

**Nine new Gingerols from the rhizoma of *Zingiber officinale* Rosc. and their
cytotoxic activities.**

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Supporting Information

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E-mail addresses: wangyzlb@126.com (Y.-Z. Wang).

For compound 1

- S1. ¹H NMR spectrum of **1** (500MHz, CDCL₃)
- S2. ¹³C NMR spectrum of **1** (125MHz, CDCL₃)
- S3. HSQC spectrum of **1**
- S4. HMBC spectrum of **1**
- S5. ¹H NMR spectrum of **1** (500MHz, C₆D₆)
- S6. HRESIMS spectrum of **1**
- S7. IR spectrum of **1**
- S8. UV spectrum of **1**

For Compound 2

- S9. ¹H NMR spectrum of **2** (500MHz, CDCL₃)
- S10. ¹³C NMR spectrum of **2** (125MHz, CDCL₃)
- S11. HSQC spectrum of **2**
- S12. HMBC spectrum of **2**
- S13. ¹H NMR spectrum of **3** (500MHz, C₆D₆)
- S14. HRESIMS spectrum of **2**
- S15. IR spectrum of **2**
- S16. UV spectrum of **2**

For compound 3

- S17. ¹H NMR spectrum of **3** (500MHz, CDCL₃)
- S18. ¹³C NMR spectrum of **3** (125MHz, CDCL₃)
- S19. HSQC spectrum of **3**
- S20. HMBC spectrum of **3**
- S21. NOESY spectrum of **3**
- S22. ¹H NMR spectrum of **3** (500MHz, C₆D₆)
- S23. HRESIMS spectrum of **3**
- S24. IR spectrum of **3**
- S25. UV spectrum of **3**

For compound 4

- S26. ¹H NMR spectrum of **4** (500MHz, CDCL₃)
- S27. ¹³C NMR spectrum of **4** (125MHz, CDCL₃)
- S28. DEPT135 spectrum of **4**
- S29. HSQC spectrum of **4**
- S30. HMBC spectrum of **4**
- S31. ¹H-¹H COSY spectrum of **4**
- S32. HRESIMS spectrum of **4**
- S33. IR spectrum of **4**
- S34. UV spectrum of **4**

For compound 5

- S35. ¹H NMR spectrum of **5** (500MHz, CDCL₃)

- S36. ^{13}C NMR spectrum of **5** (125MHz, CDCl_3)
- S37. HSQC spectrum of **5**
- S38. HMBC spectrum of **5**
- S39. ^1H - ^1H COSY spectrum of **5**
- S40. HRESIMS spectrum of **5**
- S41. IR spectrum of **5**
- S42. UV spectrum of **5**

For compound 6

- S43. ^1H NMR spectrum of **6** (500MHz, CDCl_3)
- S44. ^{13}C NMR spectrum of **6** (125MHz, CDCl_3)

For compound 7

- S45. ^1H NMR spectrum of **7** (500MHz, CDCl_3)
- S46. ^{13}C NMR spectrum of **7** (125MHz, CDCl_3)
- S47. NOESY spectrum of **7**

For compound 8

- S48. ^1H NMR spectrum of **8** (500MHz, CDCl_3)
- S49. ^{13}C NMR spectrum of **8** (125MHz, CDCl_3)
- S50. HSQC spectrum of **8**
- S51. HMBC spectrum of **8**
- S52. NOESY spectrum of **8**
- S53. HRESIMS spectrum of **8**
- S54. IR spectrum of **8**
- S55. UV spectrum of **8**

For compound 9

- S56. ^1H NMR spectrum of **9** (500MHz, CDCl_3)
- S57. ^{13}C NMR spectrum of **9** (125MHz, CDCl_3)
- S58. HSQC spectrum of **9**
- S59. HMBC spectrum of **9**
- S60. NOESY spectrum of **9**
- S61. HRESIMS spectrum of **9**
- S62. IR spectrum of **9**
- S63. UV spectrum of **9**

For compound 10

- S64. ^1H NMR spectrum of **10** (500MHz, CDCl_3)
- S65. ^{13}C NMR spectrum of **10** (125MHz, CDCl_3)
- S66. HSQC spectrum of **10**
- S67. HMBC spectrum of **10**
- S68. NOESY spectrum of **10**
- S69. HRESIMS spectrum of **10**

S70. IR spectrum of **10**

S71. UV spectrum of **10**

For compound 11

S72. ^1H NMR spectrum of **11** (500MHz, CDCl_3)

S73. ^{13}C NMR spectrum of **11** (125MHz, CDCl_3)

S74. HSQC spectrum of **11**

S75. HMBC spectrum of **11**

S76. NOESY spectrum of **11**

S77. HRESIMS spectrum of **11**

S78. IR spectrum of **11**

S79. UV spectrum of **11**

For compound 12

S80. ^1H NMR spectrum of **12** (500MHz, CDCl_3)

S81. ^{13}C NMR spectrum of **12** (125MHz, CDCl_3)

For compound 13

S82. ^1H NMR spectrum of **13** (500MHz, CDCl_3)

S83. ^{13}C NMR spectrum of **13** (125MHz, CDCl_3)

For Compound 14:

S84. ^1H NMR spectrum (500MHz, CDCl_3) of **14**

S85. ^{13}C NMR spectrum (125MHz, CDCl_3) of **14**

For Compound 15:

S86. ^1H NMR spectrum (500MHz, CDCl_3) of **15**

S87. ^{13}C NMR spectrum (125MHz, CDCl_3) of **15**

For compound 16

S88. ^1H NMR spectrum of **16** (500MHz, CDCl_3)

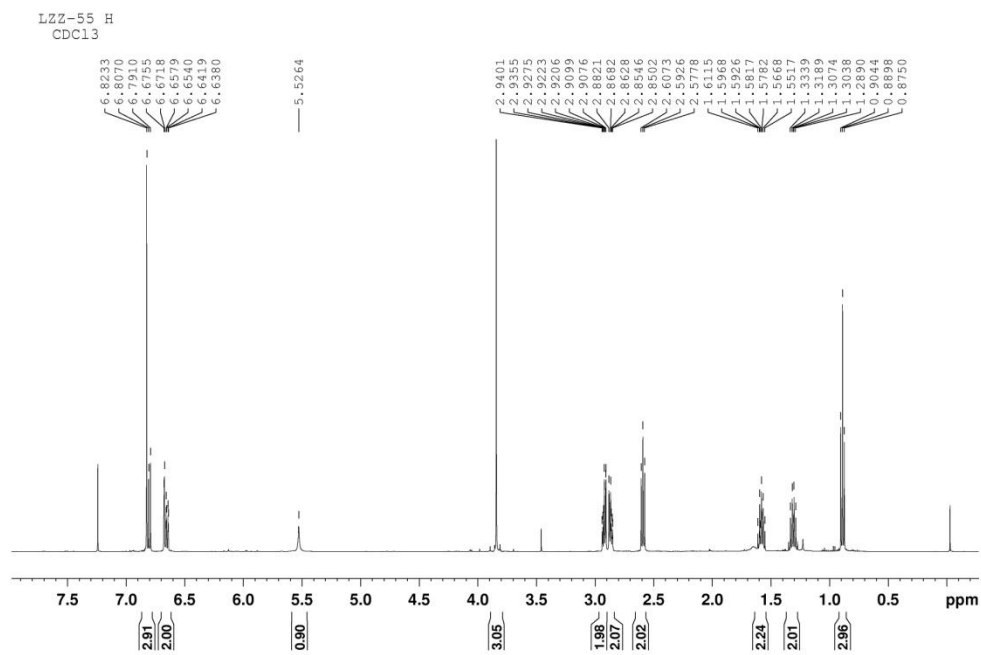
S89. ^{13}C NMR spectrum of **16** (125MHz, CDCl_3)

For Compound 17:

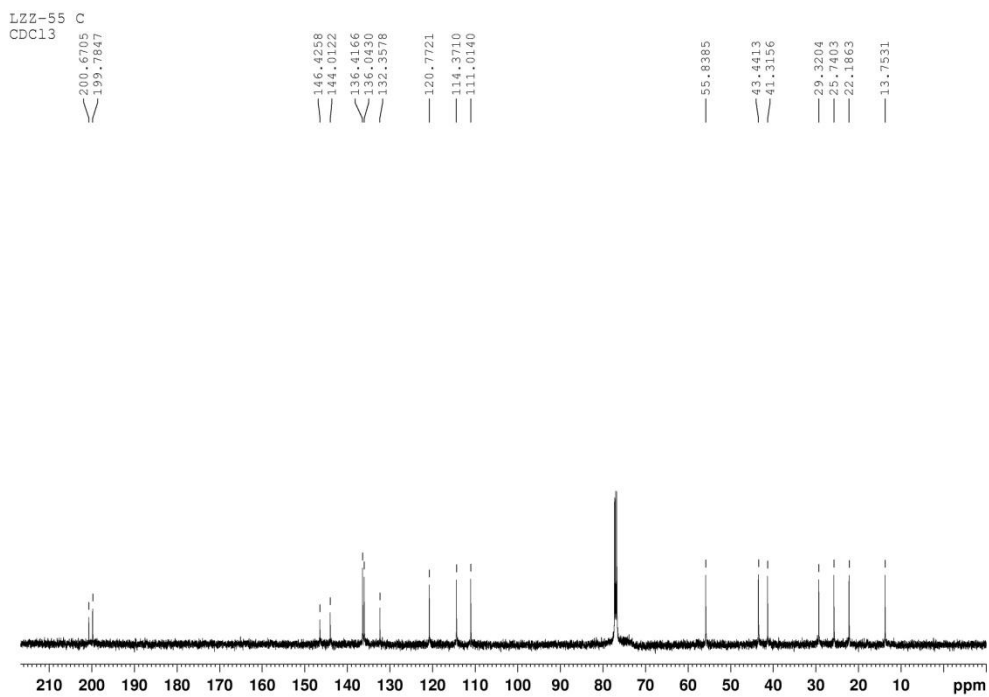
S90. ^1H NMR spectrum (500MHz, CDCl_3) of **17**

S91. ^{13}C NMR spectrum (125MHz, CDCl_3) of **17**

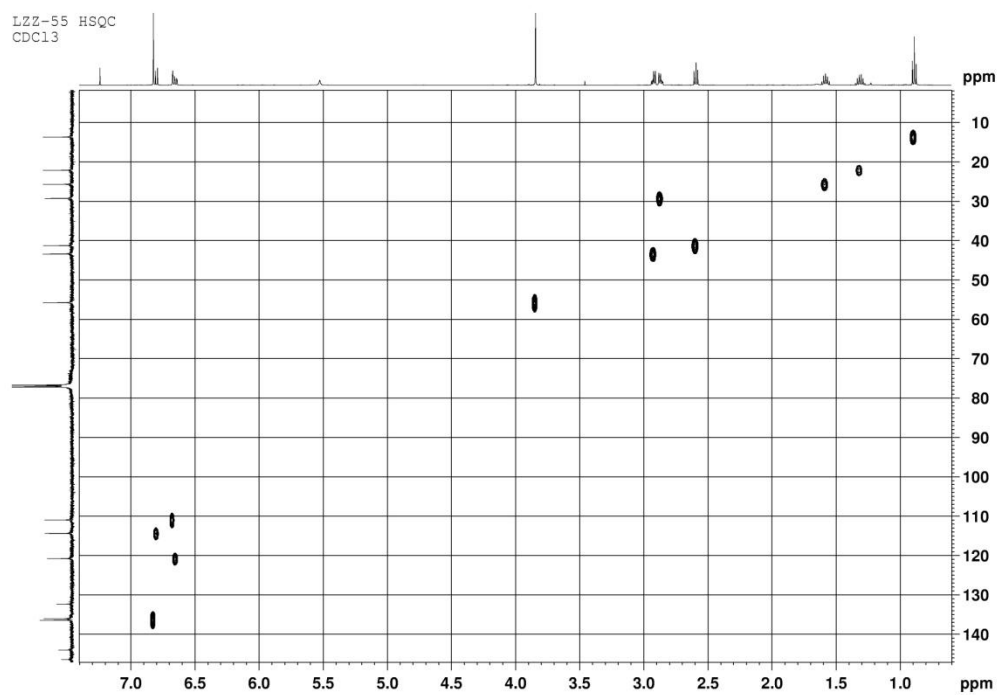
S1. ^1H NMR spectrum of **1** (500MHz, CDCl_3)



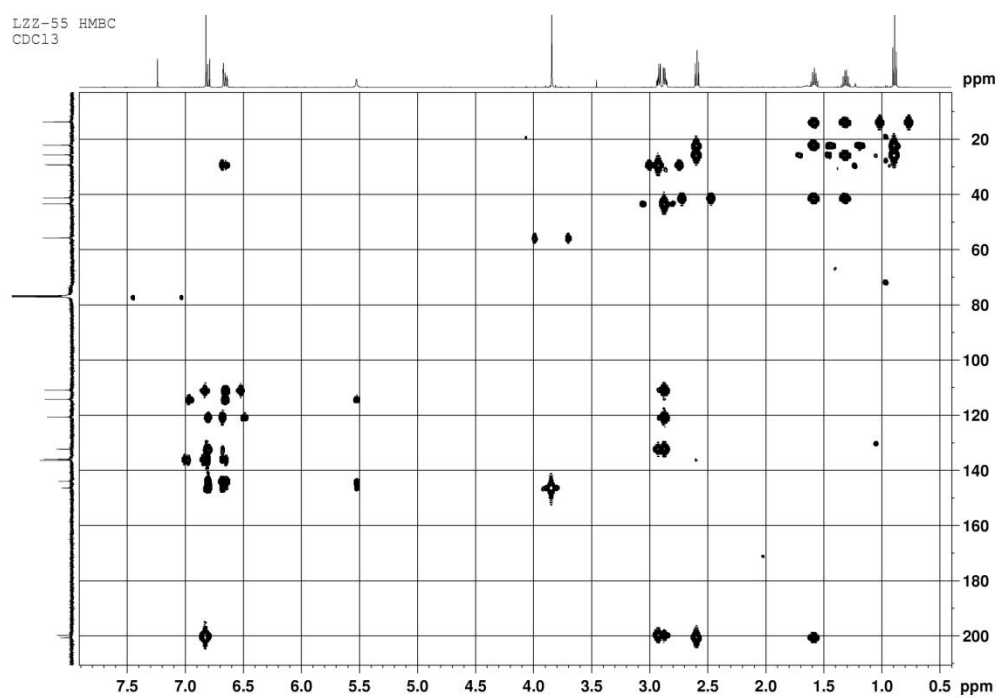
S2. ^{13}C NMR spectrum of **1** (125MHz, CDCl_3)



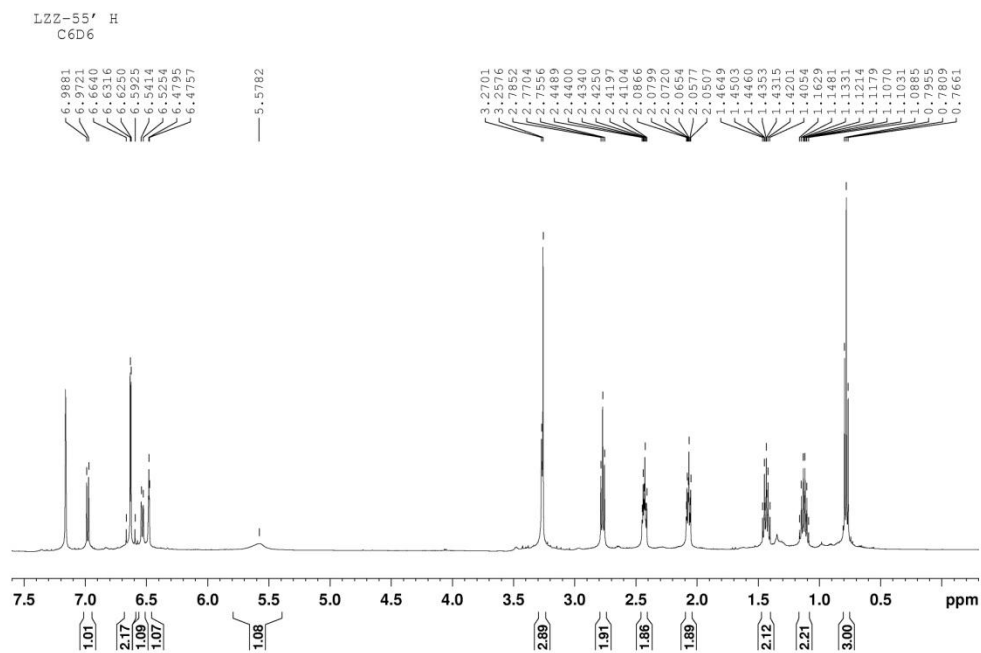
S3. HSQC spectrum of **1**



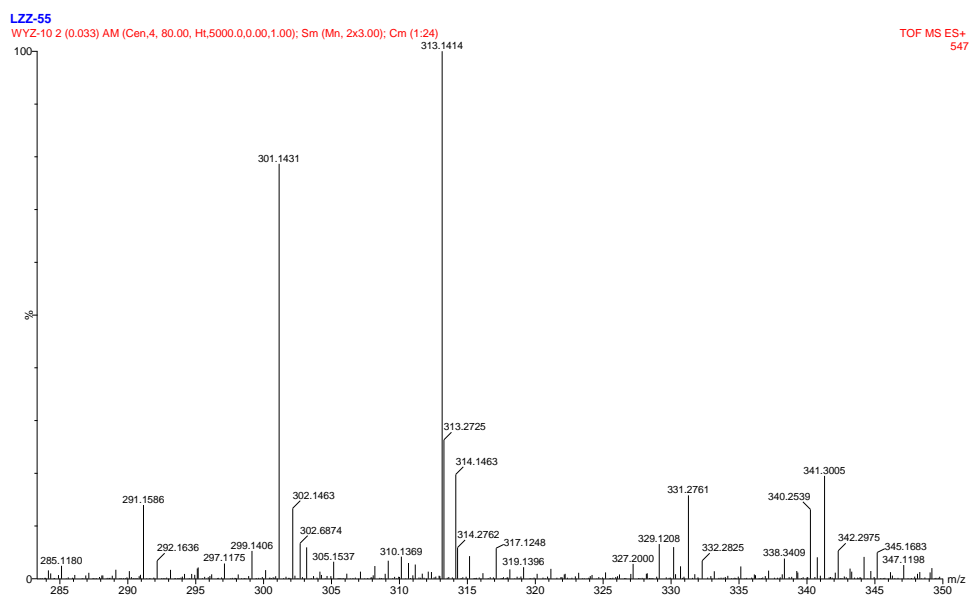
S4. HMBC spectrum of **1**



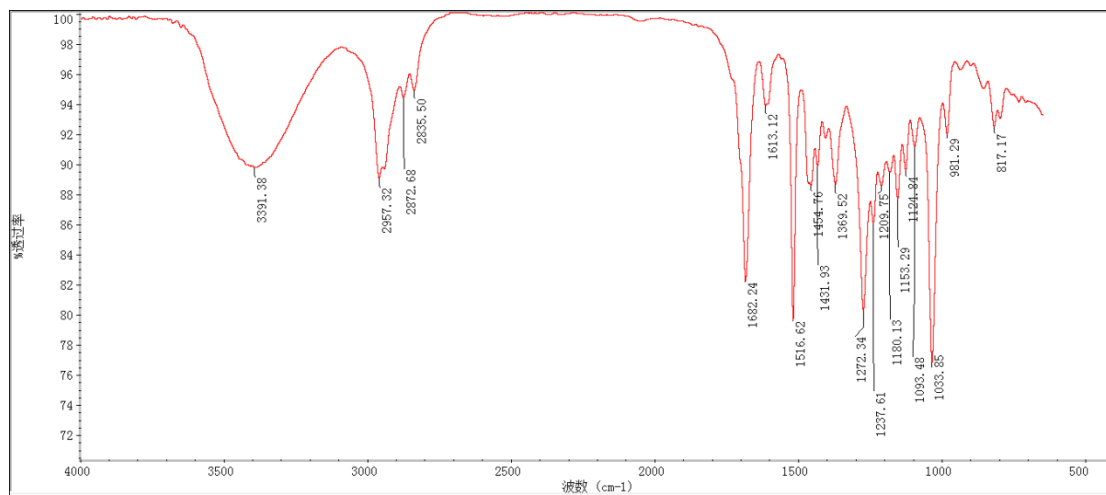
S5. ¹H NMR spectrum of **1** (500MHz, C₆D₆)



S6. HRESIMS spectrum of **1**



S7. IR spectrum of **1**



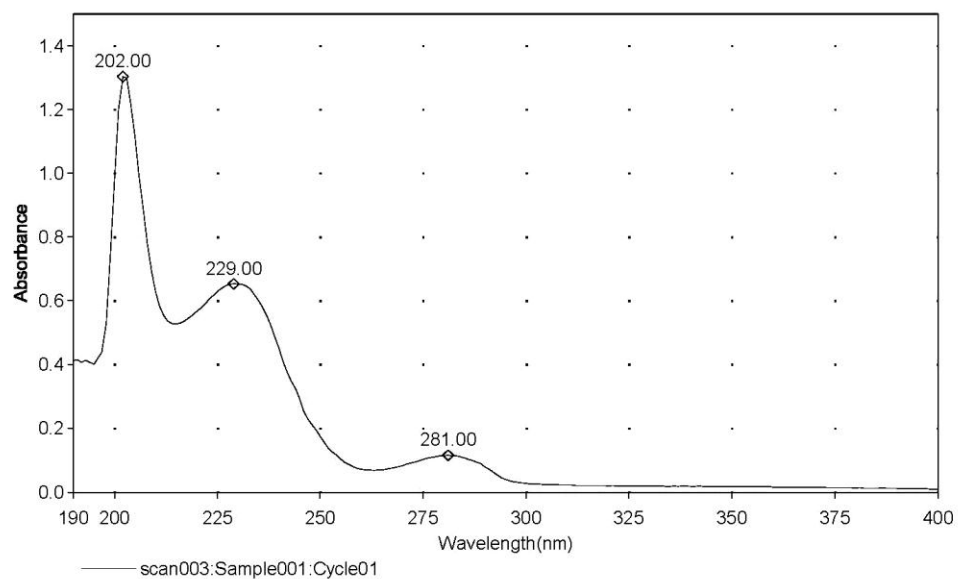
S8. UV spectrum of 1

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Operator Name (None Entered)
Department (None Entered)
Organization (None Entered)
Information (None Entered)

