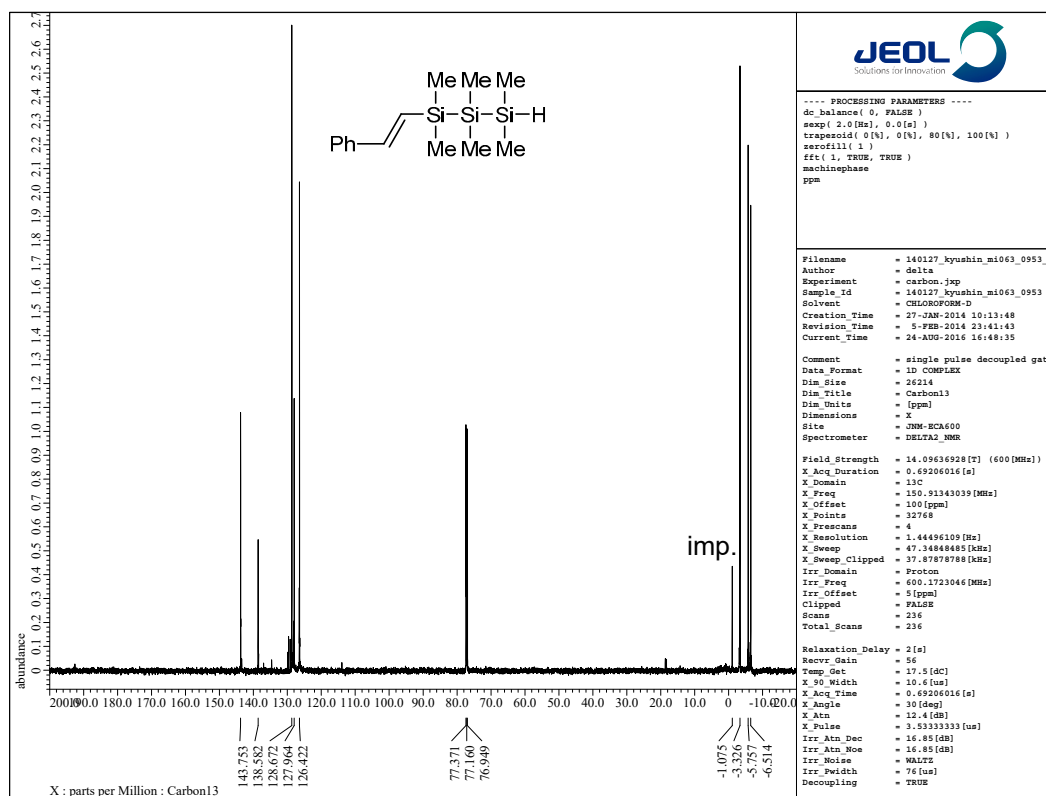
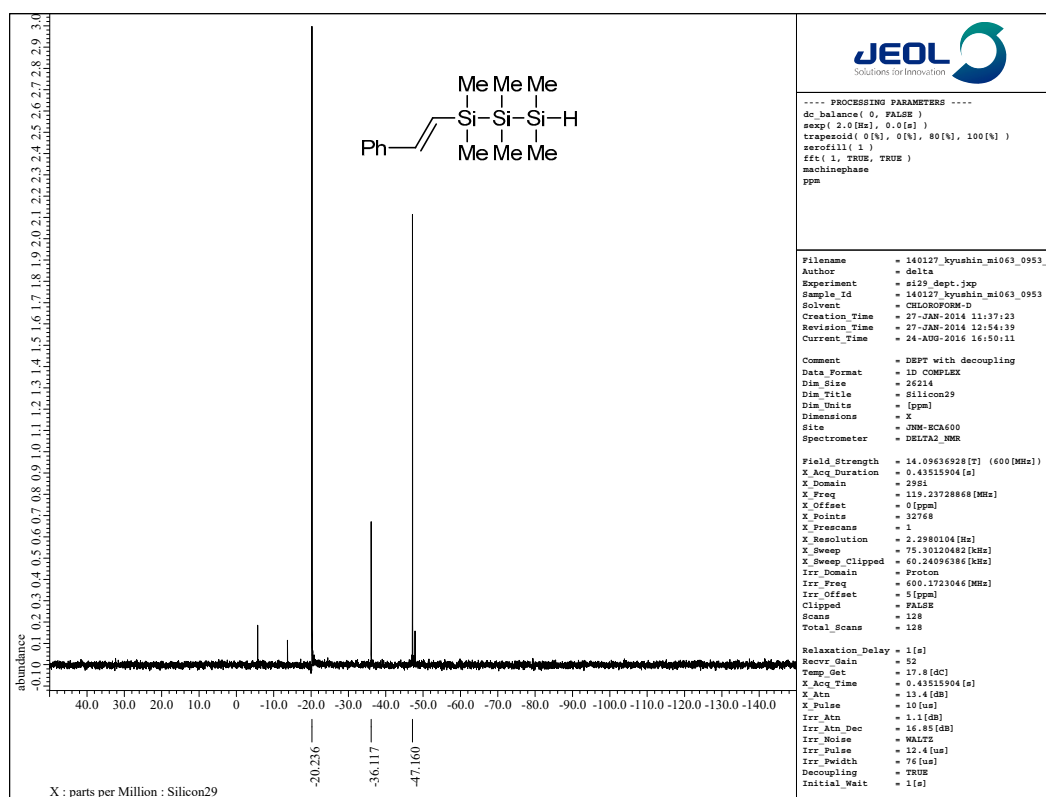


Figure S20. Mass spectrum of 7 (EI, 70 eV).

Figure S21. ¹H NMR spectrum of 8 in CDCl₃ at room temperature.

Figure S22. ¹³C NMR spectrum of 8 in CDCl₃ at room temperature.Figure S23. ²⁹Si NMR spectrum of 8 in CDCl₃ at room temperature.

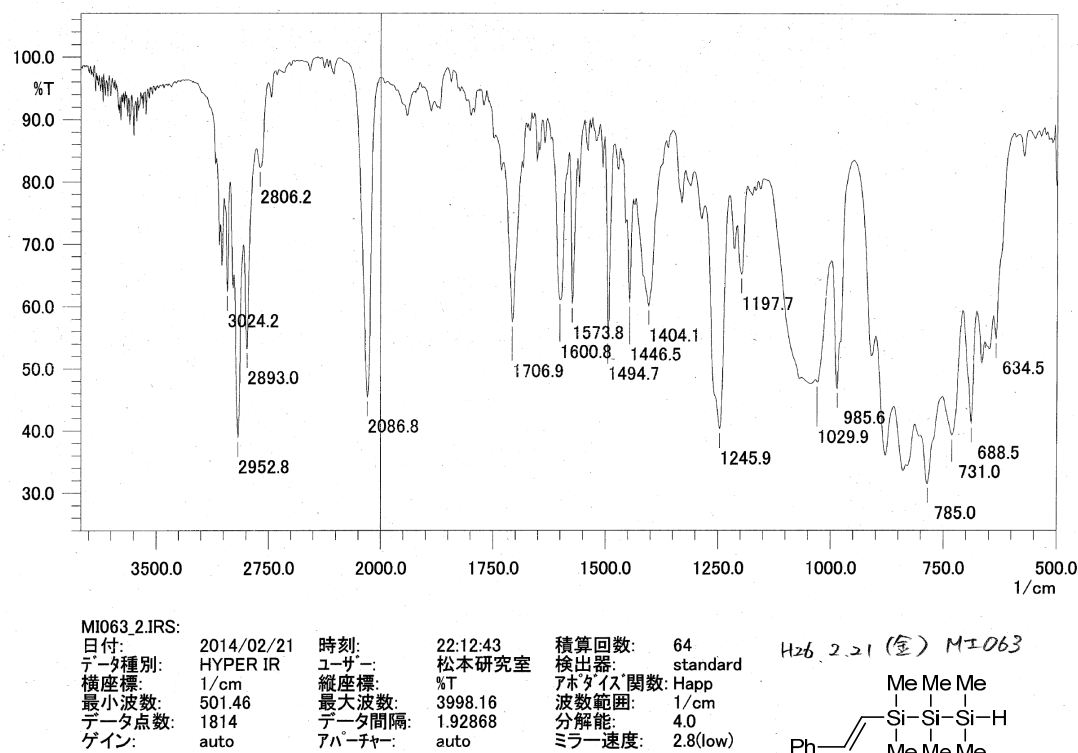


Figure S24. IR spectrum of 8 (NaCl).

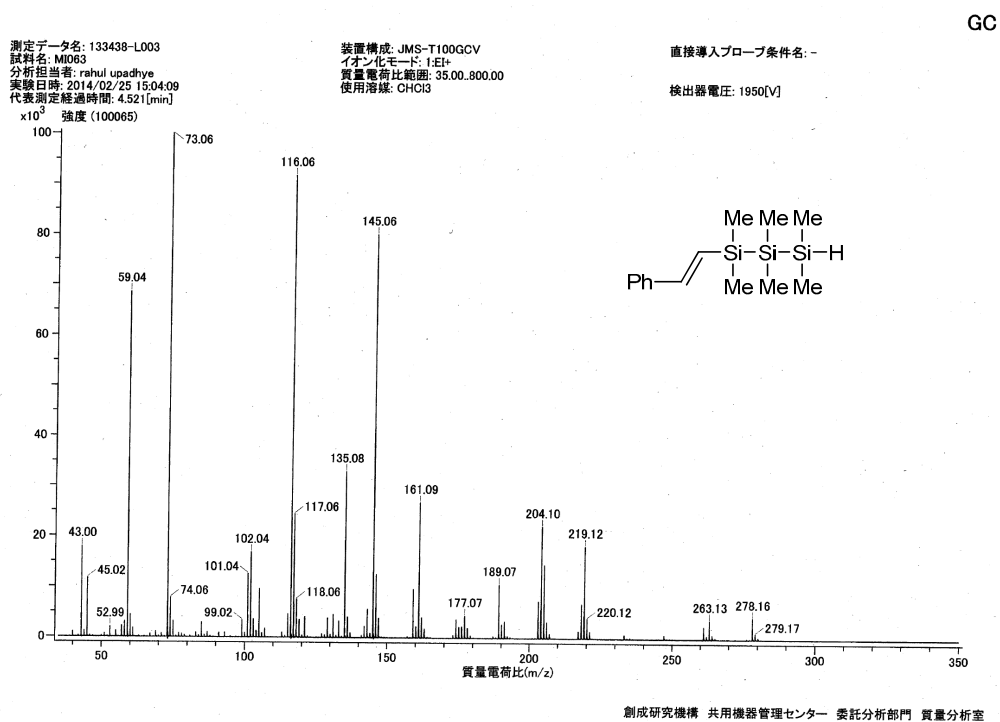
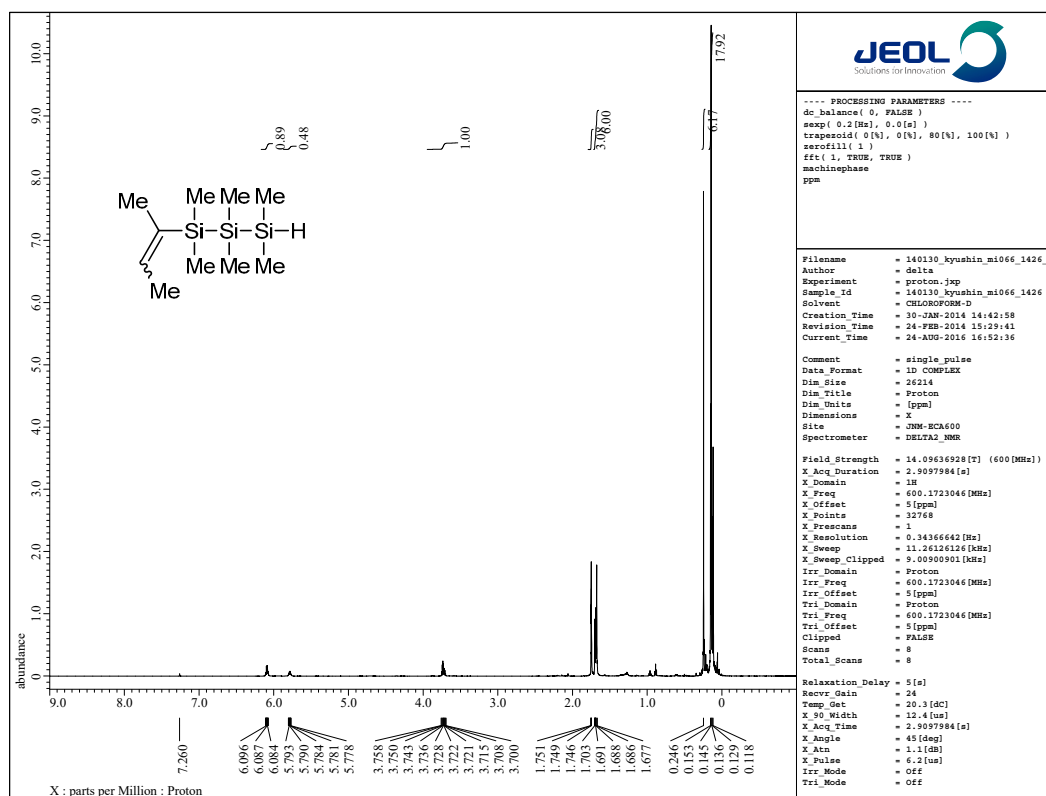
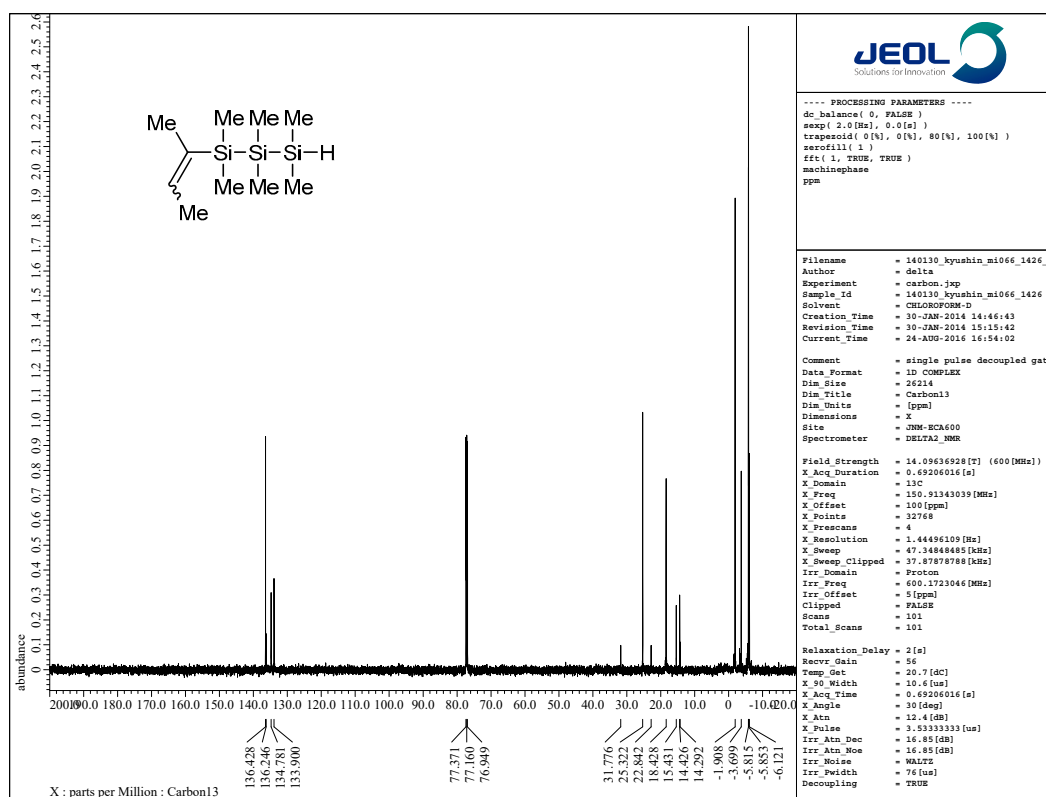


Figure S25. Mass spectrum of 8 (EI, 70 eV).

Figure S26. ¹H NMR spectrum of **9** in CDCl₃ at room temperature.Figure S27. ¹³C NMR spectrum of **9** in CDCl₃ at room temperature.

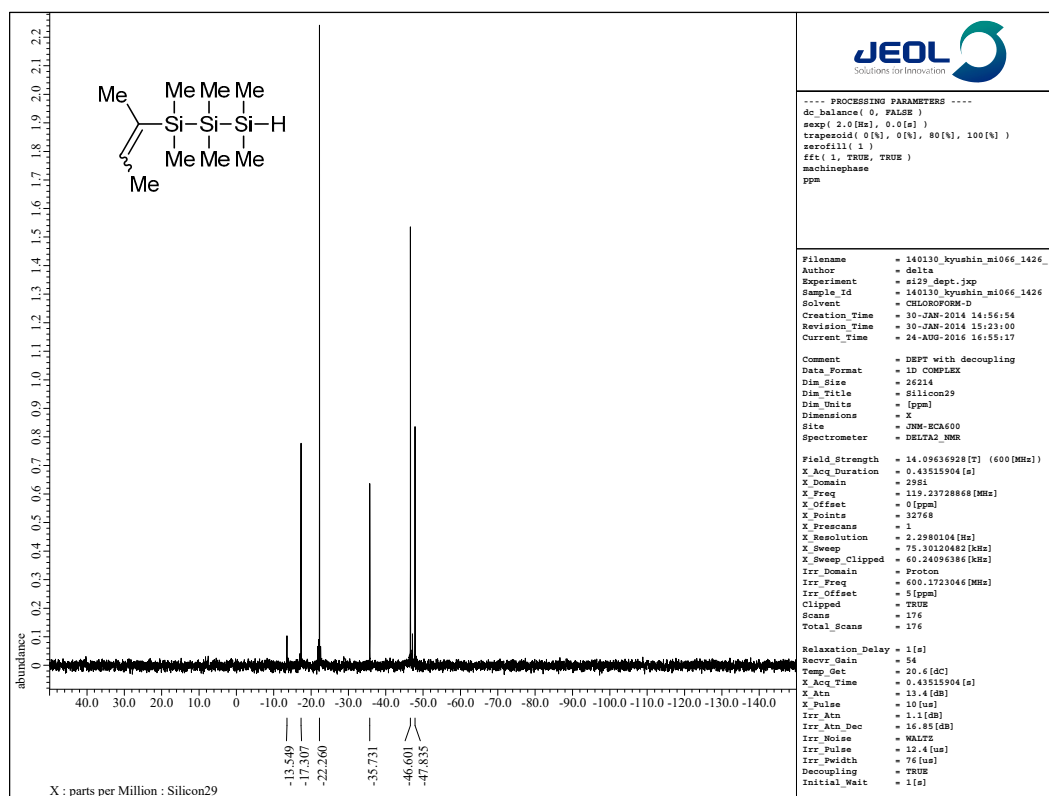
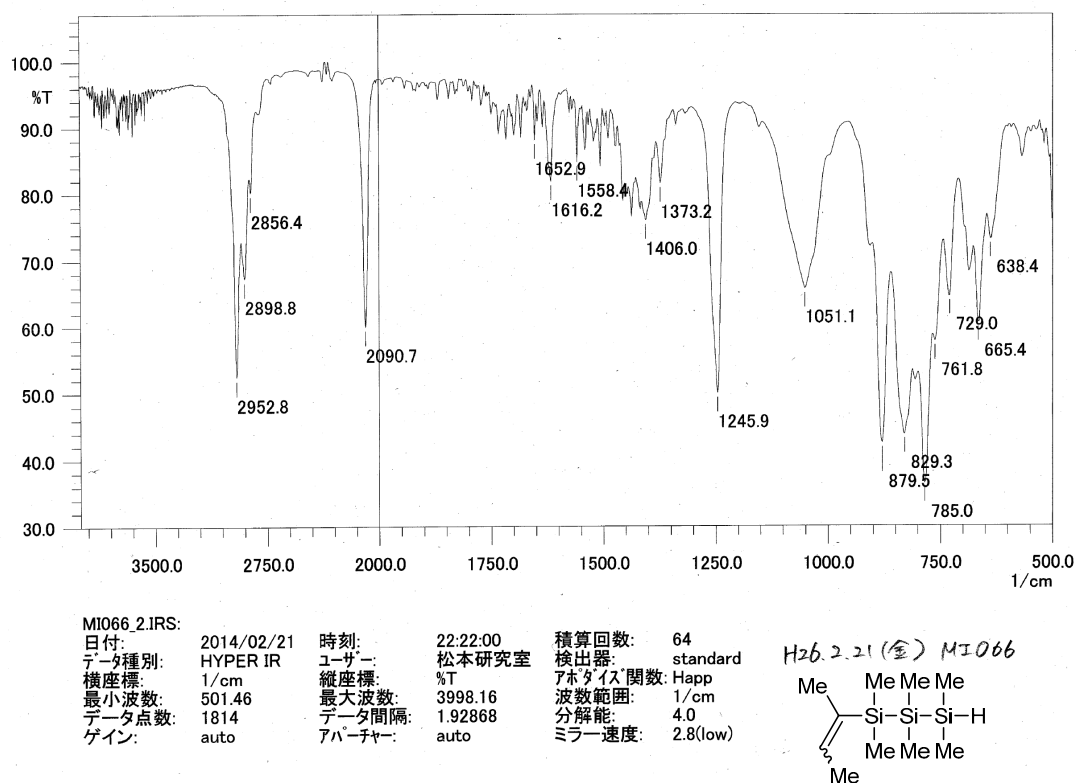
Figure S28. ^{29}Si NMR spectrum of 9 in CDCl_3 at room temperature.

Figure S29. IR spectrum of 9 (NaCl).

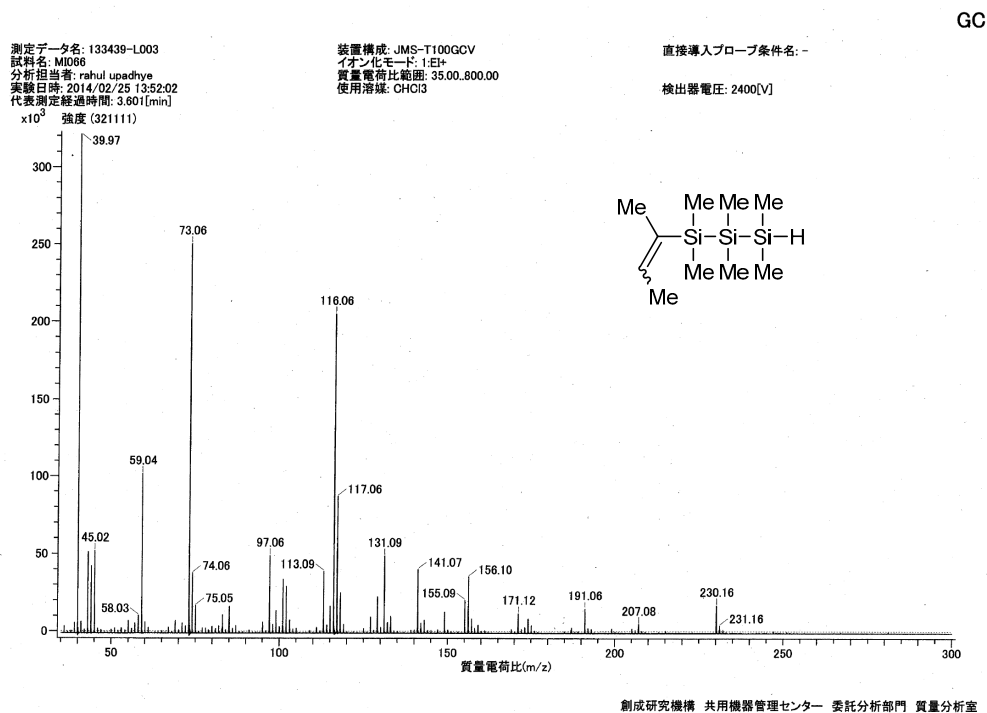
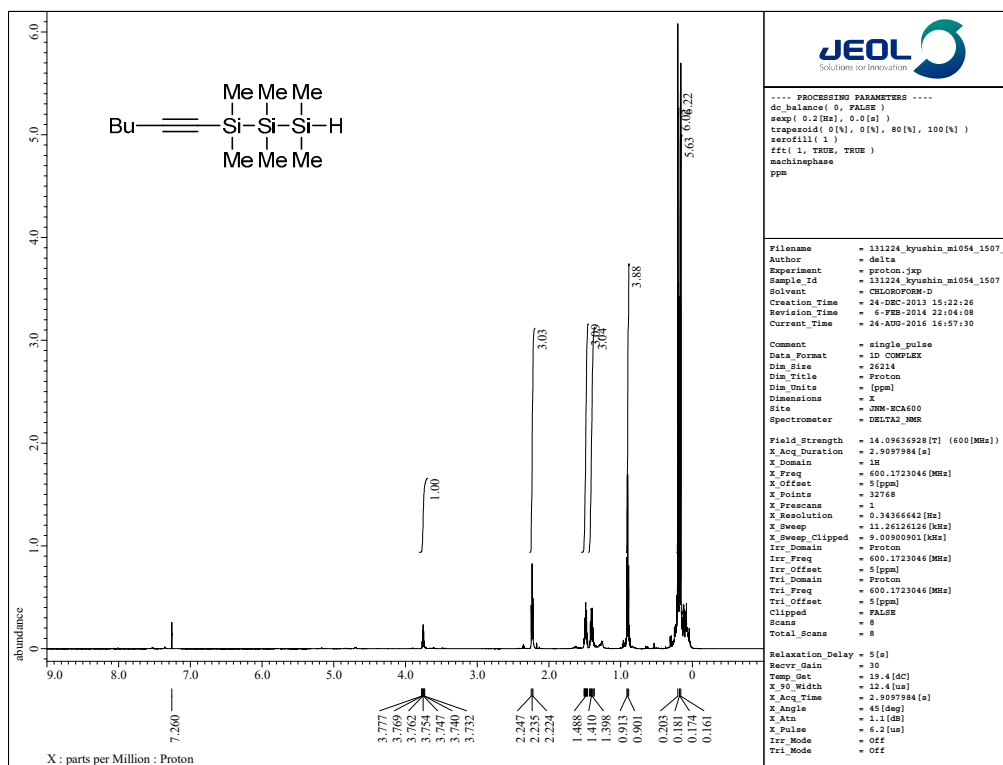
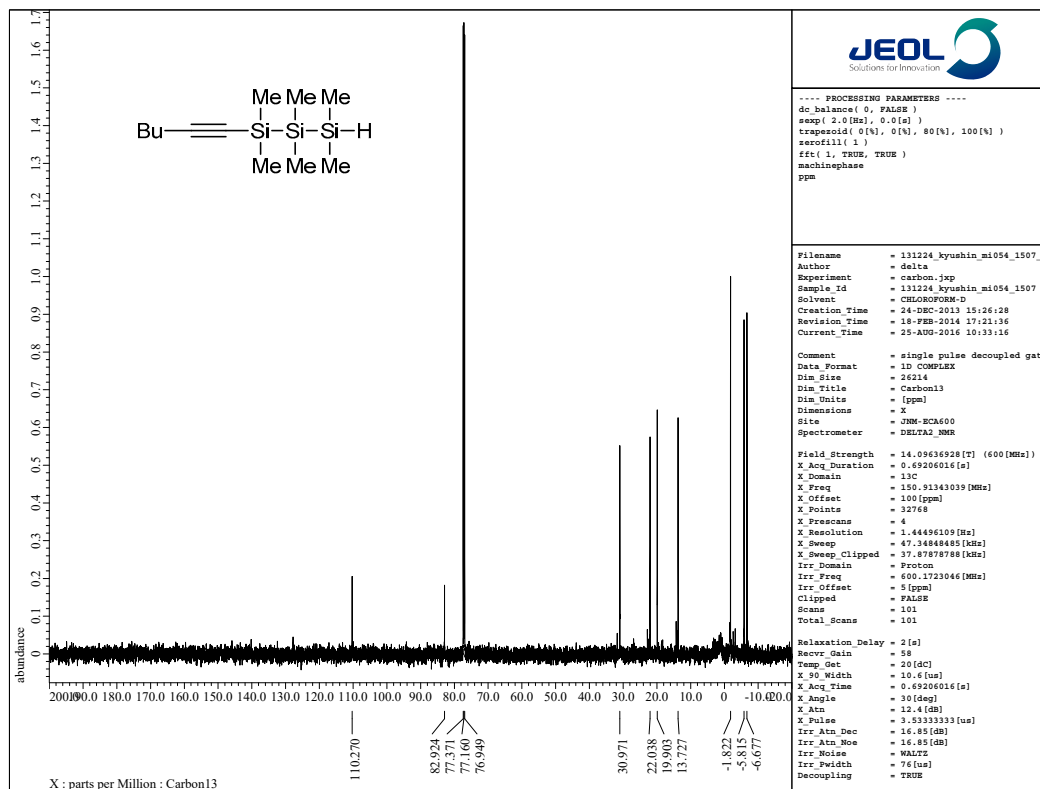
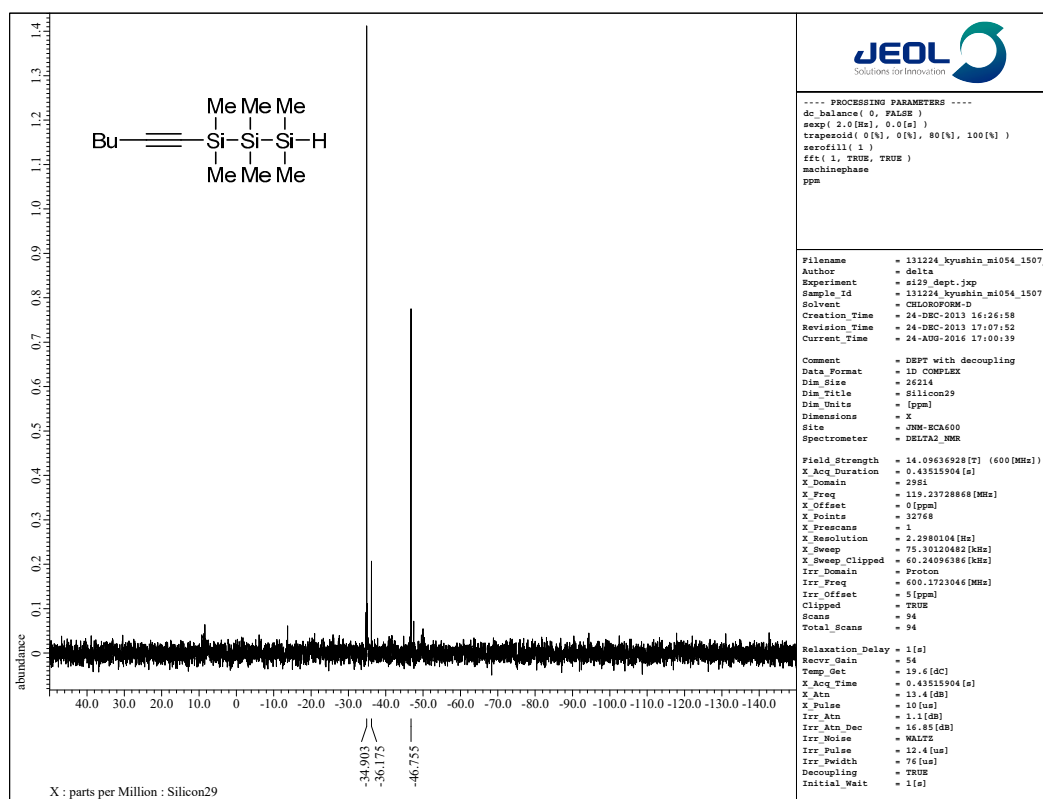


Figure S30. Mass spectrum of 9 (EI, 70 eV)

Figure S31. ¹H NMR spectrum of 10 in CDCl₃ at room temperature.