Date of Report 2017/11/29
Time of Report 21:00:54下午

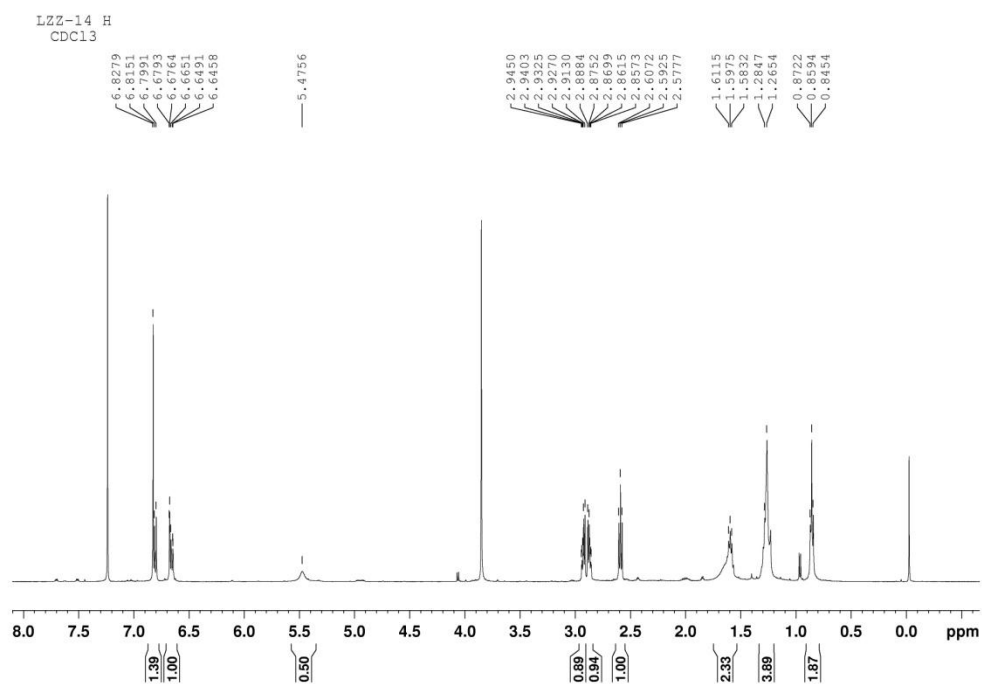
Scan Graph



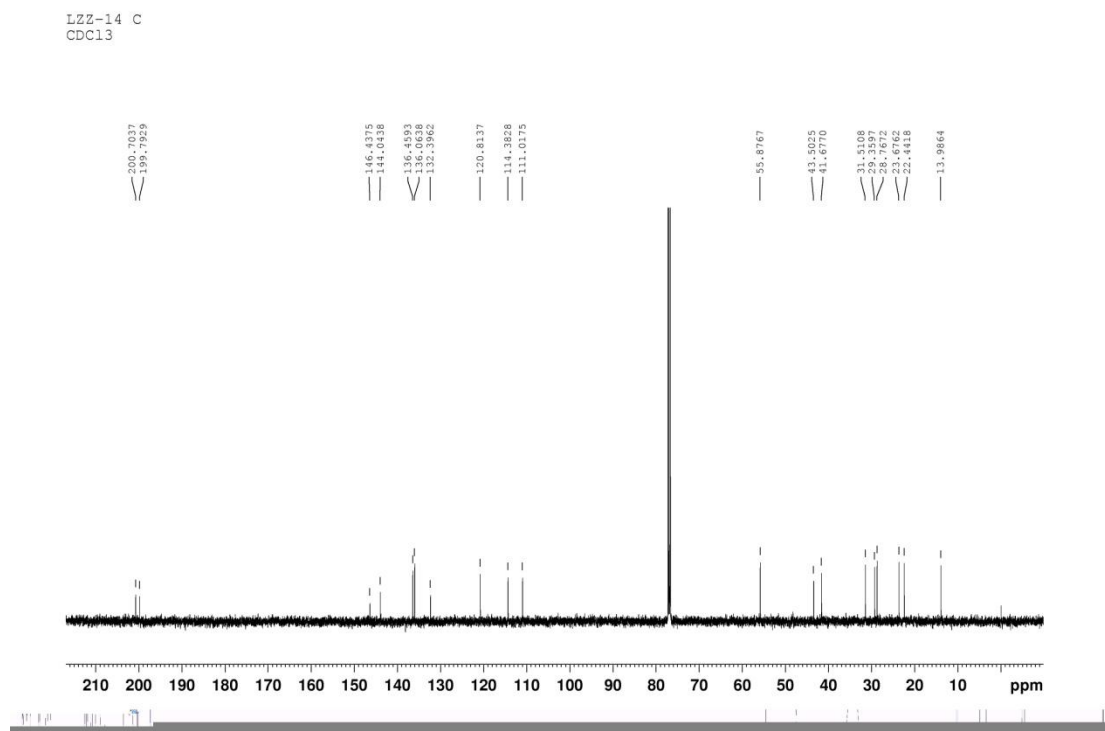
Results Table - scan003,Sample001,Cycle01

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281.00	.115	Sort By Wavelength

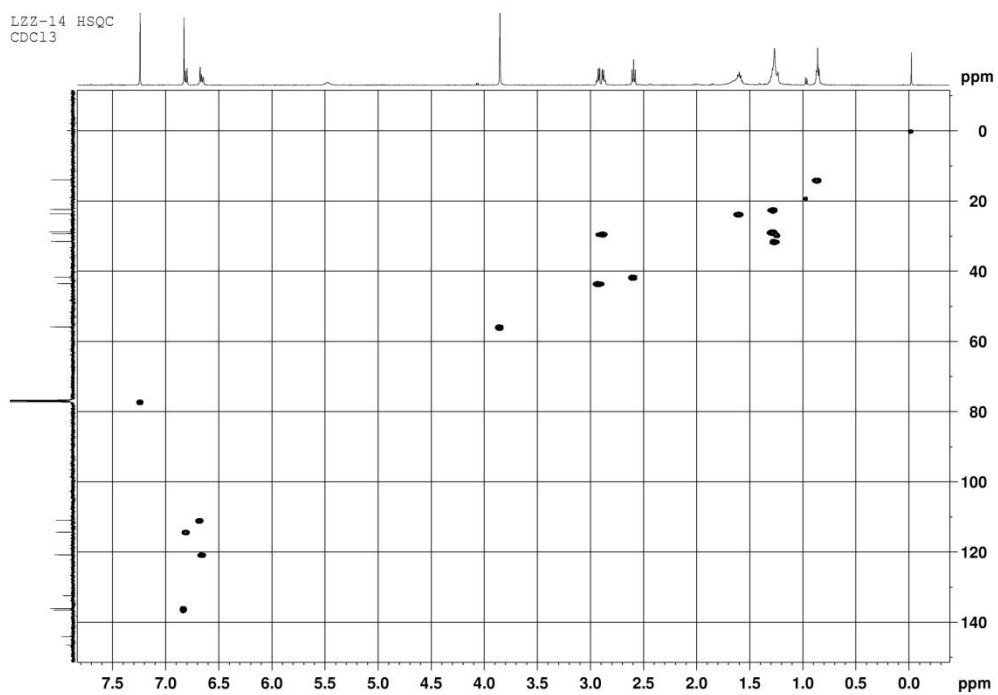
S9. ¹H NMR spectrum of **2** (500MHz, CDCl₃)



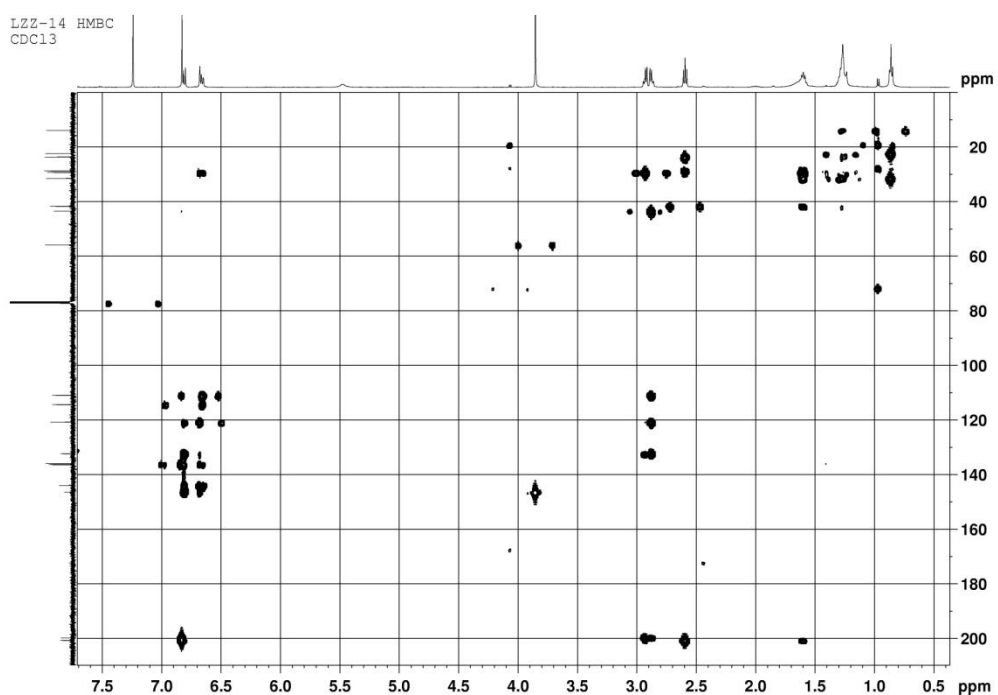
S10. ¹³C NMR spectrum of **2** (125MHz, CDCl₃)



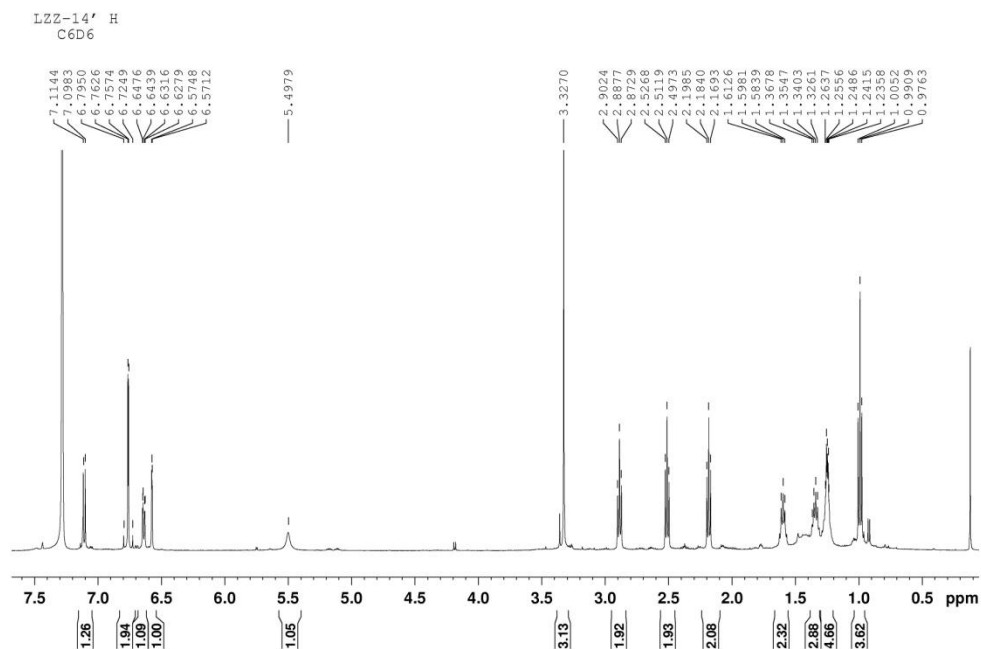
S11. HSQC spectrum of 2



S12. HMBC spectrum of 2



S13. ¹H NMR spectrum of **2** (500MHz, C₆D₆)



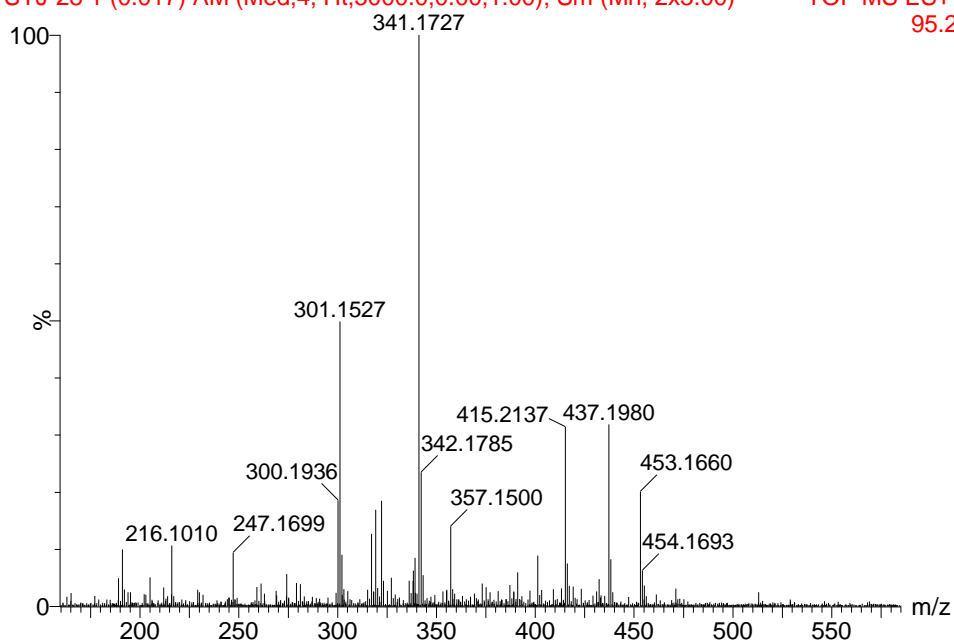
S14. HRESIMS spectrum of **2**

LZZ-14

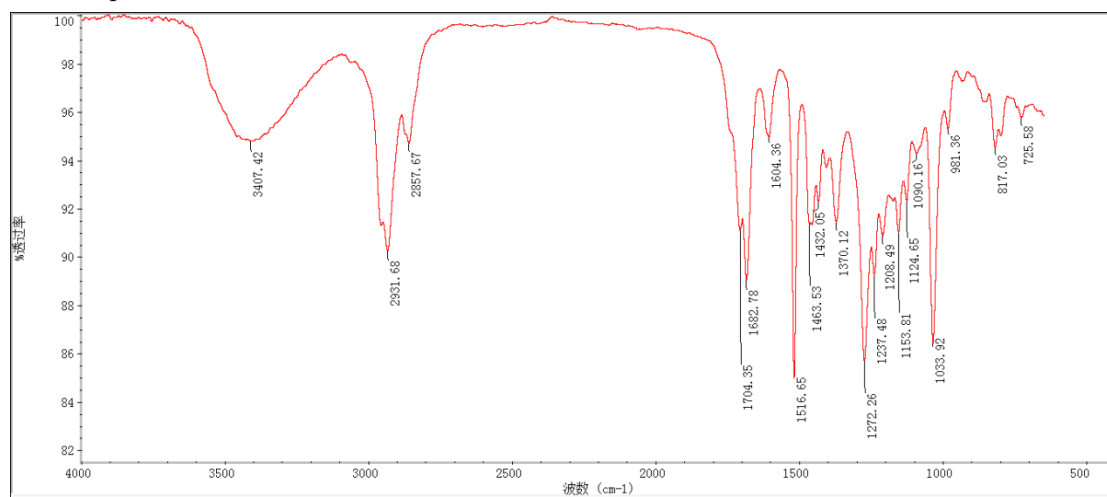
04-MAR-2017

SYJ-28 1 (0.017) AM (Med,4, Ht,5000.0,0.00,1.00); Sm (Mn, 2x3.00)

TOF MS ES+
95.2



S15. IR spectrum of 2

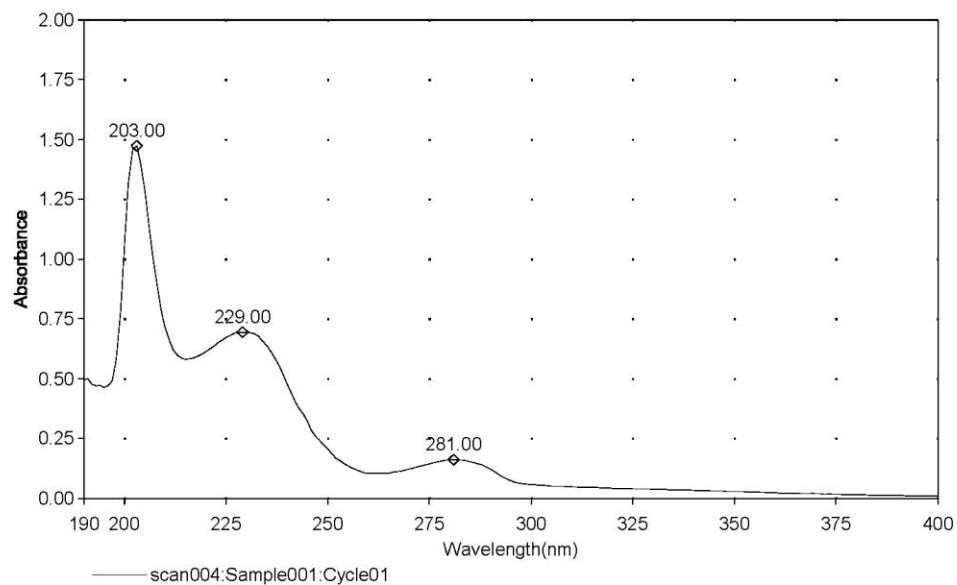


S16. UV spectrum of 2

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Operator Name	(None Entered)	Date of Report	2017/11/29
Department	(None Entered)	Time of Report	21:07:00下午
Organization	(None Entered)		
Information	(None Entered)		

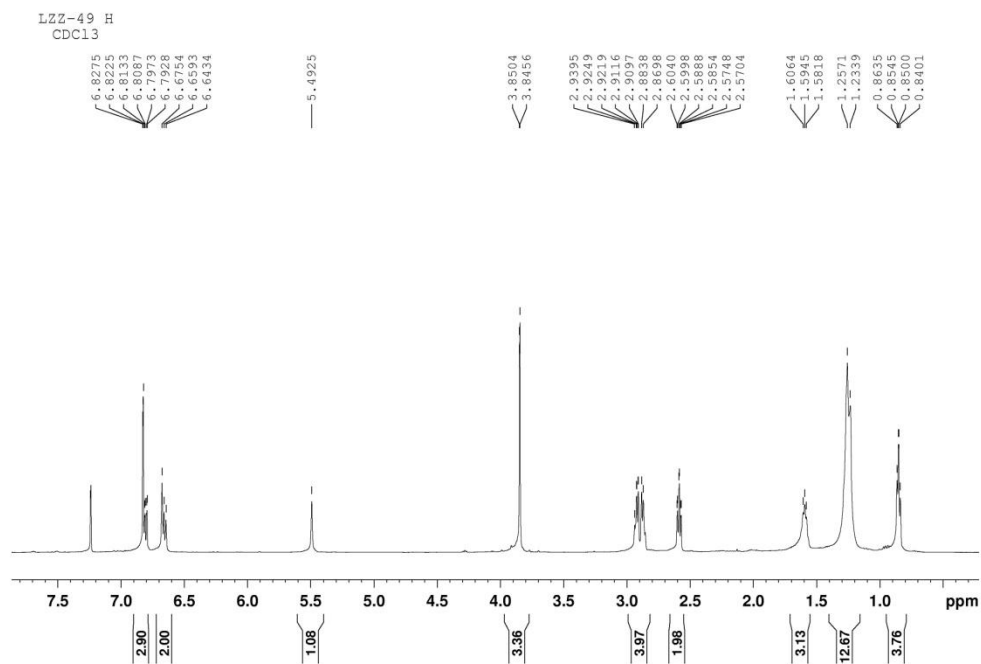
Scan Graph



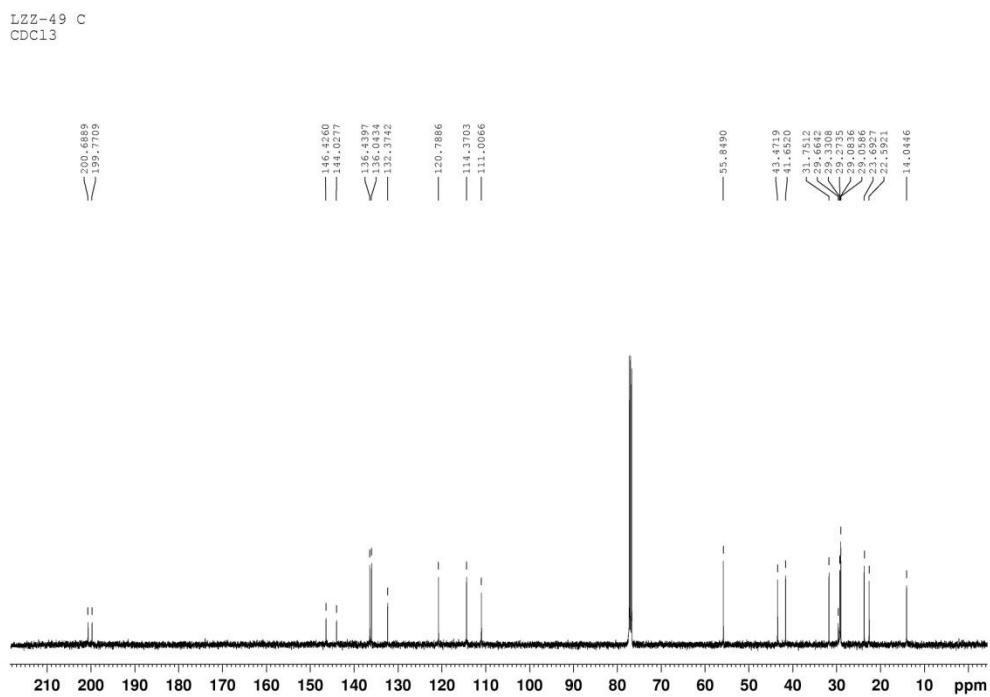
Results Table - scan004,Sample001,Cycle01

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281.00	.160	Sort By Wavelength

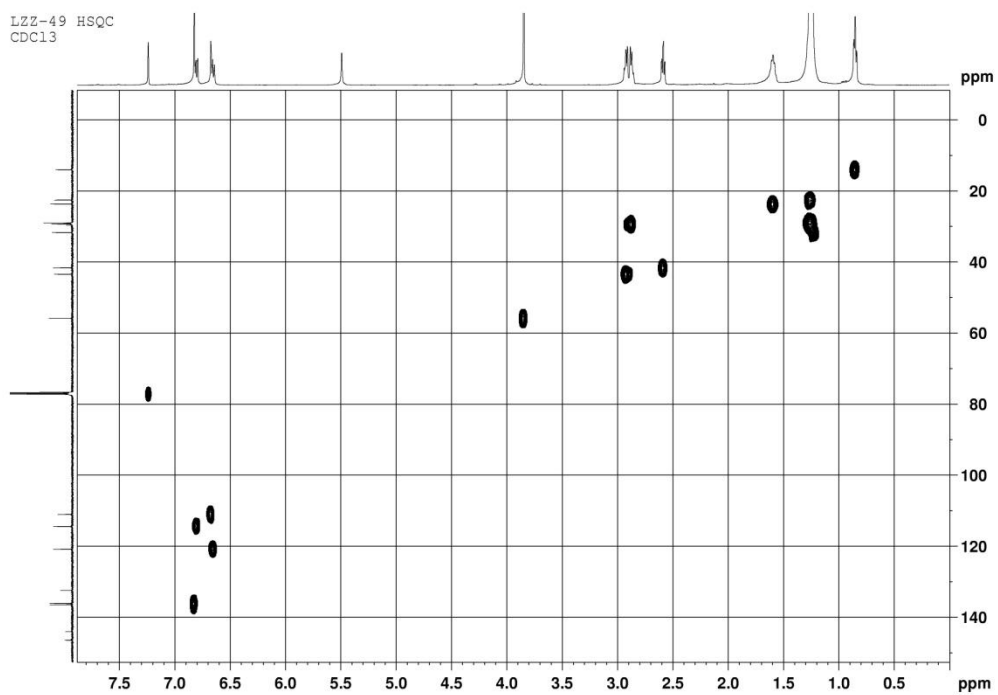
S17. ¹H NMR spectrum of **3** (500MHz, CDCL₃)



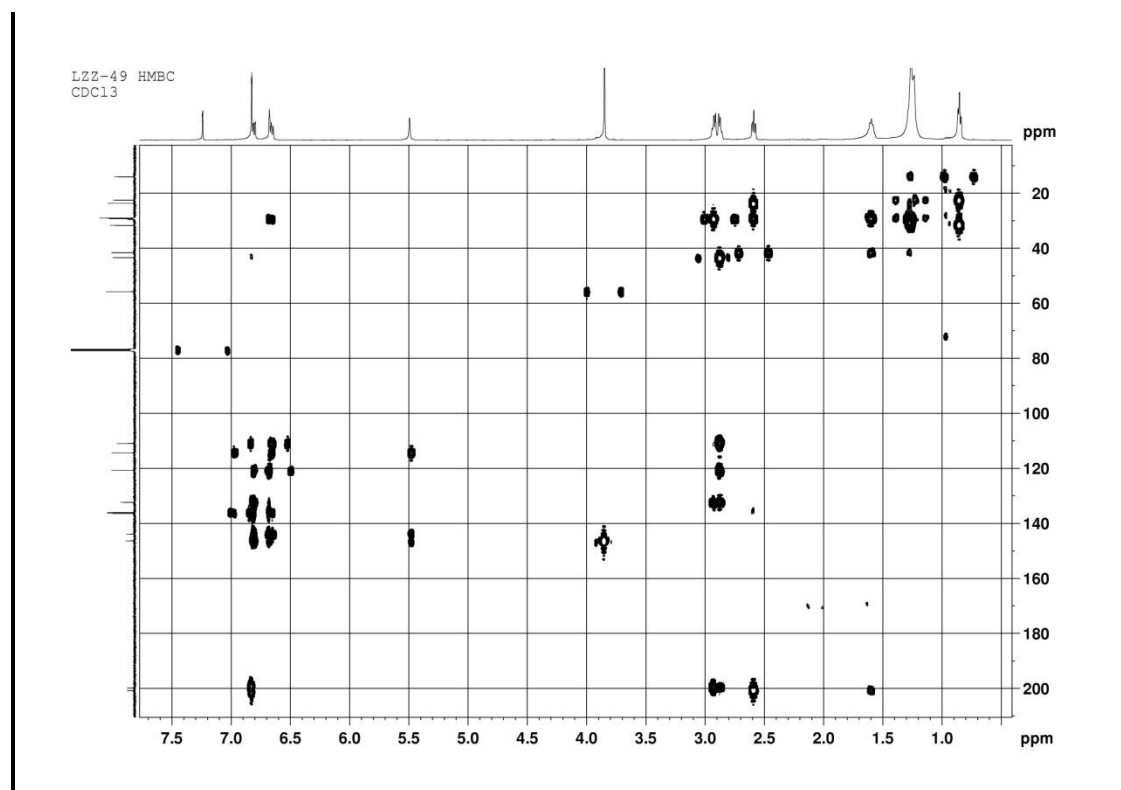
S18. ¹³C NMR spectrum of **3** (125MHz, CDCL₃)