Figure S32. ¹³C NMR spectrum of **10** in CDCl₃ at room temperature.Figure S33. ²⁹Si NMR spectrum of **10** in CDCl₃ at room temperature.

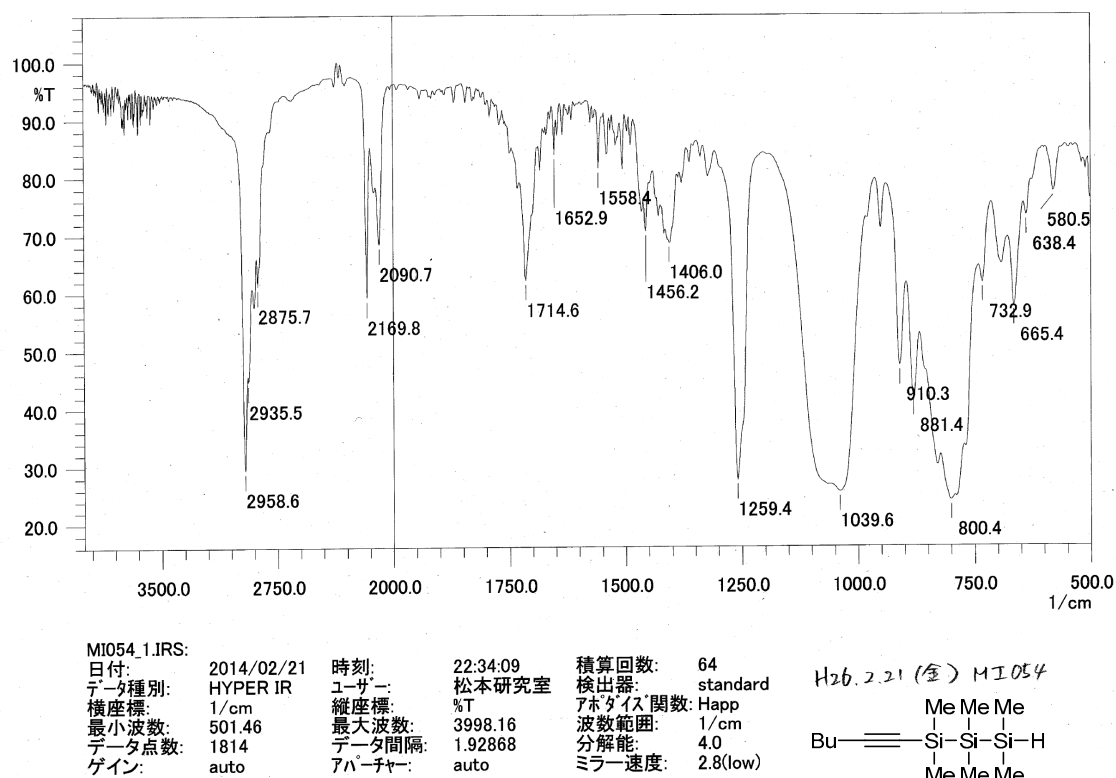


Figure S34. IR spectrum of 10 (NaCl).

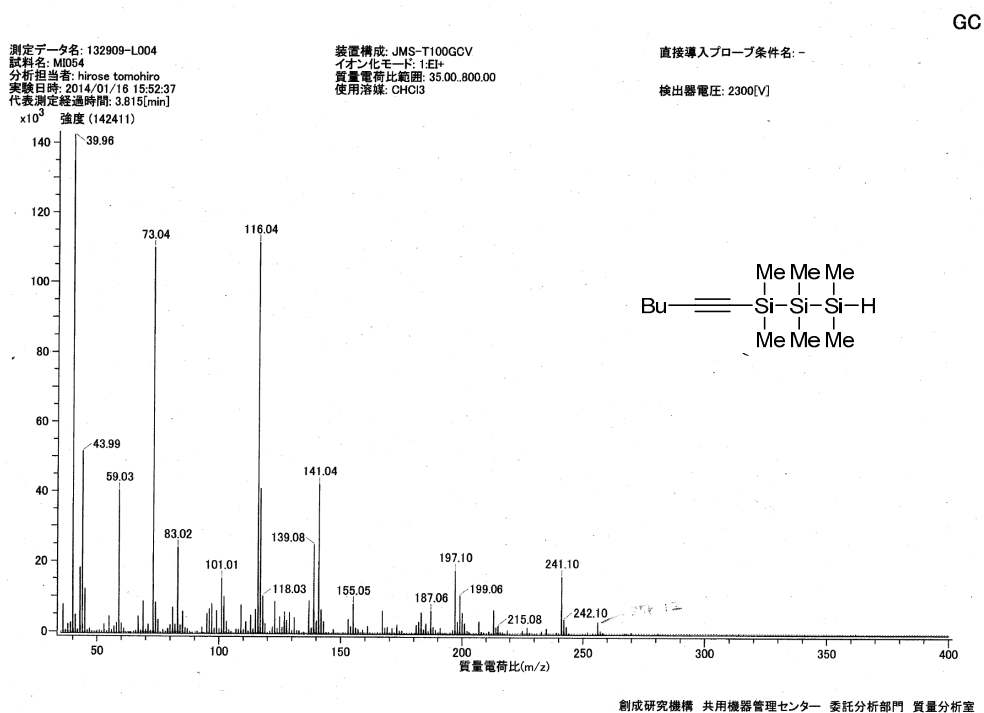
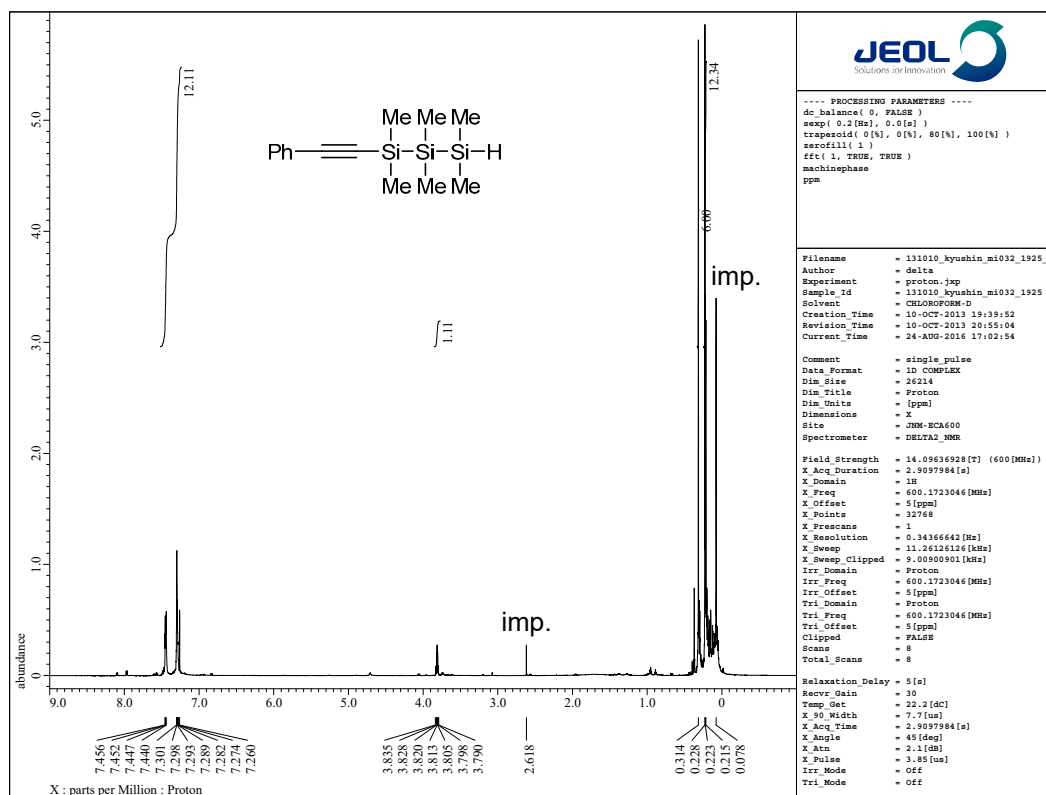
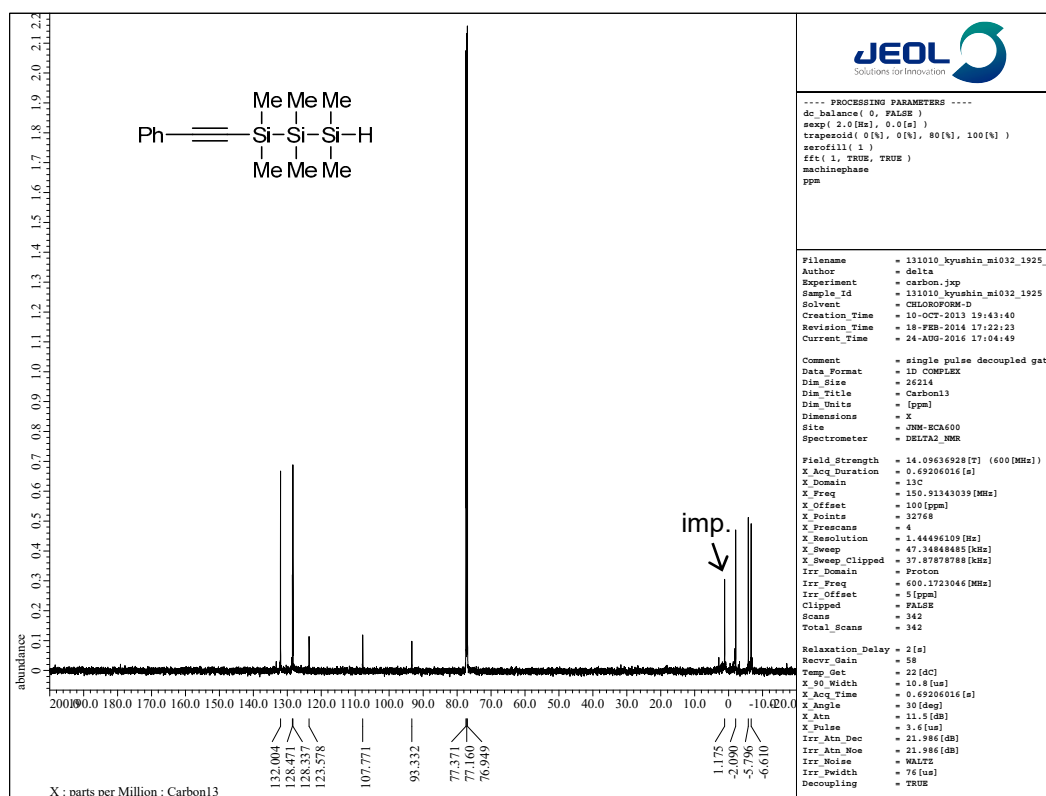


Figure S35. Mass spectrum of 10 (EI, 70 eV).

Figure S36. ^1H NMR spectrum of 11 in CDCl_3 at room temperature.Figure S37. ^{13}C NMR spectrum of 11 in CDCl_3 at room temperature.

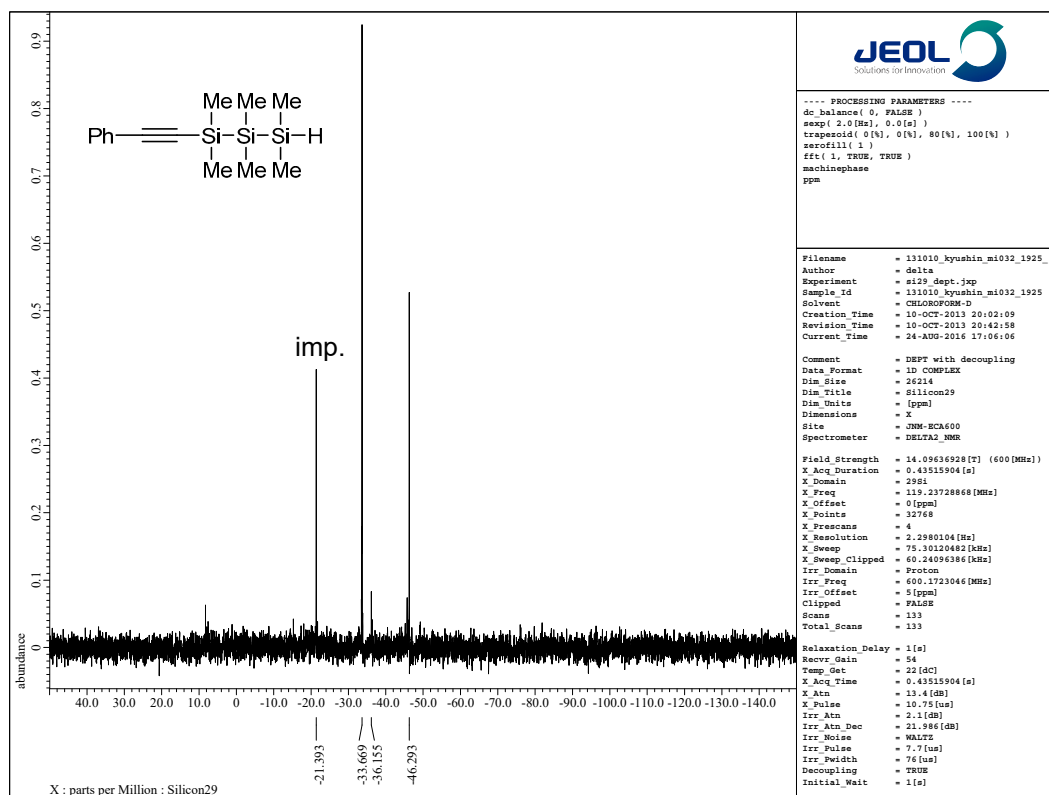
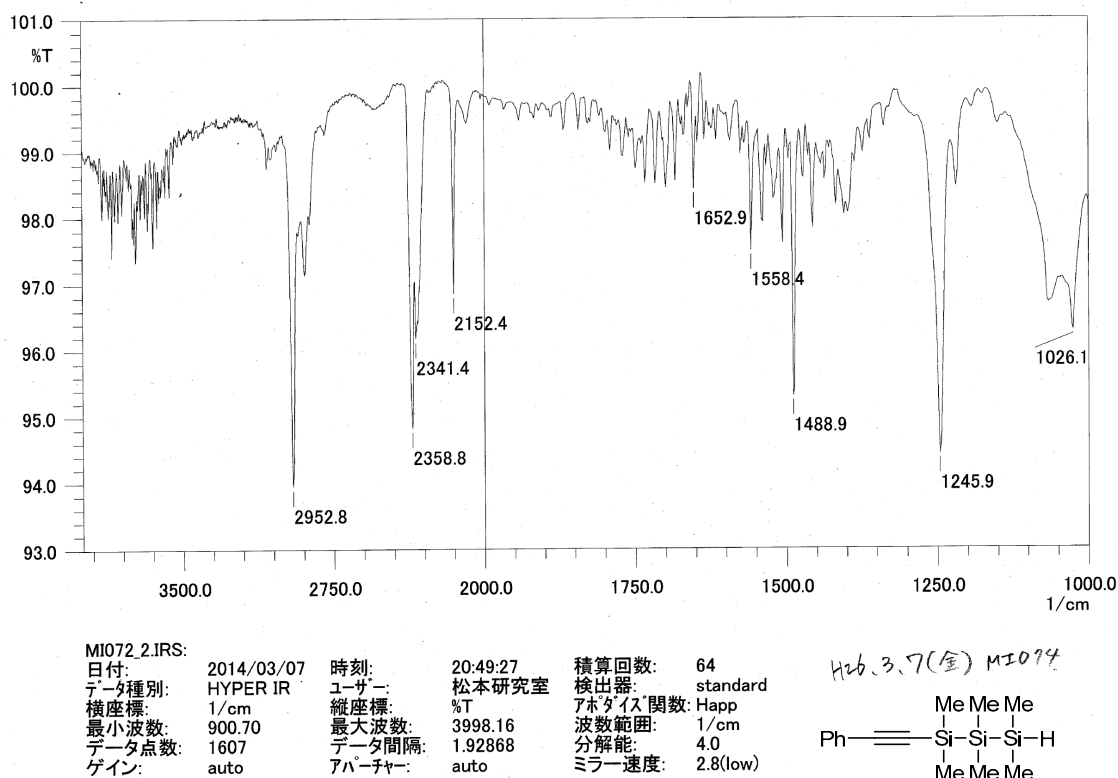
Figure S38. ^{29}Si NMR spectrum of 11 in CDCl_3 at room temperature.

Figure S39. IR spectrum of 11 (NaCl).

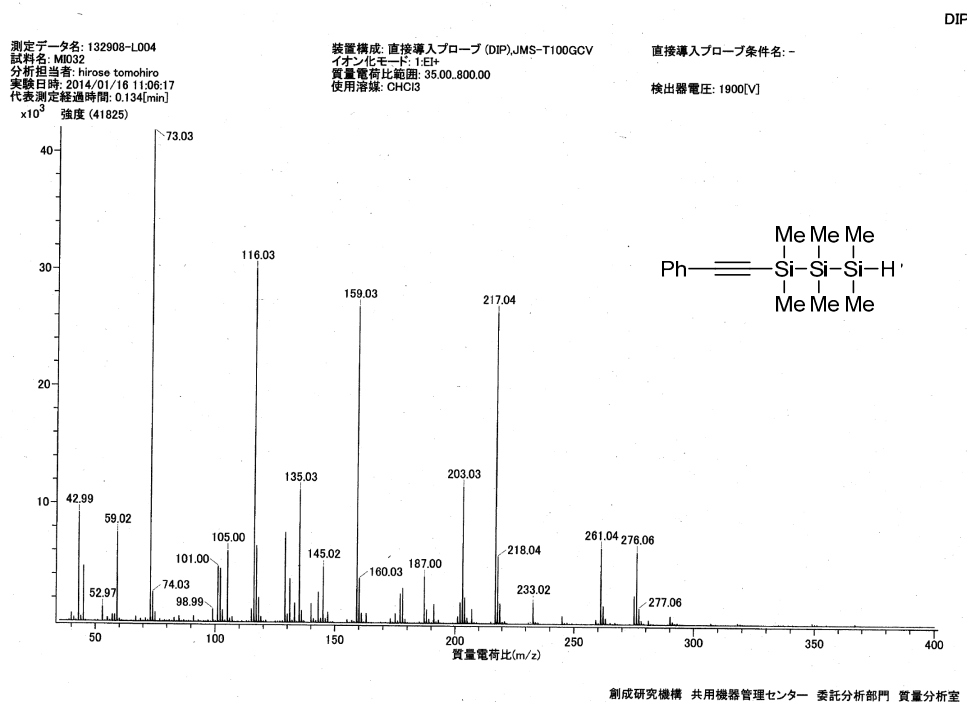
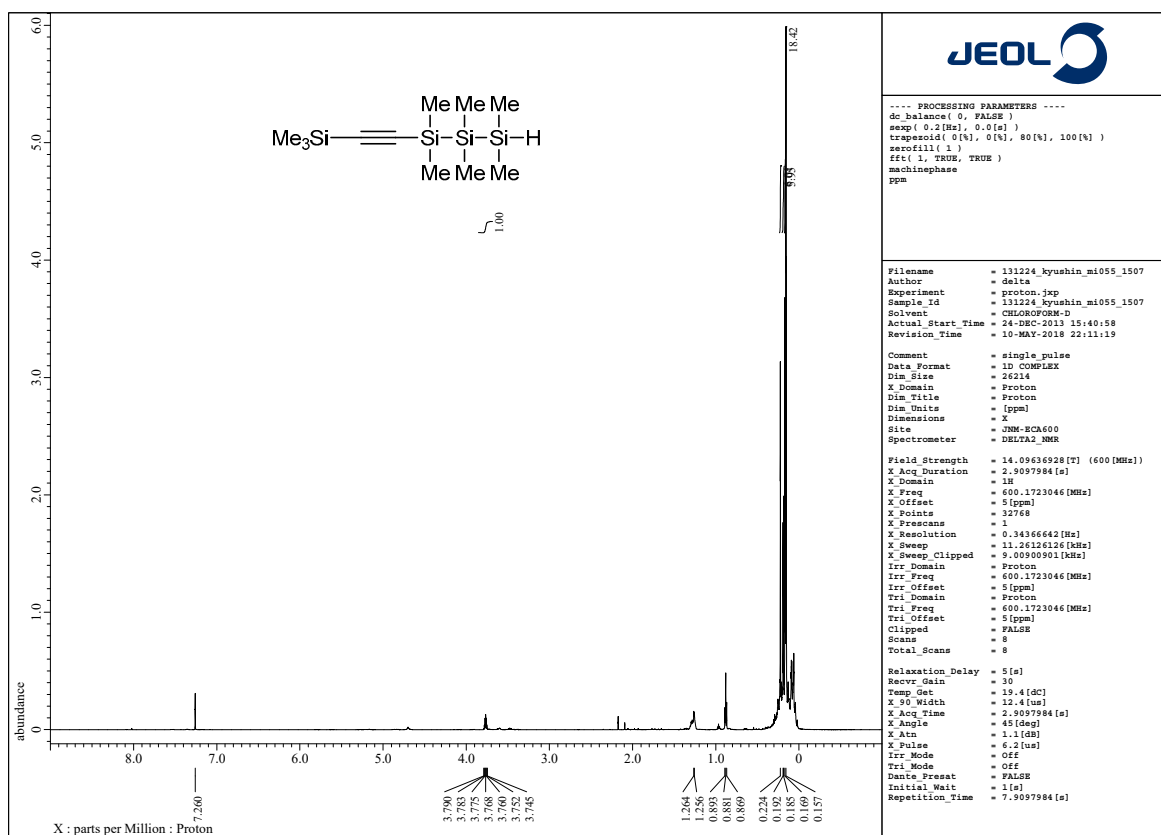
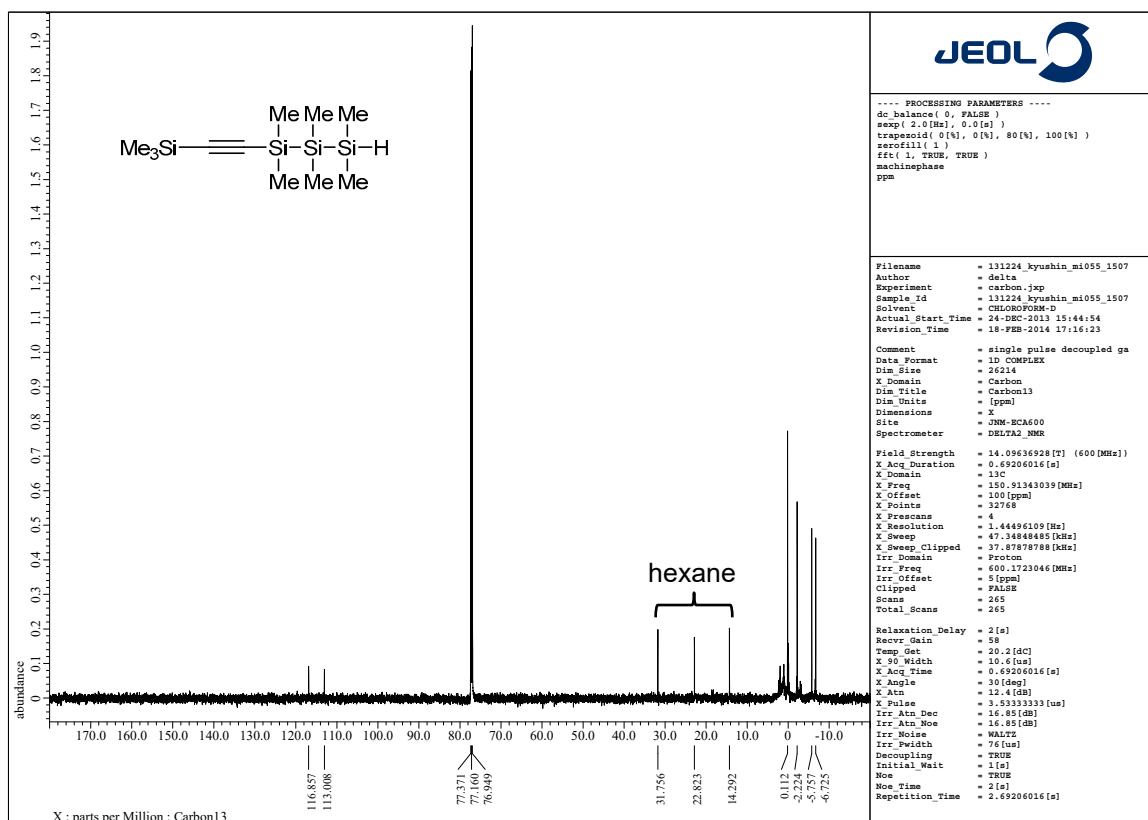
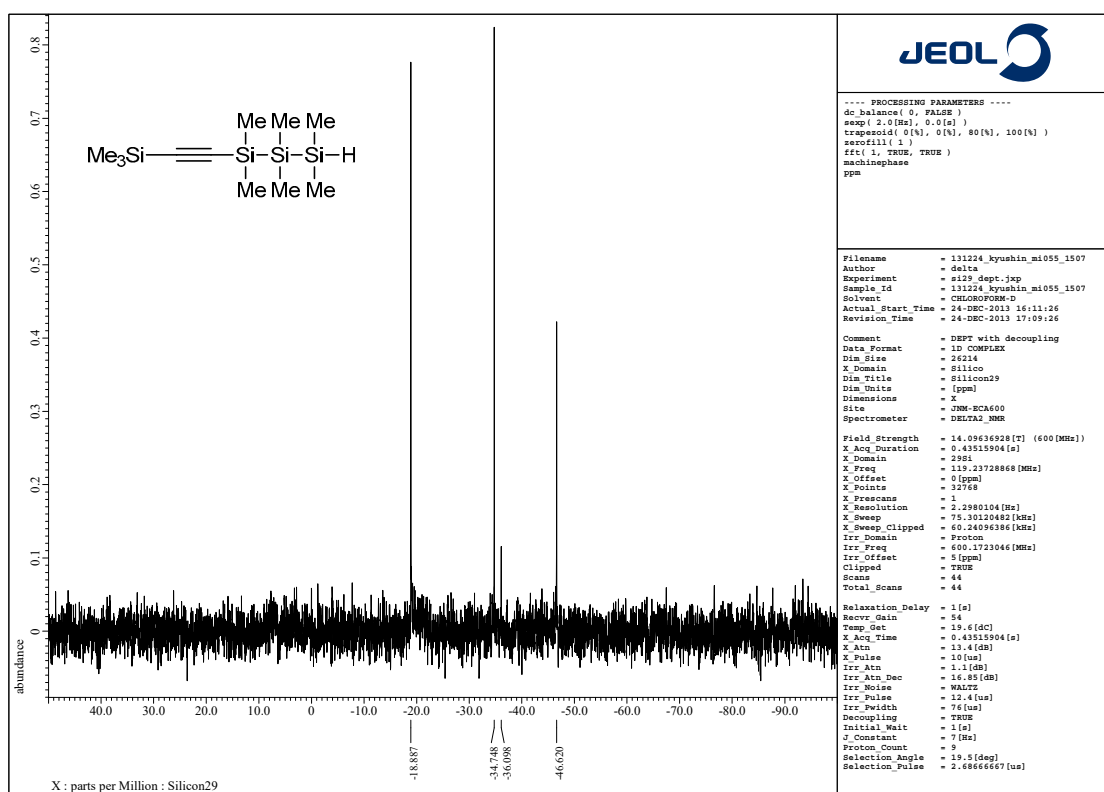


Figure S40. Mass spectrum of 11 (EI, 70 eV).

Figure S41. ¹H NMR spectrum of 12 in CDCl₃ at room temperature.

Figure S42. ^{13}C NMR spectrum of 12 in CDCl_3 at room temperature.Figure S43. ^{29}Si NMR spectrum of 12 in CDCl_3 at room temperature.