S19. HSQC spectrum of **3**

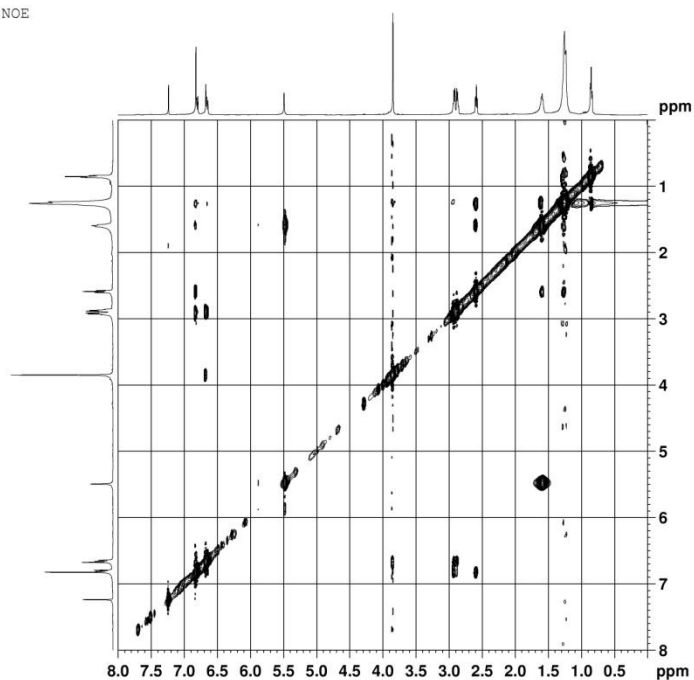


S20. HMBC spectrum of **3**

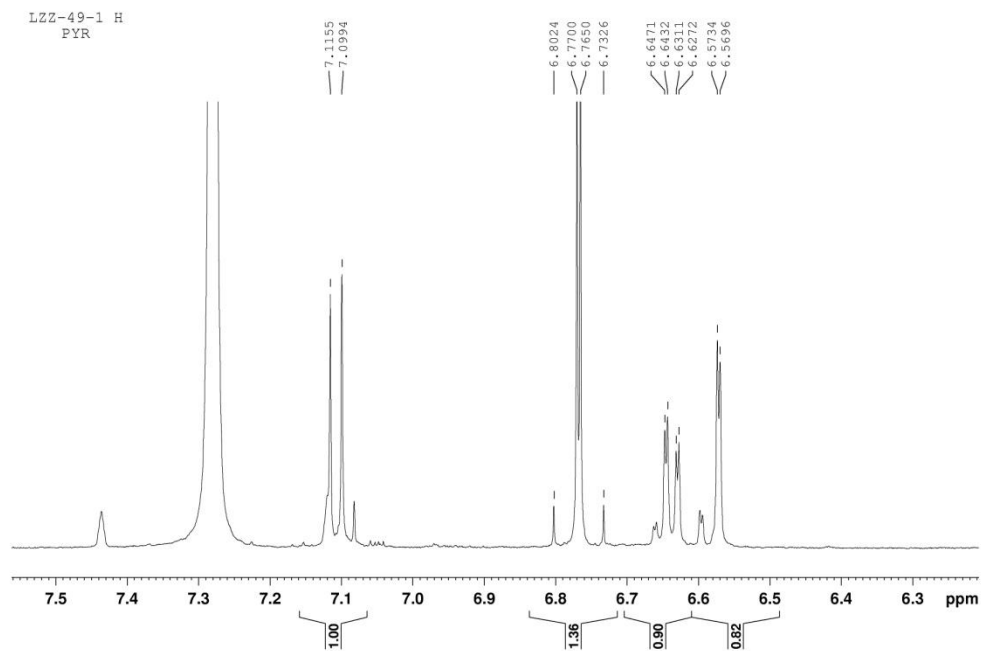


S21. NOESY spectrum of **3**

LZZ-49 NOE
CDCl₃



S22. ¹H NMR spectrum of **3** (500MHz, C₆D₆)



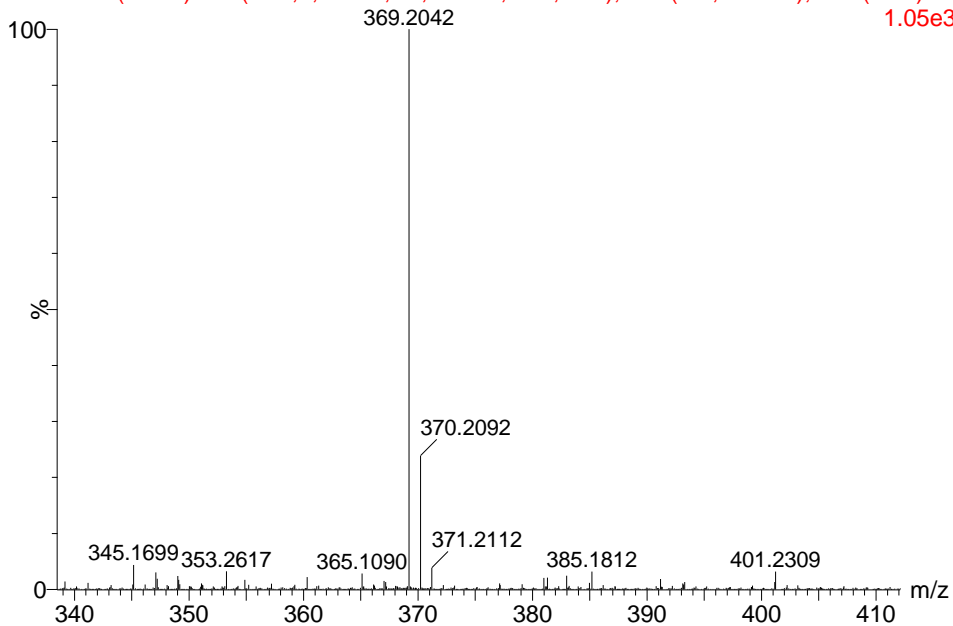
S23. HRESIMS spectrum of **3**

LZZ-49

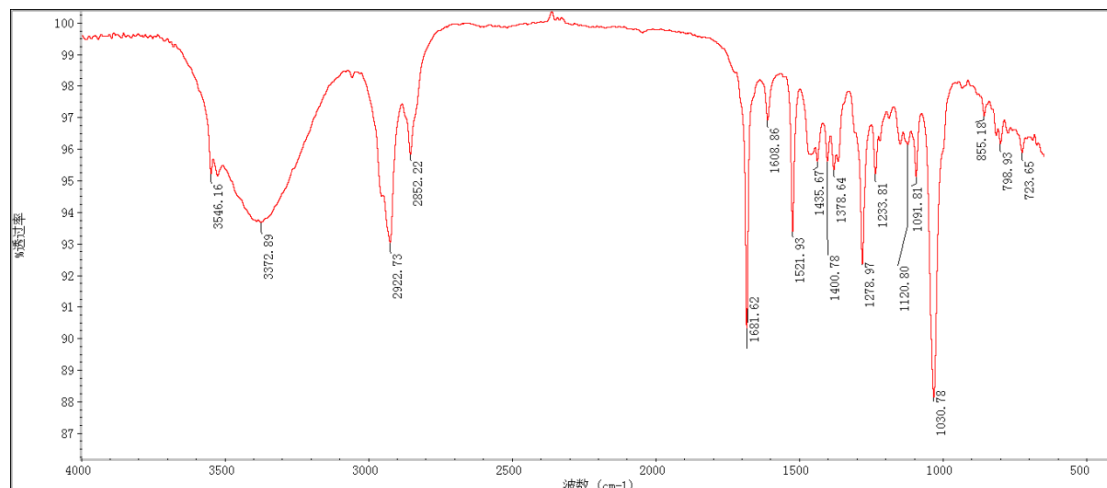
26-Jul-2017

WYZ-3 10 (0.187) AM (Cen,2, 80.00, Ht,5000.0,0.00,1.00); Sm (SG, 2x3.00); Cm (1:31)

1.05e3



S24. IR spectrum of **3**

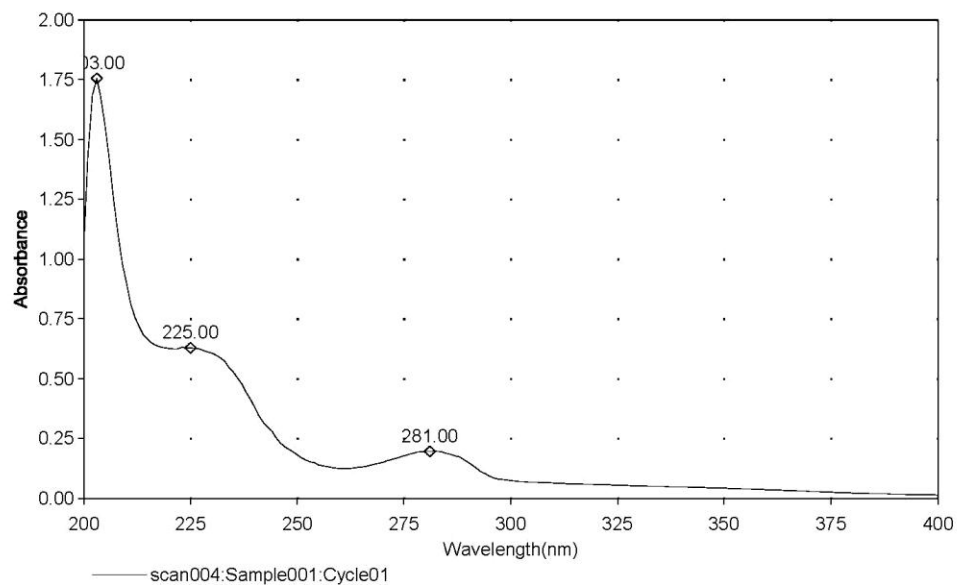


S25. UV spectrum of 3

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Operator Name (None Entered) Date of Report 2017/11/7
 Department (None Entered) Time of Report 17:15:11下午
 Organization (None Entered)
 Information (None Entered)

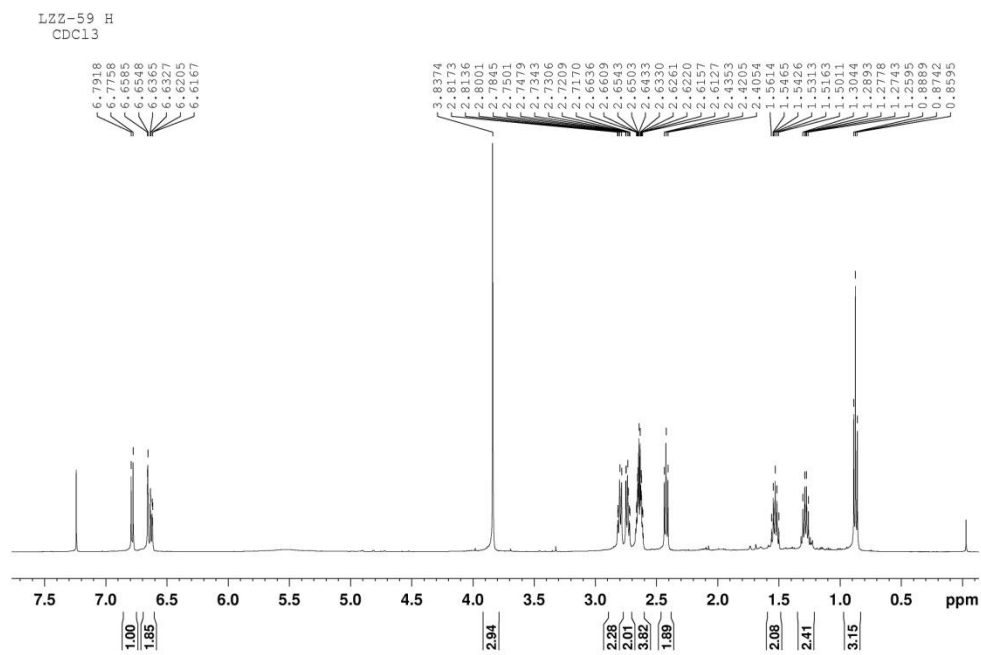
Scan Graph



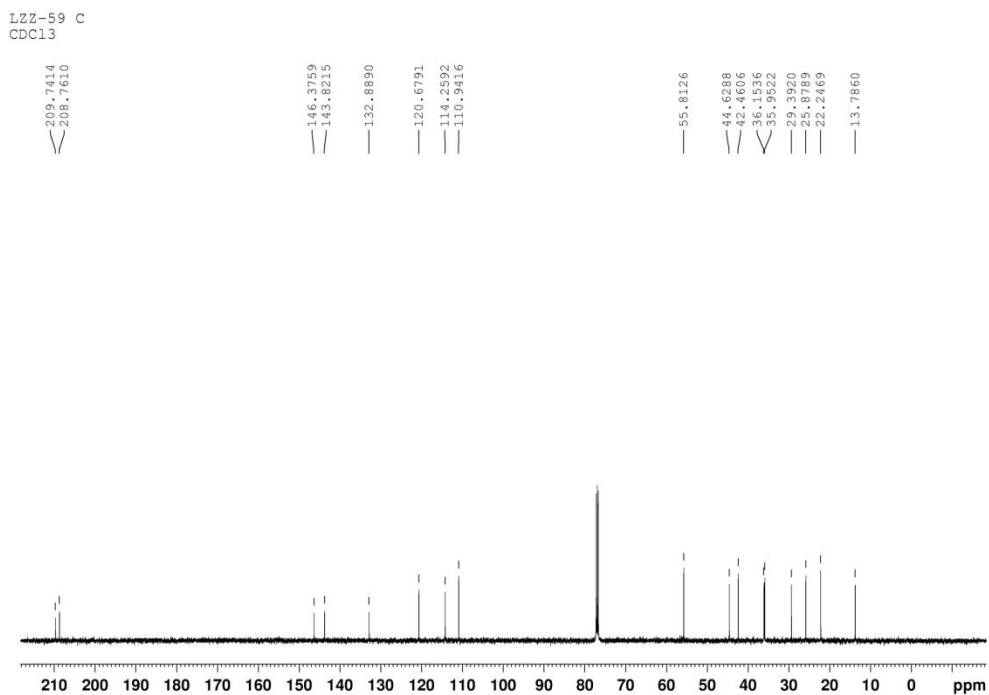
Results Table - LZZ-49.sre,Sample001,Cycle01

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281.00	.196	Sort By Wavelength

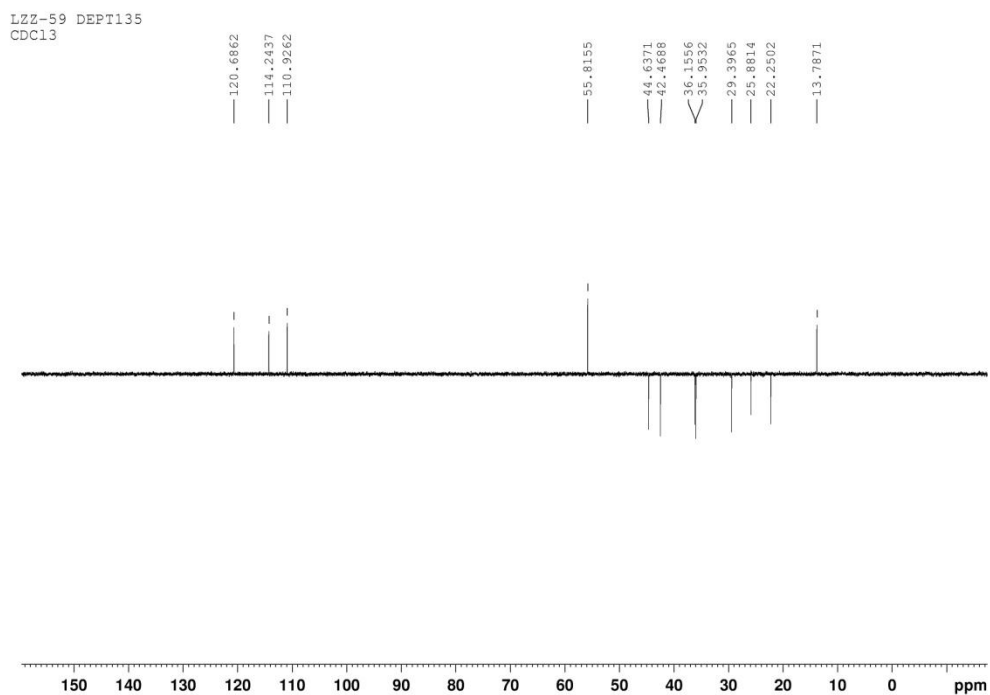
S26. ¹H NMR spectrum of **4** (500MHz, CDCl₃)



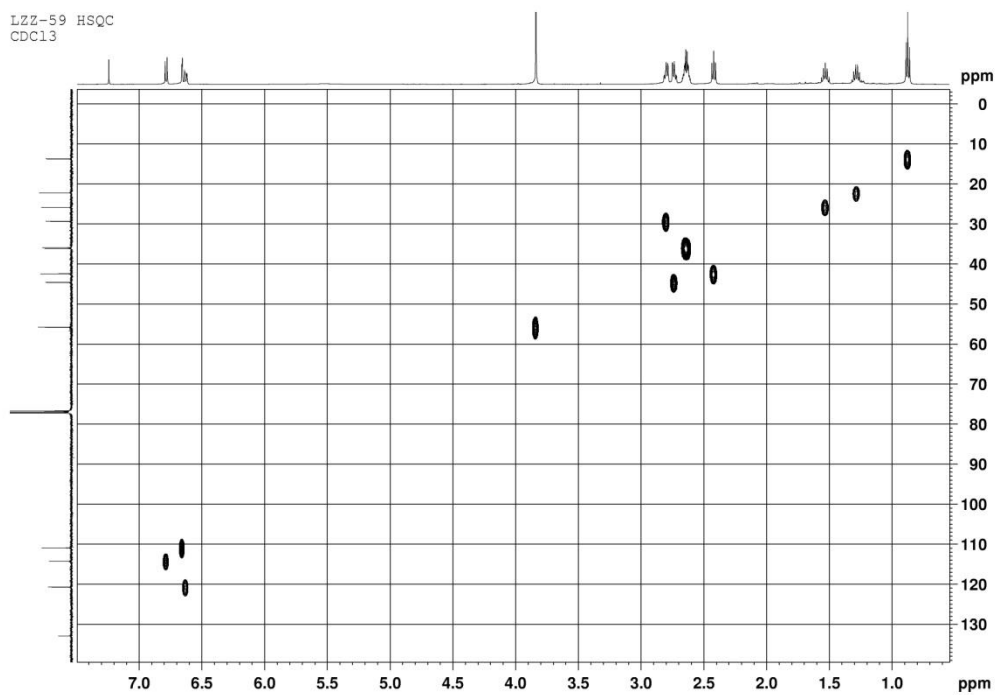
S27. ¹³C NMR spectrum of **4** (125MHz, CDCl₃)



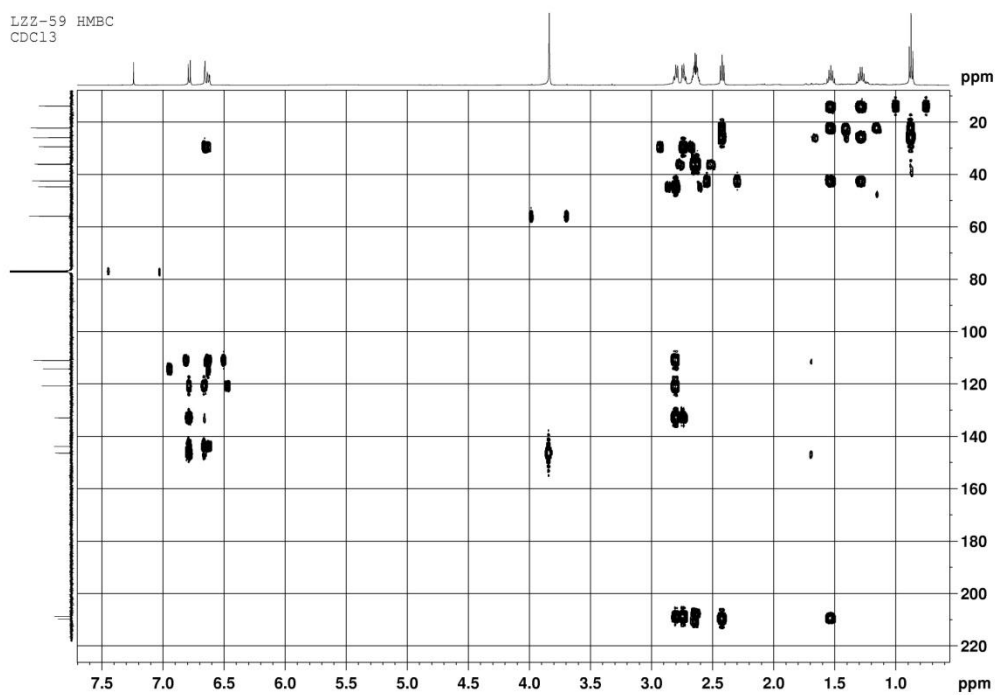
S28. DEPT135 spectrum of 4



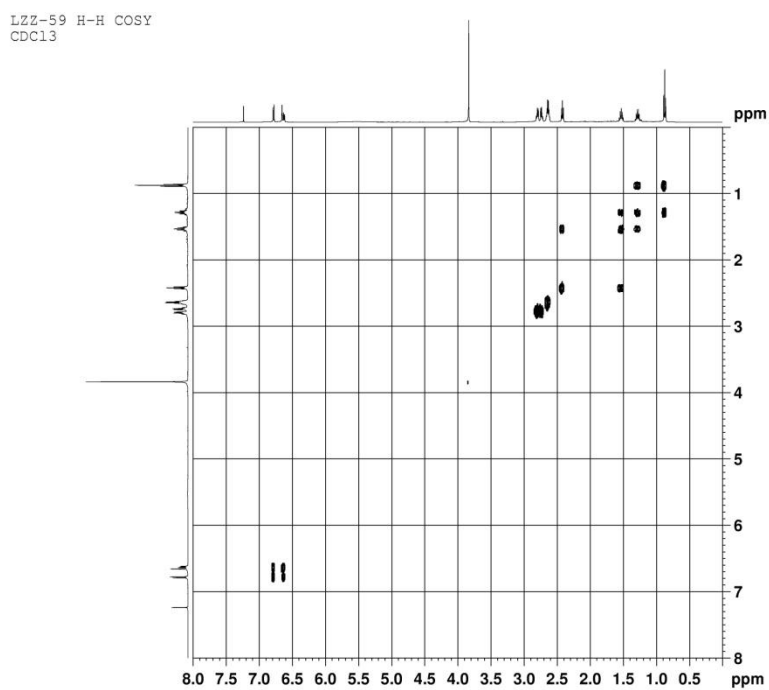
S29. HSQC spectrum of 4



S30. HMBC spectrum of 4



S31. ¹H-¹H COSY spectrum of 4



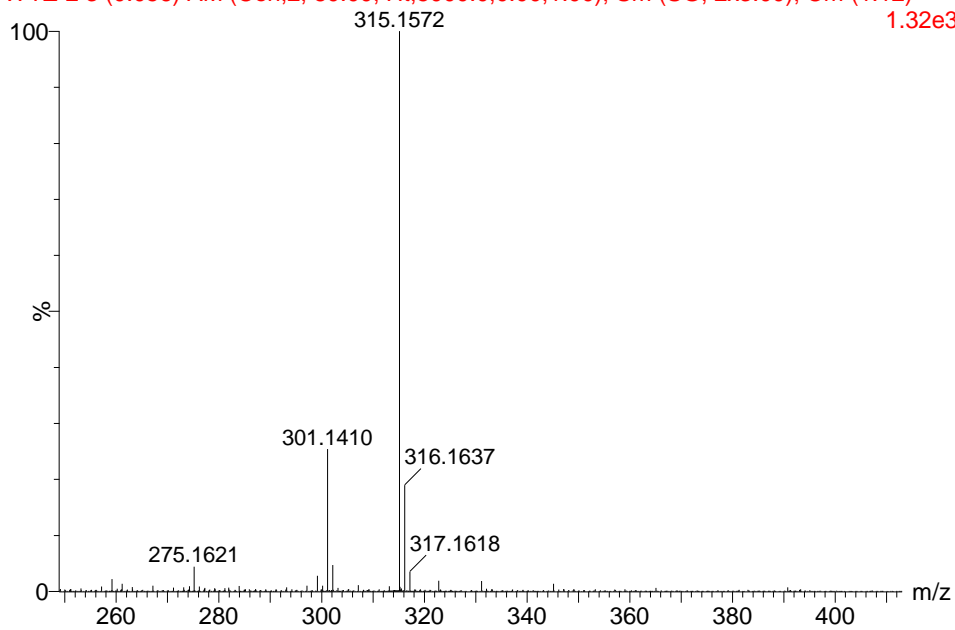
S32. HRESIMS spectrum of 4

LZZ-59

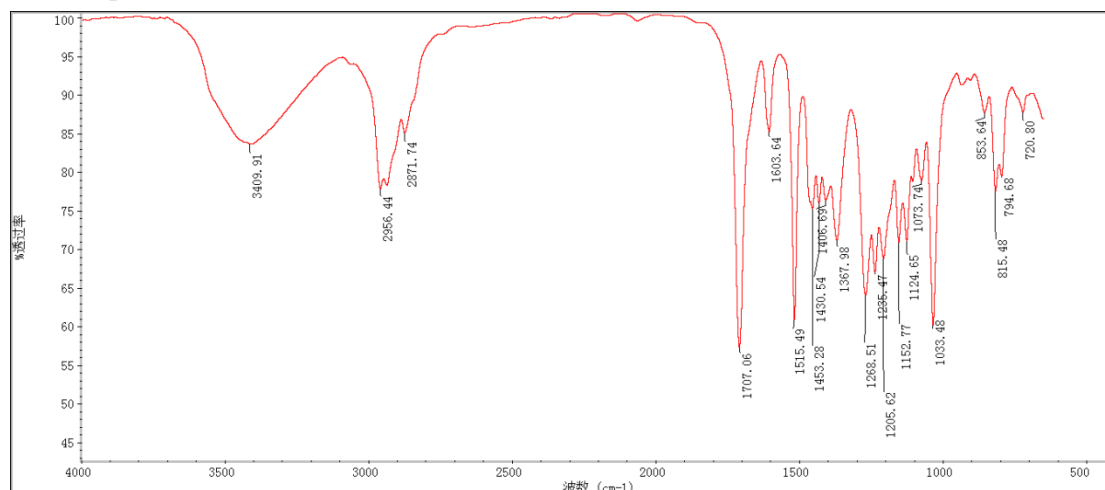
26-Jul-2017

WYZ-2 3 (0.056) AM (Cen,2, 80.00, Ht,5000.0,0.00,1.00); Sm (SG, 2x3.00); Cm (1:12)