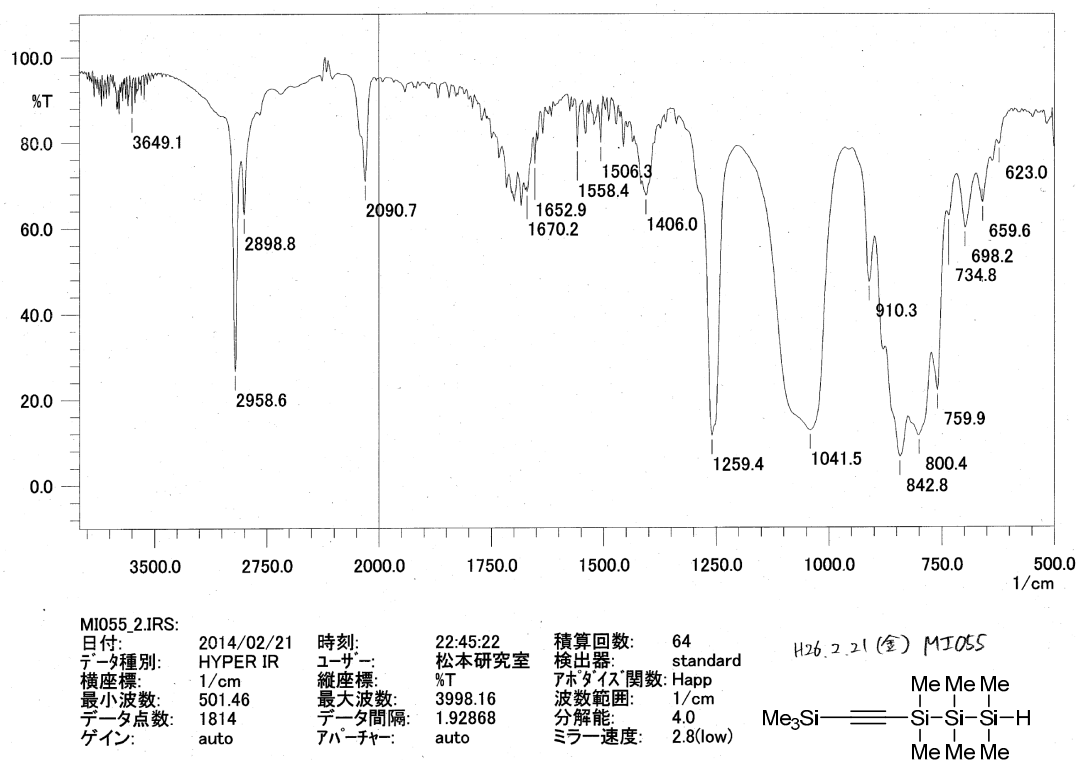


Figure S44. IR spectrum of 12 (NaCl).

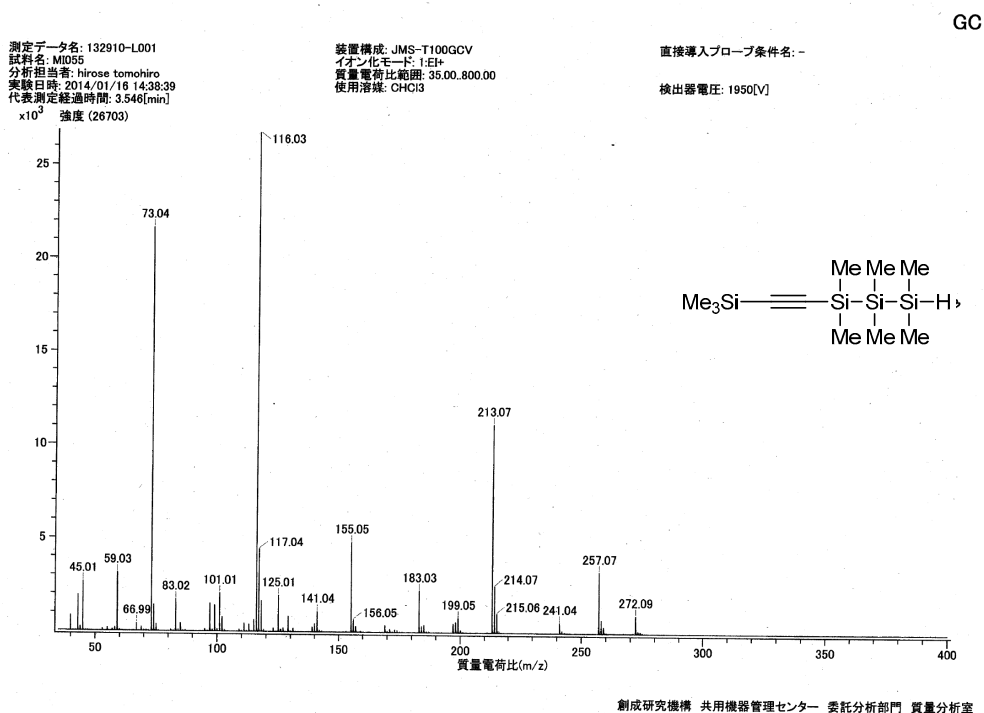
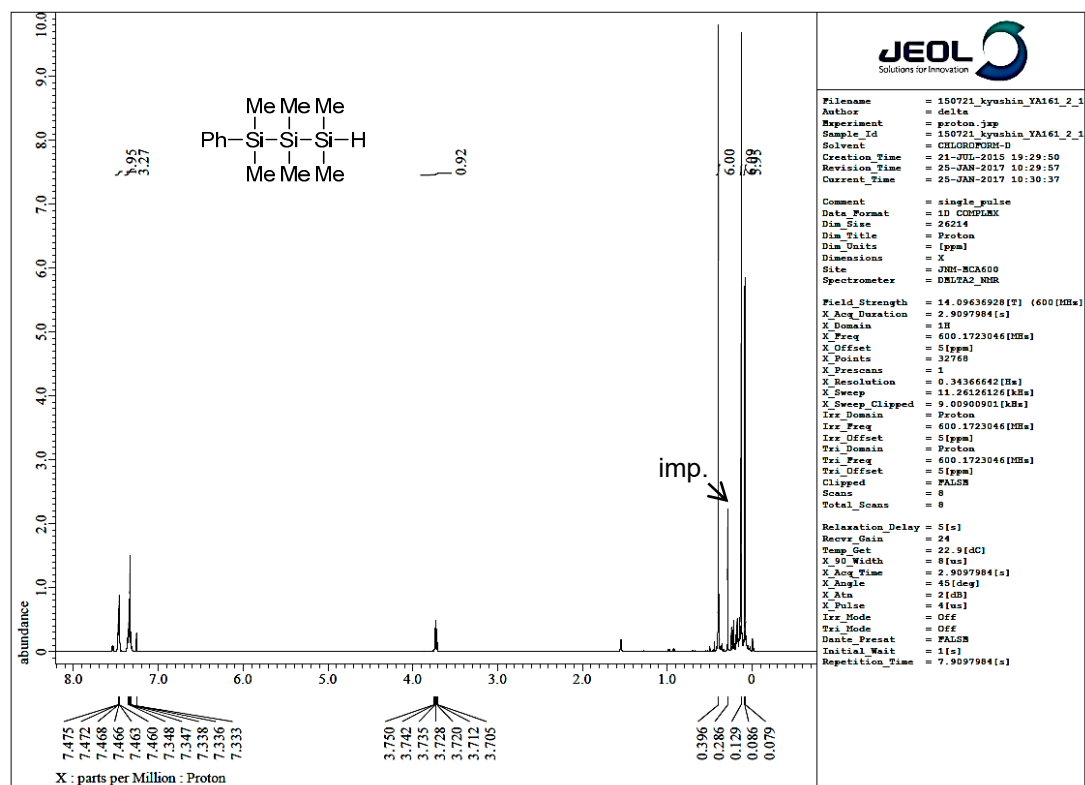
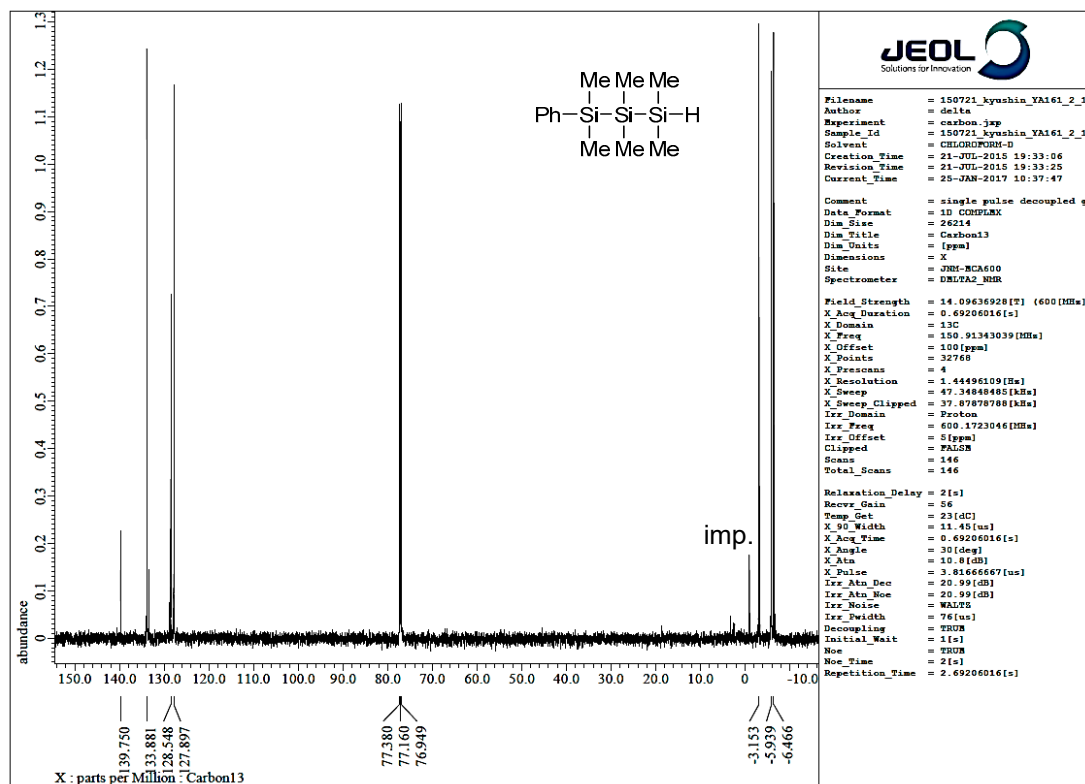
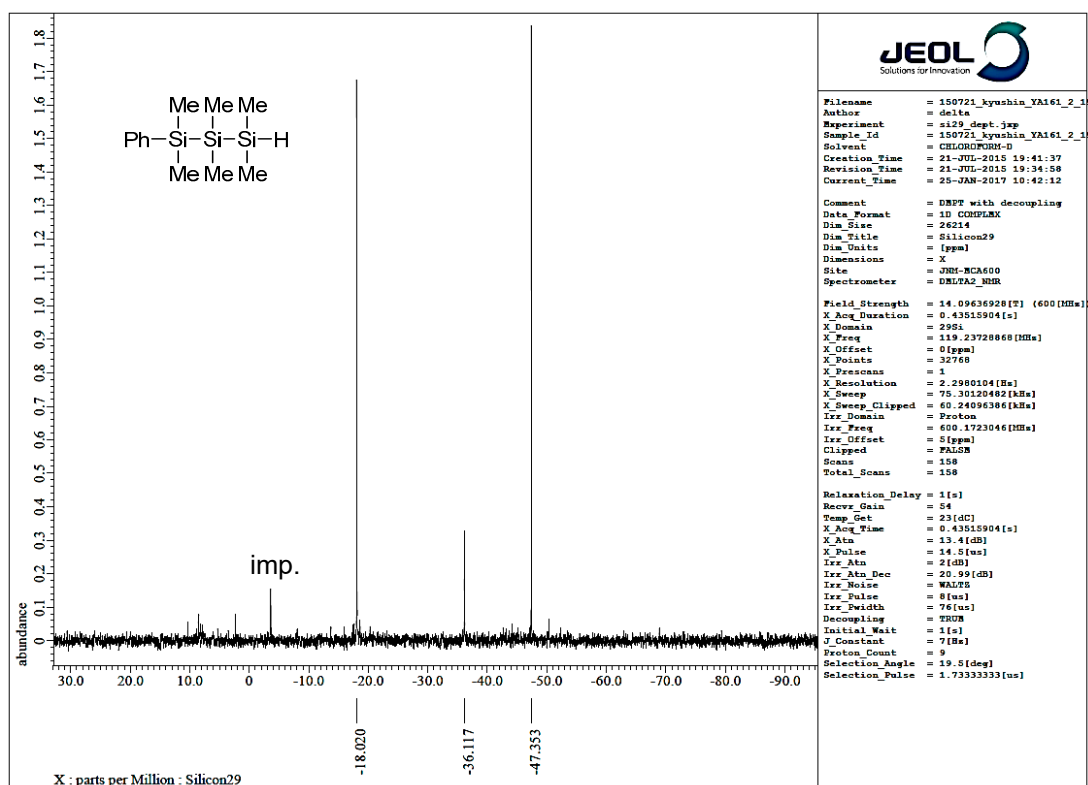
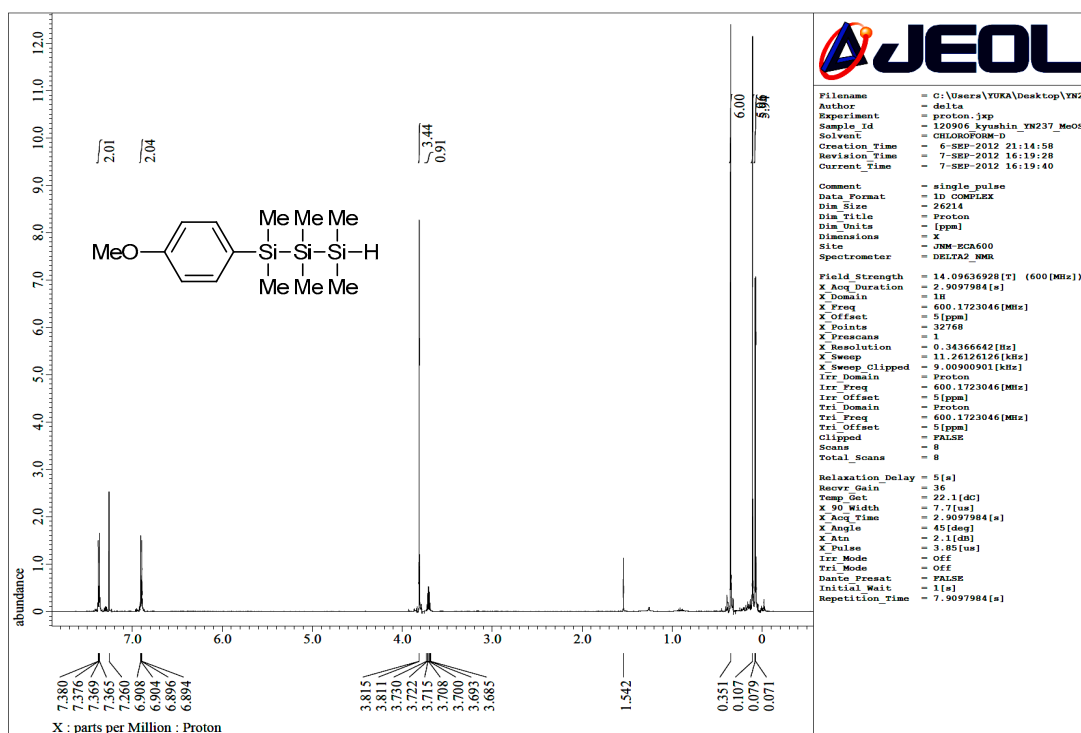
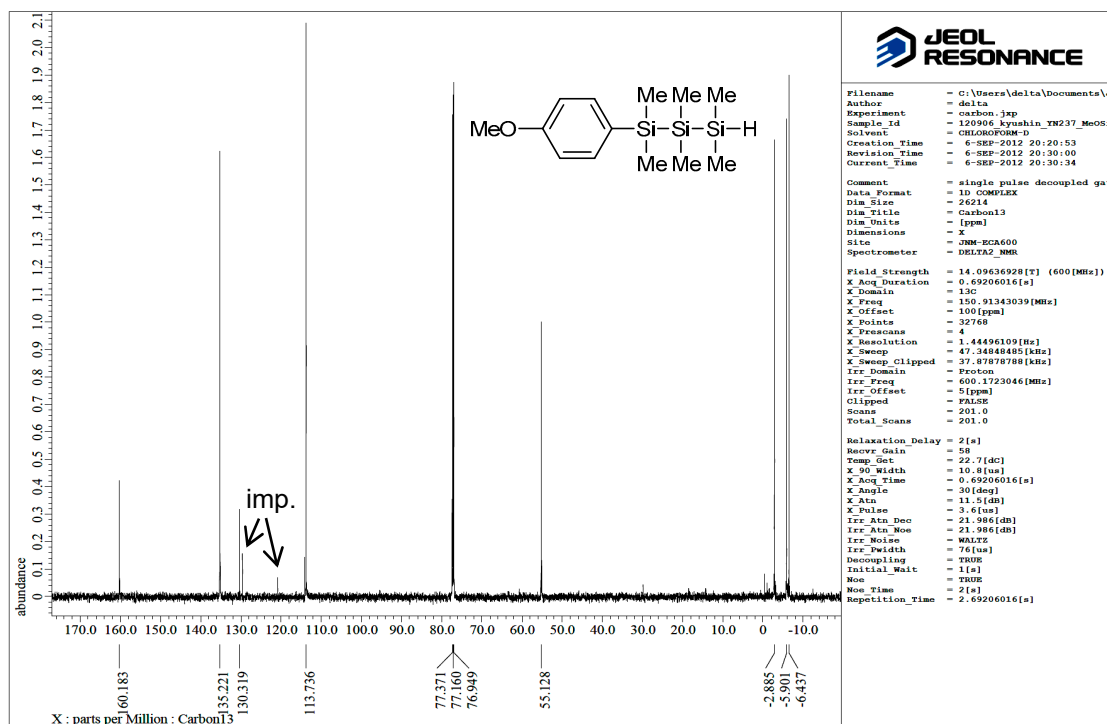
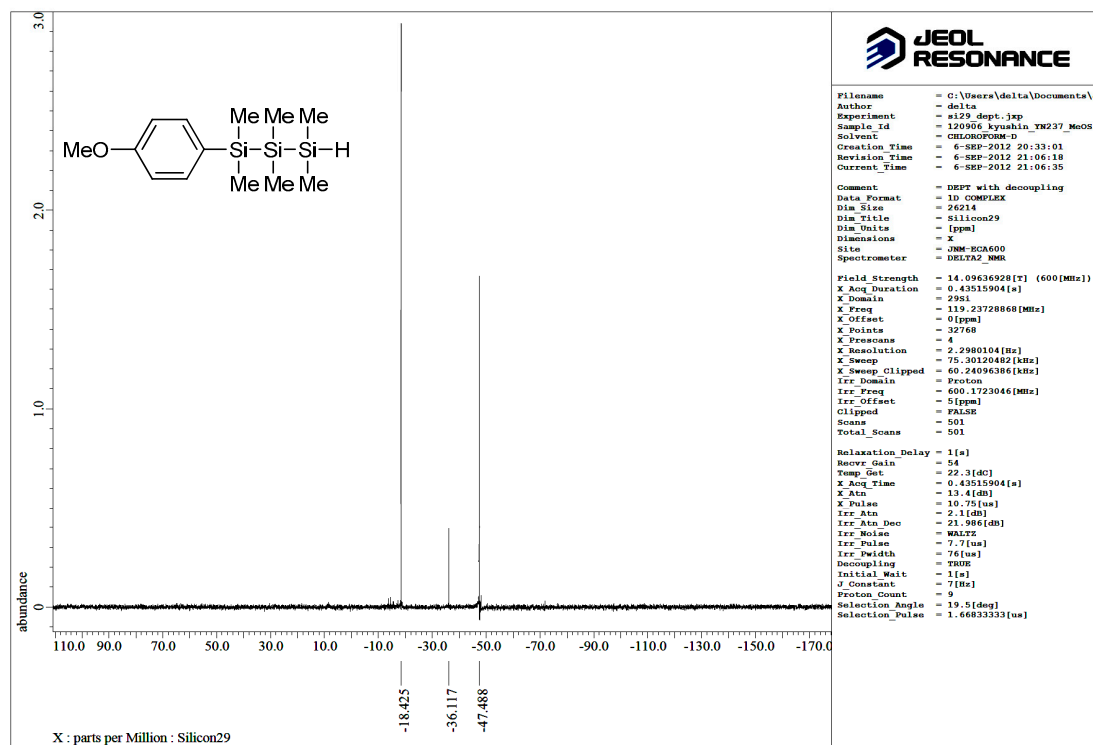


Figure S45. Mass spectrum of 12 (EI, 70 eV).

Figure S46. ^1H NMR spectrum of **13** in CDCl_3 at room temperature.Figure S47. ^{13}C NMR spectrum of **13** in CDCl_3 at room temperature.

Figure S48. ^{29}Si NMR spectrum of 13 in CDCl_3 at room temperature.Figure S49. ^1H NMR spectrum of 14 in CDCl_3 at room temperature.

Figure S50. ^{13}C NMR spectrum of 14 in CDCl_3 at room temperature.Figure S51. ^{29}Si NMR spectrum of 14 in CDCl_3 at room temperature.

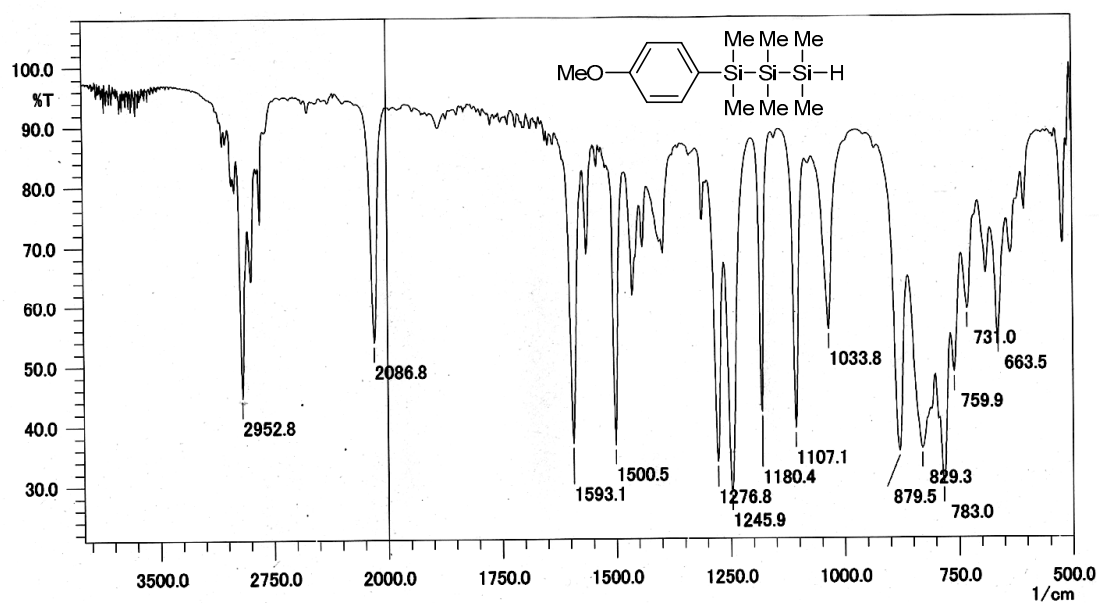


Figure S52. IR spectrum of 14 (NaCl).

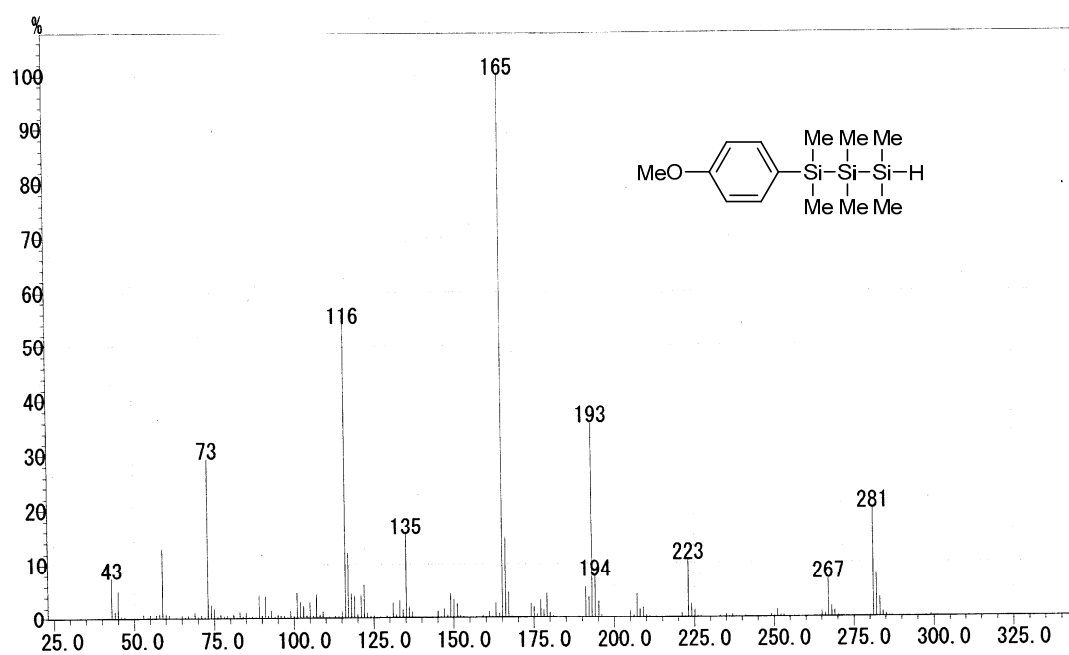


Figure S53. Mass spectrum of 14 (EI, 70 eV).

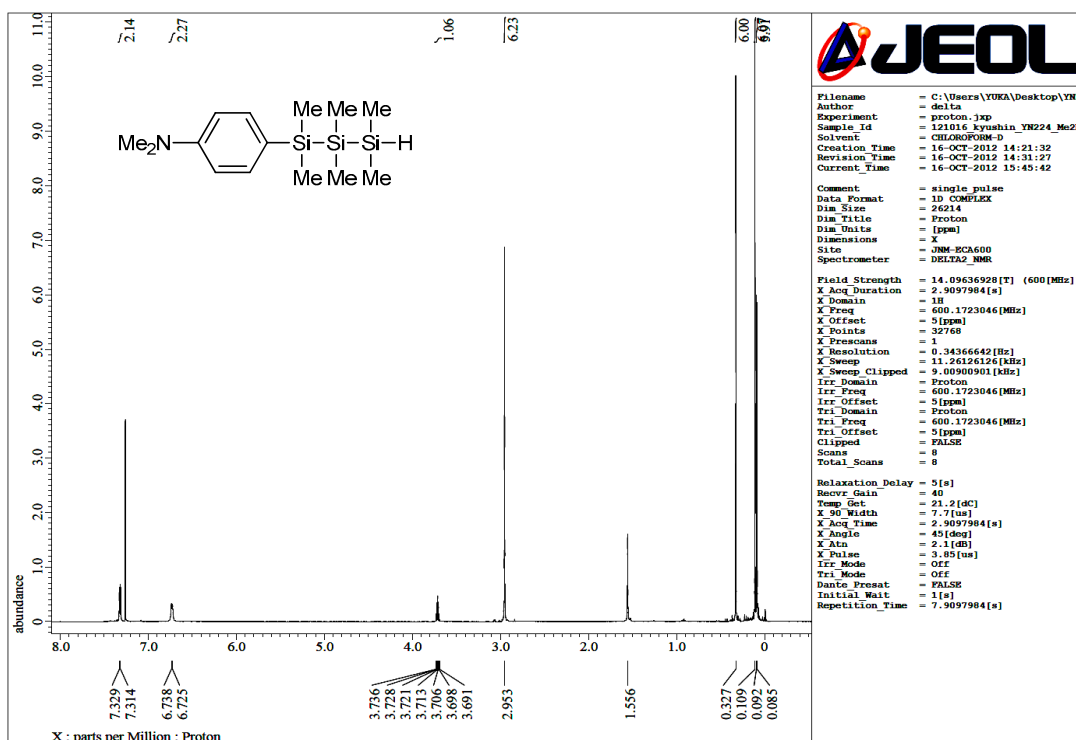


Figure S54. ^1H NMR spectrum of 15 in CDCl_3 at room temperature.

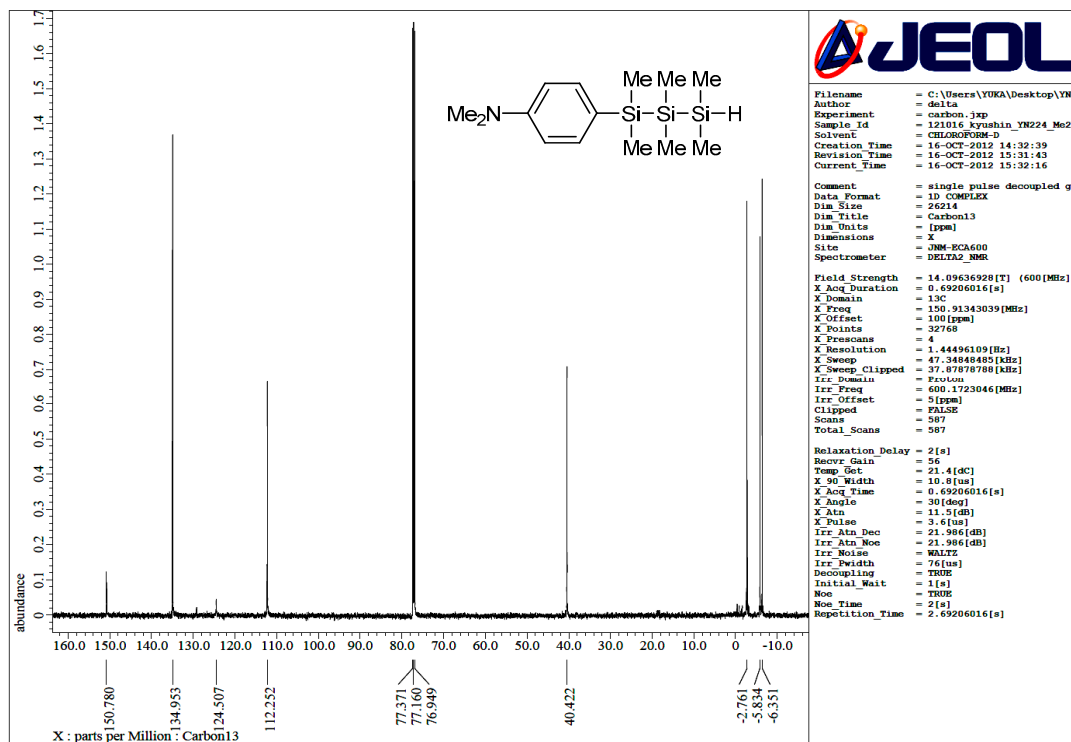


Figure S55. ^{13}C NMR spectrum of 15 in CDCl_3 at room temperature.

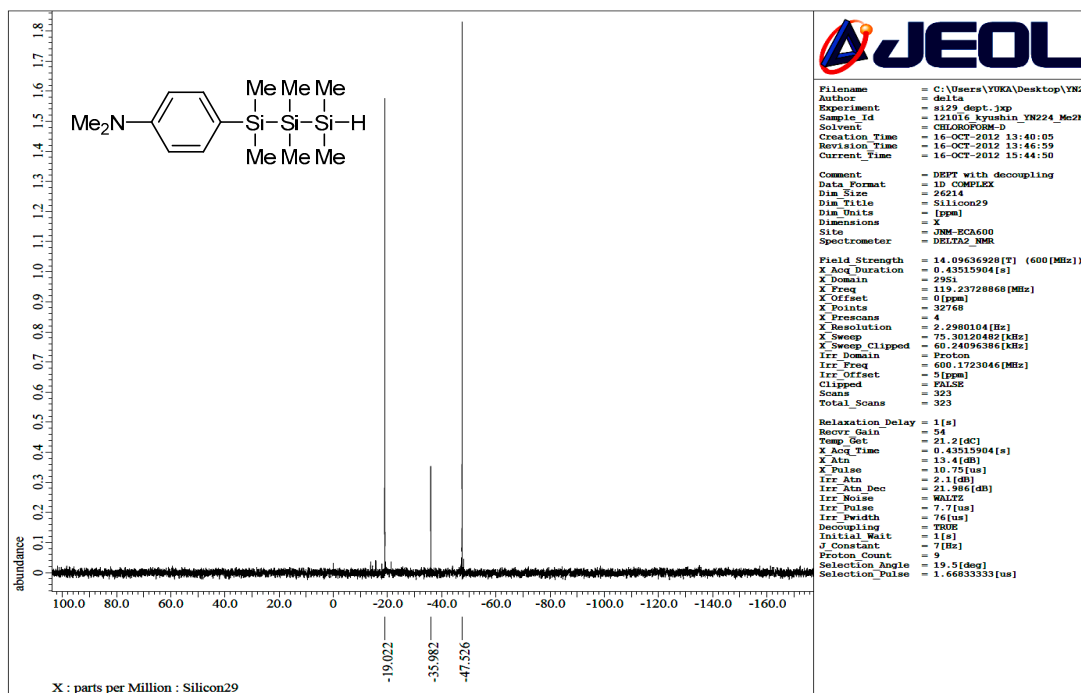


Figure S56. ^{29}Si NMR spectrum of 15 in CDCl_3 at room temperature.

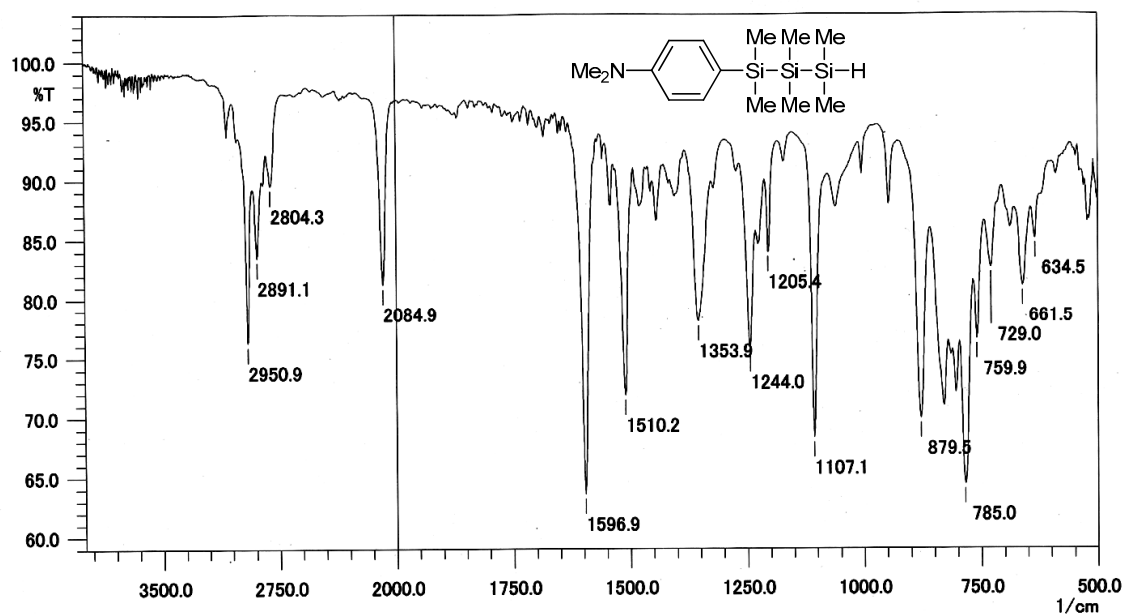


Figure S57. IR spectrum of 15 (NaCl).

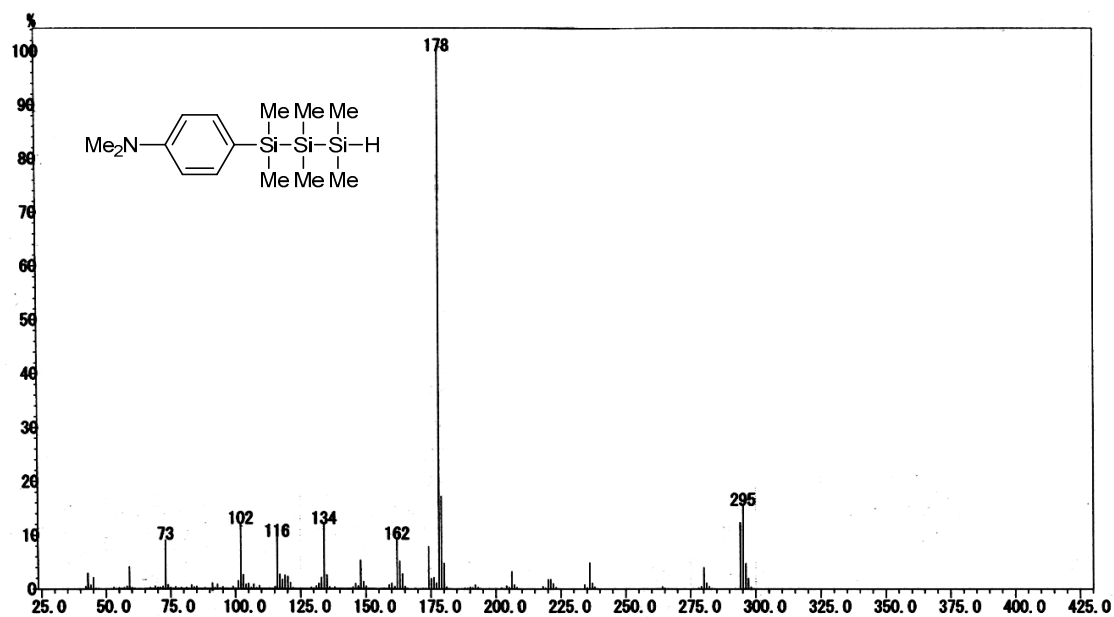
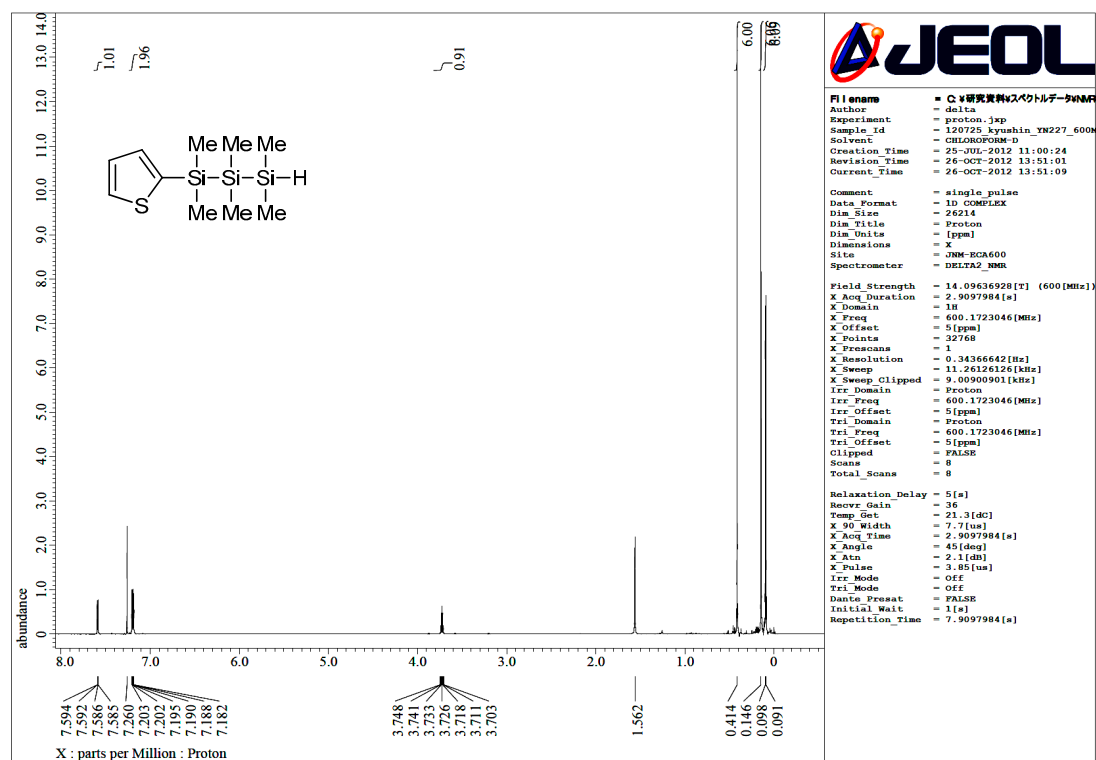
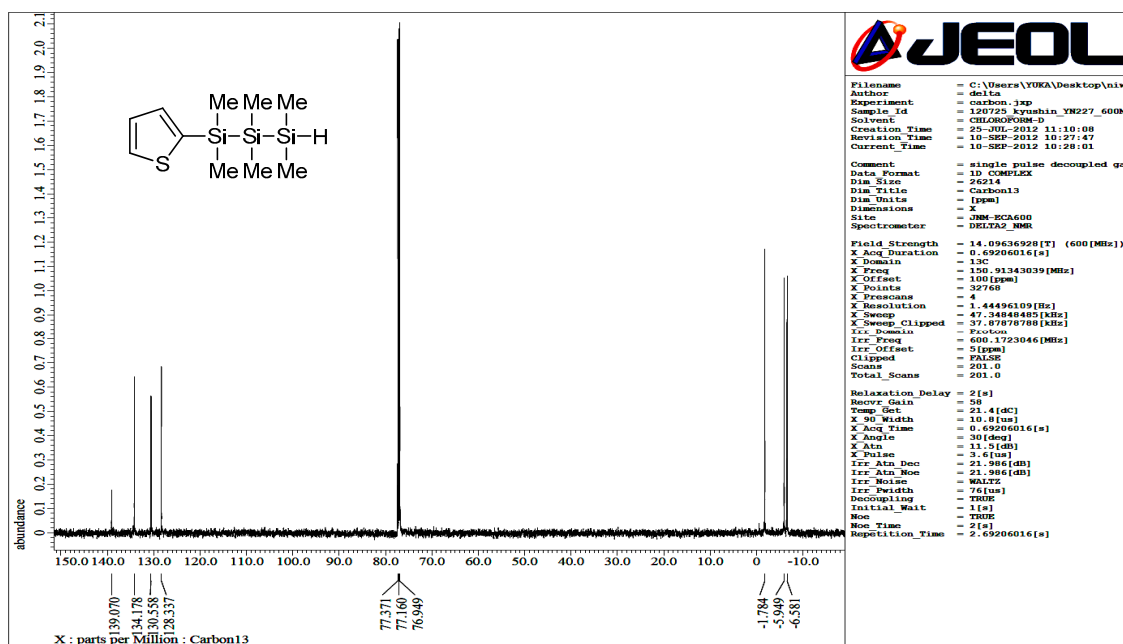
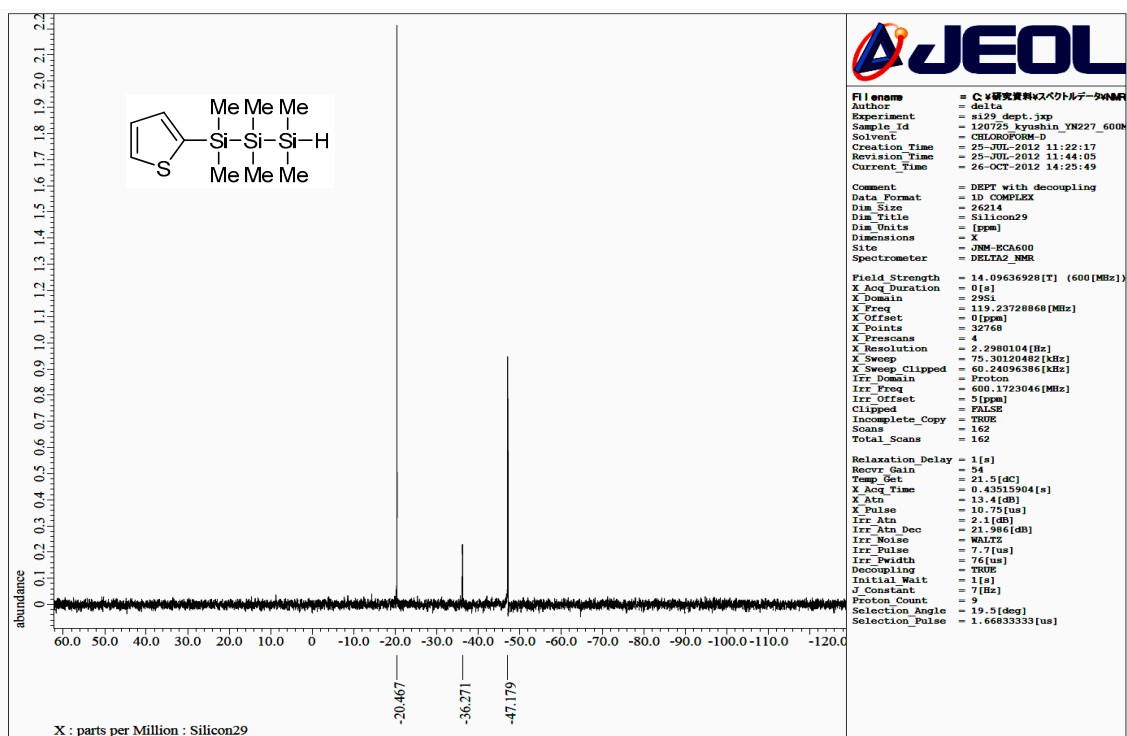


Figure S58. Mass spectrum of 15 (EI, 70 eV).

Figure S59. ¹H NMR spectrum of 16 in CDCl₃ at room temperature.

Figure S60. ¹³C NMR spectrum of 16 in CDCl₃ at room temperature.Figure S61. ²⁹Si NMR spectrum of 16 in CDCl₃ at room temperature.

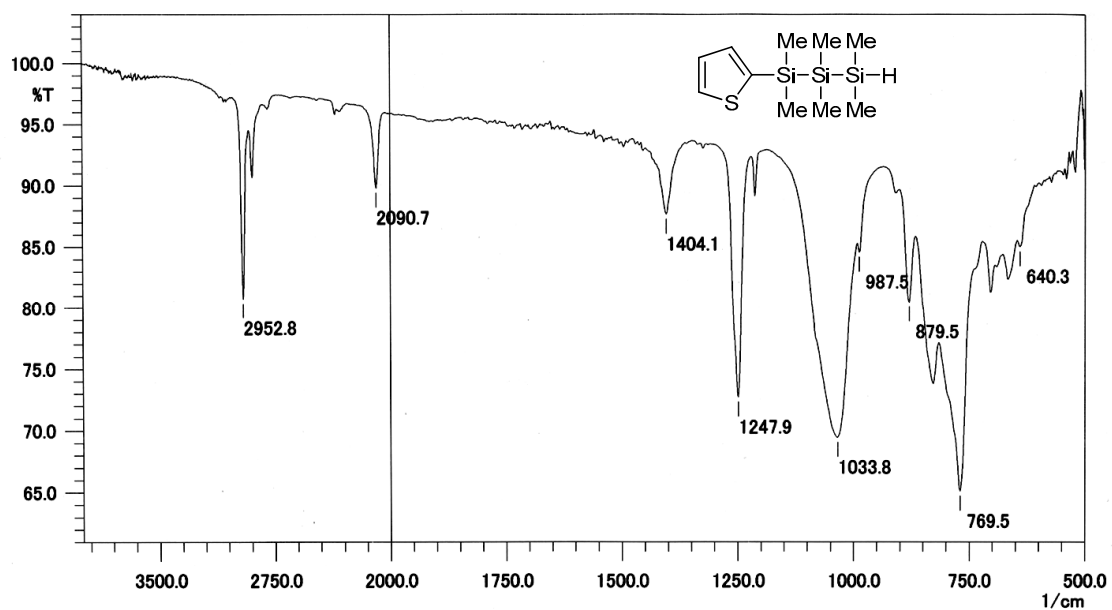


Figure S62. IR spectrum of 16 (NaCl).

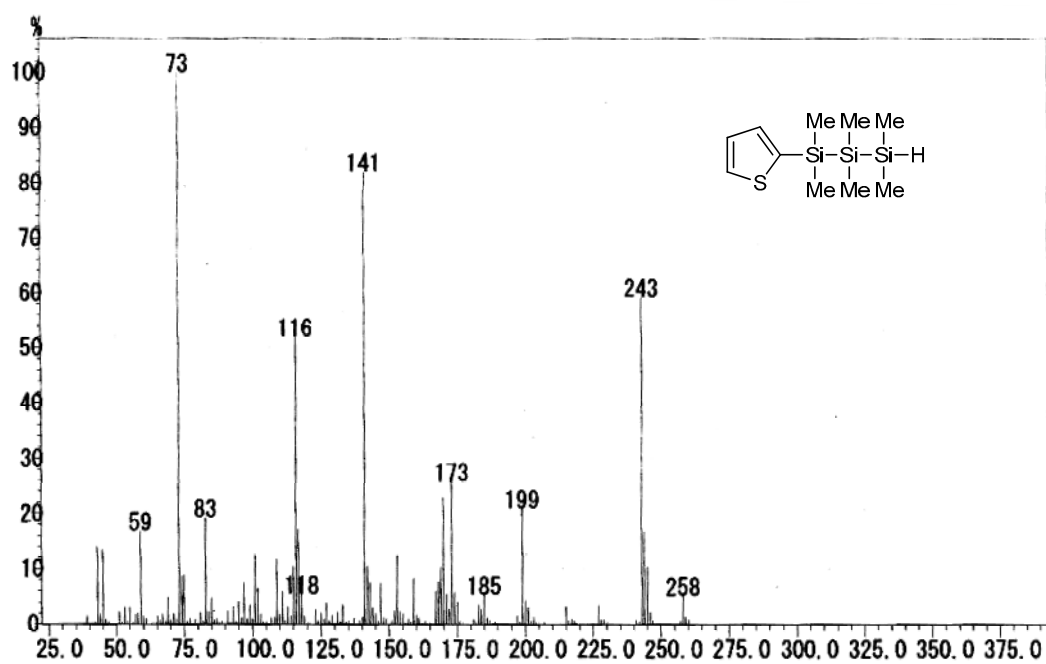
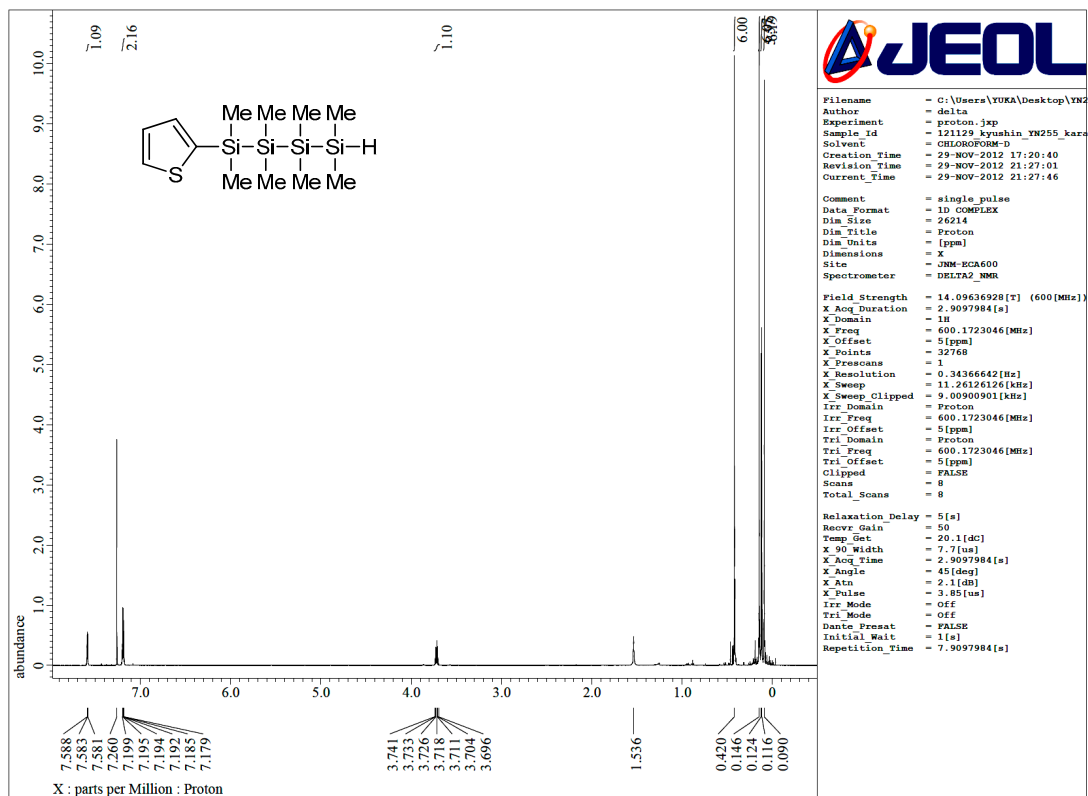
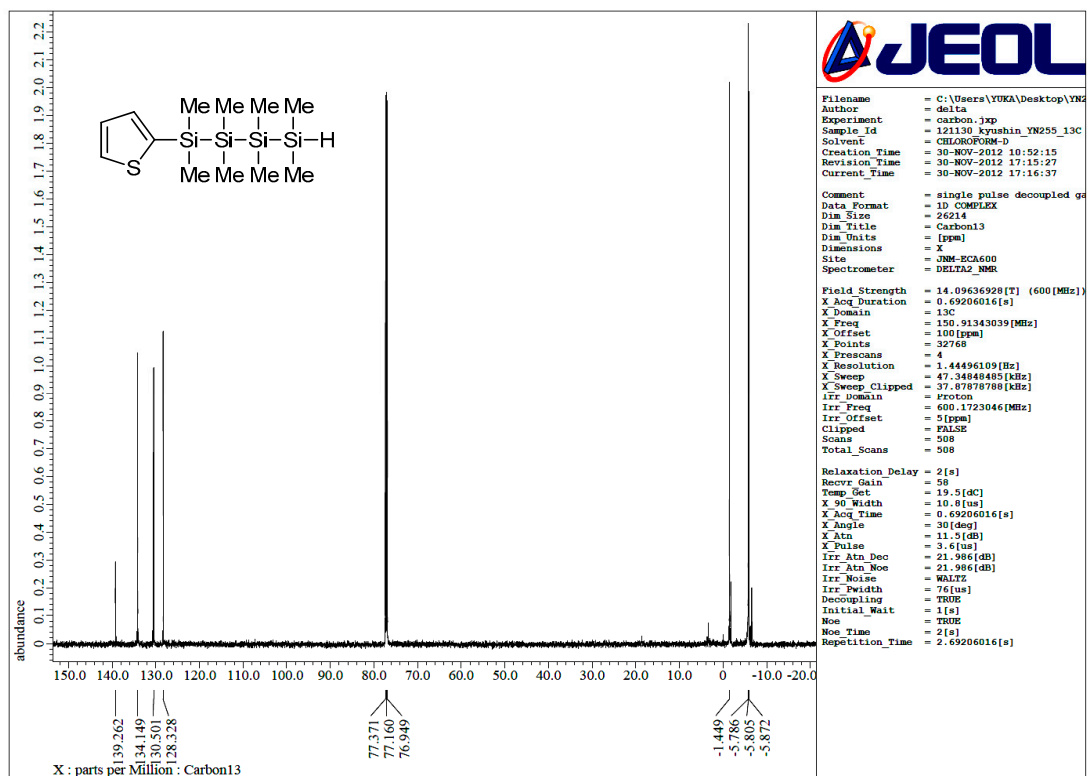


Figure S63. Mass spectrum of 16 (EI, 70 eV).

Figure S64. ¹H NMR spectrum of 17 in CDCl₃ at room temperature.Figure S65. ¹³C NMR spectrum of 17 in CDCl₃ at room temperature.

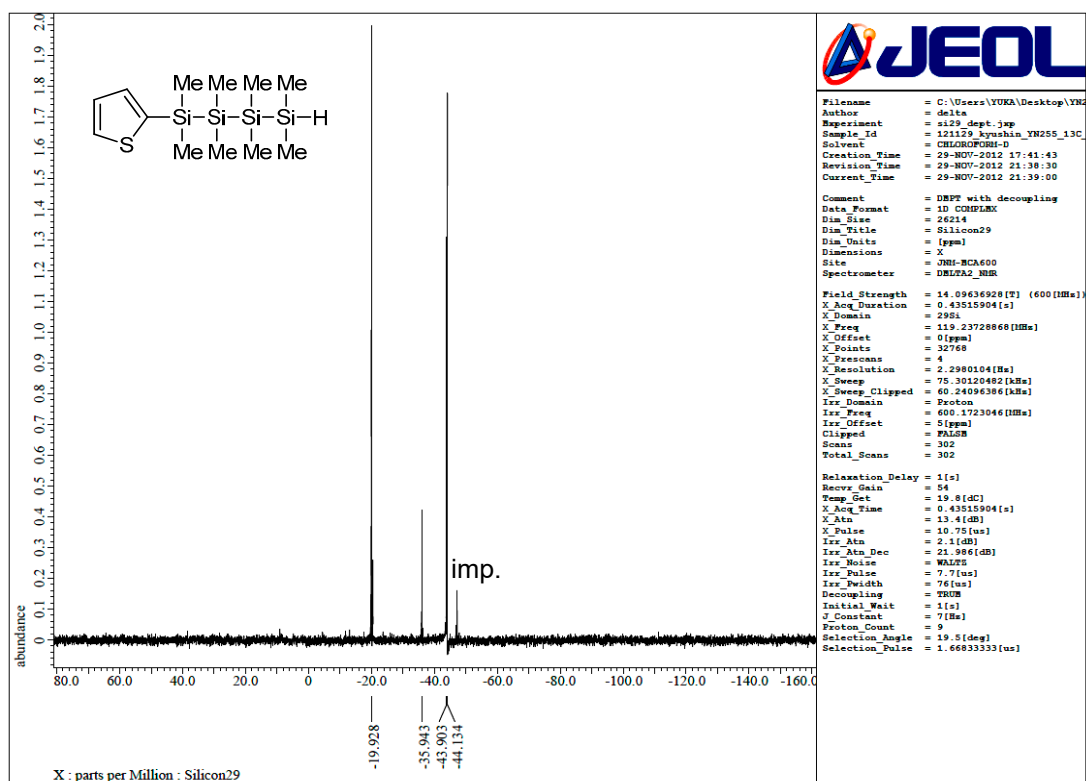


Figure S66. ^{29}Si NMR spectrum of 17 in CDCl_3 at room temperature.

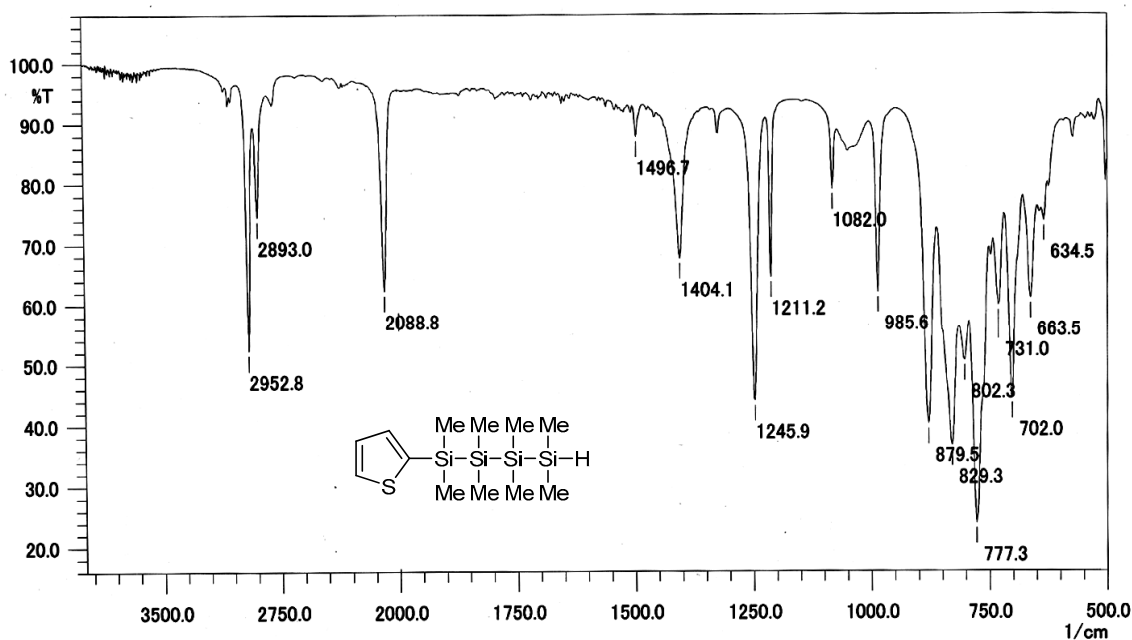


Figure S67. IR spectrum of 17 (NaCl).