1.32e3



S33. IR spectrum of 4

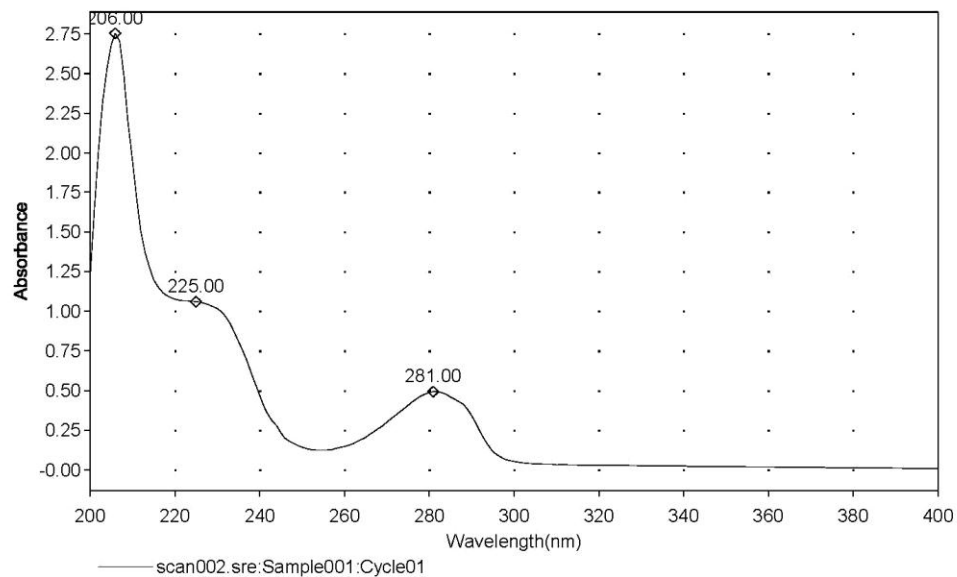


S34. UV spectrum of 4

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Operator Name	(None Entered)	Date of Report	2017/11/7
Department	(None Entered)	Time of Report	17:19:40下午
Organization	(None Entered)		
Information	(None Entered)		

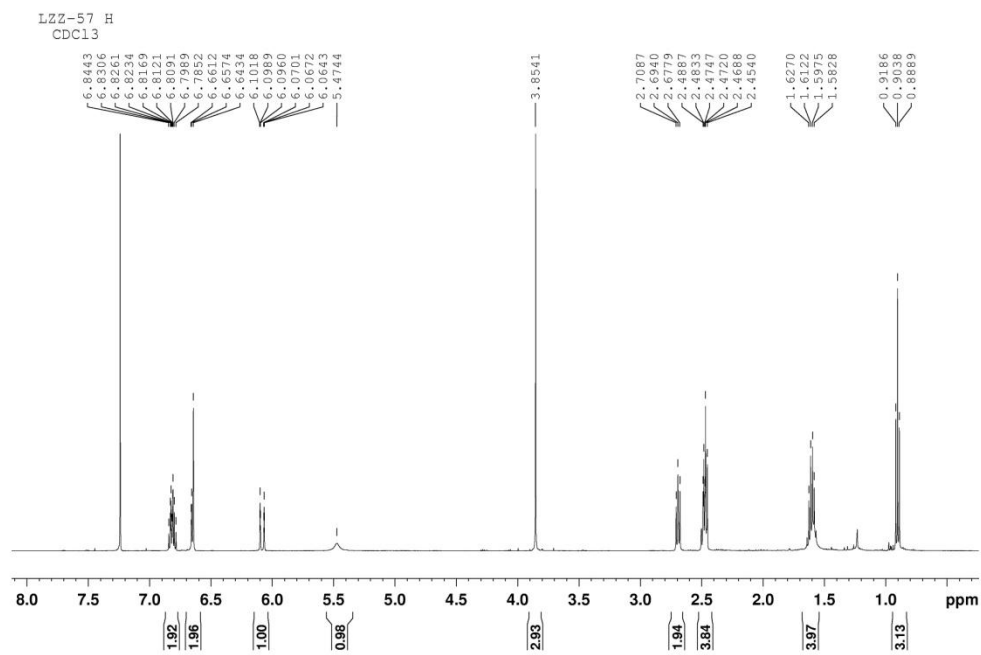
Scan Graph



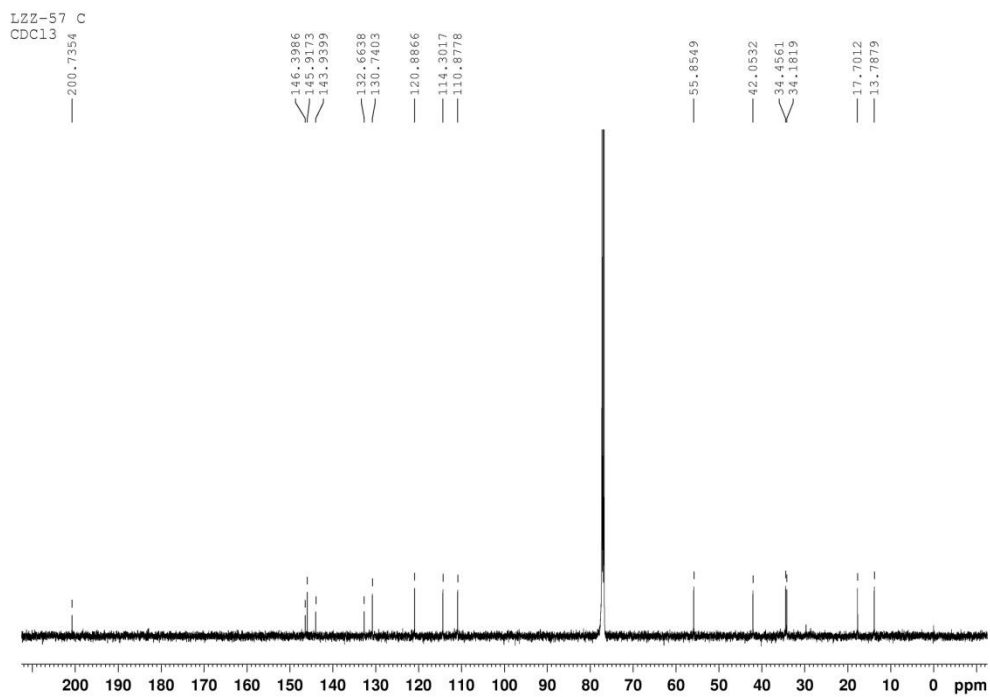
Results Table - scan002.sre,Sample001,Cycle01

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281.00	.492	Sort By Wavelength

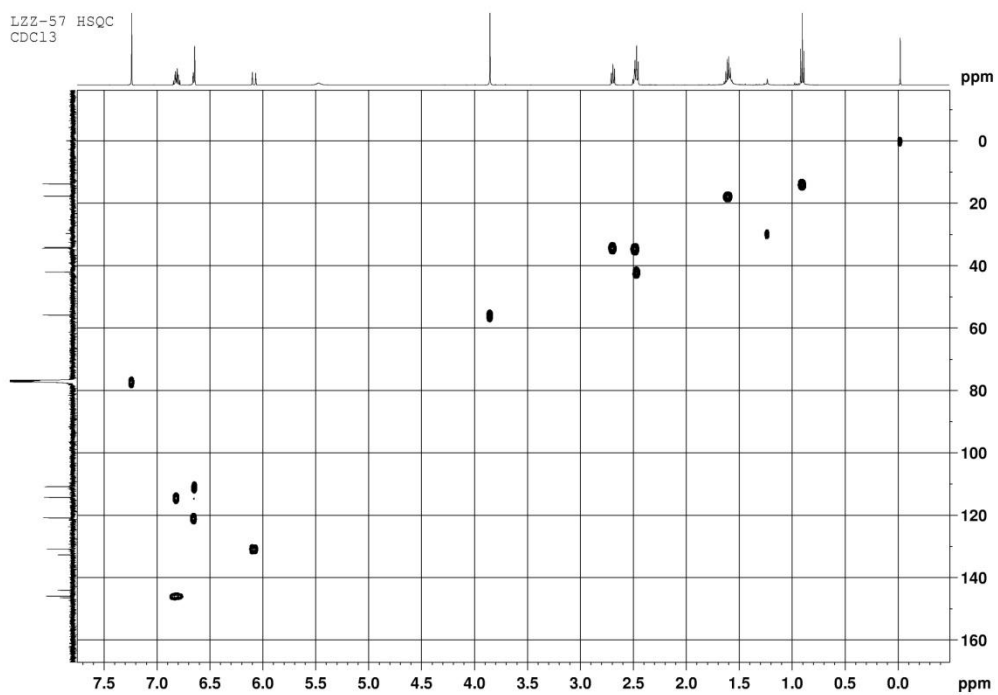
S35. ¹H NMR spectrum of **5** (500MHz, CDCl₃)



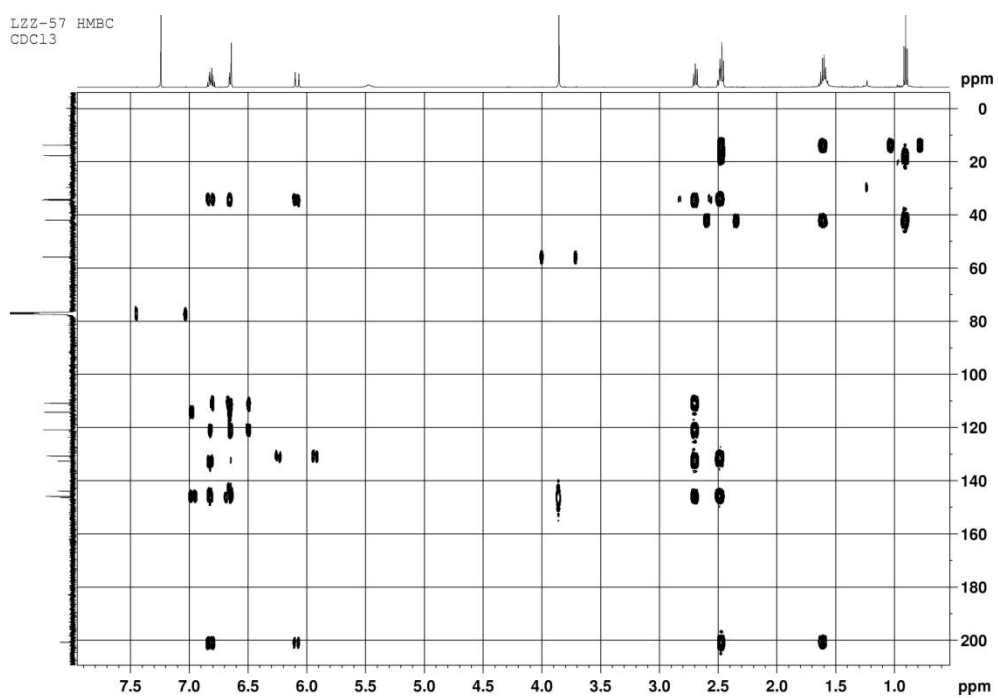
S36. ¹³C NMR spectrum of **5** (125MHz, CDCl₃)



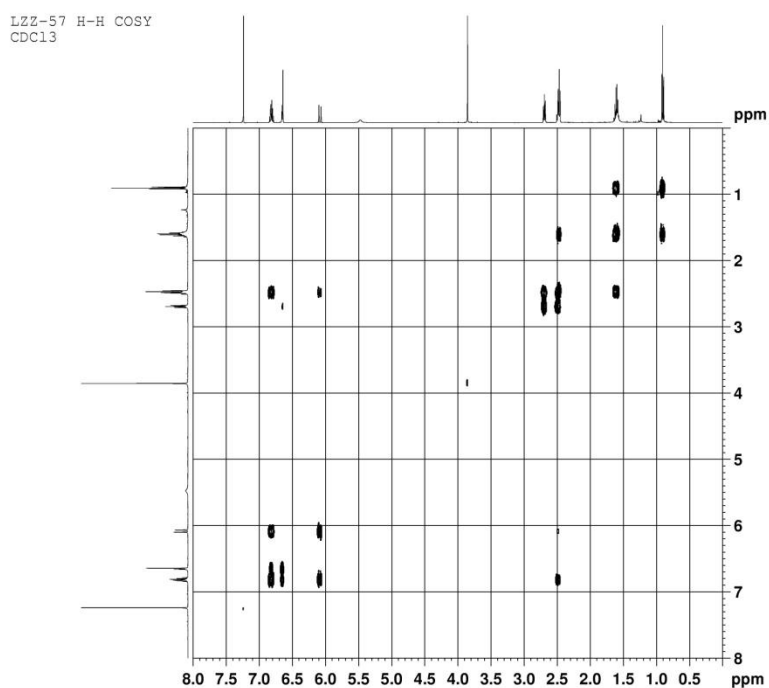
S37. HSQC spectrum of **5**



S38. HMBC spectrum of **5**



S39. ^1H - ^1H COSY spectrum of **5**



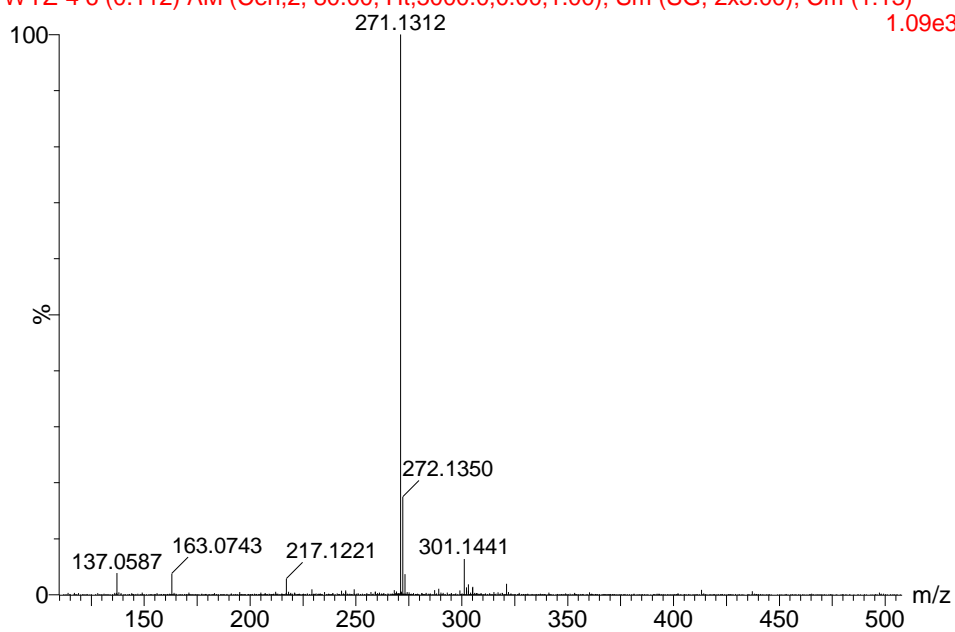
S40. HRESIMS spectrum of **5**

LZZ-57

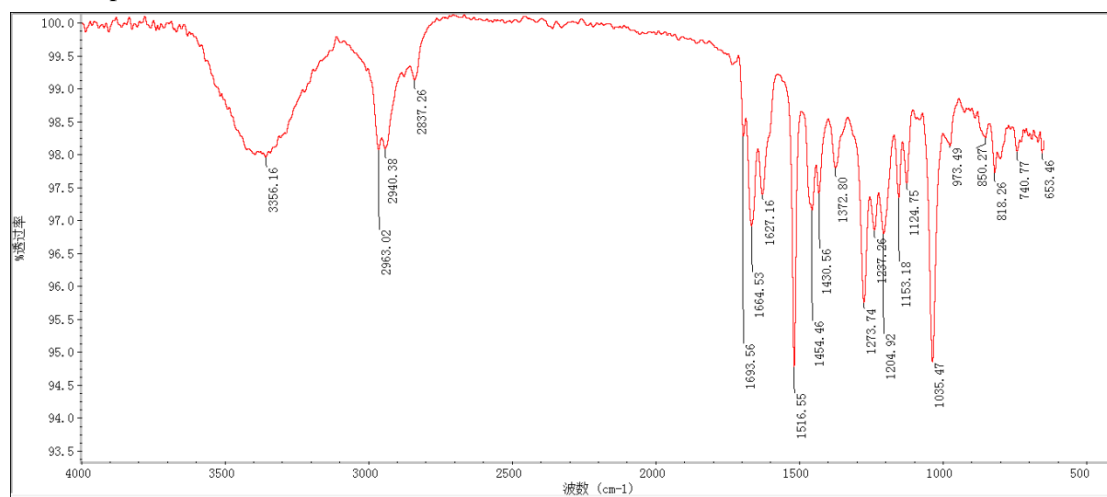
26-Jul-2017

WYZ-4 6 (0.112) AM (Cen,2, 80.00, Ht,5000.0,0.00,1.00); Sm (SG, 2x3.00); Cm (1:13)

1.09e3



S41. IR spectrum of 5

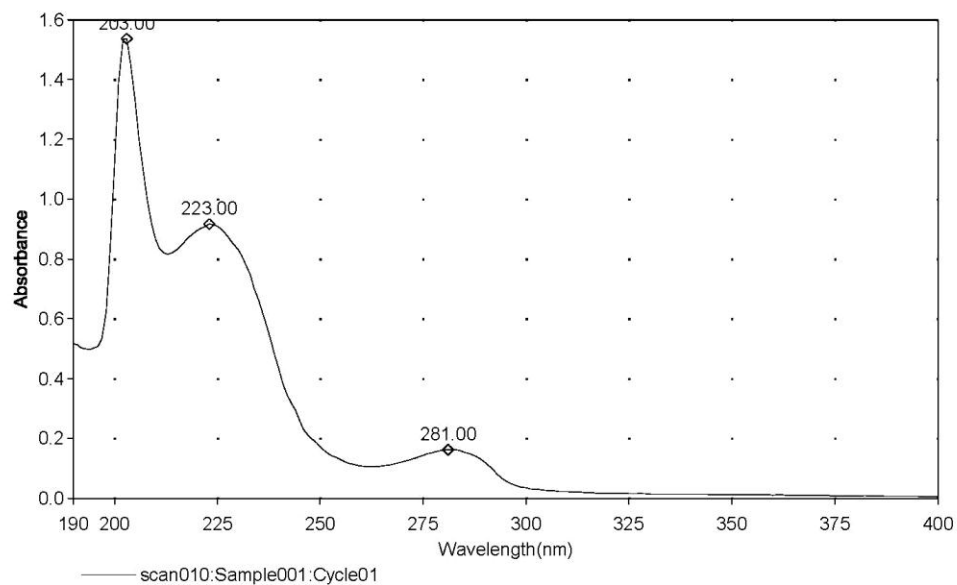


S42. UV spectrum of 5

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Operator Name	(None Entered)	Date of Report	2017/11/29
Department	(None Entered)	Time of Report	21:23:34下午
Organization	(None Entered)		
Information	(None Entered)		

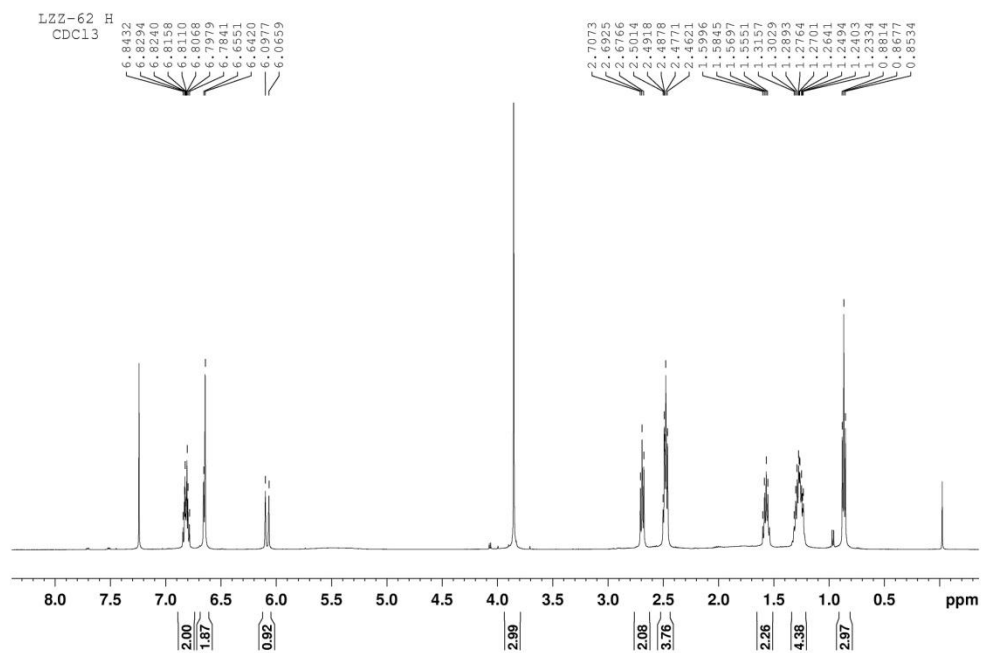
Scan Graph



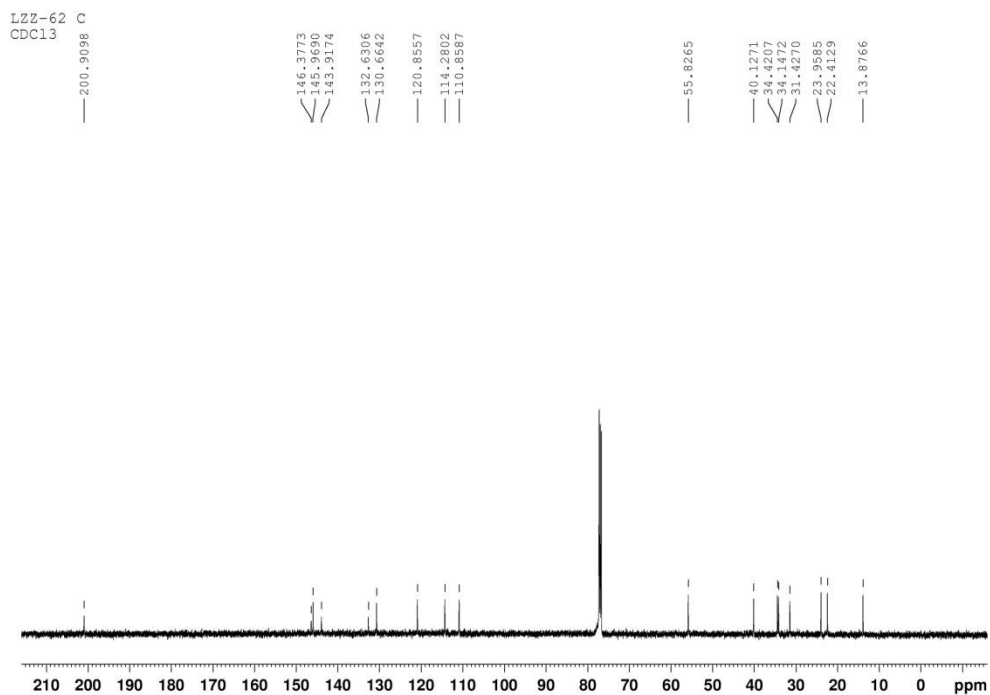
Results Table - scan010,Sample001,Cycle01