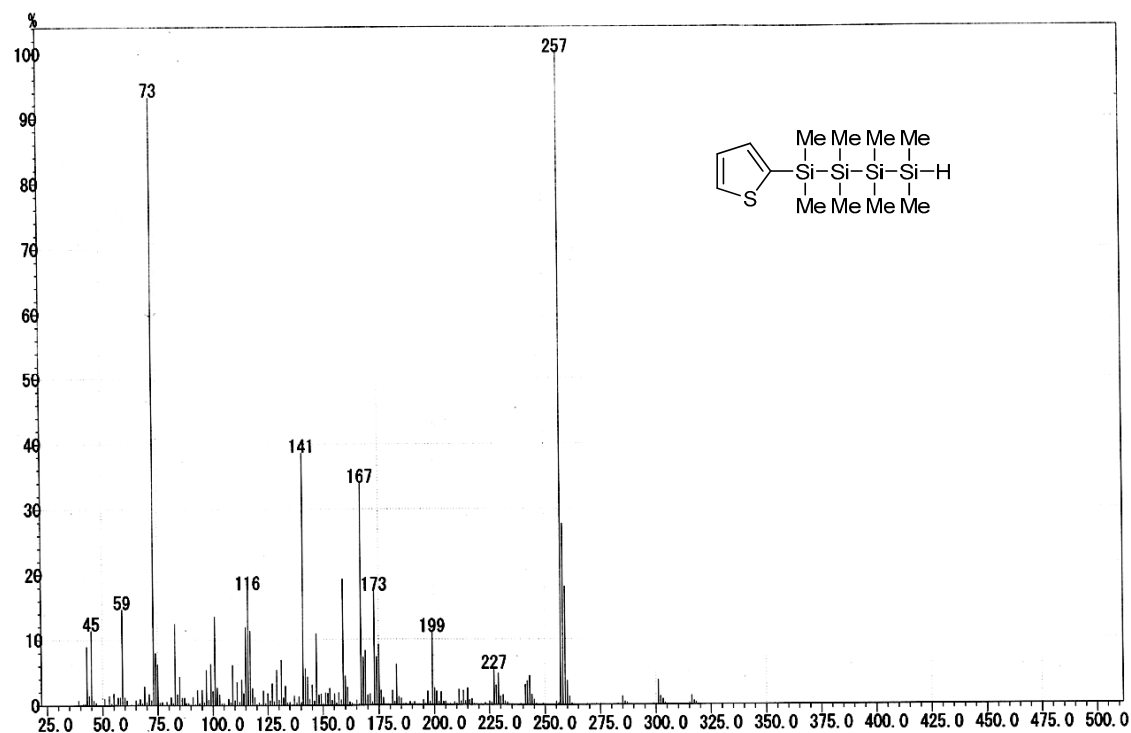
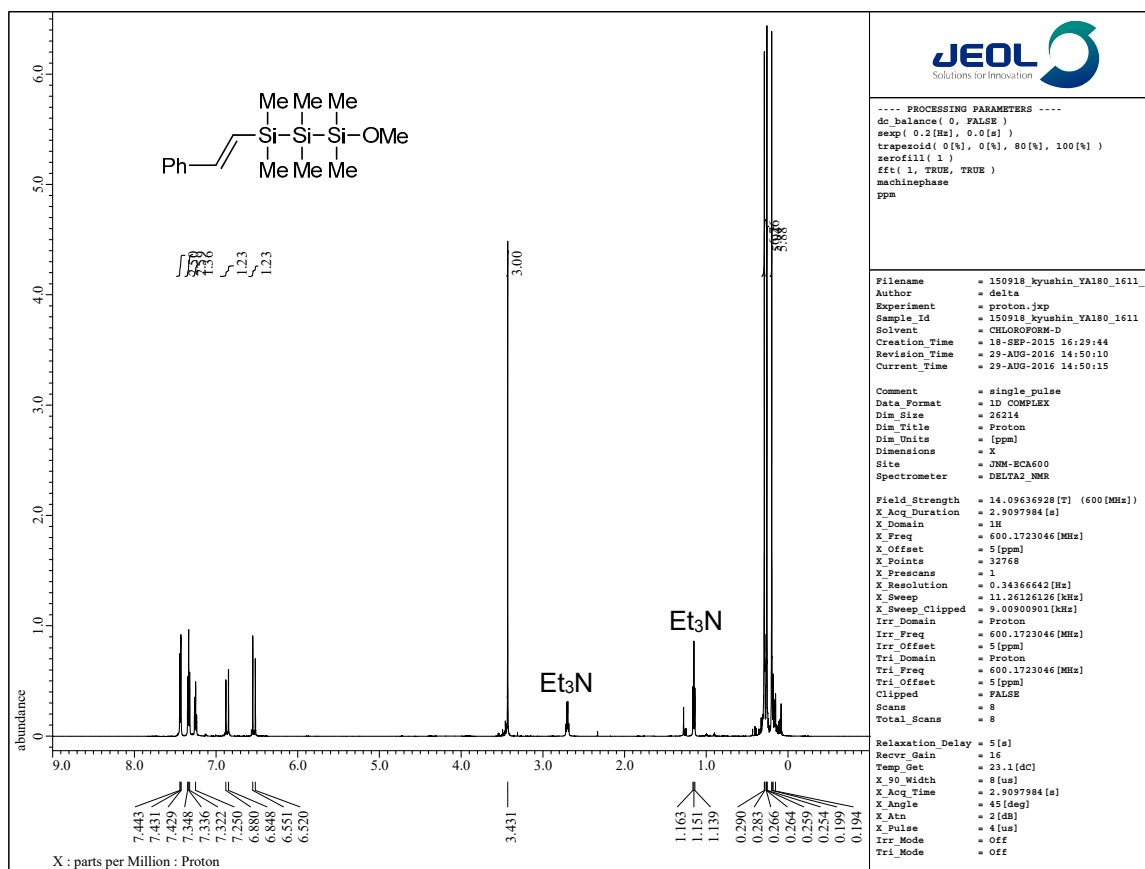
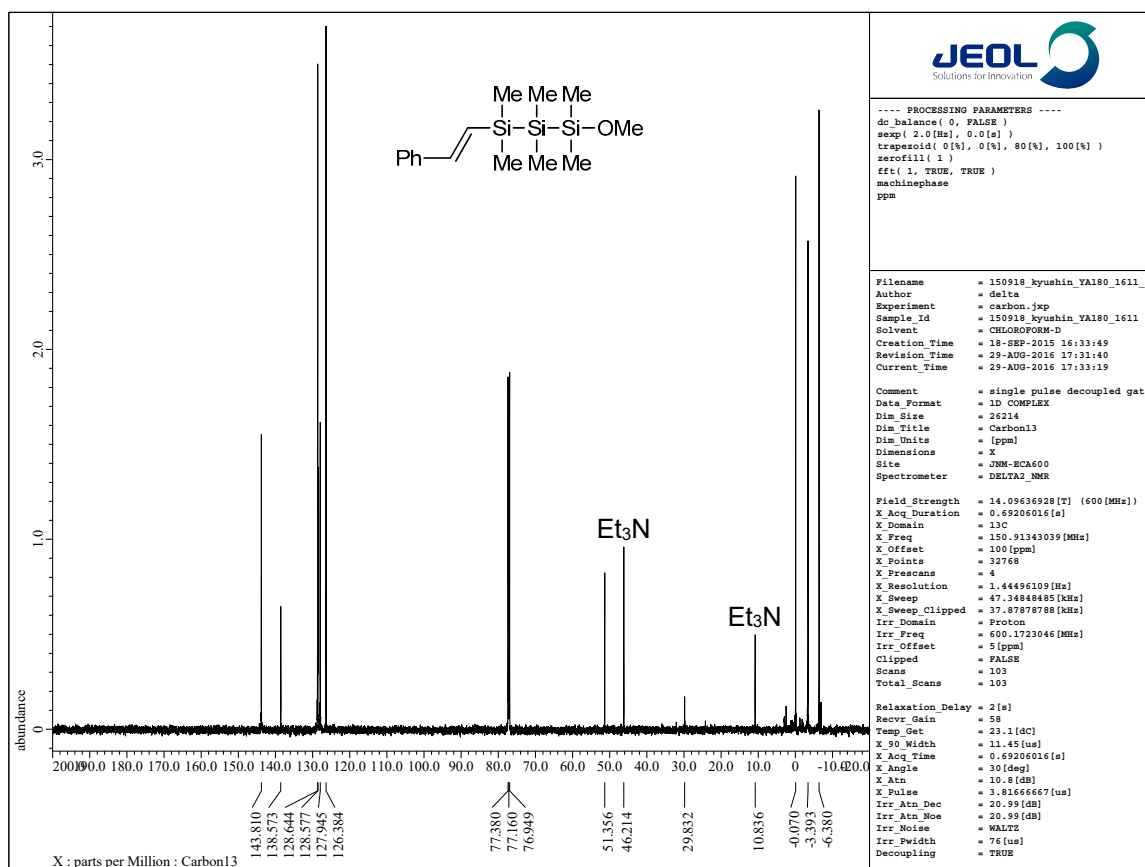
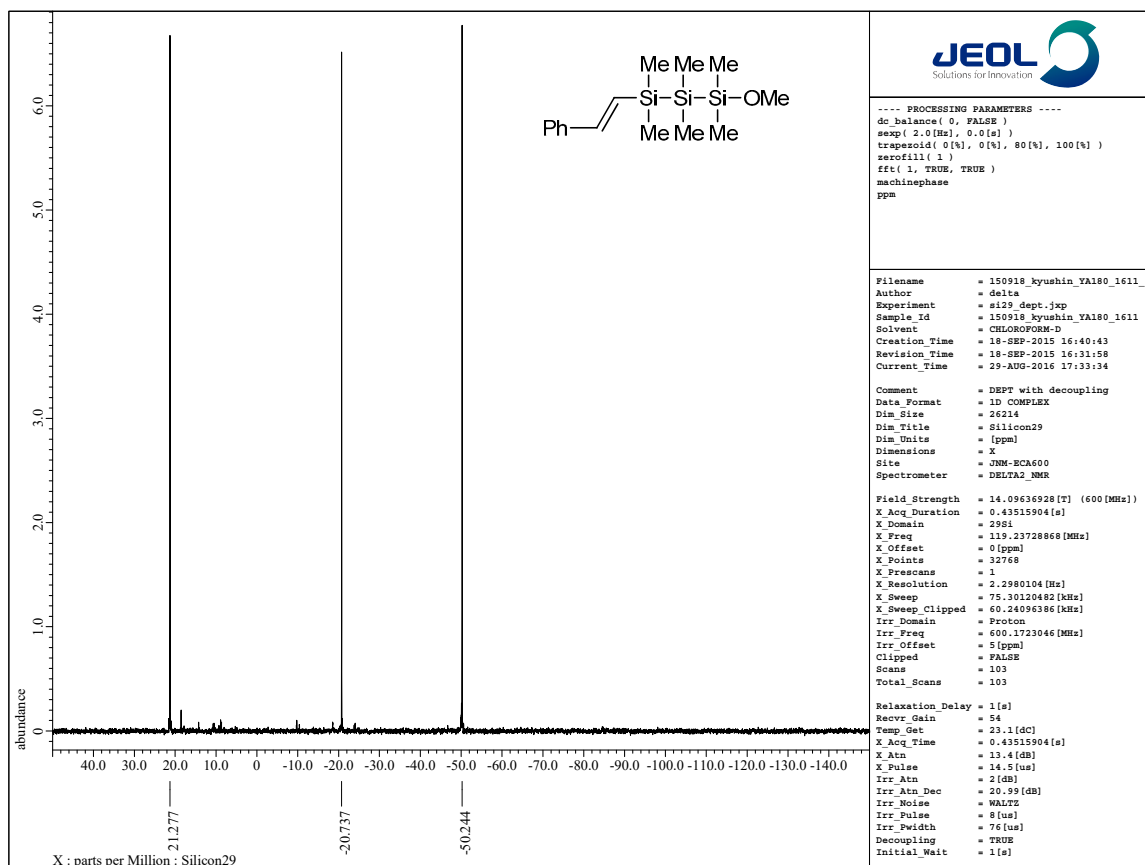


Figure S68. Mass spectrum of 17 (EI, 70 eV).

Figure S69. ^1H NMR spectrum of 18 in CDCl_3 at room temperature.

Figure S70. ¹³C NMR spectrum of 18 in CDCl₃ at room temperature.Figure S71. ²⁹Si NMR spectrum of 18 in CDCl₃ at room temperature.

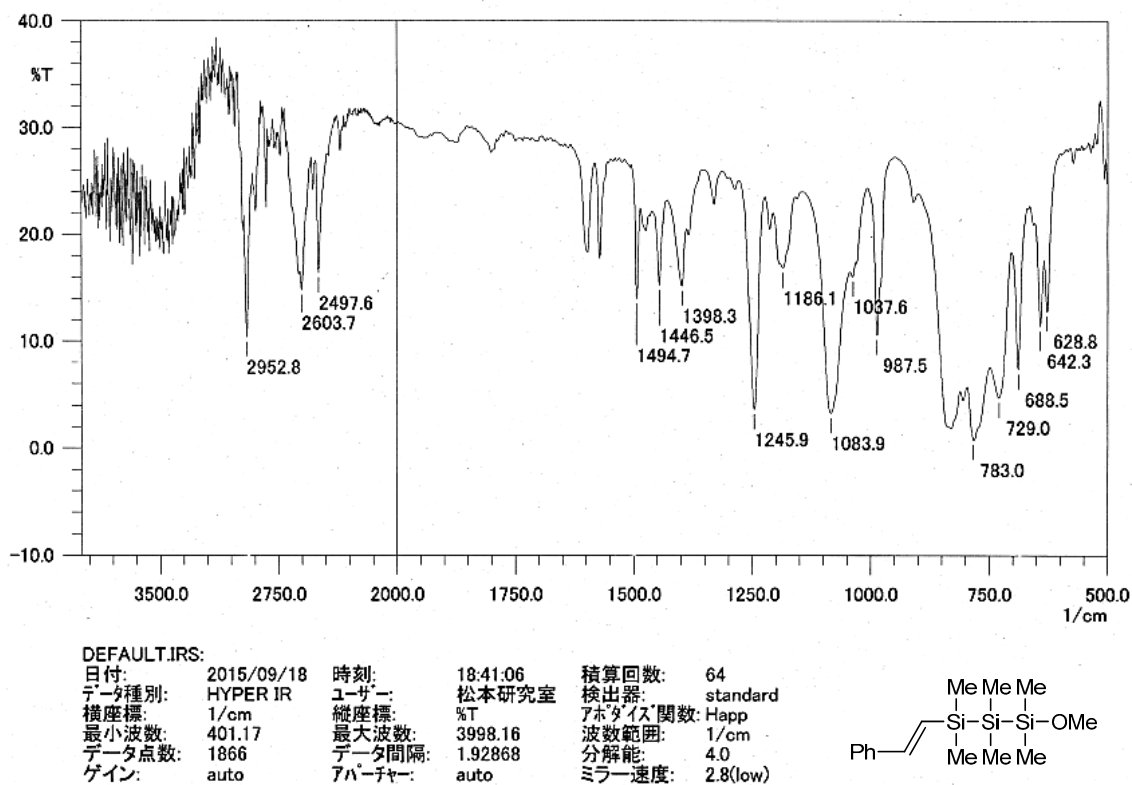


Figure S72. IR spectrum of 18 (NaCl).

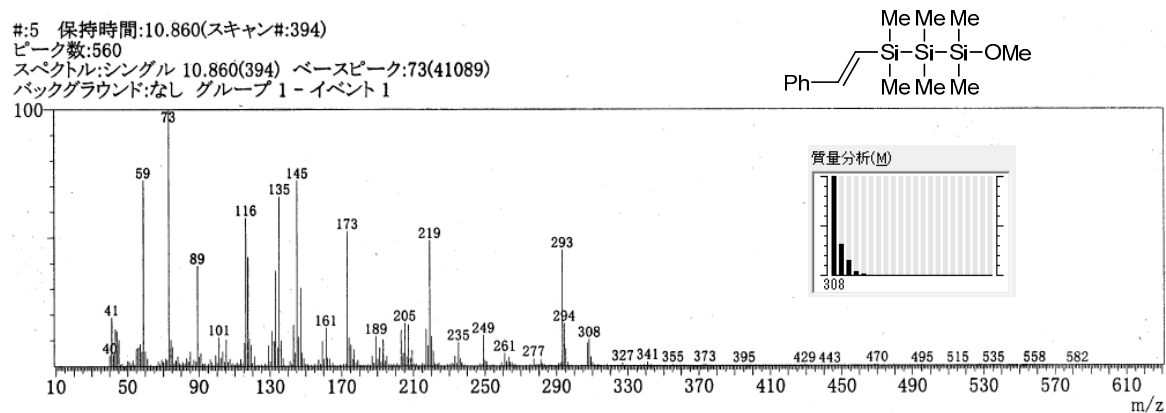
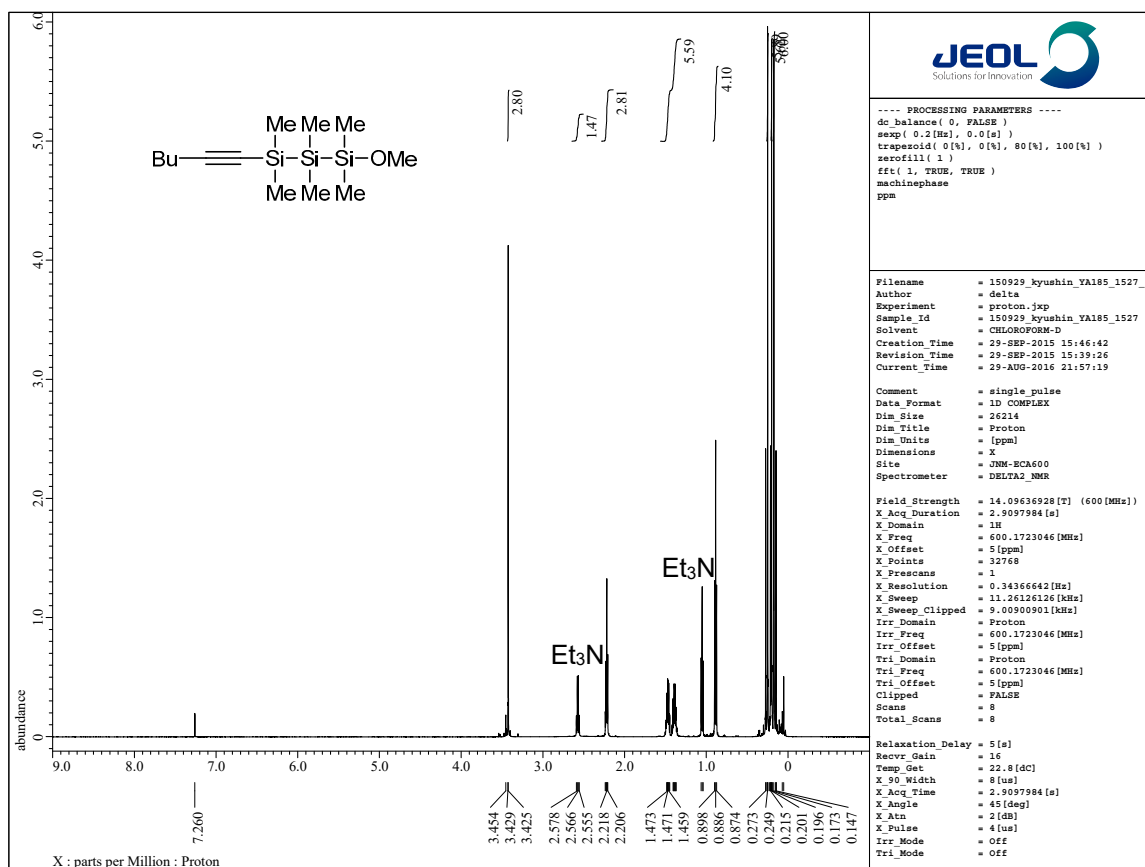
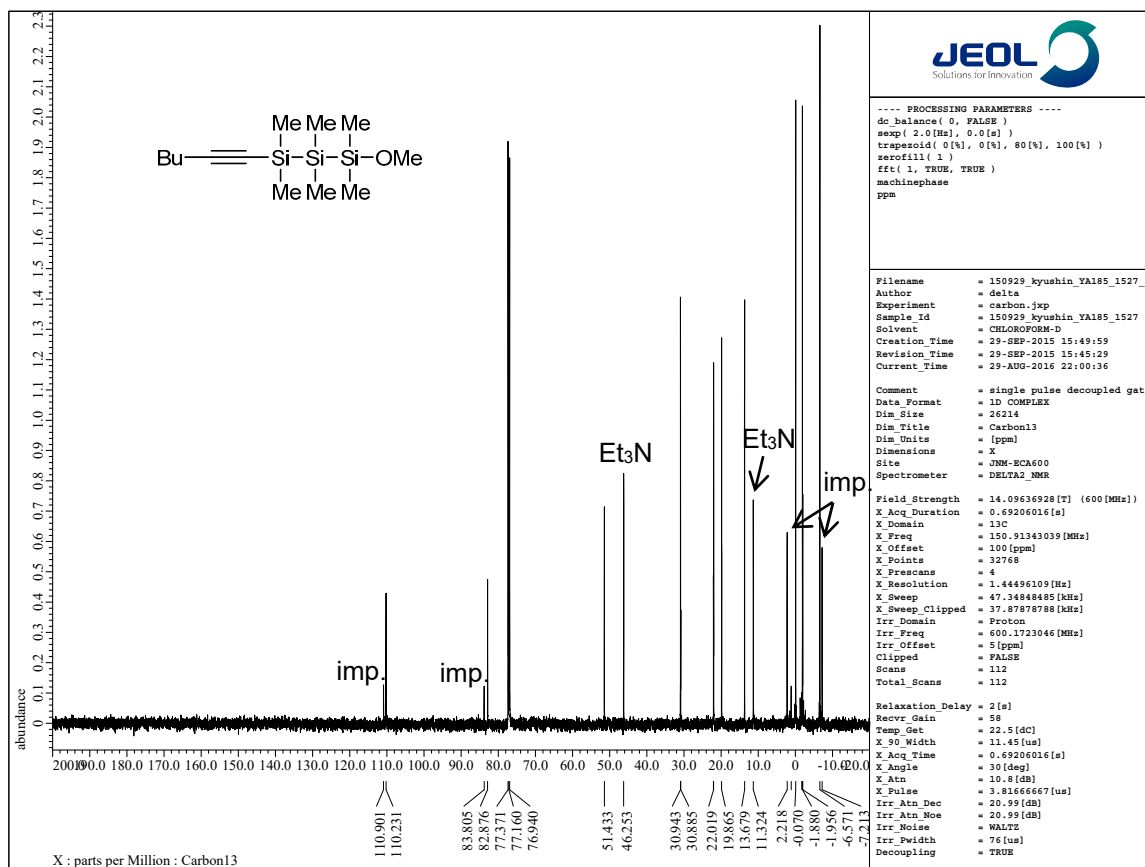


Figure S73. Mass spectrum of 18 (EI, 70 eV).

Figure S74. ^1H NMR spectrum of **19** in CDCl_3 at room temperature.Figure S75. ^{13}C NMR spectrum of **19** in CDCl_3 at room temperature.

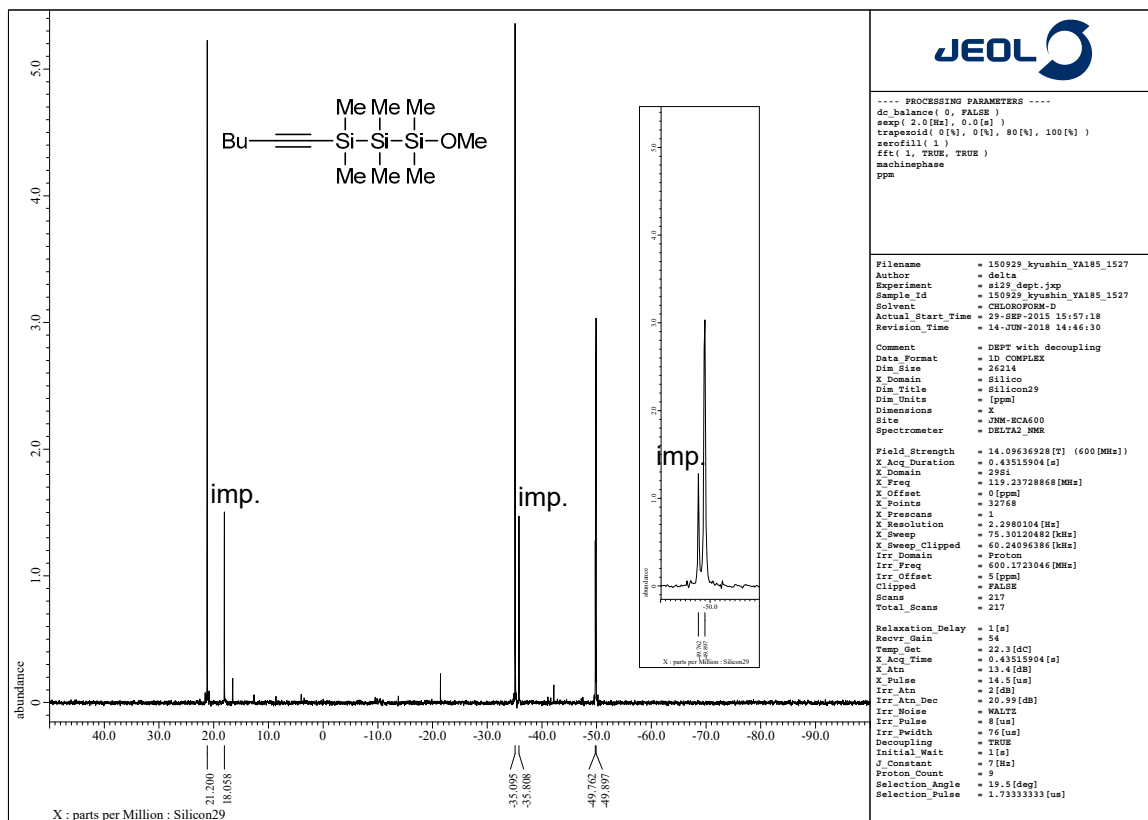
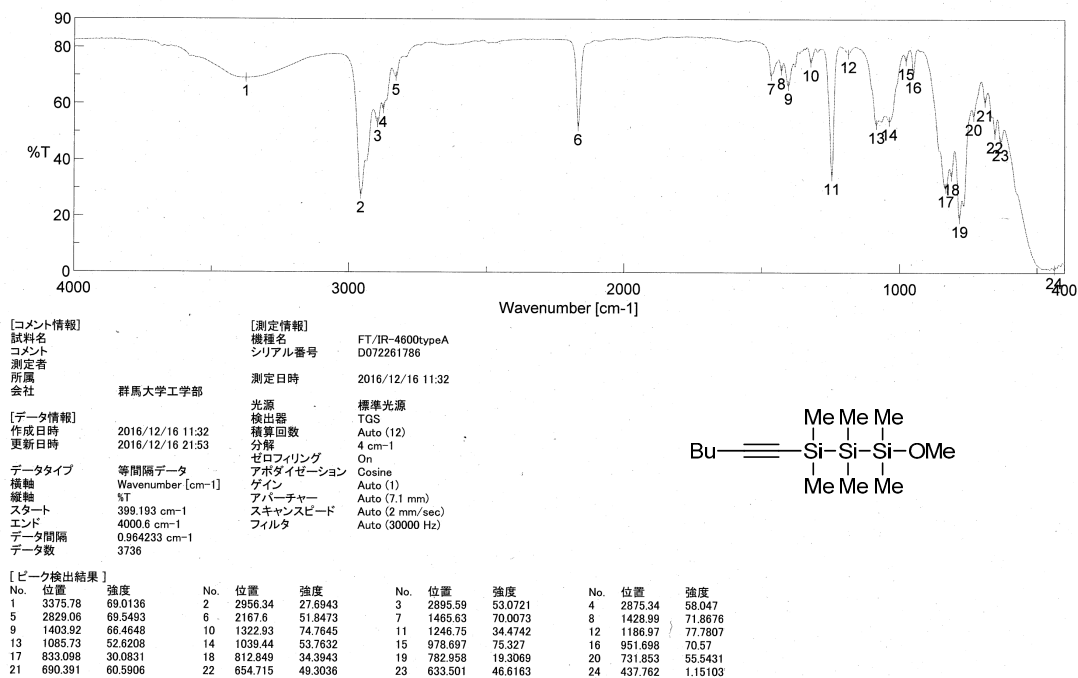
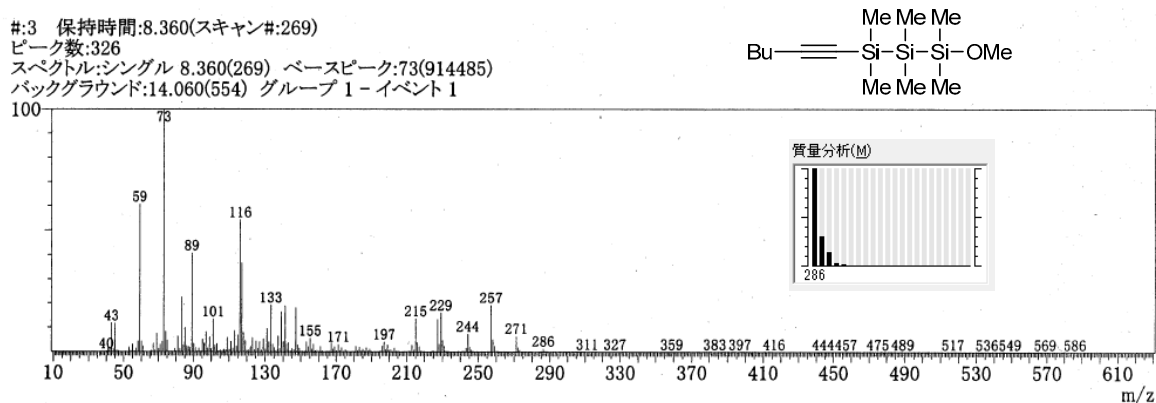
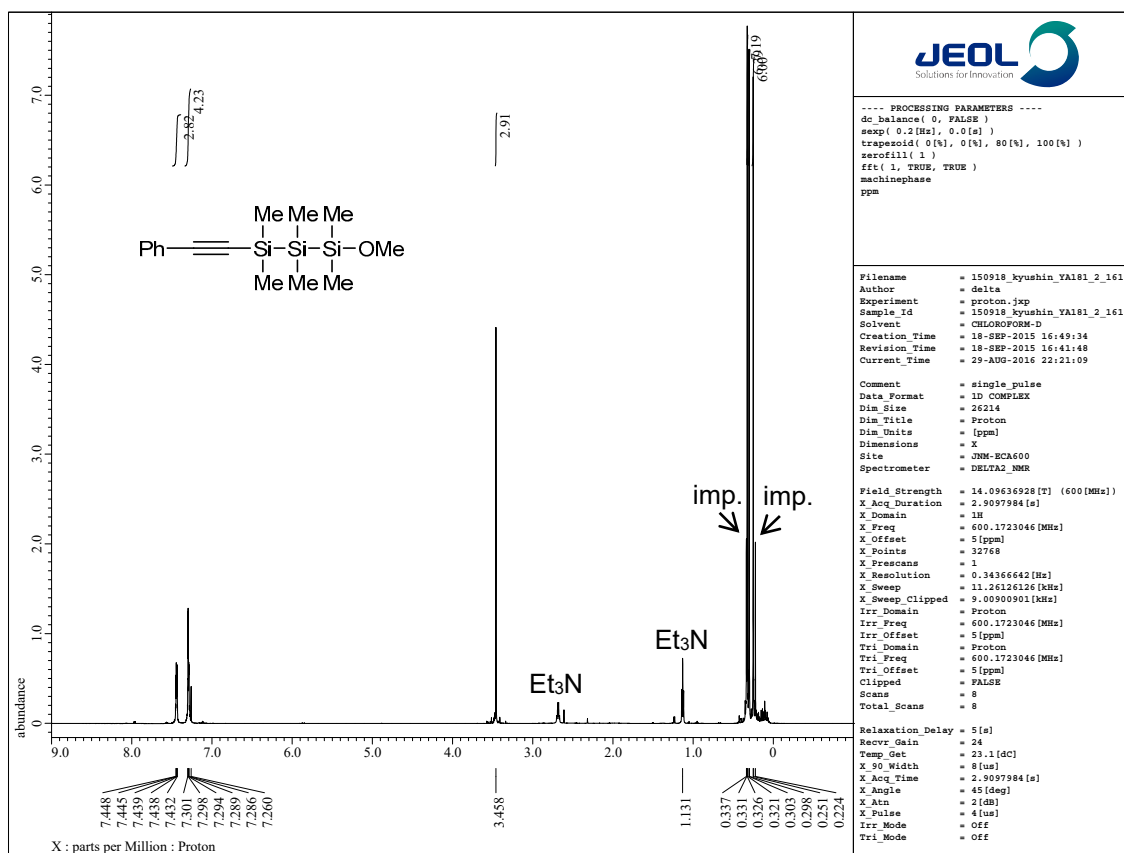
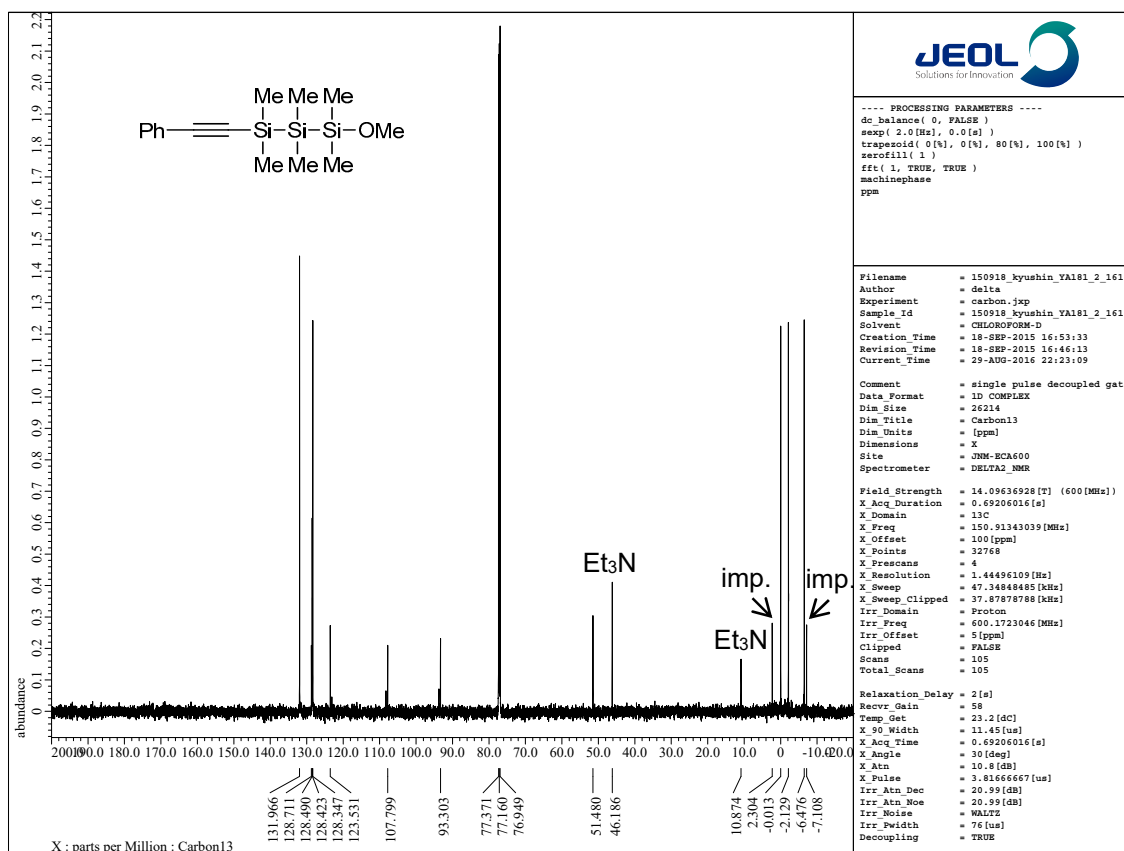
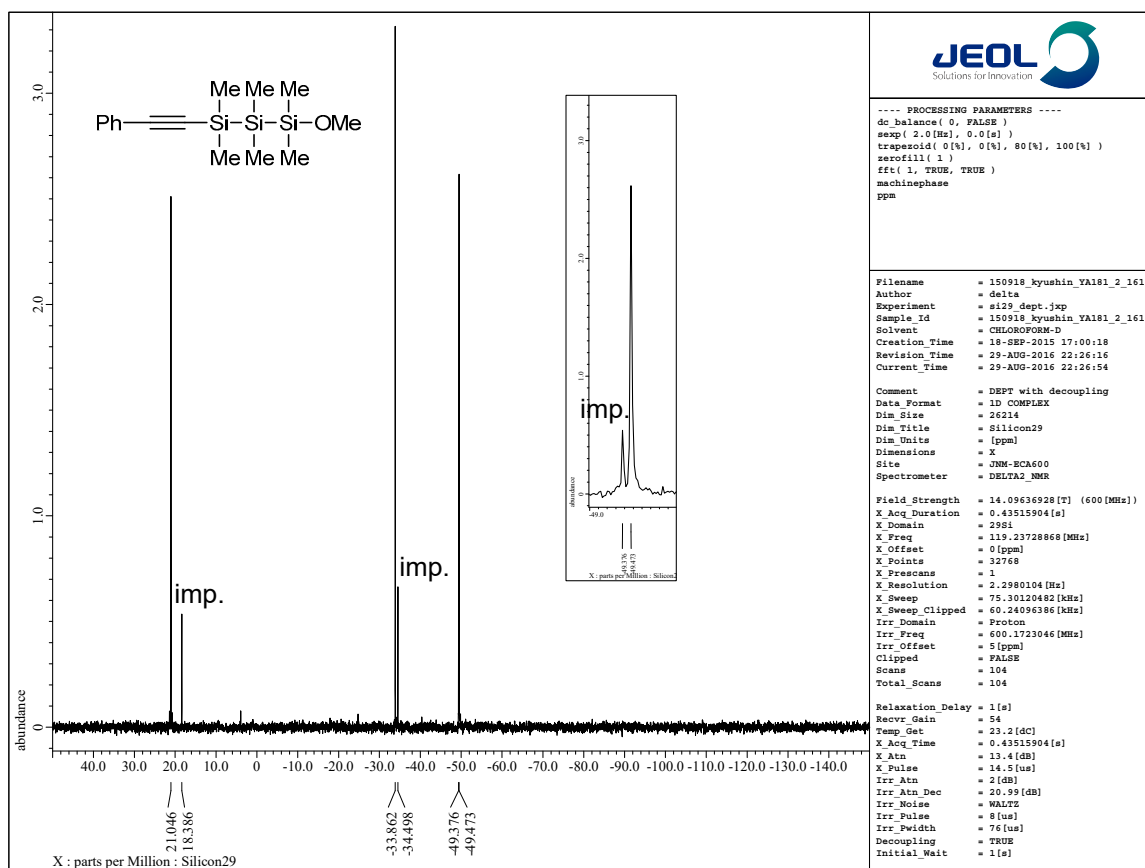
Figure S76. ²⁹Si NMR spectrum of 19 in CDCl₃ at room temperature.

Figure S77. IR spectrum of 19 (NaCl).

Figure S78. Mass spectrum of **19** (EI, 70 eV).Figure S79. ^1H NMR spectrum of **20** in CDCl_3 at room temperature.

Figure S80. ^{13}C NMR spectrum of 20 in CDCl_3 at room temperature.Figure S81. ^{29}Si NMR spectrum of 20 in CDCl_3 at room temperature.

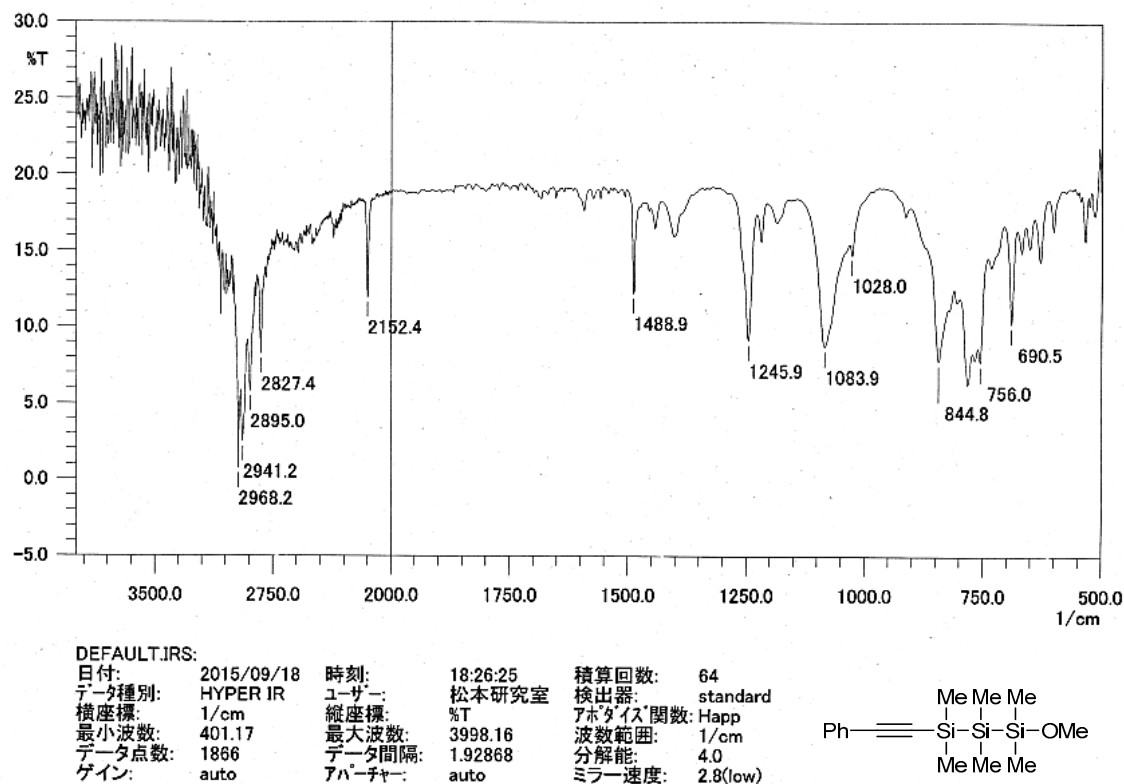


Figure S82. IR spectrum of 20 (NaCl).

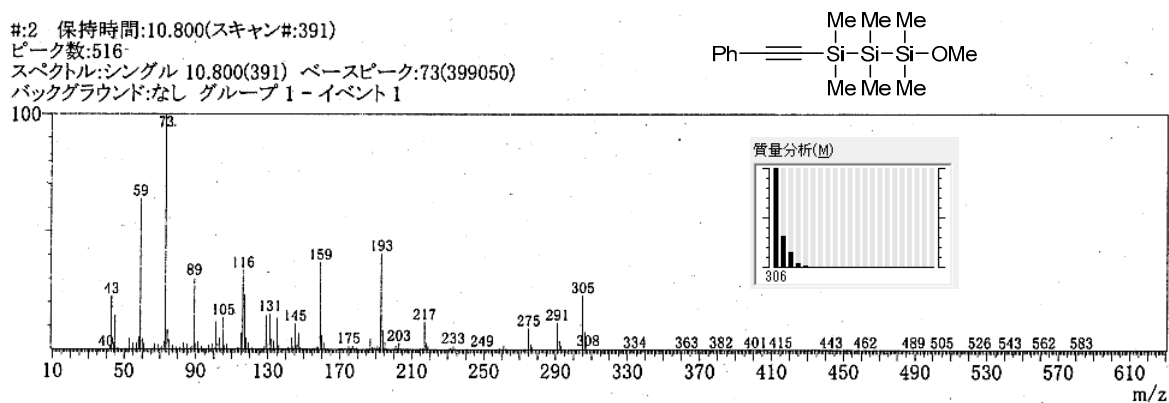
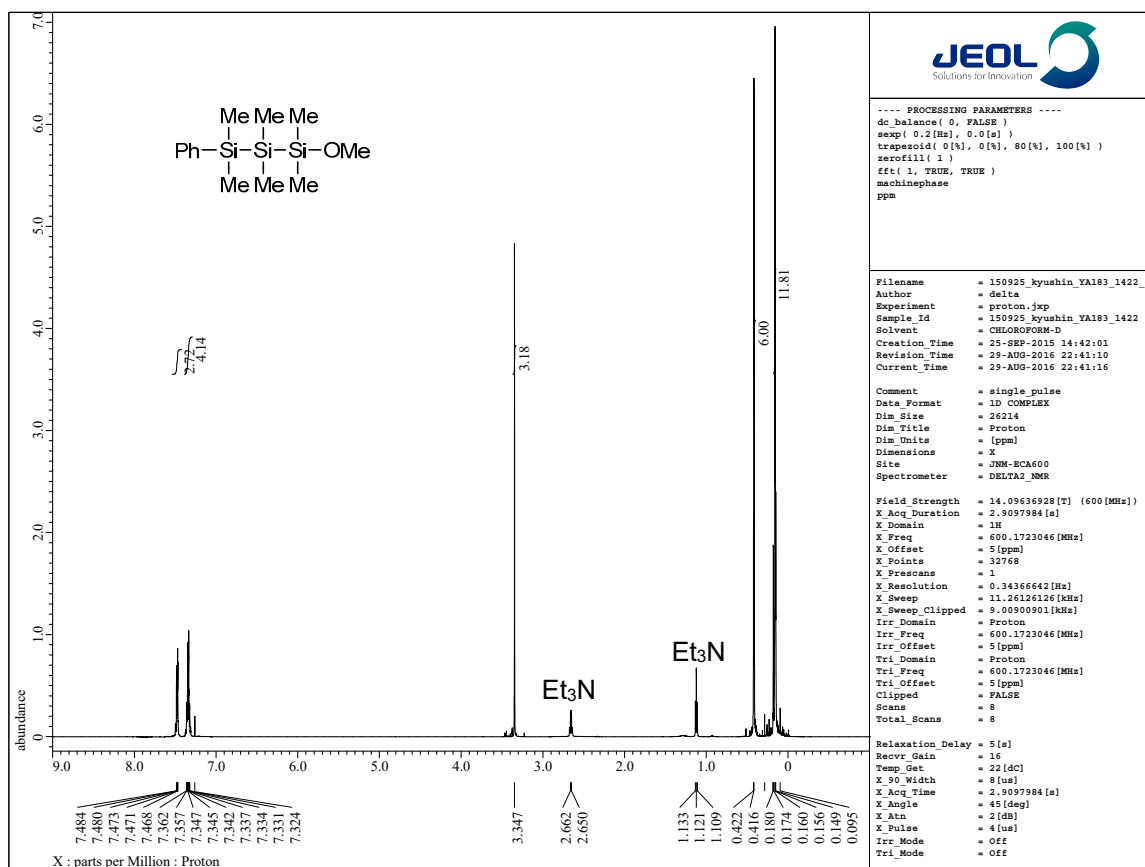
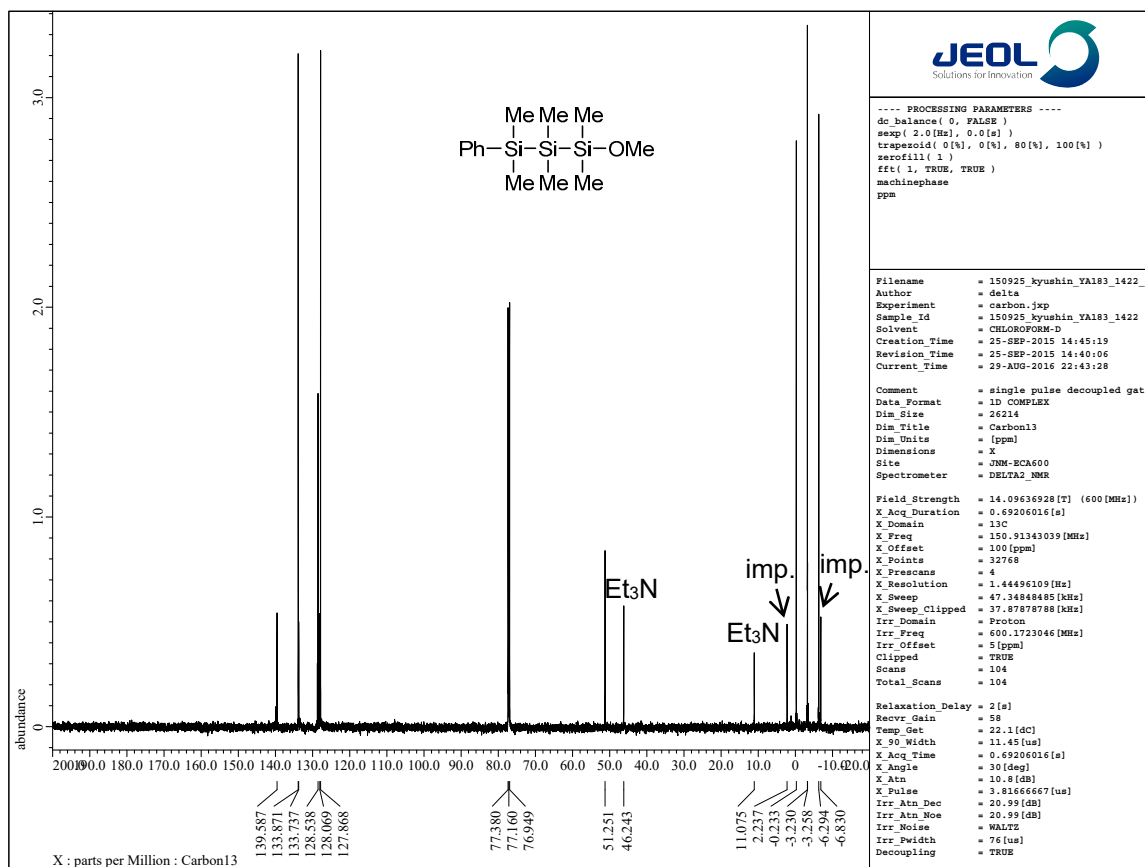
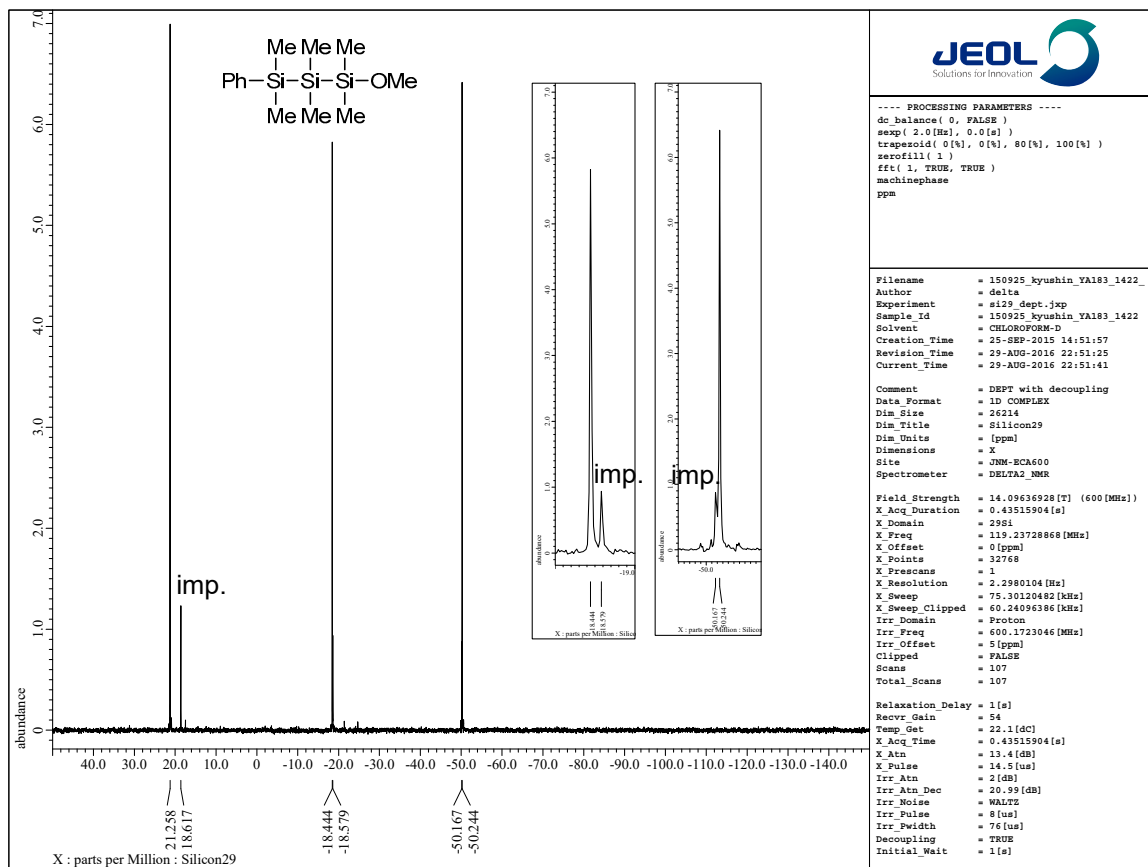
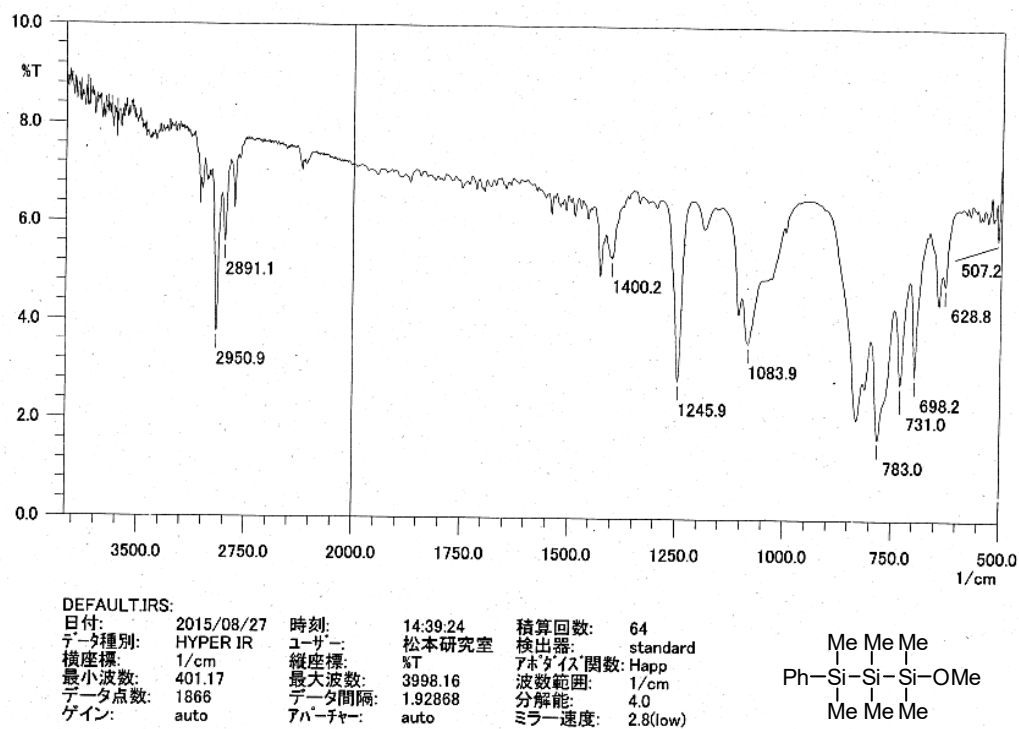
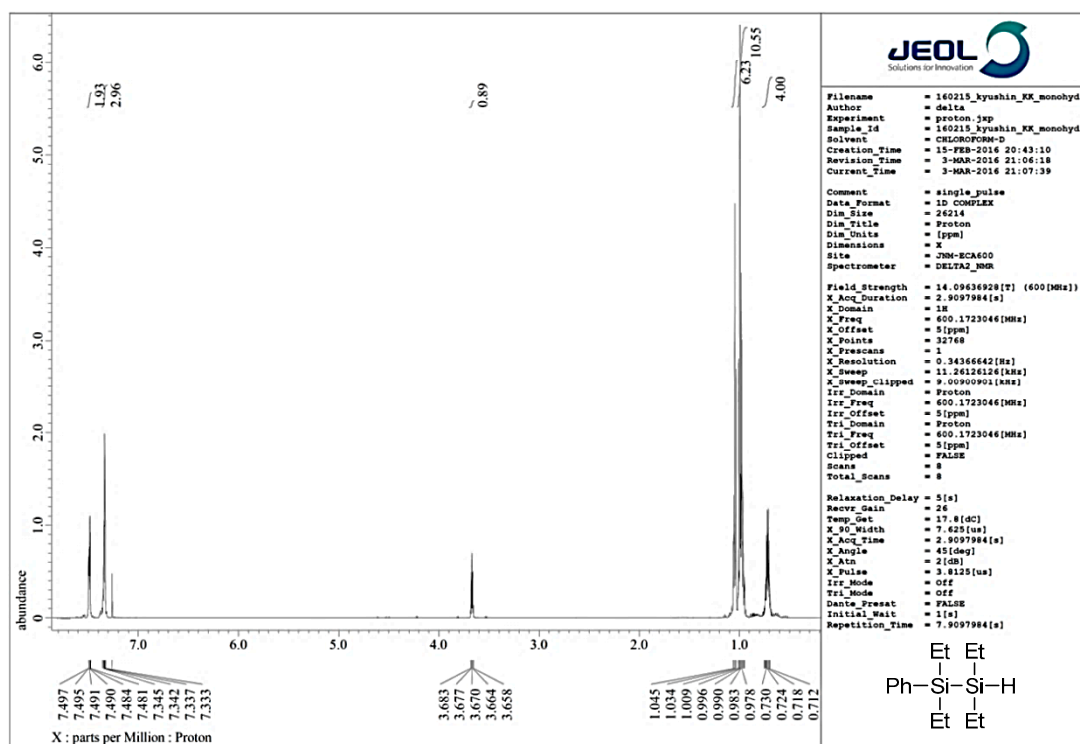
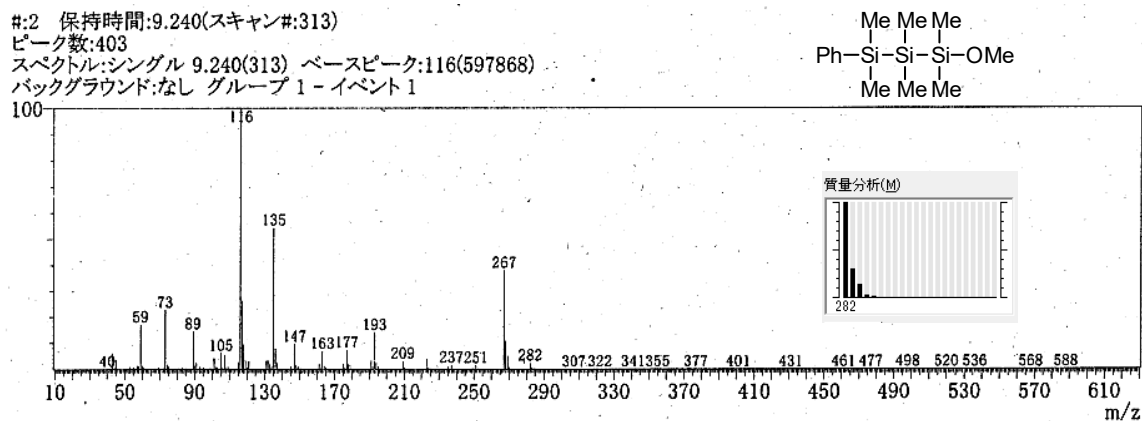


Figure S83. Mass spectrum of 20 (EI, 70 eV).

Figure S84. ¹H NMR spectrum of **21** in CDCl₃ at room temperature.Figure S85. ¹³C NMR spectrum of **21** in CDCl₃ at room temperature.

Figure S86. ²⁹Si NMR spectrum of **21** in CDCl₃ at room temperature.Figure S87. IR spectrum of **21** (NaCl).