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281.00	.162	Sort By Wavelength

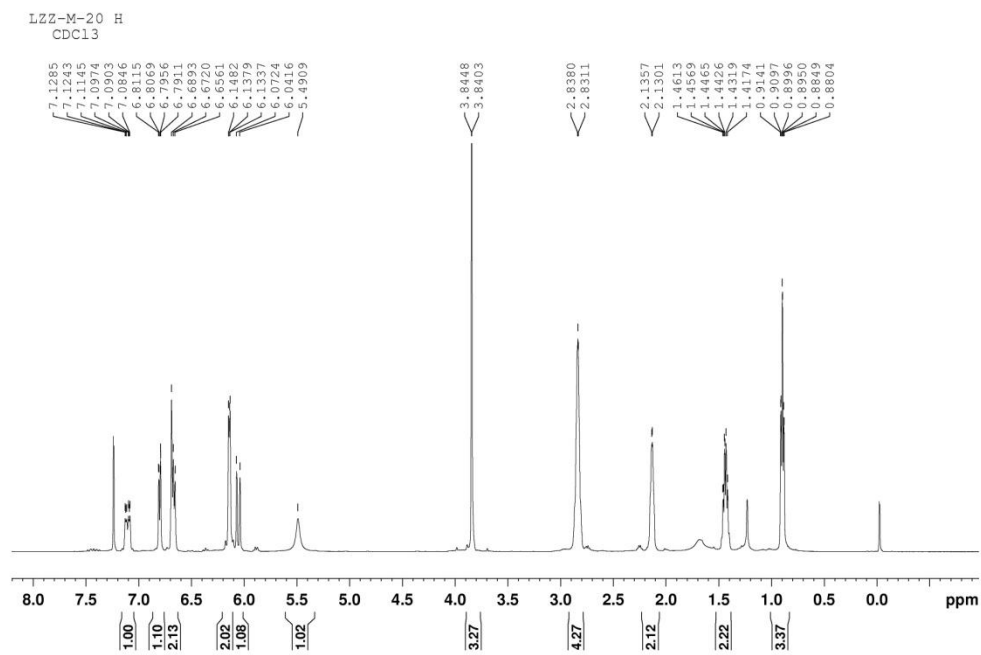
S43. ¹H NMR spectrum of **6** (500MHz, CDCl₃)



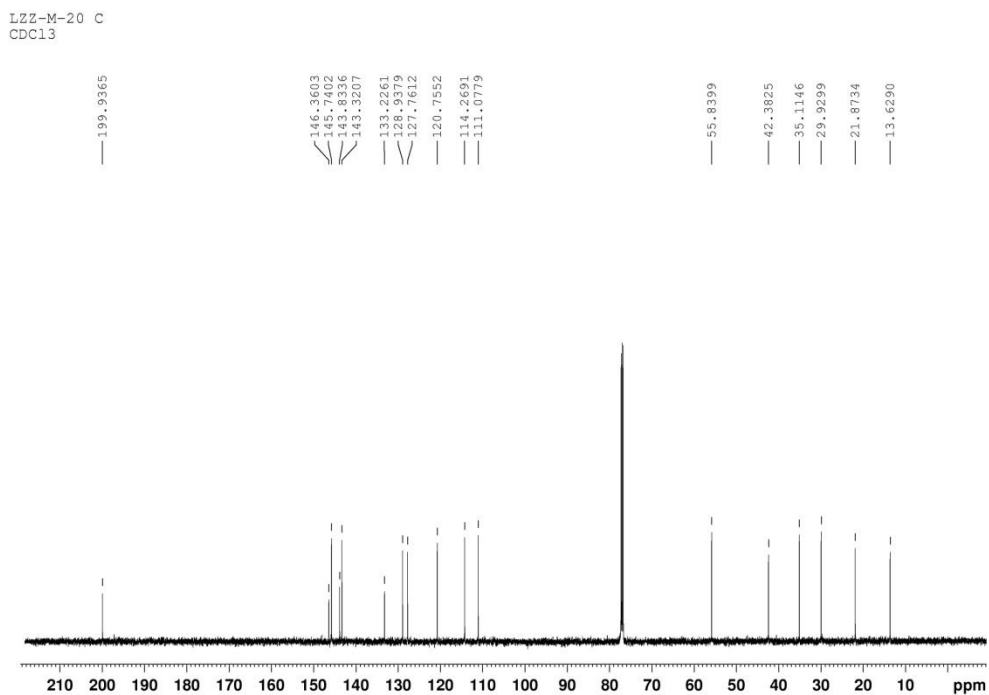
S44. ¹³C NMR spectrum of **6** (125MHz, CDCl₃)



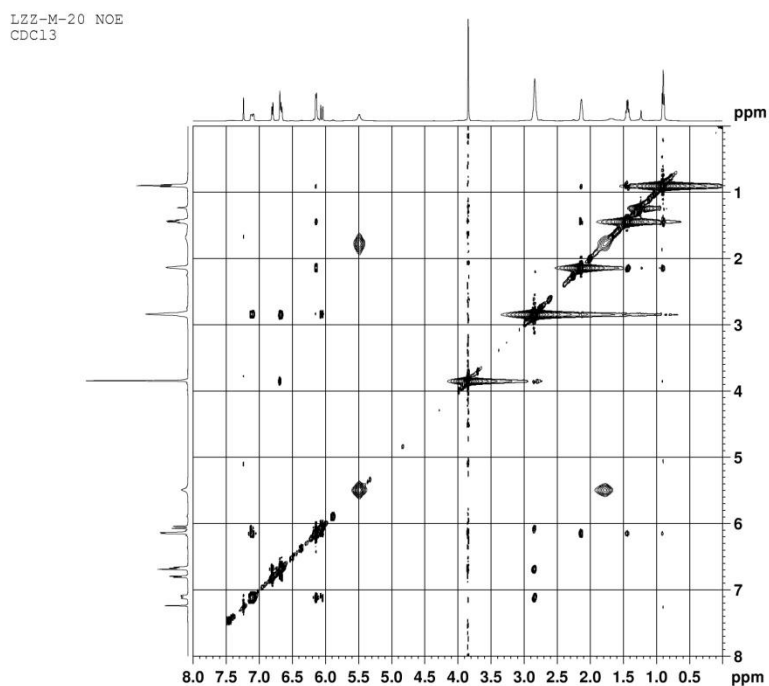
S45. ^1H NMR spectrum of **7** (500MHz, CDCl_3)



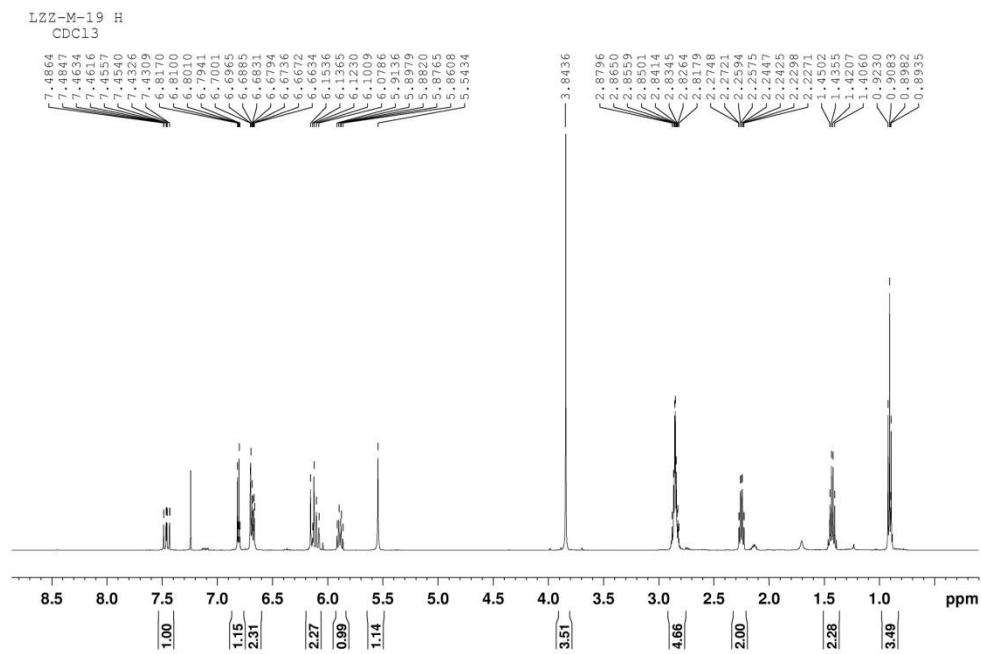
S46. ^{13}C NMR spectrum of **7** (125MHz, CDCl_3)



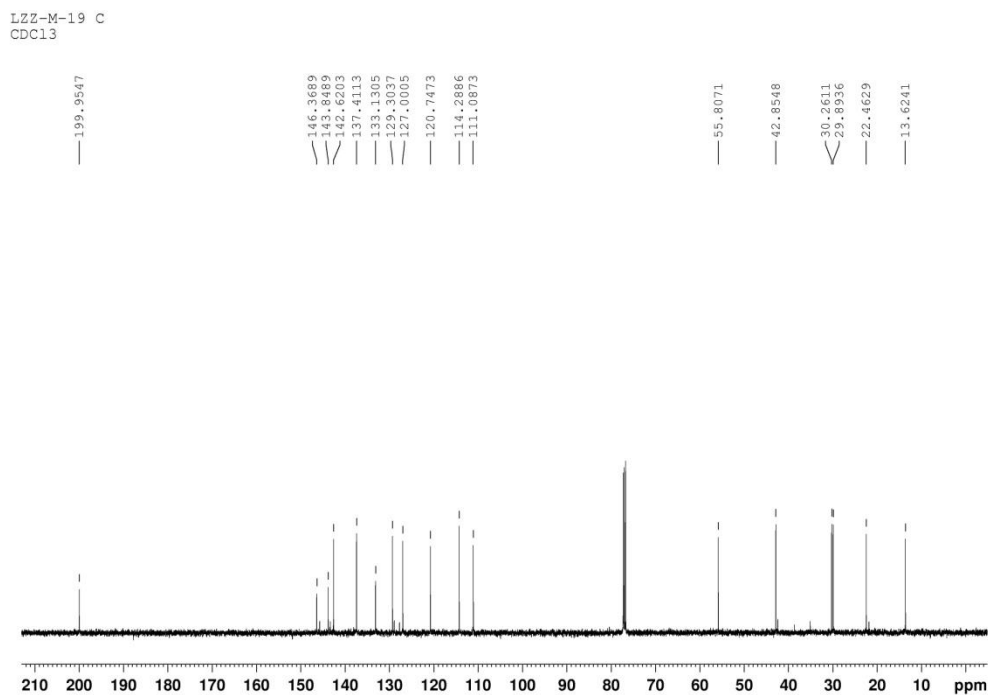
S47. NOESY spectrum of 7



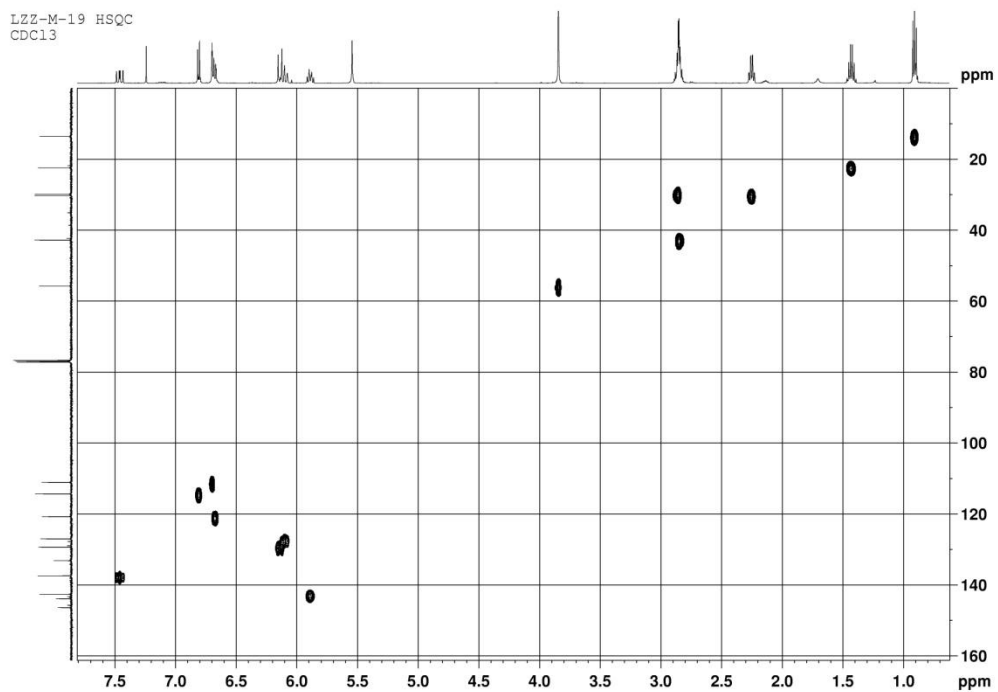
S48. ¹H NMR spectrum of 8 (500MHz, CDCl₃)



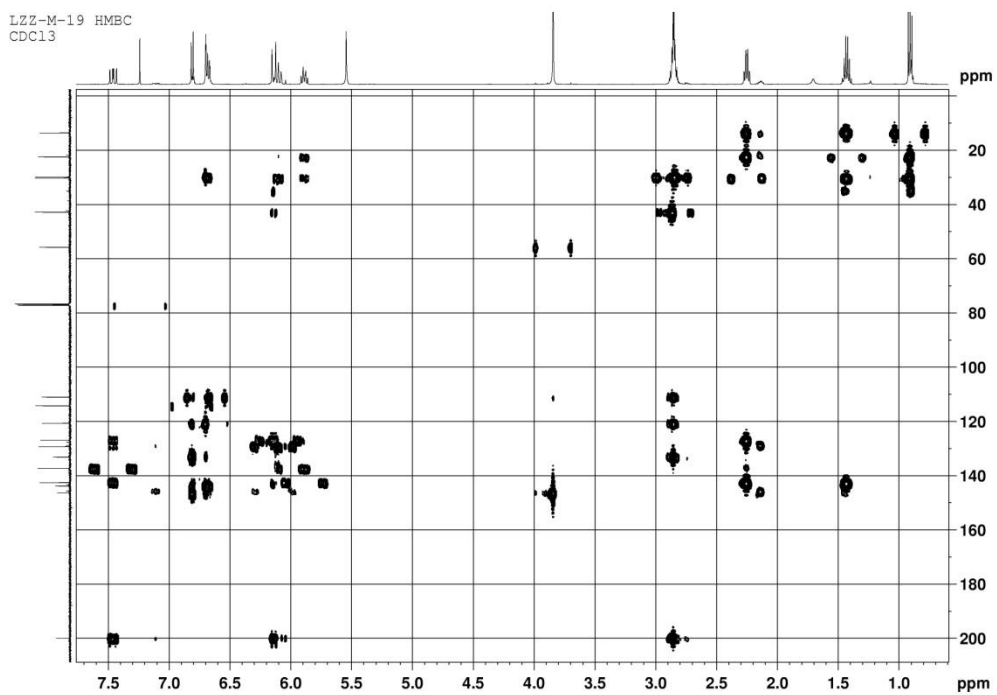
S49. ^{13}C NMR spectrum of **8** (125MHz, CDCl_3)



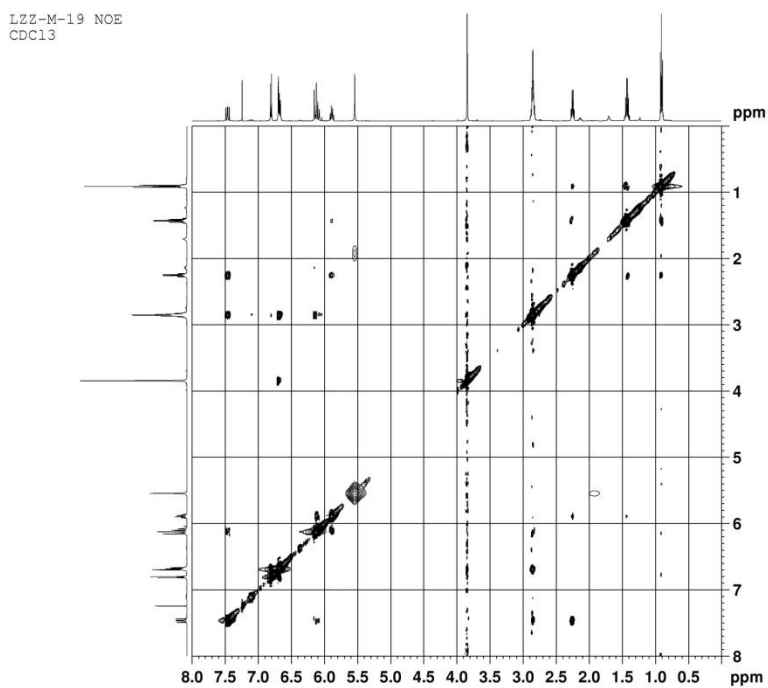
S50. HSQC spectrum of **8**



S51. HMBC spectrum of **8**



S52. NOESY spectrum of **8**

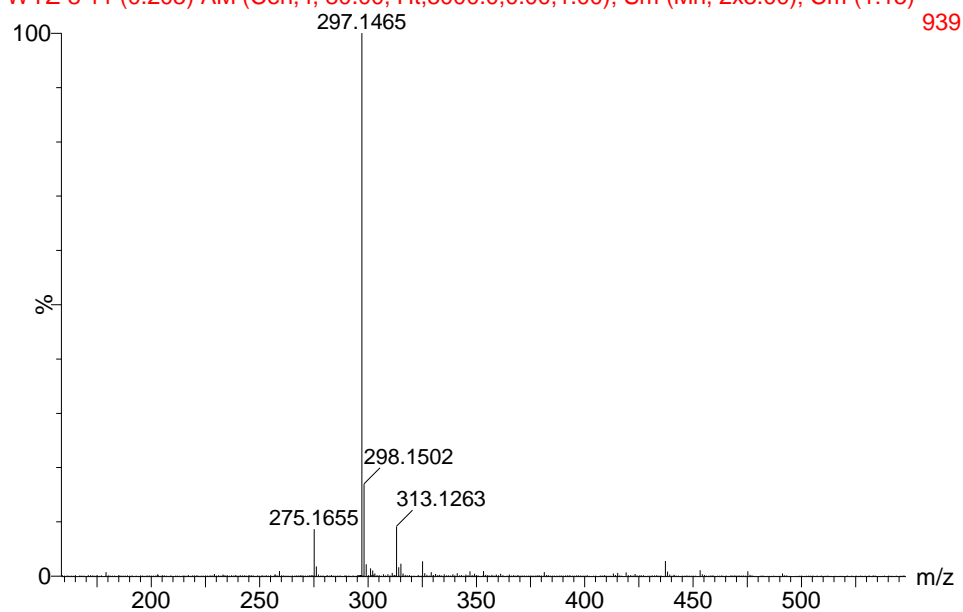


S53. HRESIMS spectrum of **8**

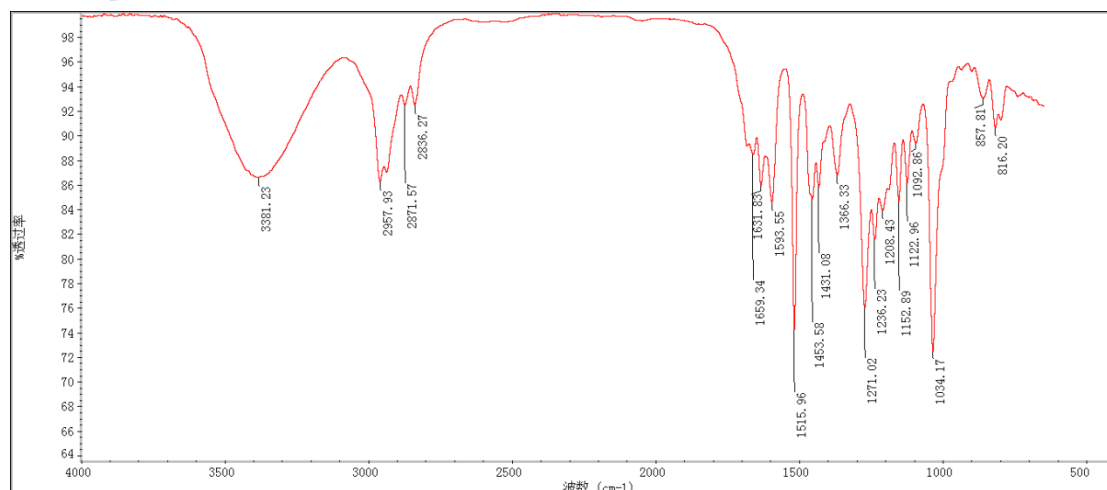
LZZ-19

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WYZ-8 11 (0.205) AM (Cen,4, 80.00, Ht,5000.0,0.00,1.00); Sm (Mn, 2x3.00); Cm (1:15)



S54. IR spectrum of **8**

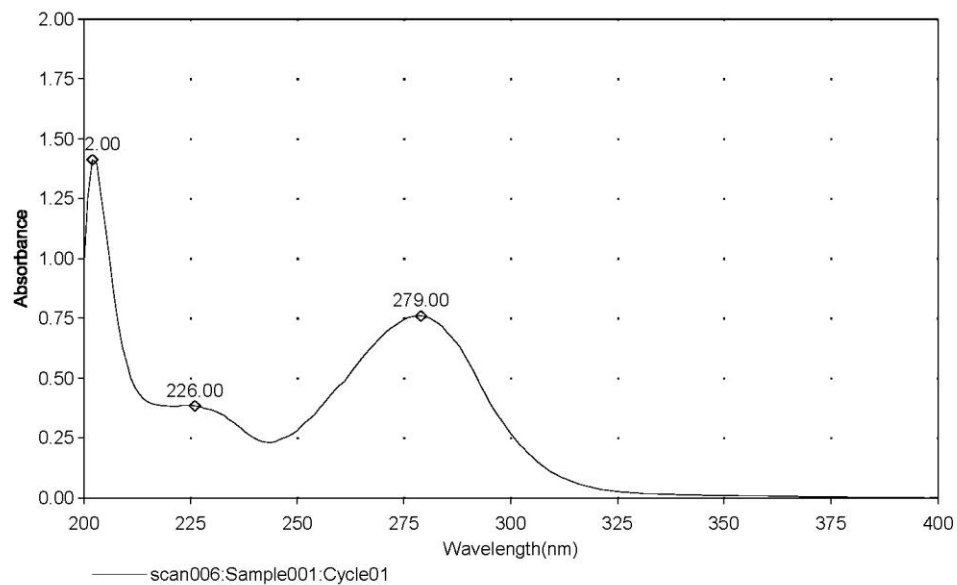


S55. UV spectrum of 8

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Operator Name (None Entered) Date of Report 2017/11/7
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Organization (None Entered)
Information (None Entered)

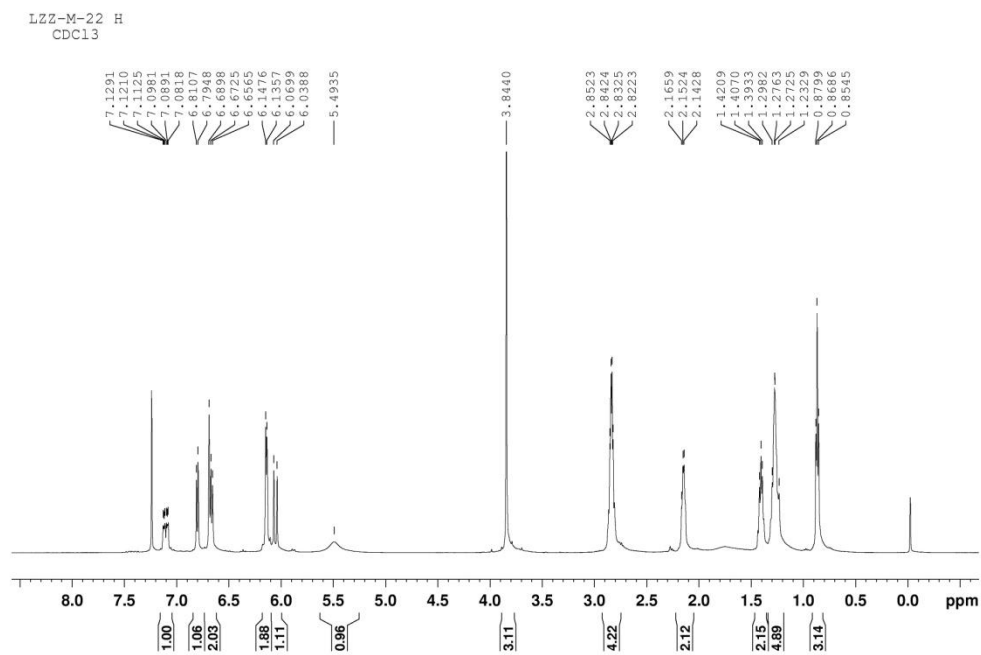
Scan Graph



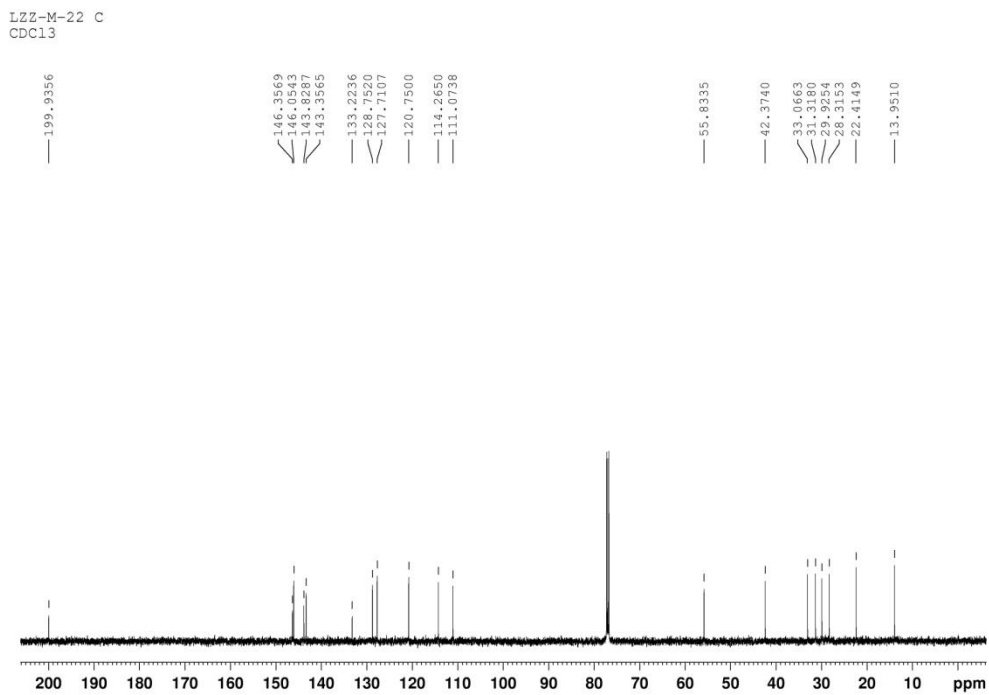
Results Table - LZZ-M-19.xps.sre, Sample001, Cycle01

nm	A	Manual Method
202.00	1.412	Report Values at 3 Wavelengths
226.00	.383	202.00 nm 226.00 nm 279.00 nm
279.00	.759	Sort By Wavelength

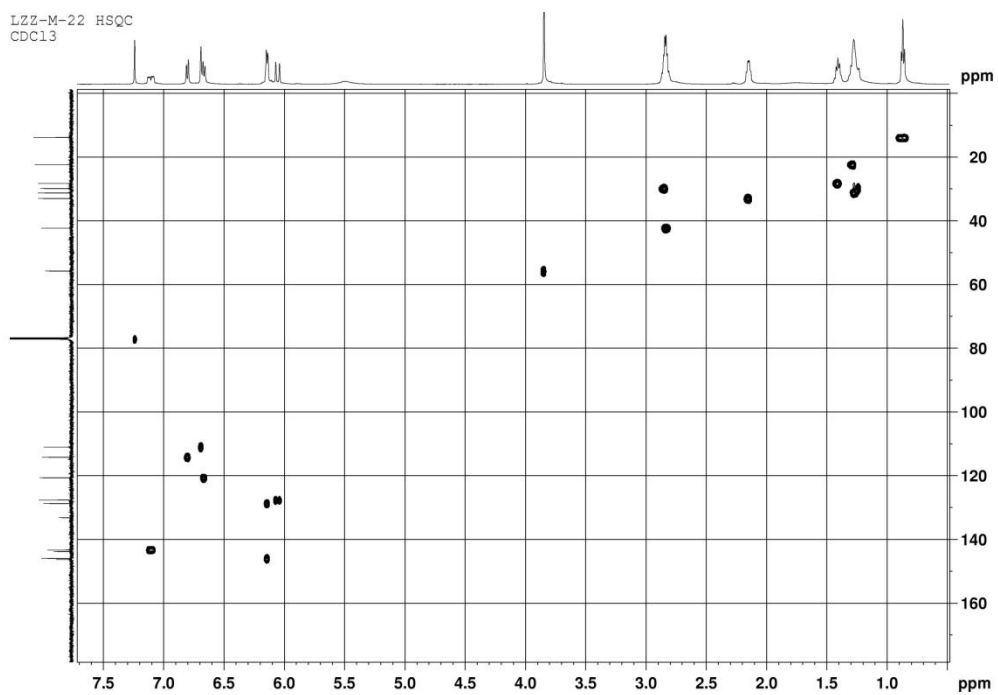
S56. ^1H NMR spectrum of **9** (500MHz, CDCl_3)



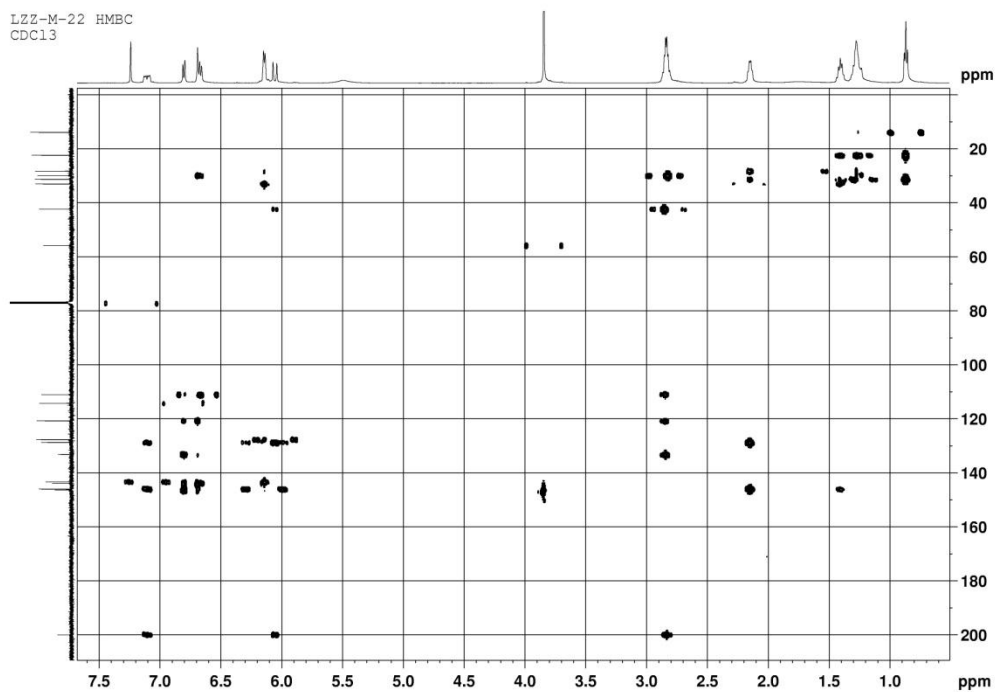
S57. ^{13}C NMR spectrum of **9** (125MHz, CDCl_3)



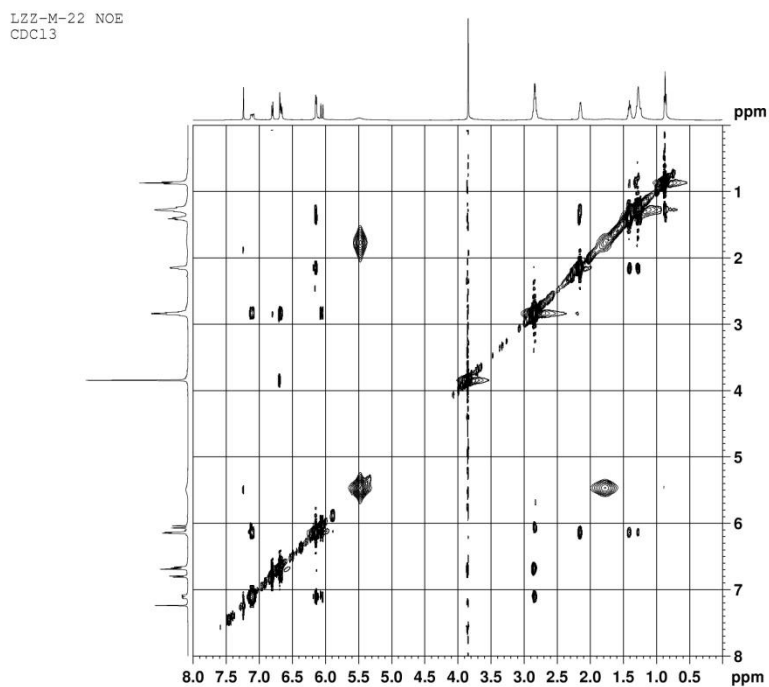
S58. HSQC spectrum of **9**



S59. HMBC spectrum of **9**



S60. NOESY spectrum of **9**



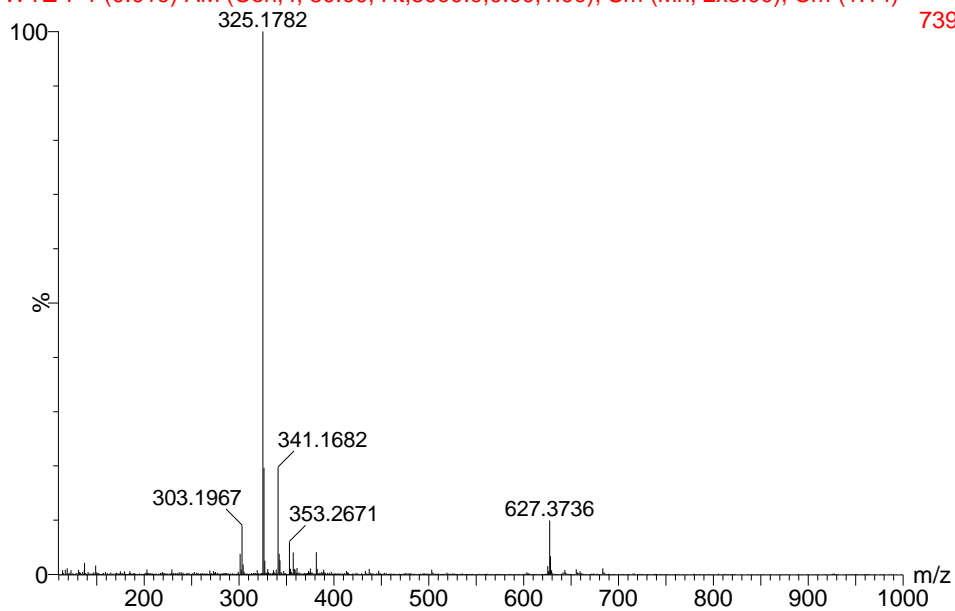
S61. HRESIMS spectrum of **9**

LZZ-22

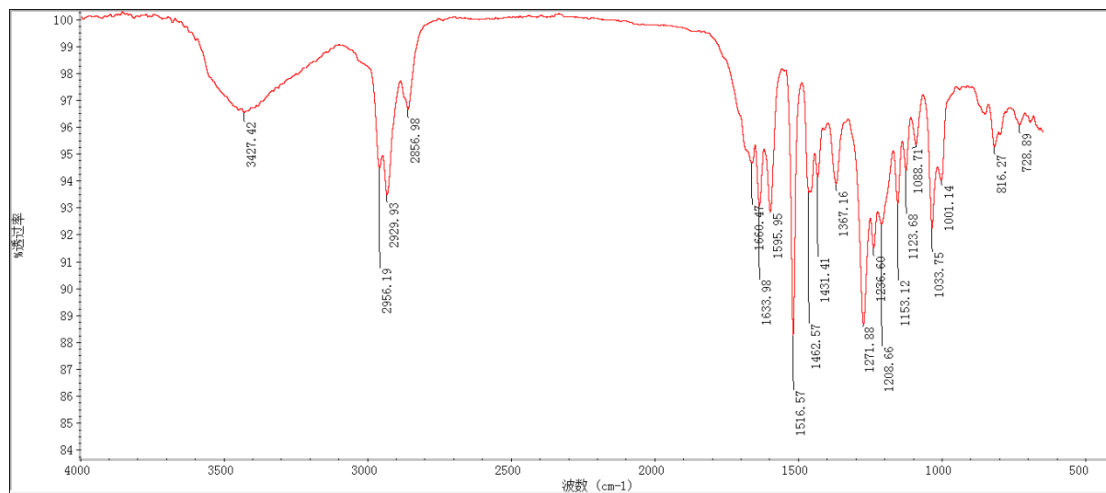
26-Sep-2017

WYZ-7 1 (0.019) AM (Cen,4, 80.00, Ht,5000.0,0.00,1.00); Sm (Mn, 2x3.00); Cm (1:14)

739



S62. IR spectrum of 9

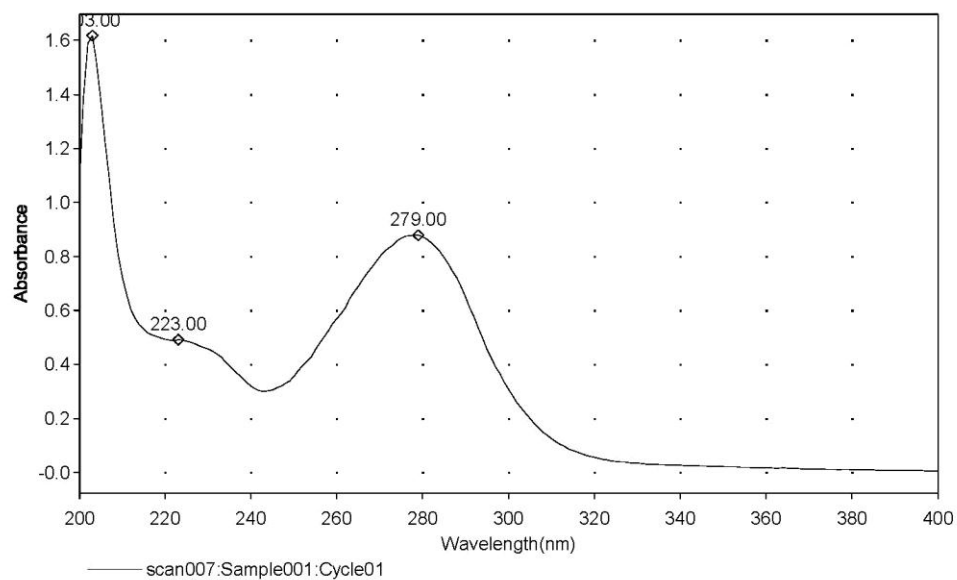


S63. UV spectrum of 9

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Operator Name (None Entered) Date of Report 2017/11/7
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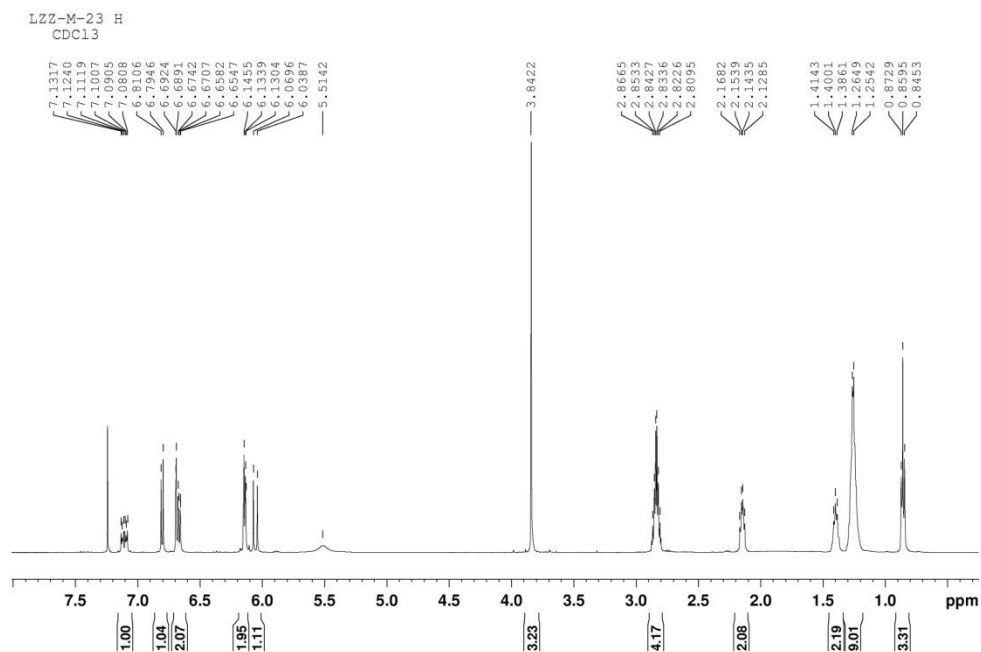
Scan Graph



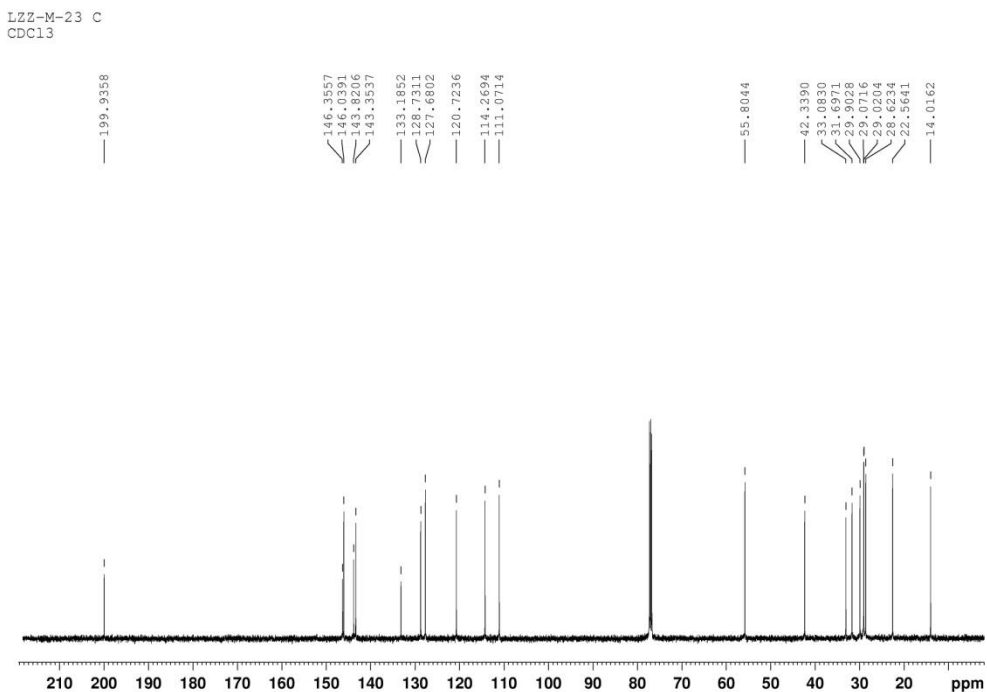
Results Table - scan007,Sample001,Cycle01

nm	A	Manual Method
203.00	1.618	Report Values at 3 Wavelengths
223.00	.492	203.00 nm 223.00 nm 279.00 nm
279.00	.878	Sort By Wavelength

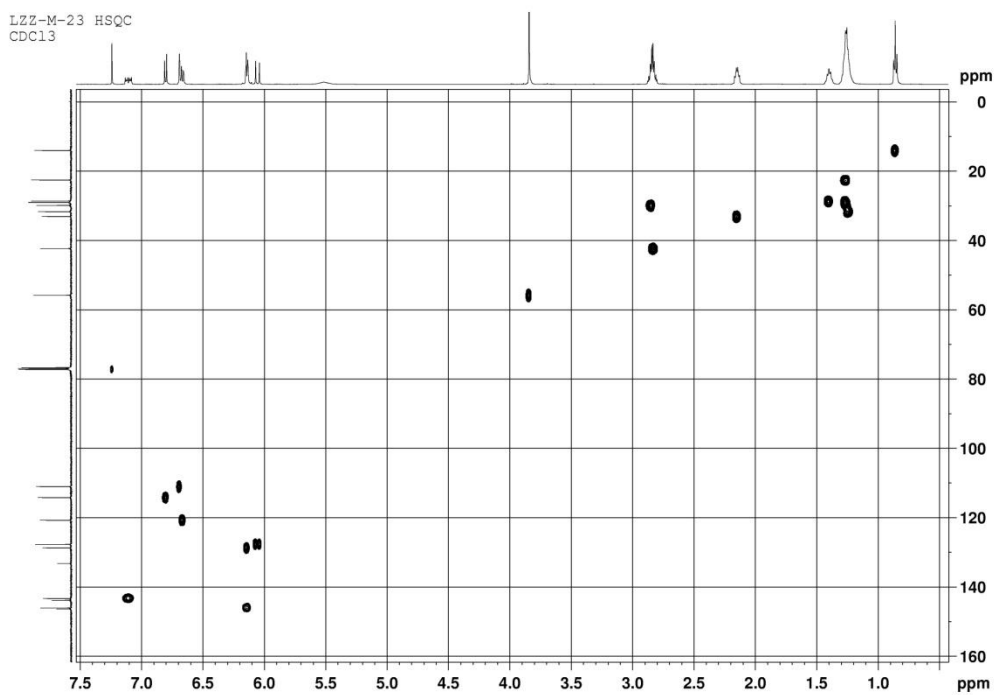
S64. ^1H NMR spectrum of **10** (500MHz, CDCl_3)



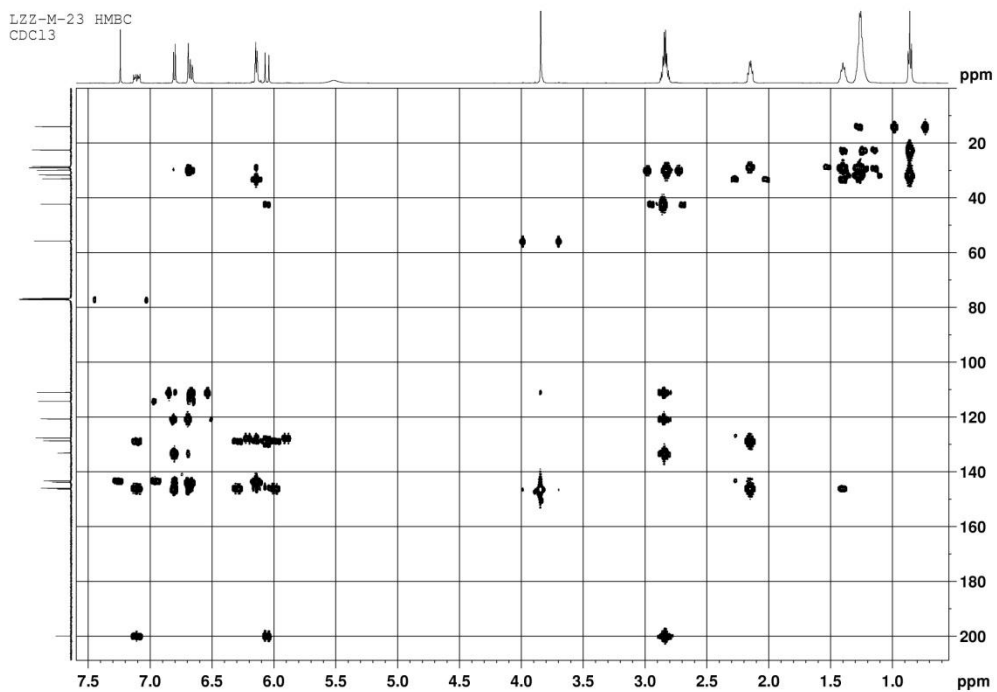
S65. ^{13}C NMR spectrum of **10** (125MHz, CDCl_3)