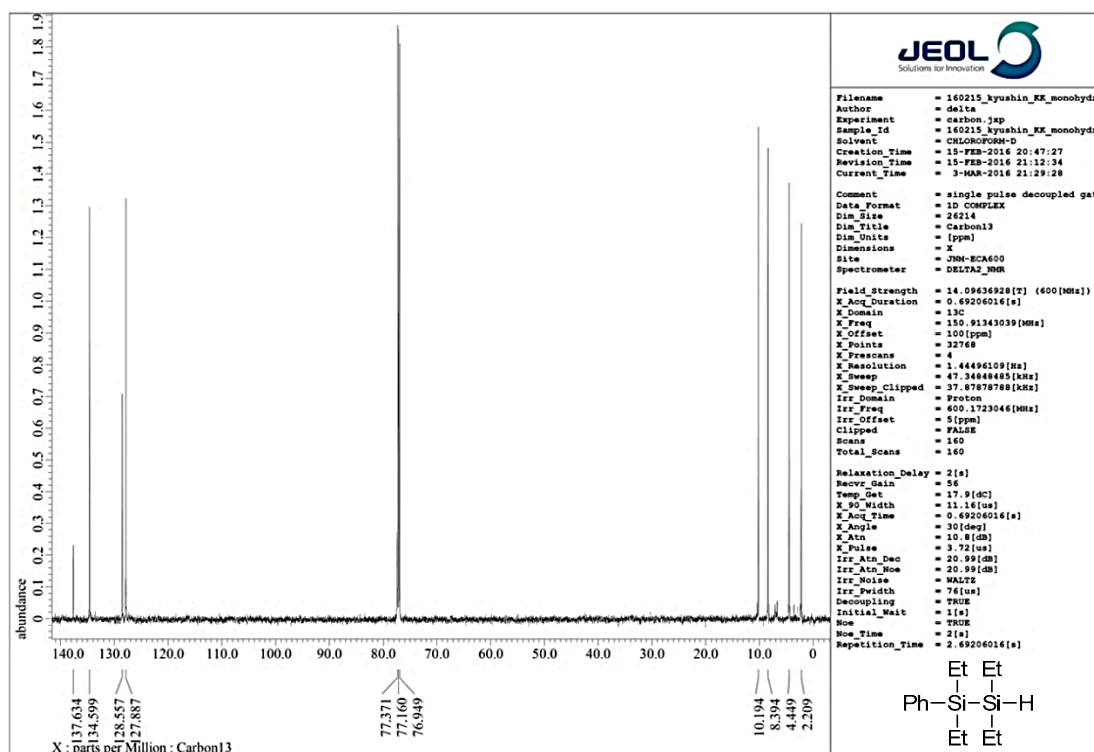


Figure S90. ^{13}C NMR spectrum of 22 in CDCl_3 at room temperature.

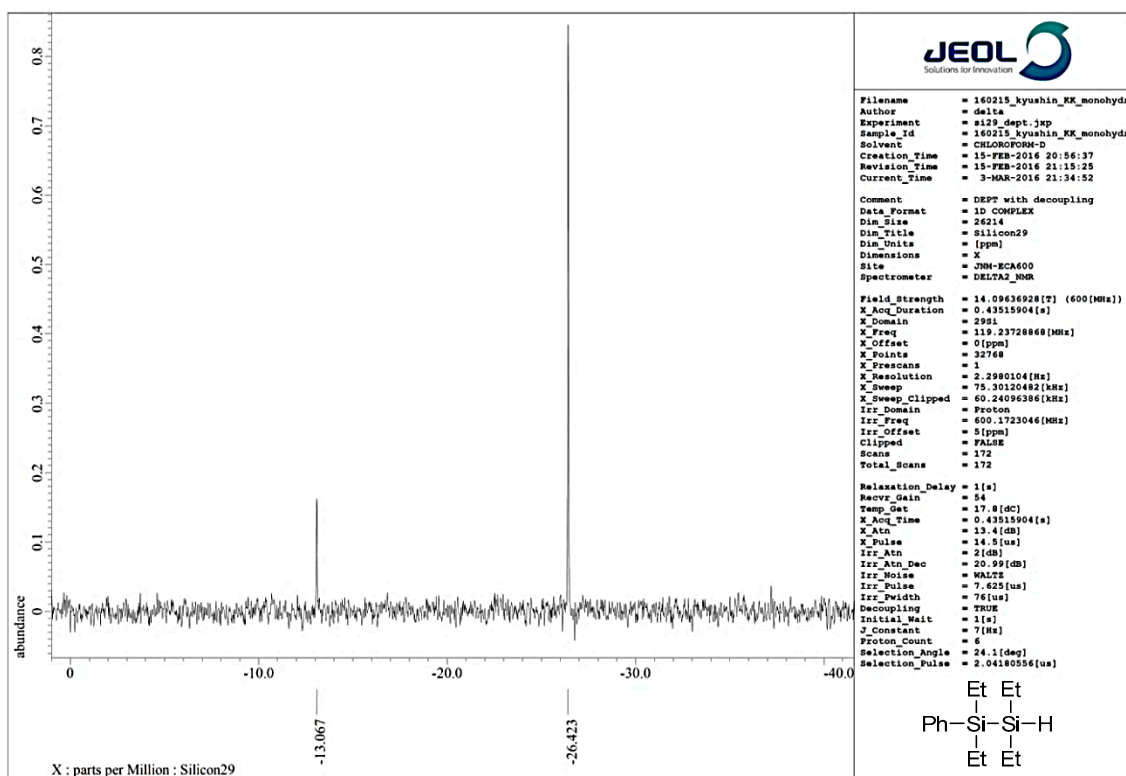


Figure S91. ^{29}Si NMR spectrum of 22 in CDCl_3 at room temperature.

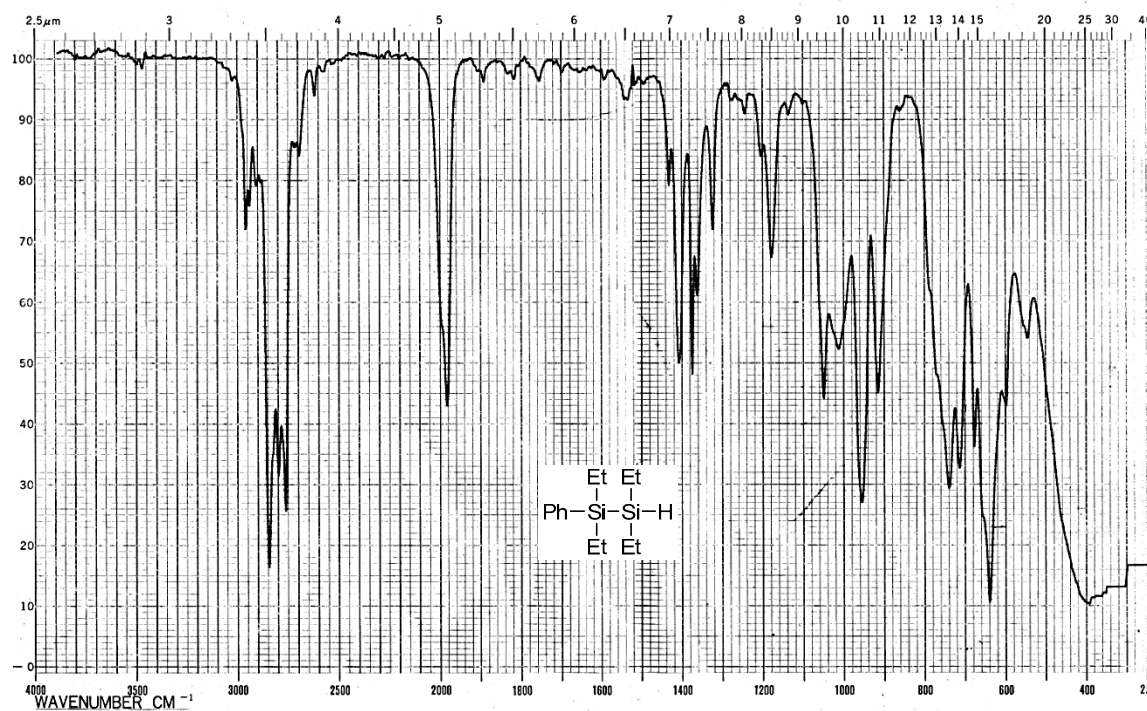


Figure S92. IR spectrum of 22 (NaCl).

#1 保持時間:9.640(スキャン#:333)
 ピーク数:307
 スペクトル:シングル 9.640(333) ベースピーク:135(1366847)
 バックグラウンド:なし グループ 1 - イベント 1

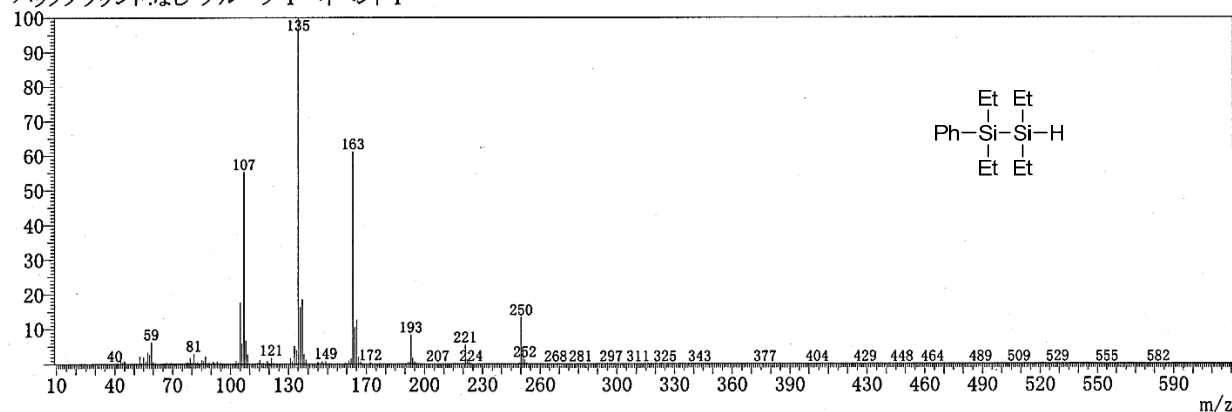


Figure S93. Mass spectrum of 22 (EI, 70 eV).

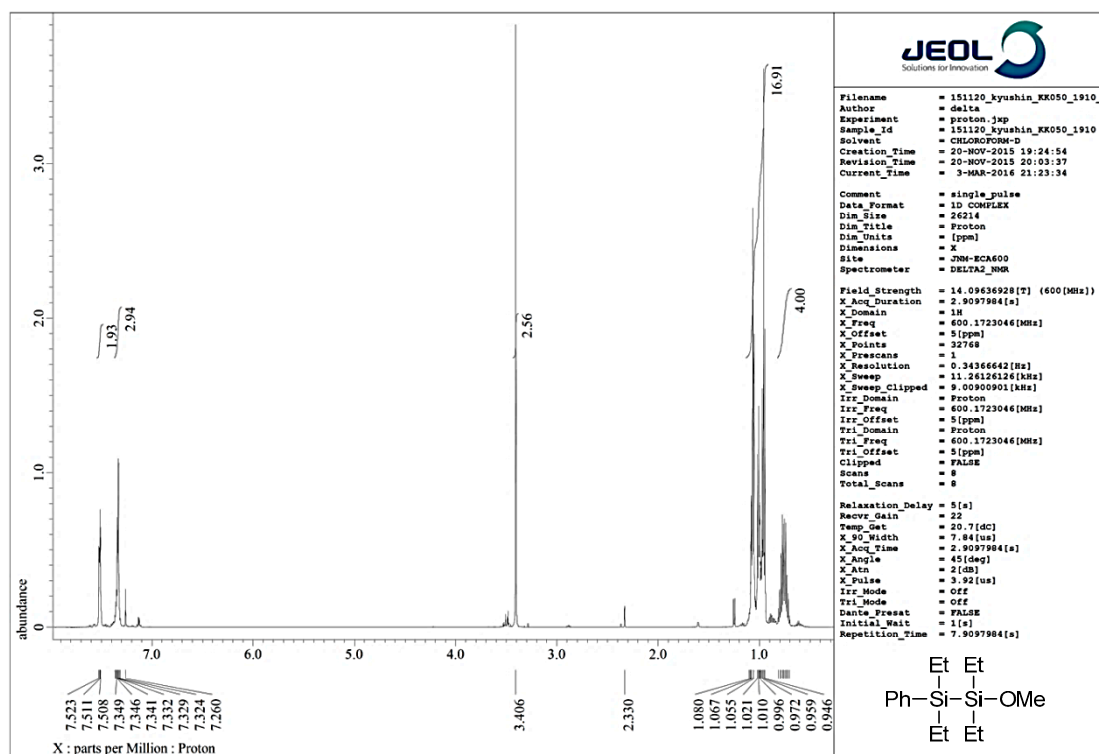


Figure S94. ^1H NMR spectrum of **23** in CDCl_3 at room temperature.

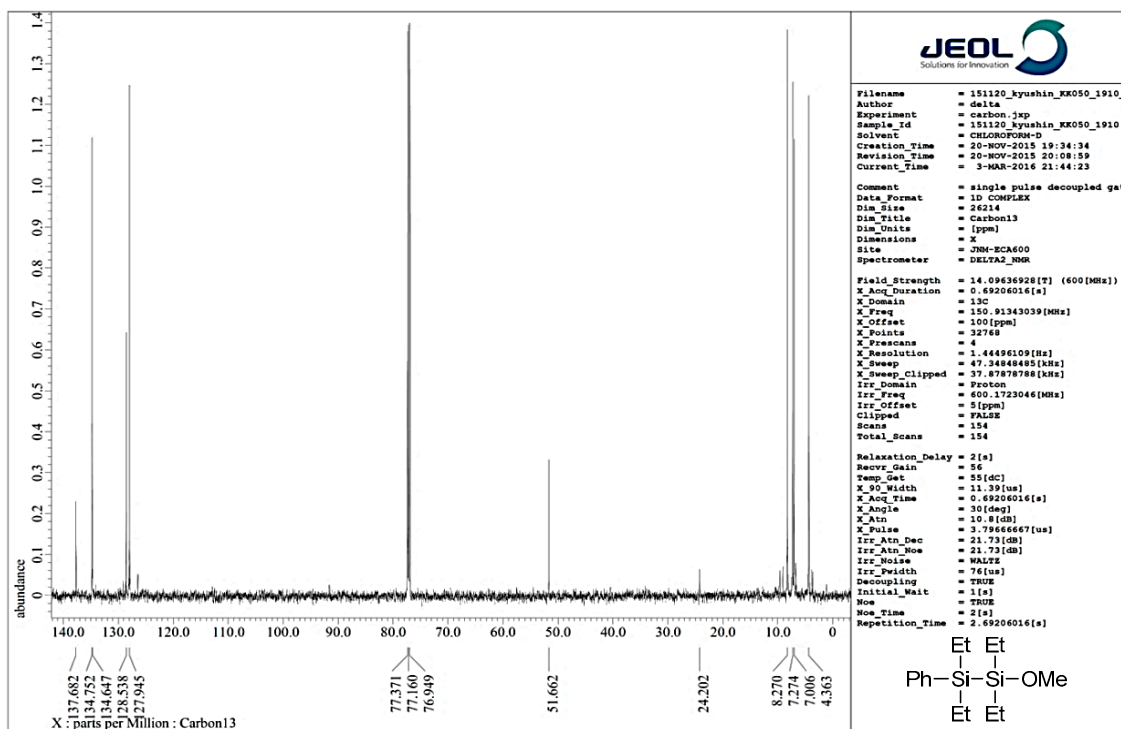
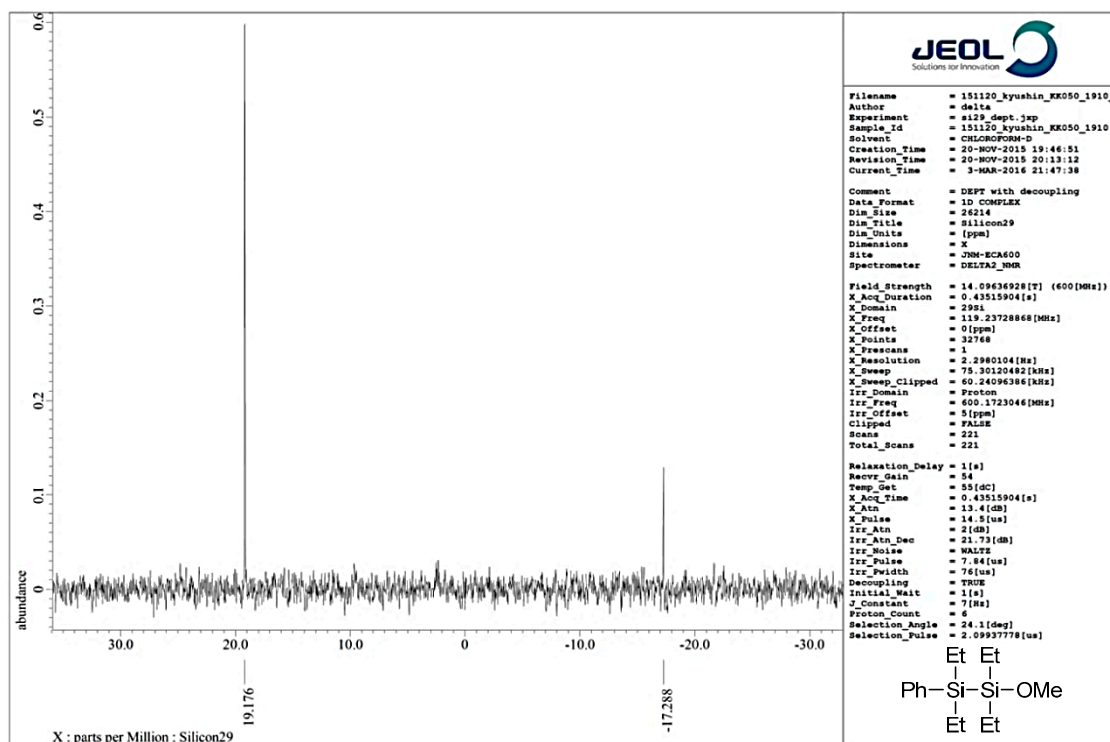
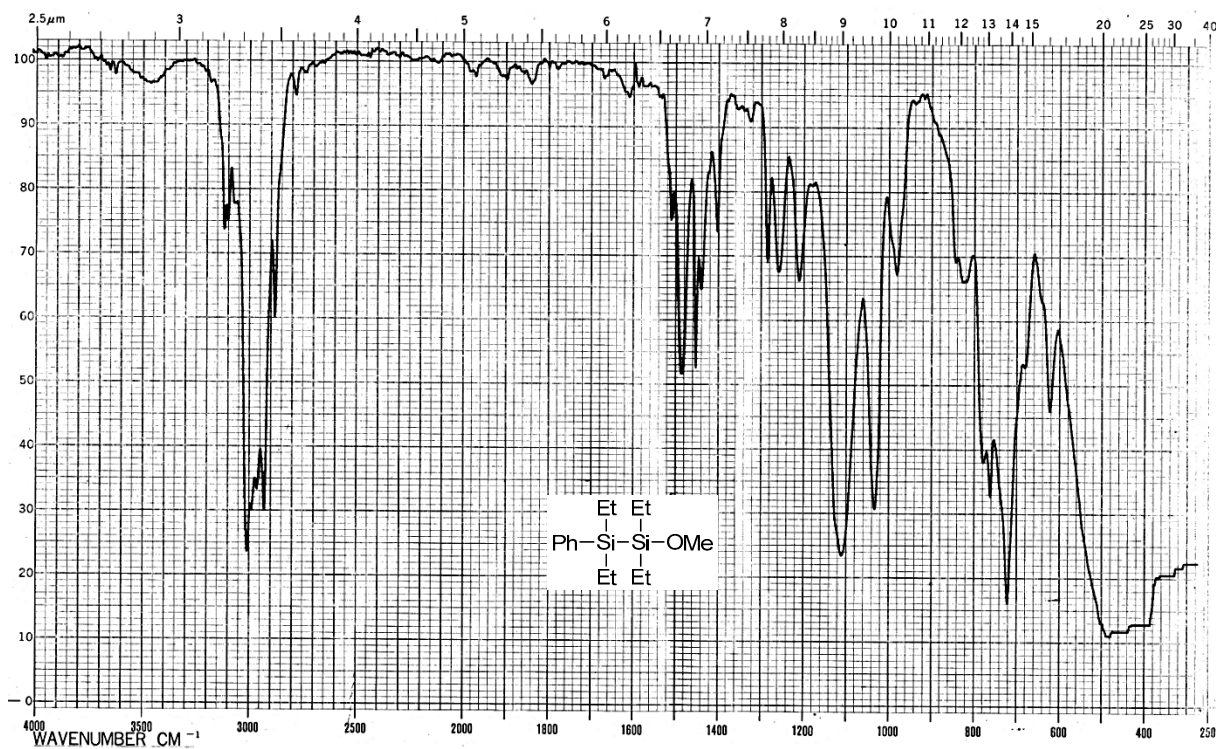


Figure S95. ^{13}C NMR spectrum of **23** in CDCl_3 at $55\text{ }^\circ\text{C}$.

Figure S96. ^{29}Si NMR spectrum of **23** in CDCl_3 at 55 °C.Figure S97. IR spectrum of **23** (NaCl).

#6 保持時間:10.480(スキャン#:375)

ピーク数:543

スペクトル:シングル 10.480(375) ベースピーク:279(351716)

バックグラウンド:なし グループ 1 - イベント 1

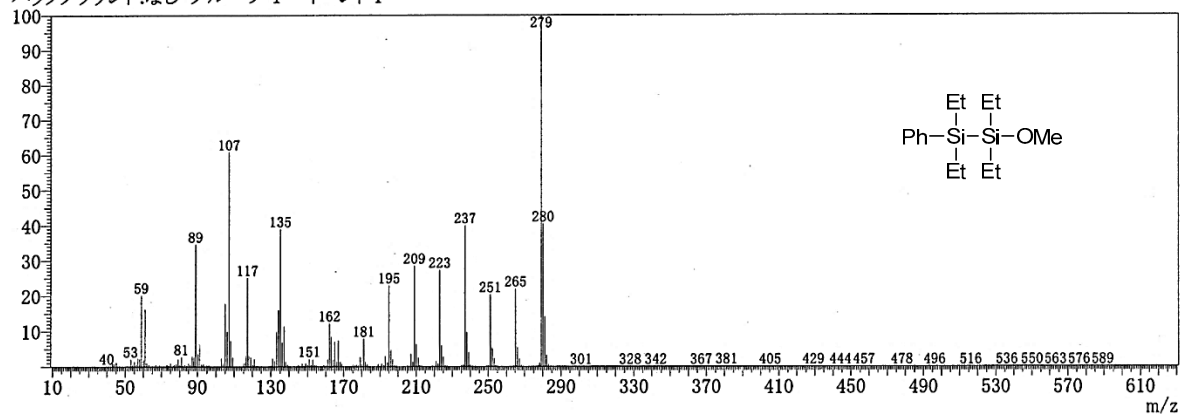
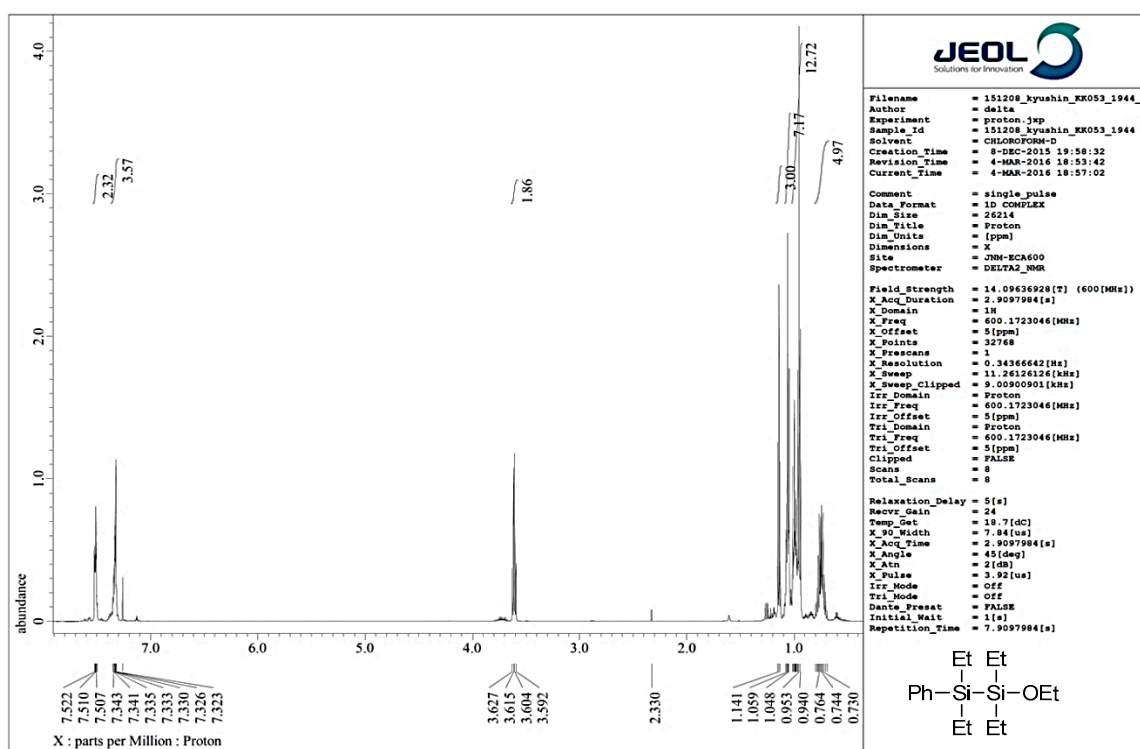
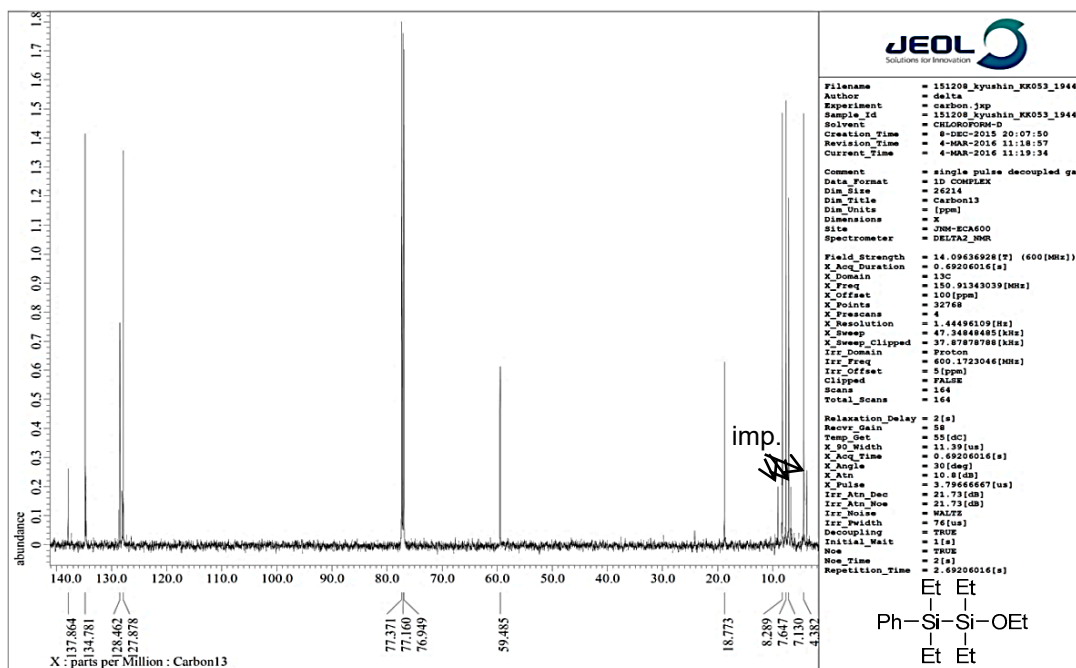
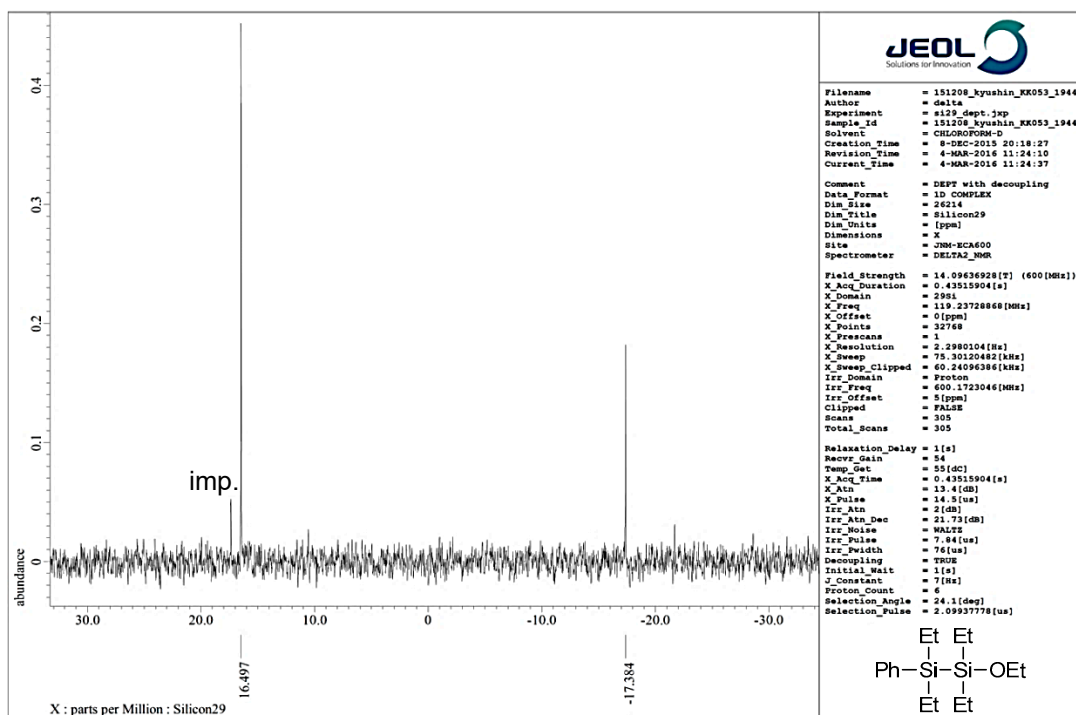
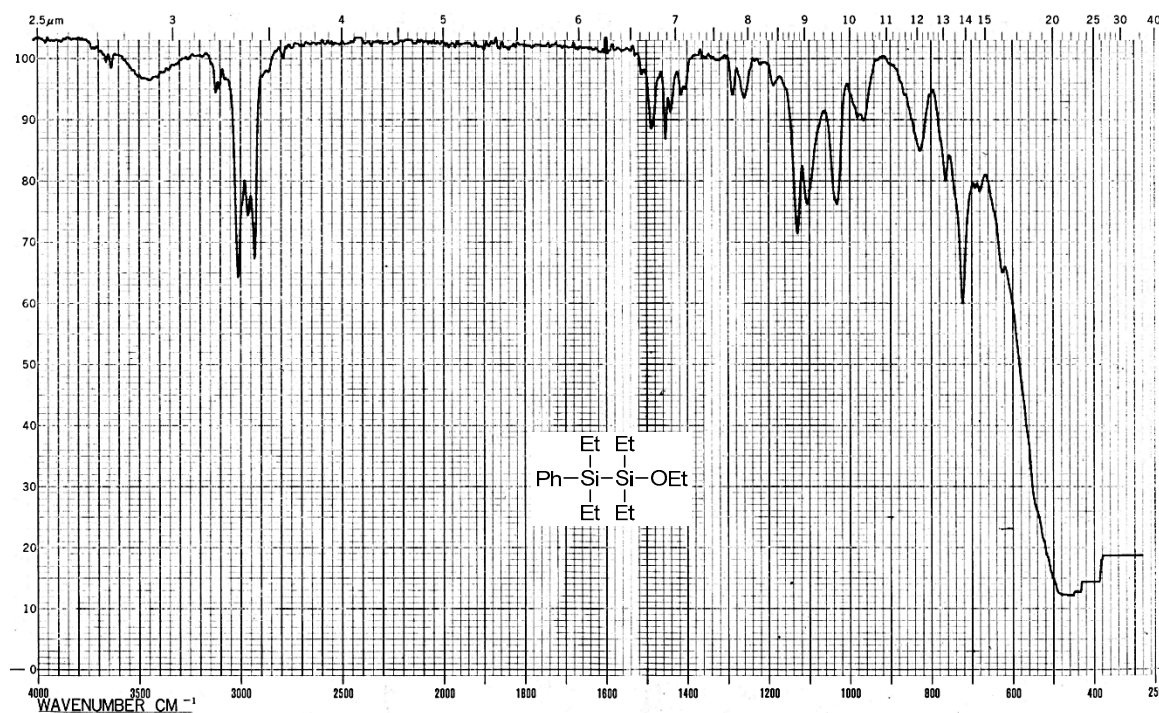


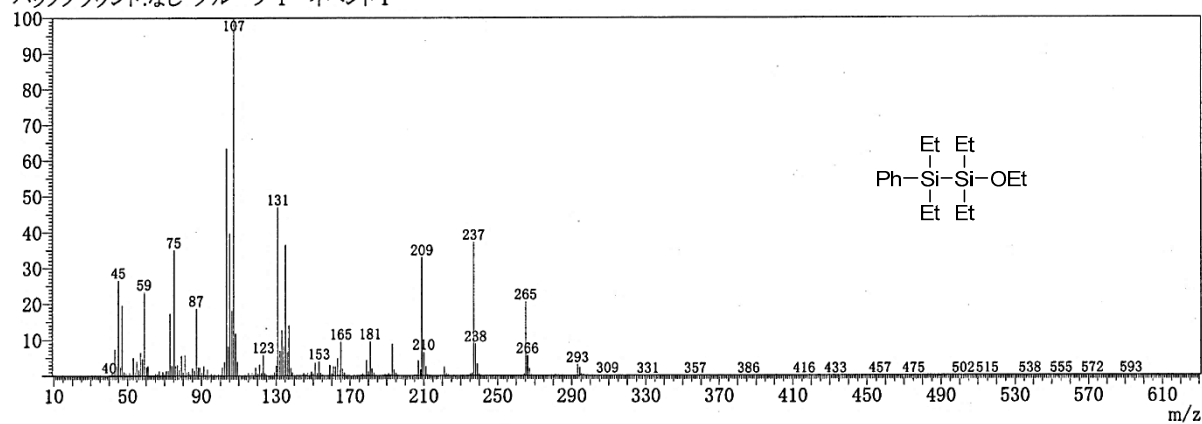
Figure S98. Mass spectrum of 23 (EI, 70 eV).