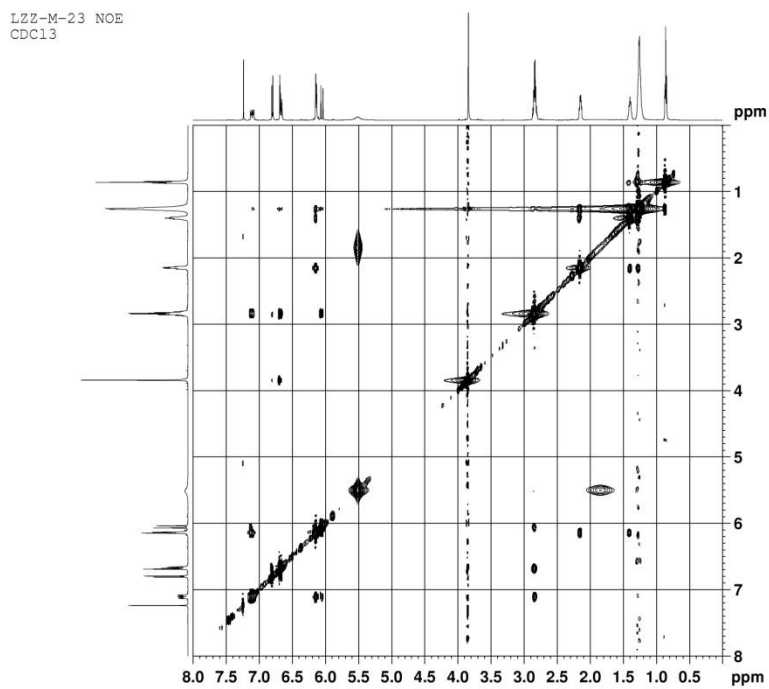
S66. HSQC spectrum of **10**



S67. HMBC spectrum of **10**



S68. NOESY spectrum of **10**



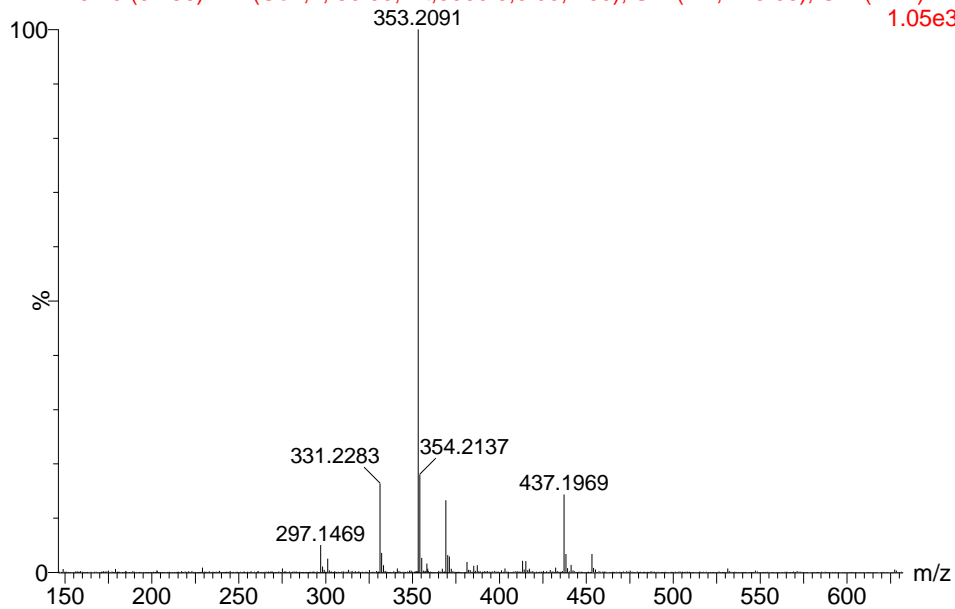
S69. HRESIMS spectrum of **10**

LZZ-23

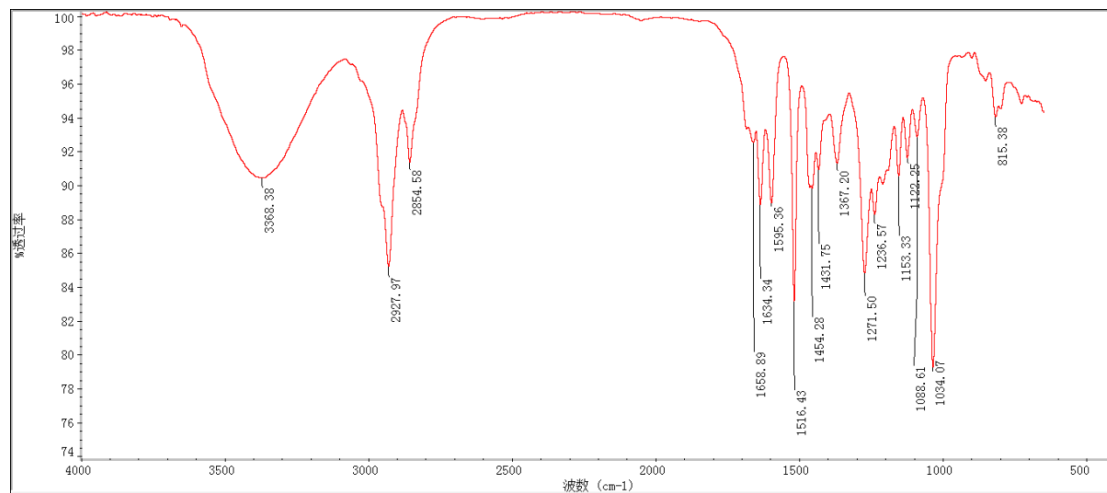
26-Sep-2017

WYZ-10 10 (0.186) AM (Cen,4, 80.00, Ht,5000.0,0.00,1.00); Sm (Mn, 2x3.00); Cm (1:17)

1.05e3



S70. IR spectrum of 10

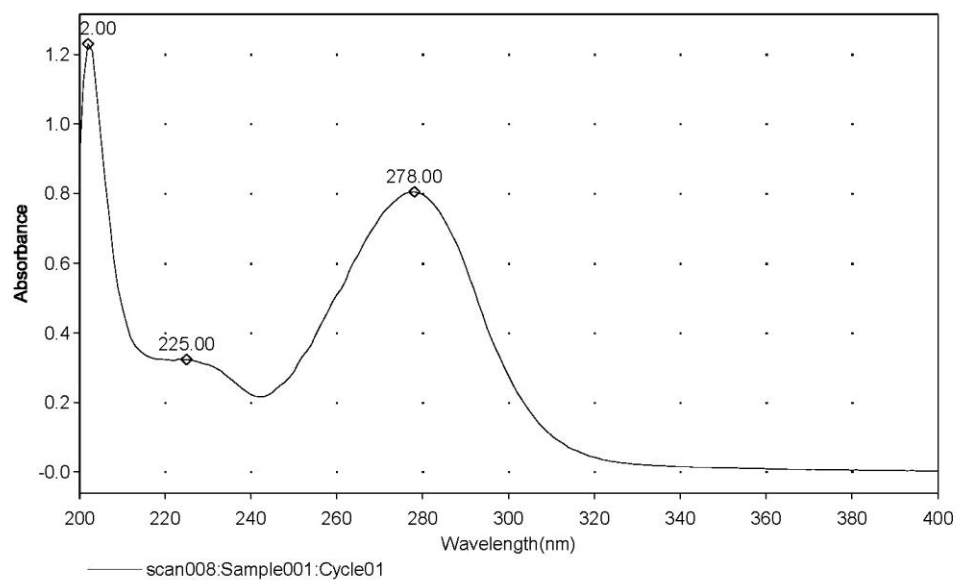


S71. UV spectrum of 10

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Operator Name (None Entered) Date of Report 2017/11/7
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Information (None Entered)

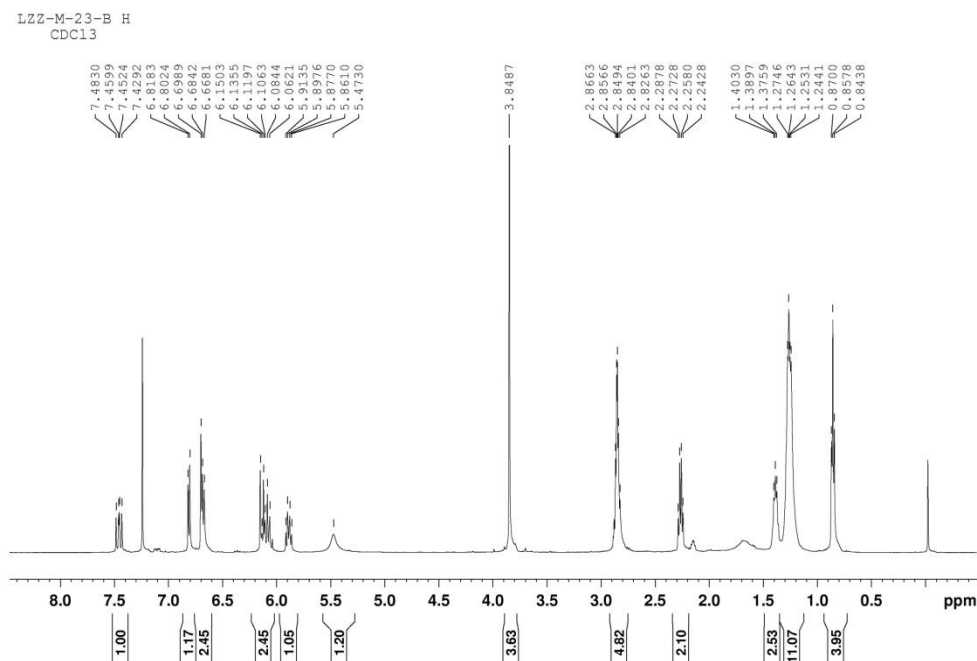
Scan Graph



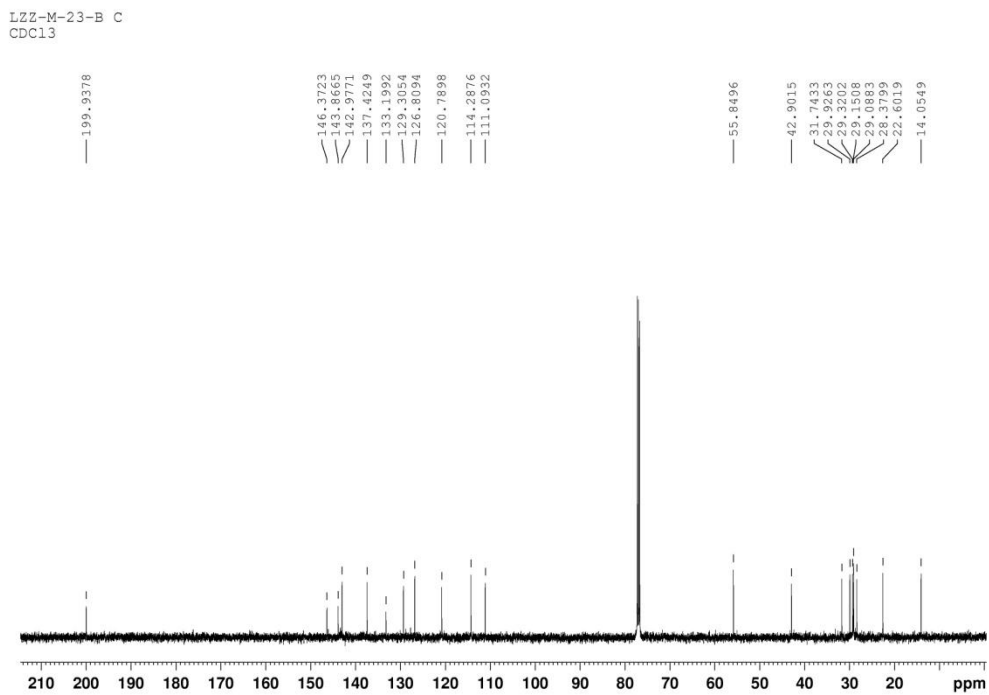
Results Table - scan008,Sample001,Cycle01

nm	A	Manual Method
202.00	1.229	Report Values at 3 Wavelengths
225.00	.322	202.00 nm 225.00 nm 278.00 nm
278.00	.804	Sort By Wavelength

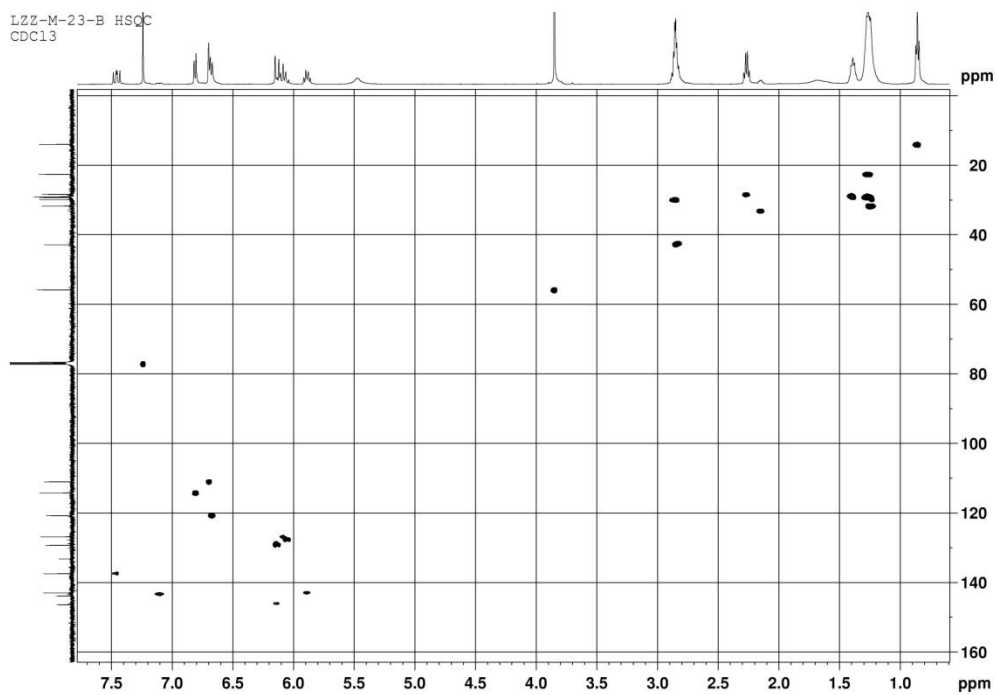
S72. ^1H NMR spectrum of **11** (500MHz, CDCl_3)



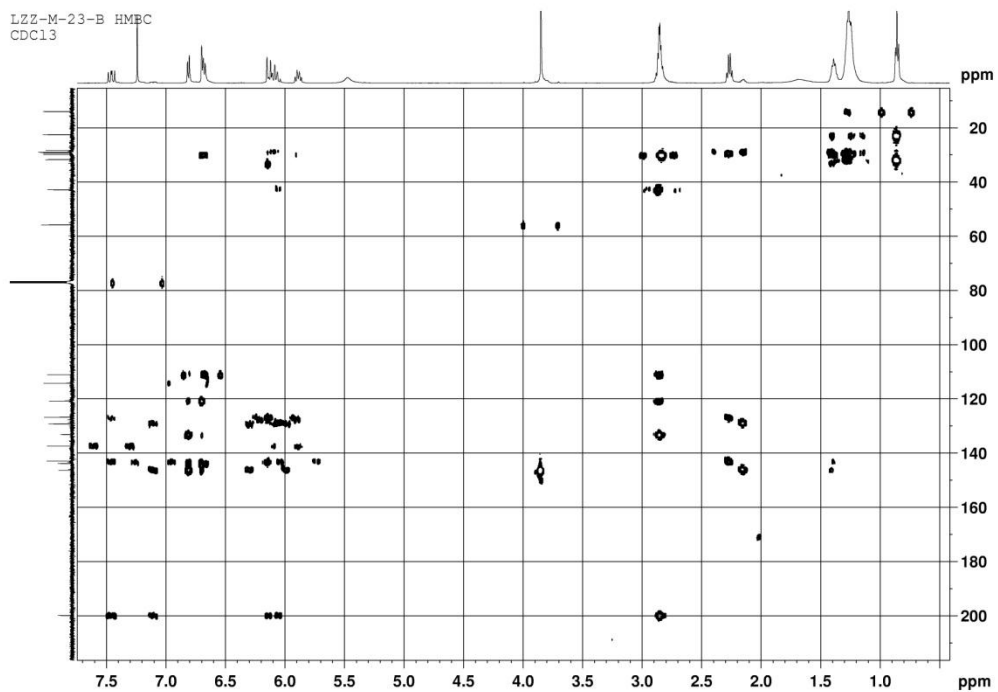
S73. ^{13}C NMR spectrum of **11** (125MHz, CDCl_3)



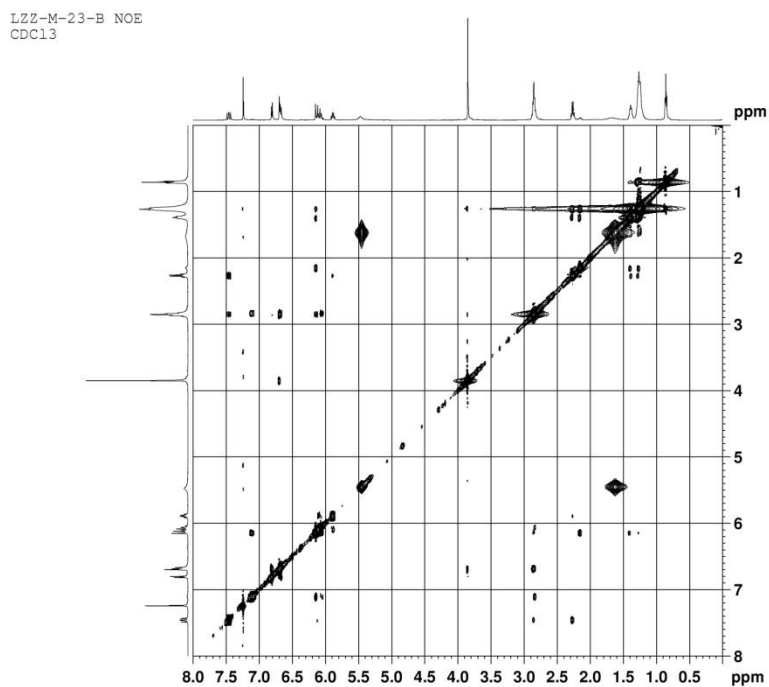
S74. HSQC spectrum of **11**



S75. HMBC spectrum of **11**



S76. NOESY spectrum of **11**



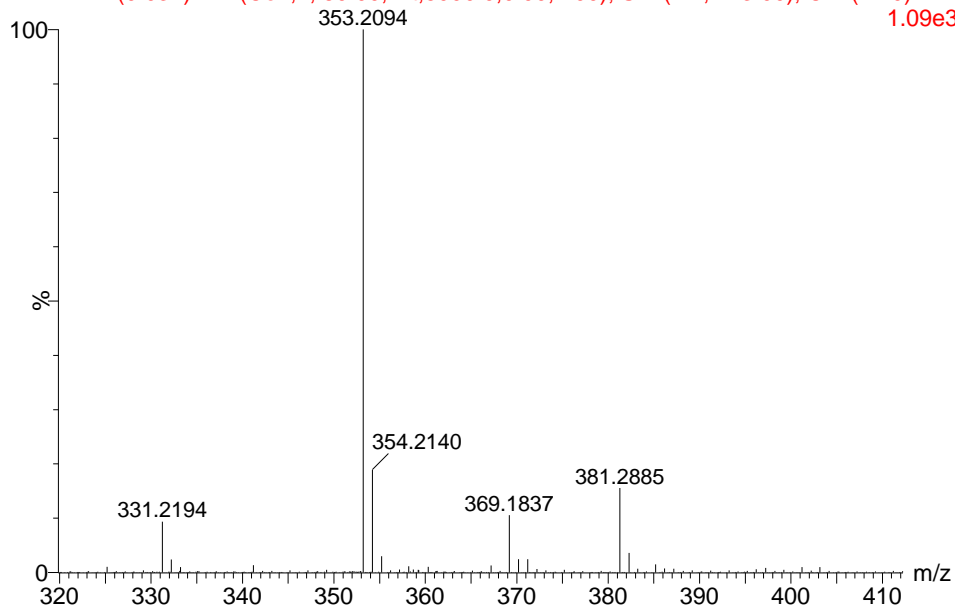
S77. HRESIMS spectrum of **11**

LZZ-23B

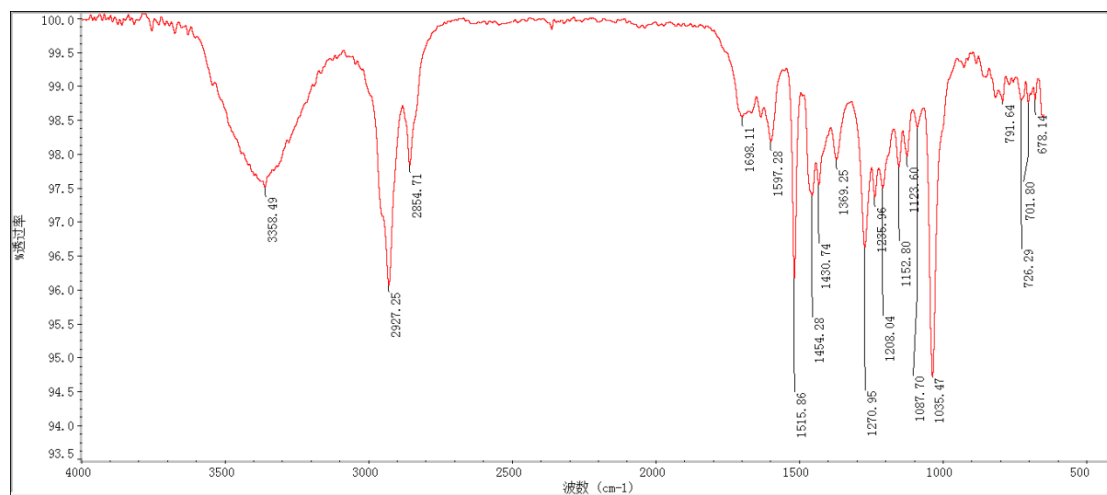
26-Sep-2017

WYZ-11 2 (0.037) AM (Cen,4, 80.00, Ht,5000.0,0.00,1.00); Sm (Mn, 2x3.00); Cm (1:20)

1.09e3



S78. IR spectrum of **11**

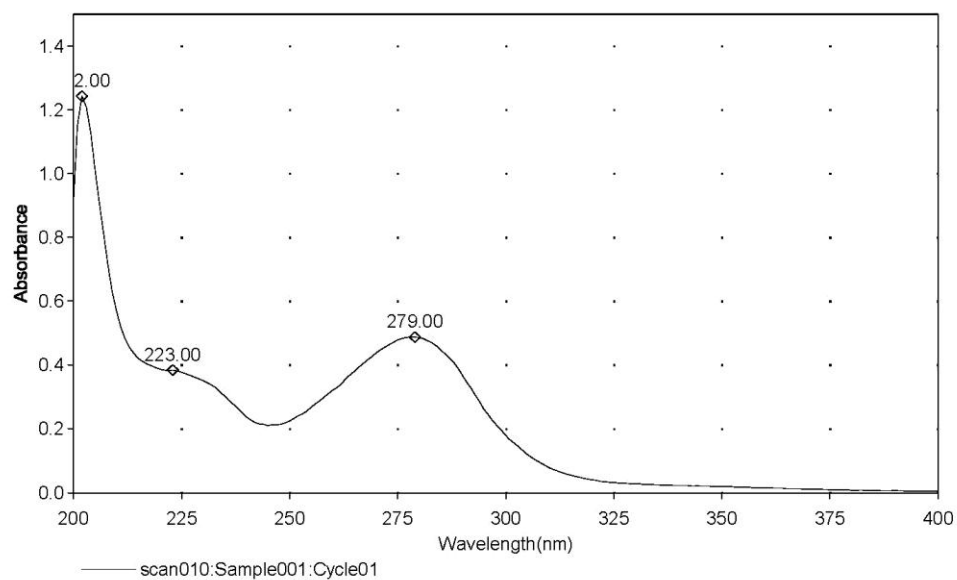


S79. UV spectrum of **11**

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Operator Name (None Entered) Date of Report 2017/11/7
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Organization (None Entered)
Information (None Entered)