Figure S99. ^1H NMR spectrum of 24 in CDCl_3 at room temperature.

Figure S100. ^{13}C NMR spectrum of **24** in CDCl_3 at 55°C .Figure S101. ^{29}Si NMR spectrum of **24** in CDCl_3 at 55°C .

Figure S102. IR spectrum of **24** (NaCl).

#3 保持時間:10.660(スキャン#:384)
 ピーク数:486
 スペクトル:シングル 10.660(384) ベースピーク:107(520684)
 バックグラウンド:なし グループ 1 - イベント 1

Figure S103. Mass spectrum of **24** (EI, 70 eV).

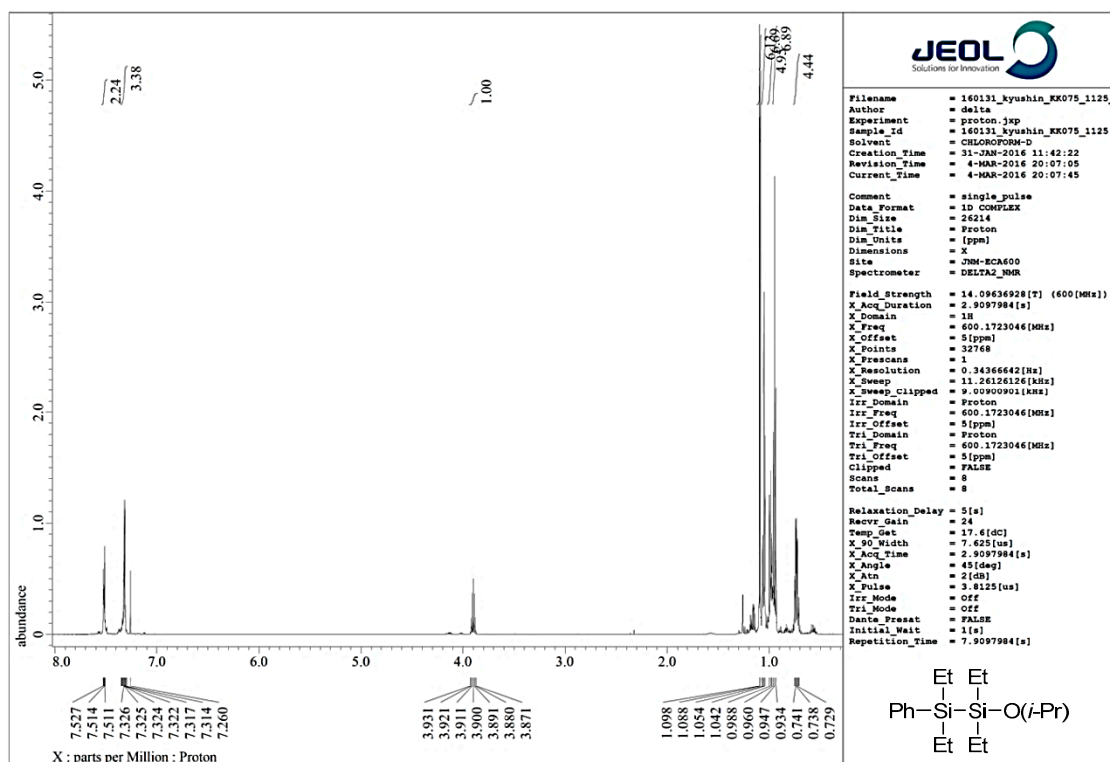


Figure S104. ¹H NMR spectrum of 25 in CDCl₃ at room temperature.

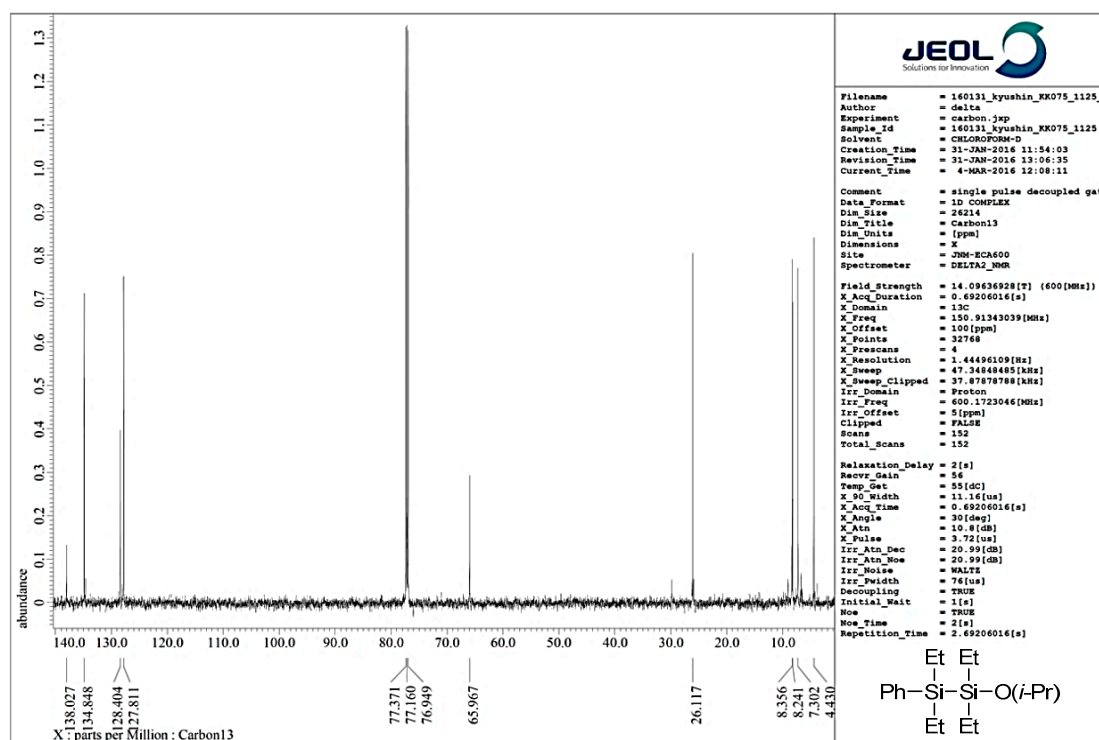
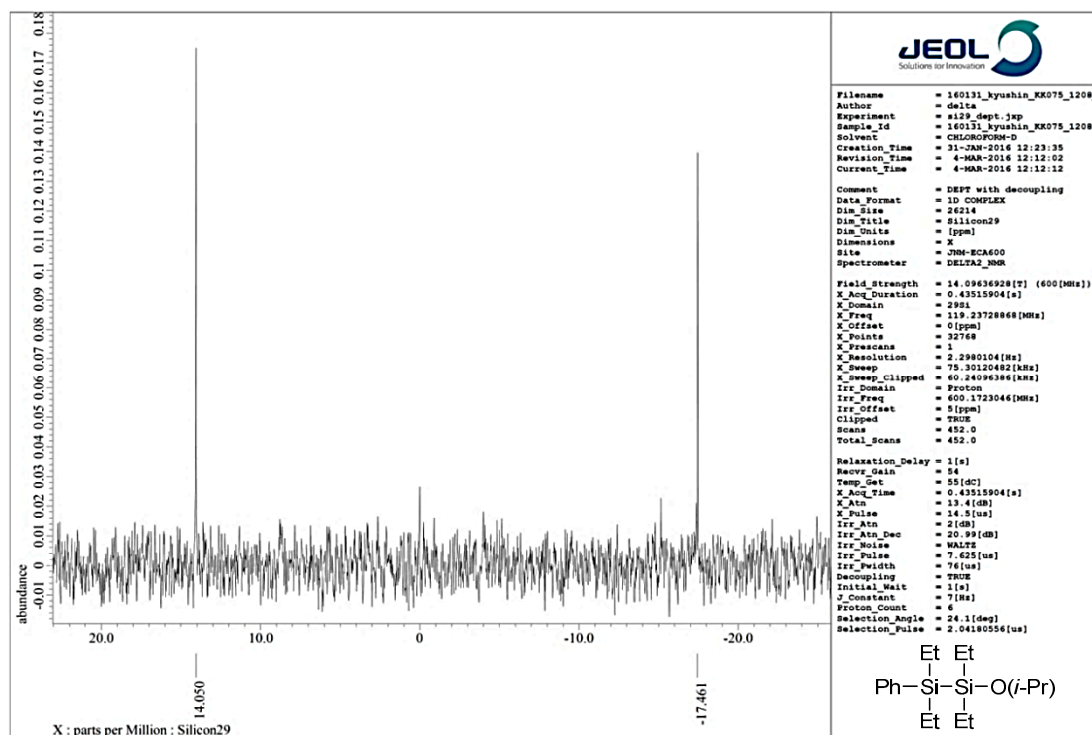
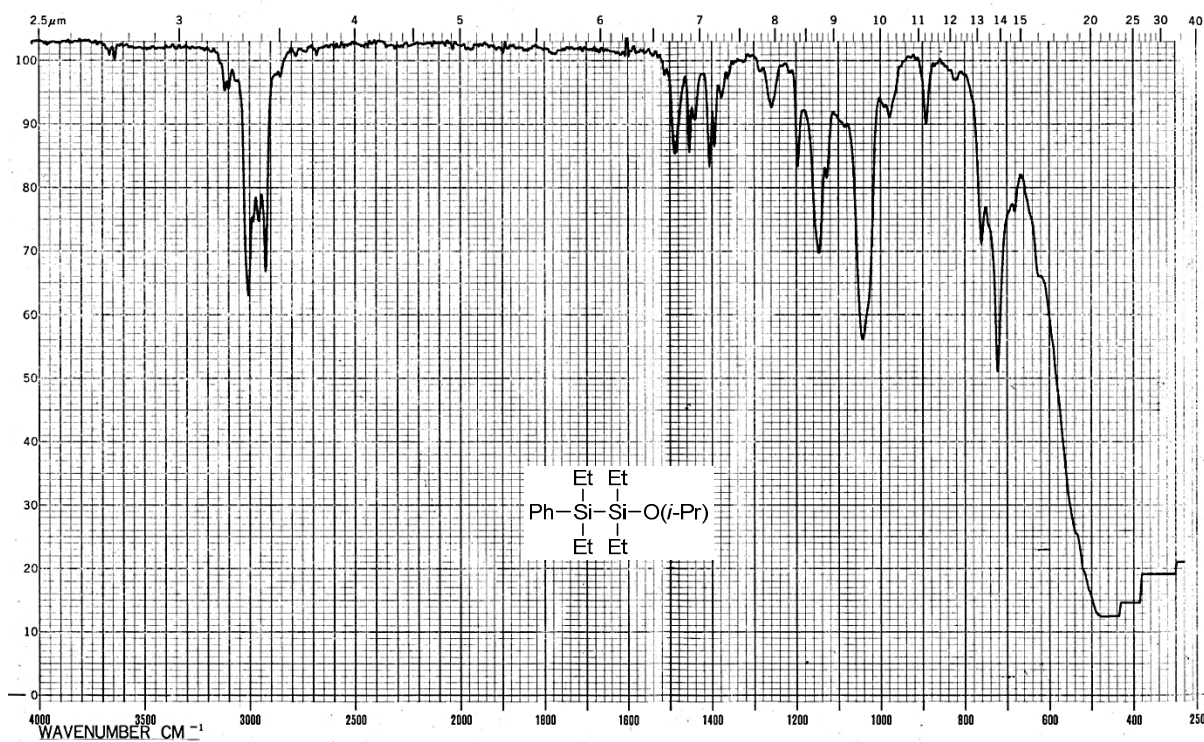


Figure S105. ¹³C NMR spectrum of 25 in CDCl₃ at 55 °C.

Figure S106. ^{29}Si NMR spectrum of **25** in CDCl_3 at 55 °C.Figure S107. IR spectrum of **25** (NaCl).

#1 保持時間:10.900(スキャン#:396)
 ピーク数:358
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 バックグラウンド:なし グループ 1 - イベント 1

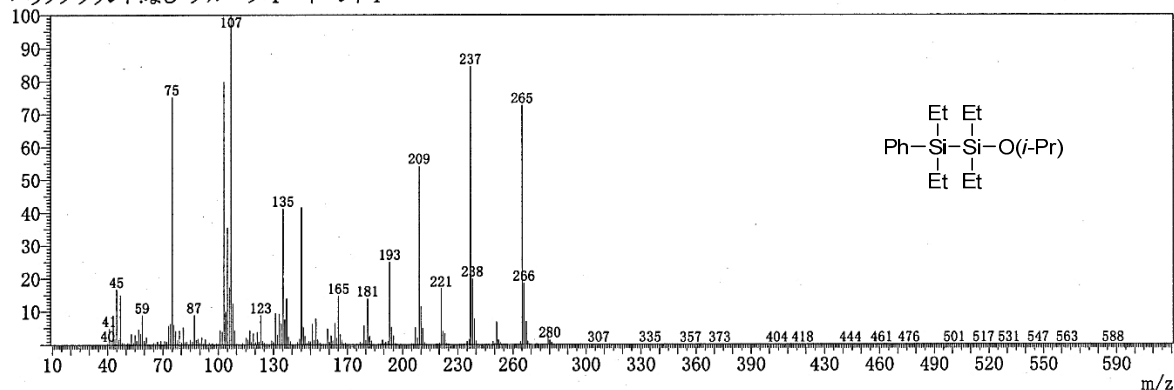


Figure S108. Mass spectrum of 25 (EI, 70 eV).

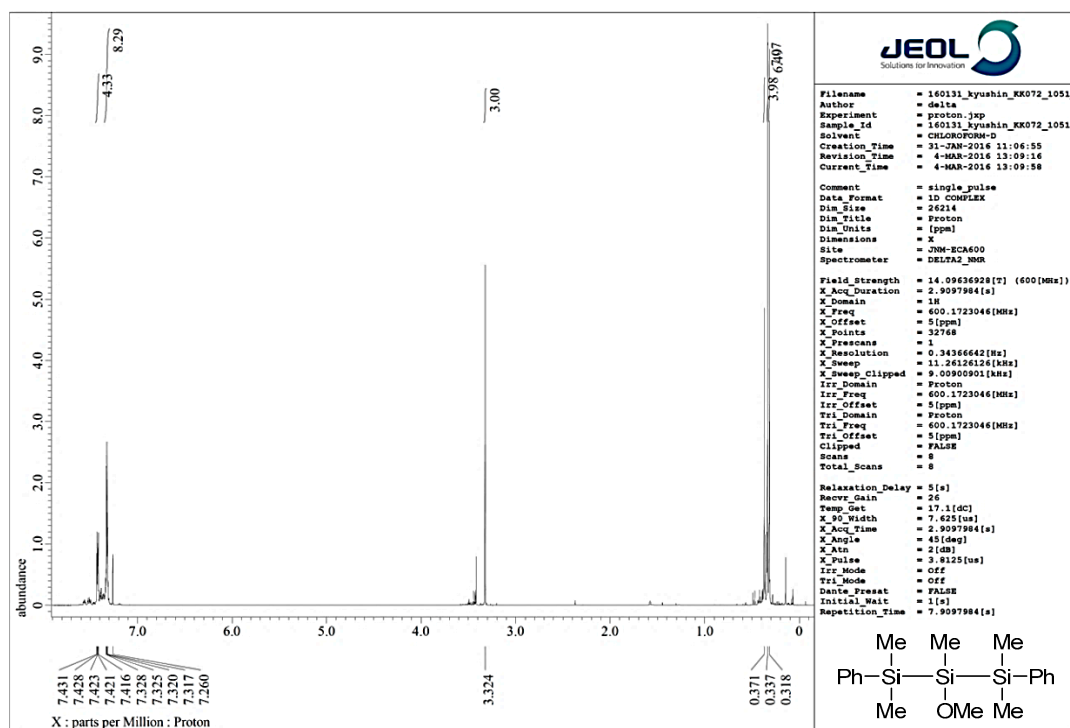


Figure S109. ¹H NMR spectrum of 27 in CDCl₃ at room temperature.

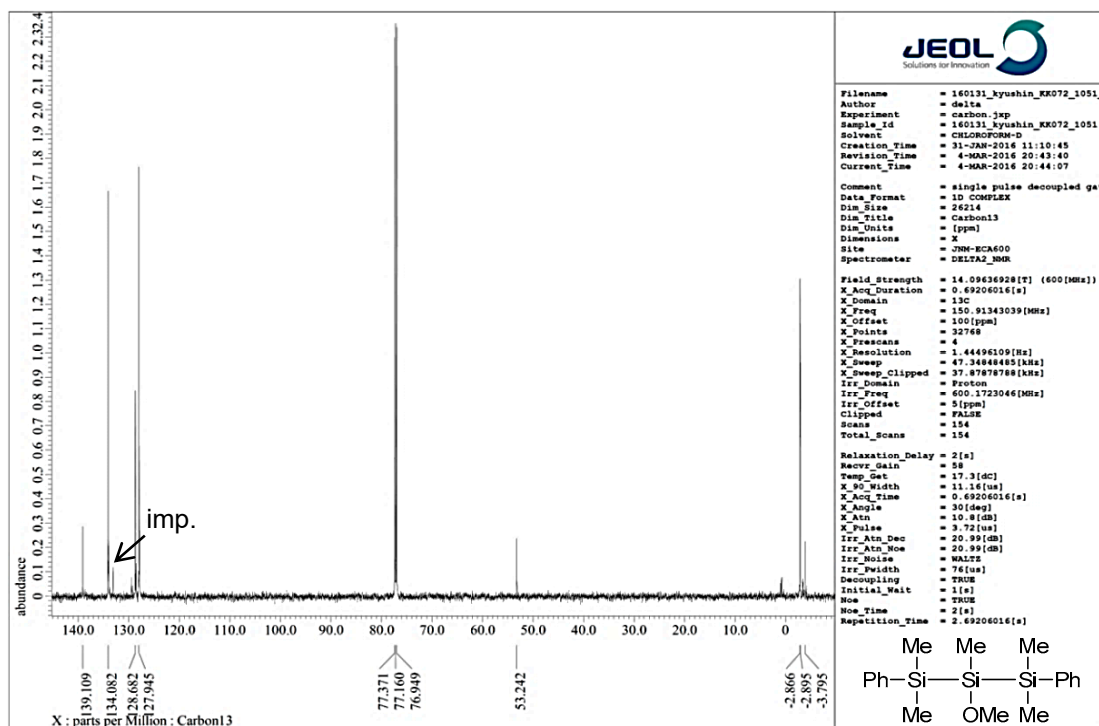


Figure S110. ^{13}C NMR spectrum of 27 in CDCl_3 at room temperature.

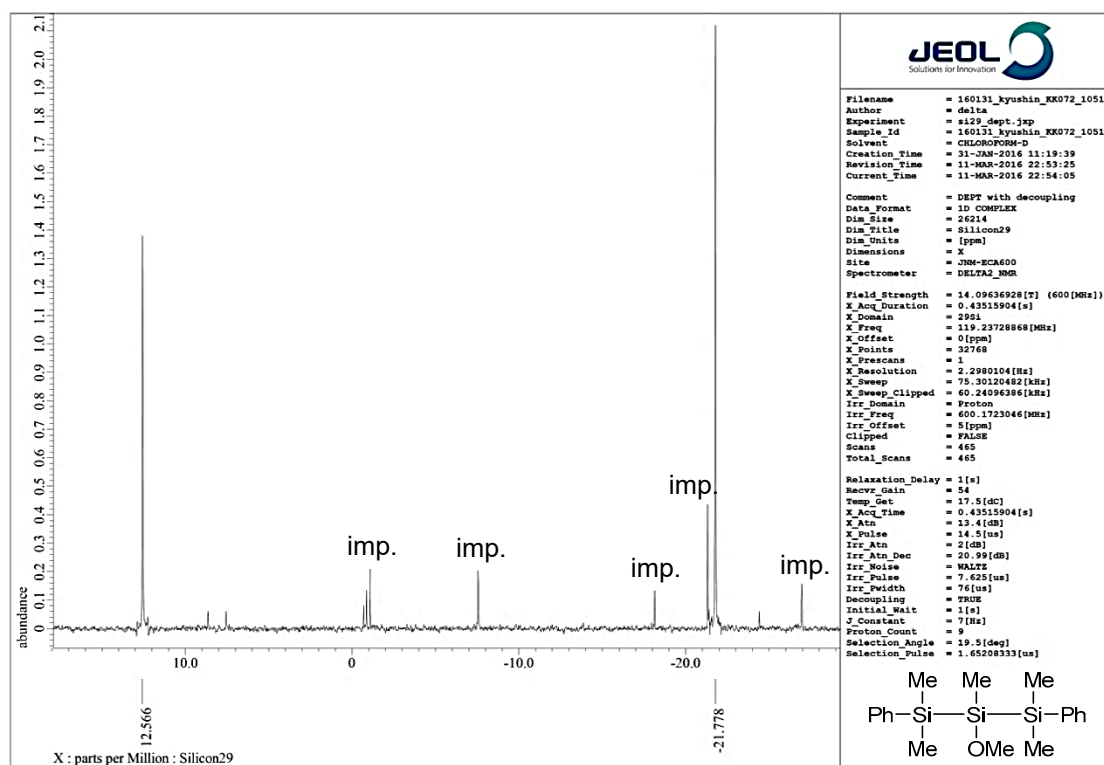


Figure S111. ^{29}Si NMR spectrum of 27 in CDCl_3 at room temperature.

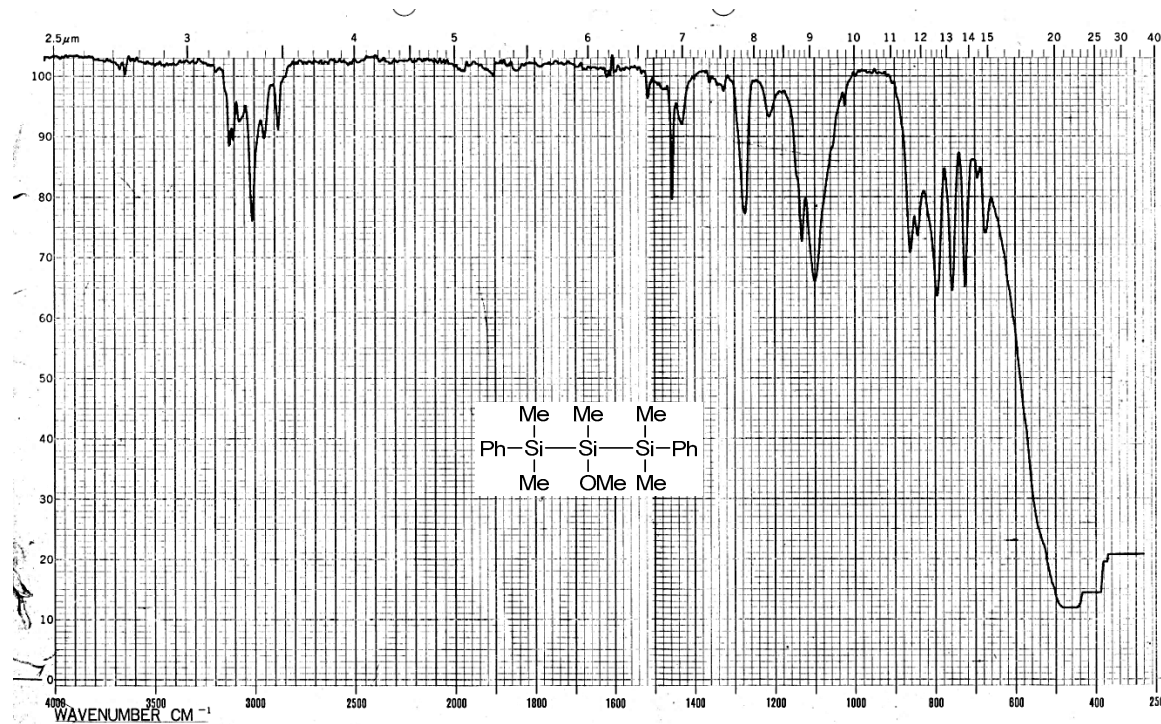


Figure S112. IR spectrum of 27 (NaCl).

#:4 保持時間:12.760(スキャン#:489)
 ピーク数:364
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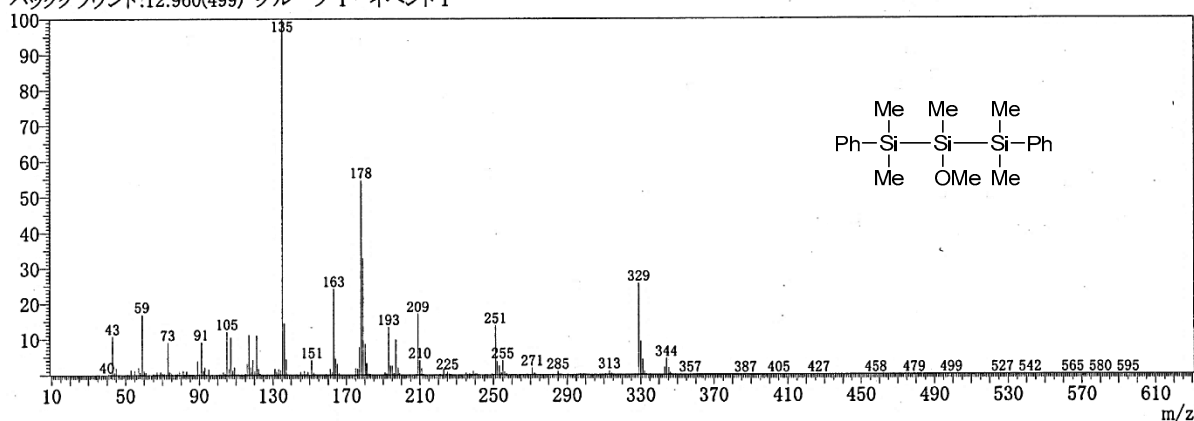


Figure S113. Mass spectrum of 27 (EI, 70 eV).