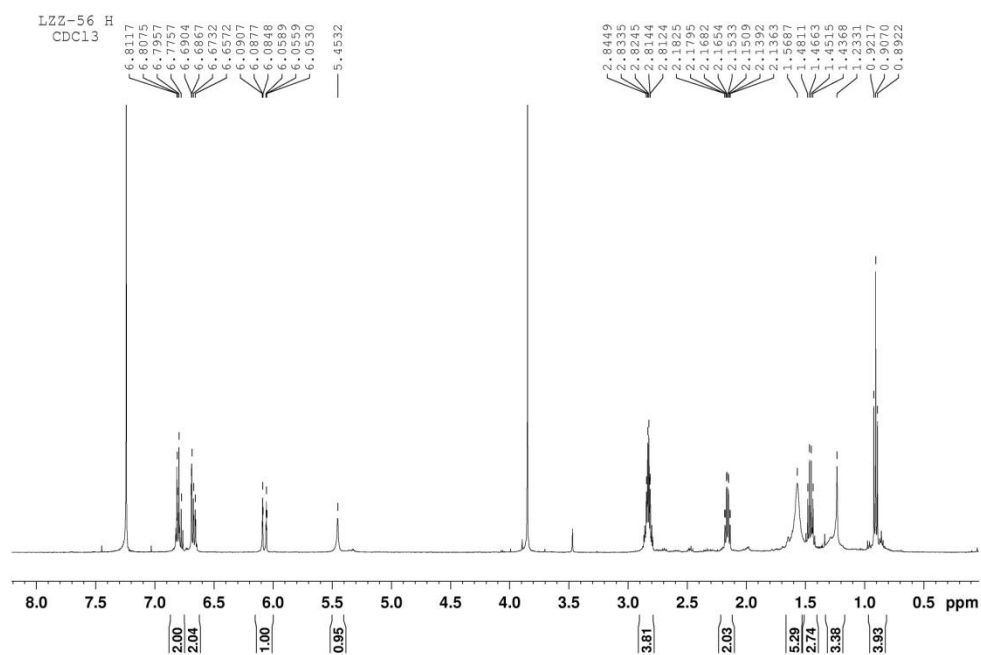
Scan Graph



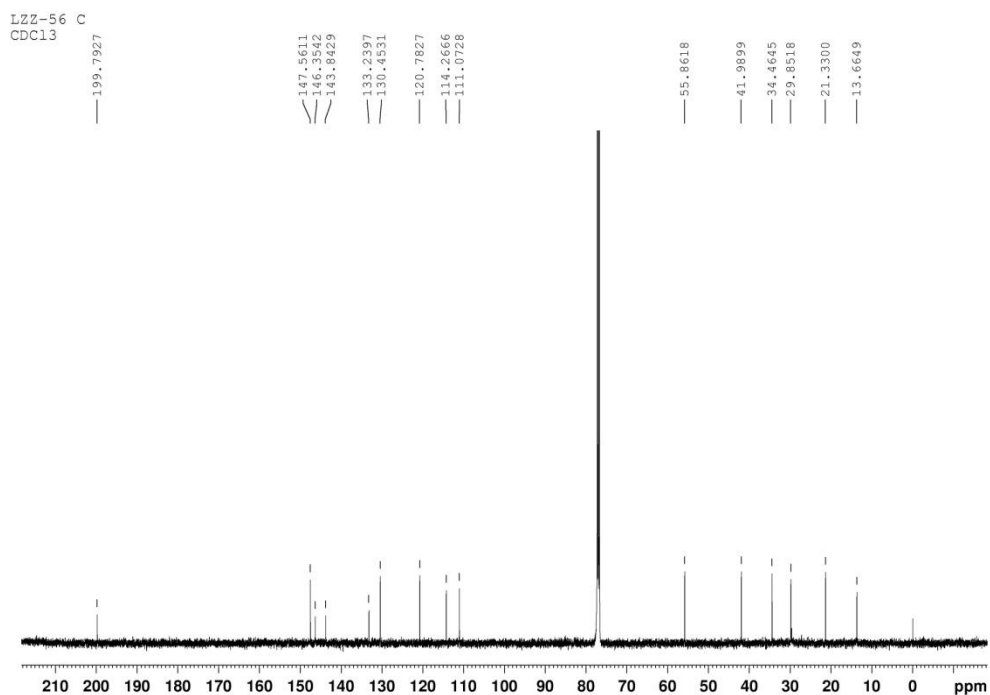
Results Table - scan010,Sample001,Cycle01

nm	A	Manual Method
202.00	1.242	Report Values at 3 Wavelengths
223.00	.383	202.00 nm 223.00 nm 279.00 nm
279.00	.487	Sort By Wavelength

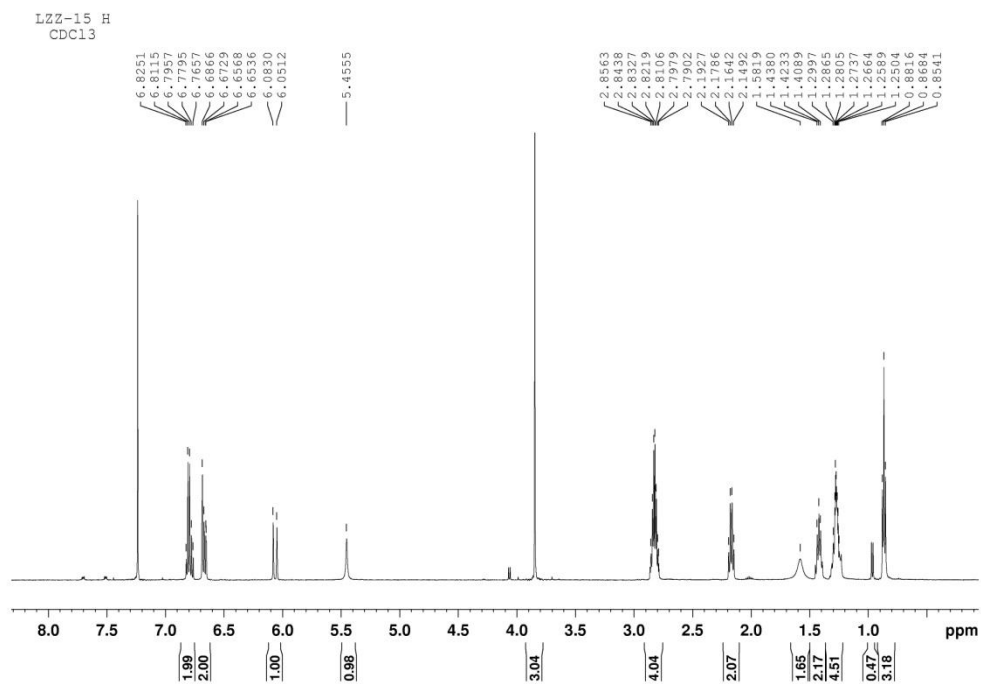
S80. ¹H NMR spectrum of **12** (500MHz, CDCL₃)



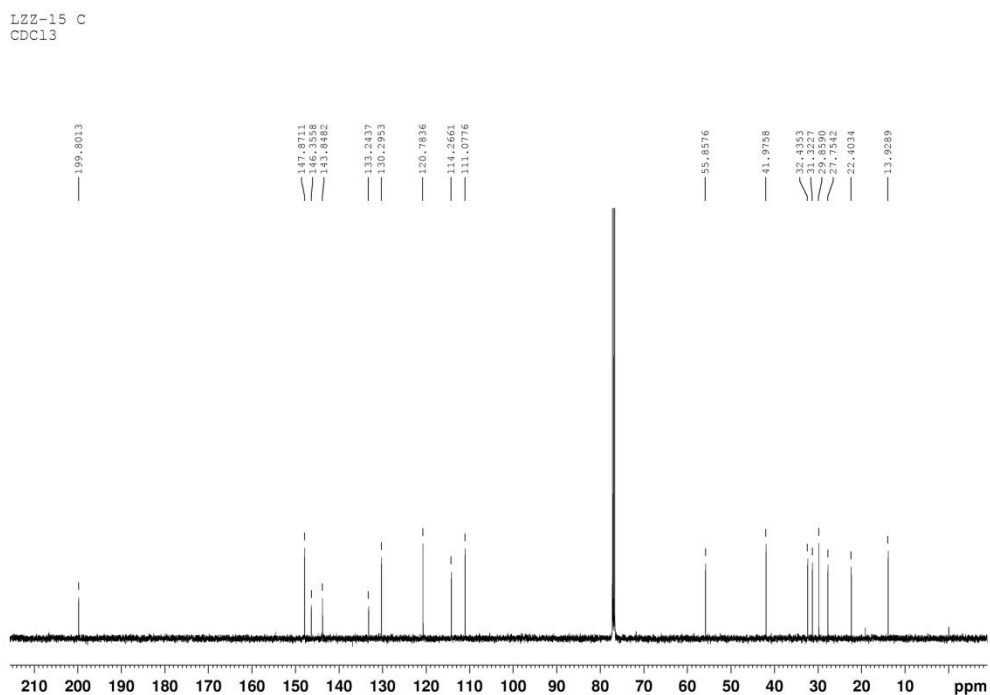
S81. ¹³C NMR spectrum of **12** (125MHz, CDCl₃)



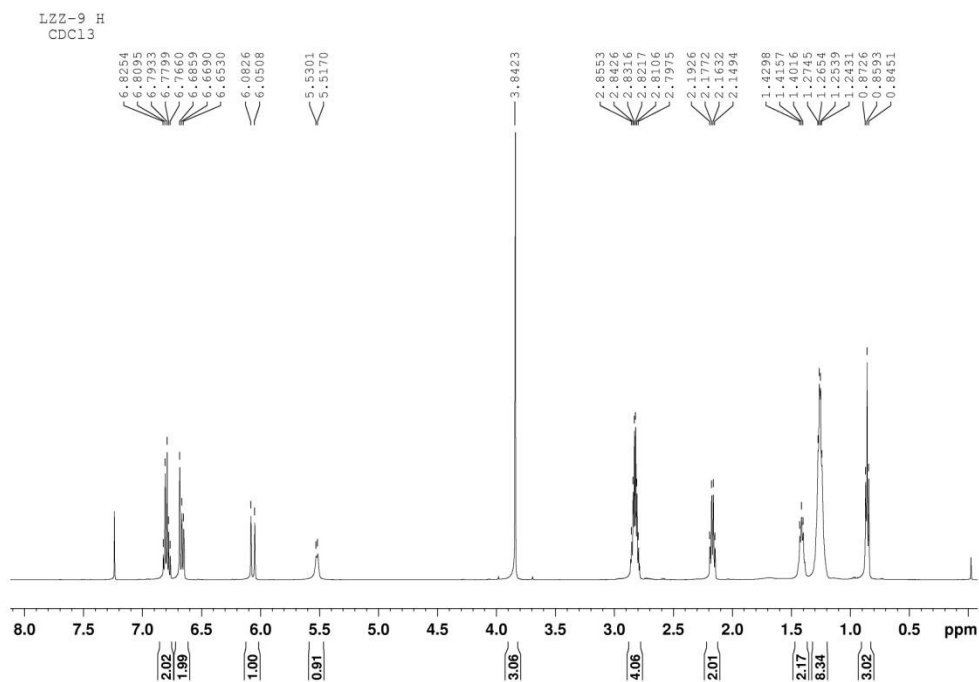
S82. ¹H NMR spectrum of **13** (500MHz, CDCl₃)



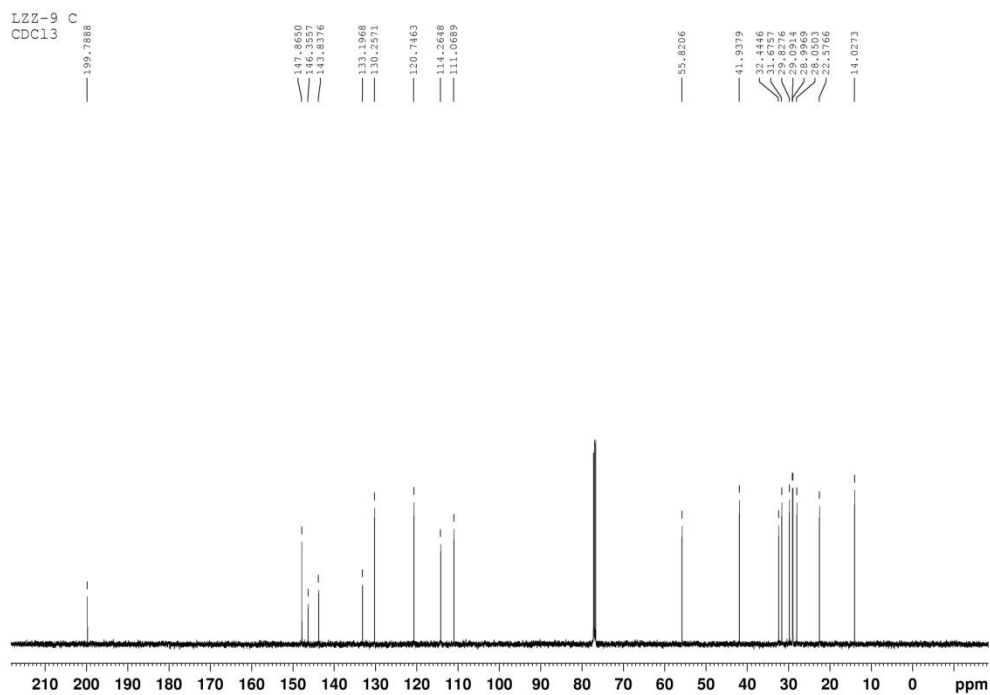
S83. ¹³C NMR spectrum of **13** (125MHz, CDCl₃)



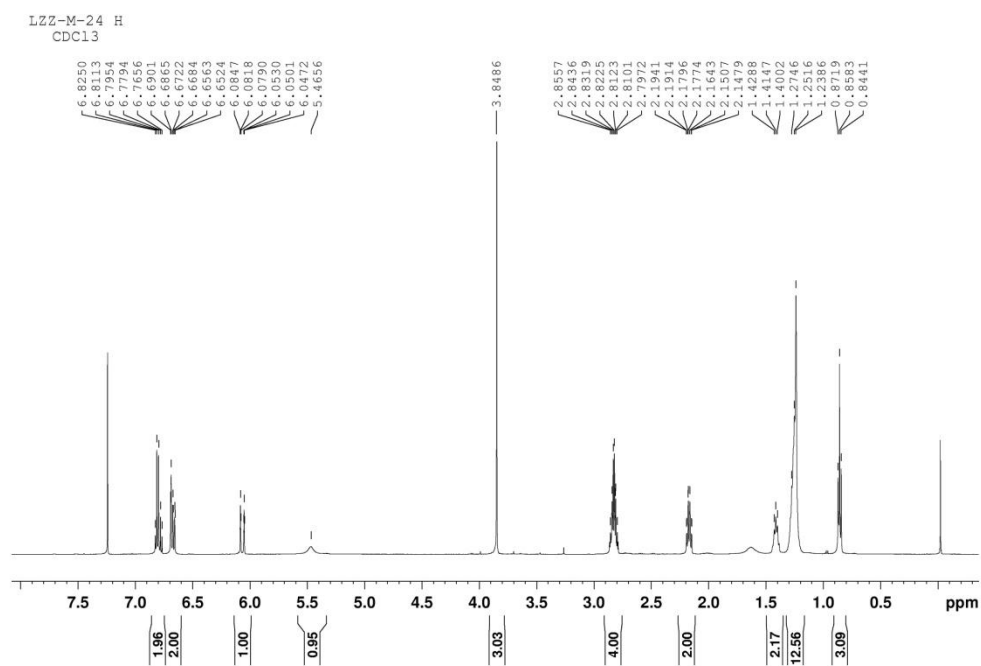
S84. ¹H NMR spectrum (500MHz, CDCl₃) of **14**



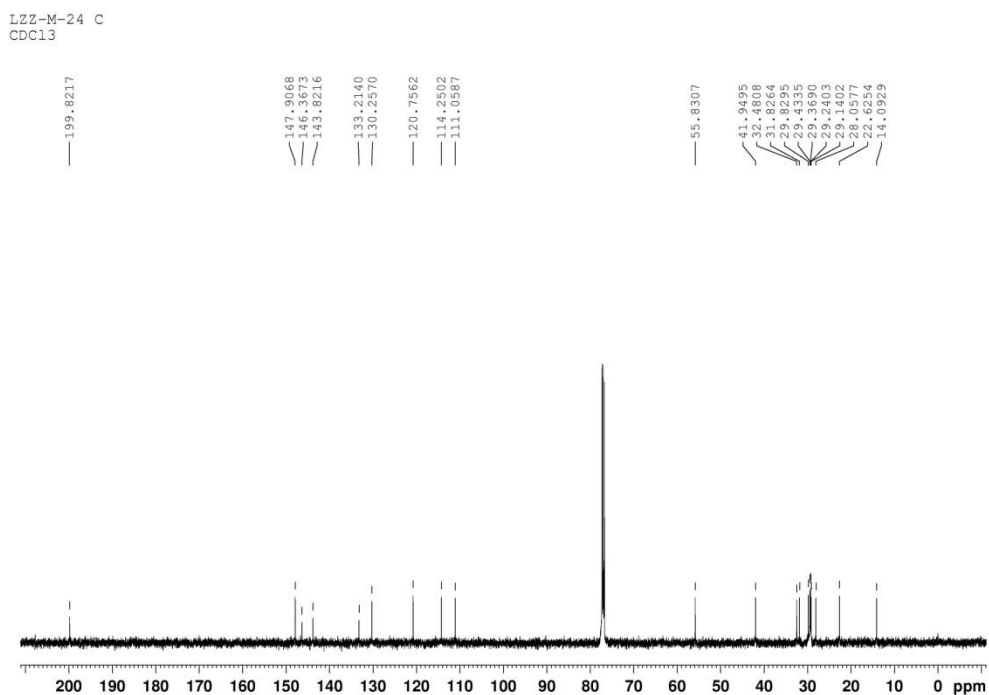
S85. ¹³C NMR spectrum (125MHz, CDCl₃) of **14**



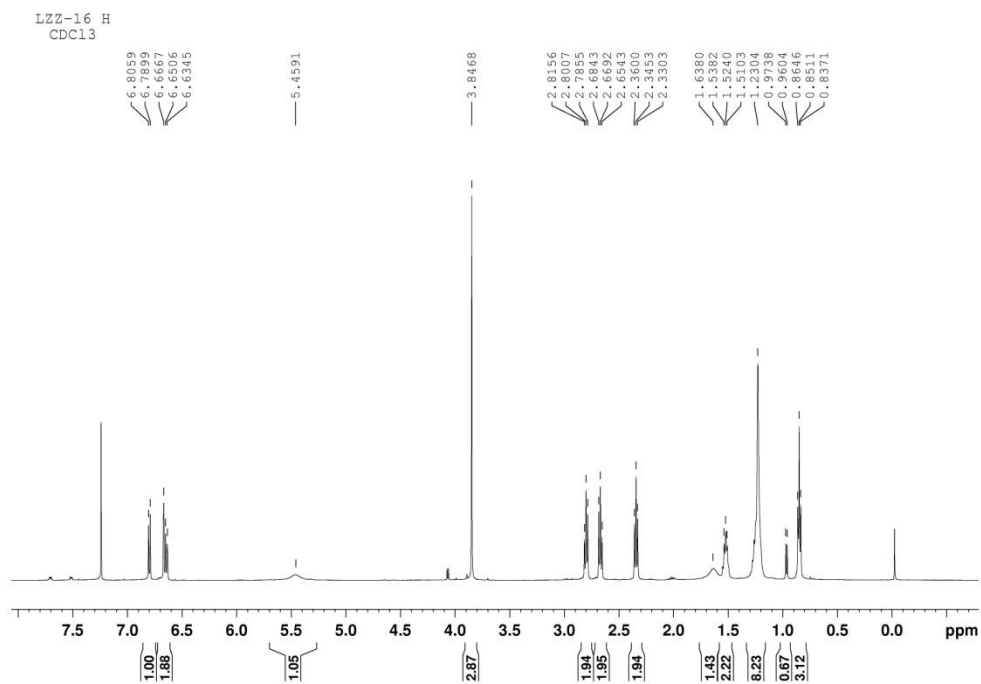
S86. ¹H NMR spectrum (500MHz, CDCl₃) of **15**



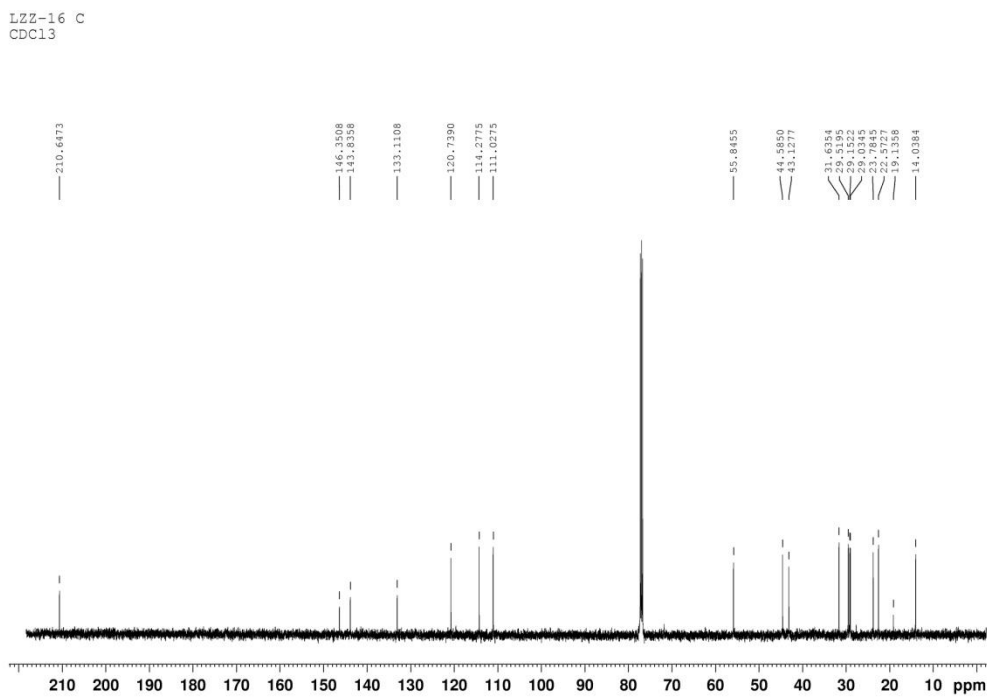
S87. ¹³C NMR spectrum (125MHz, CDCl₃) of **15**



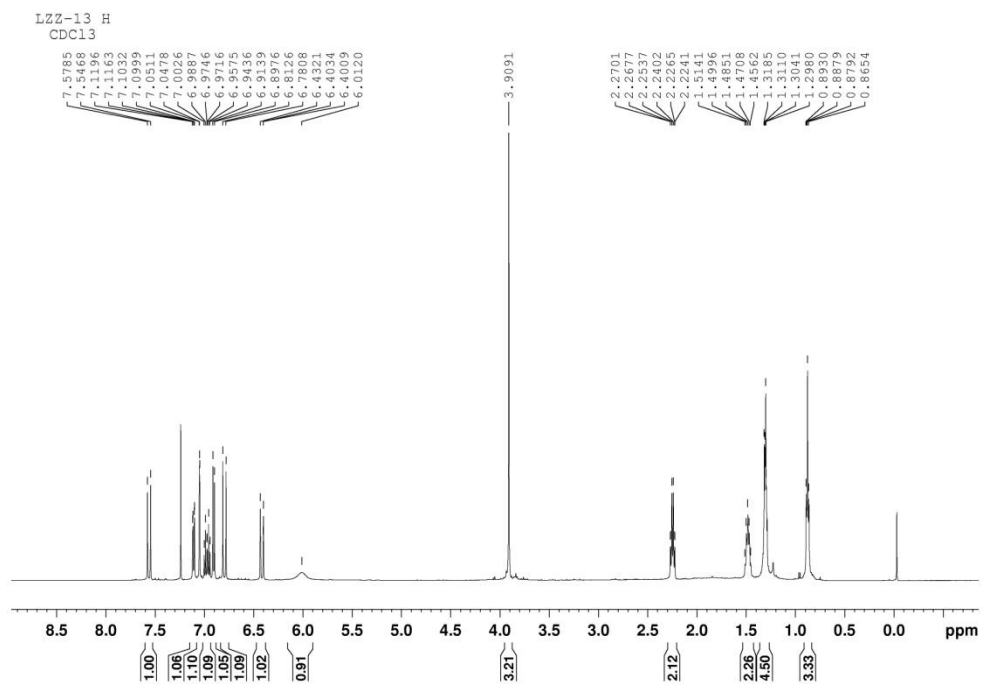
S88. ¹H NMR spectrum of **16** (500MHz, CDCl₃)



S89. ¹³C NMR spectrum of **16** (125MHz, CDCl₃)



S90. ¹H NMR spectrum (500MHz, CDCl₃) of **17**



S91. ¹³C NMR spectrum (125MHz, CDCl₃) of **17**

