

Electronic Supplementary Information for

New synthesis of phenyl-isothiocyanates C-functionalised cyclams. Bioconjugation and ^{64}Cu phenotypic PET imaging studies of multiple myeloma with the te2a derivative

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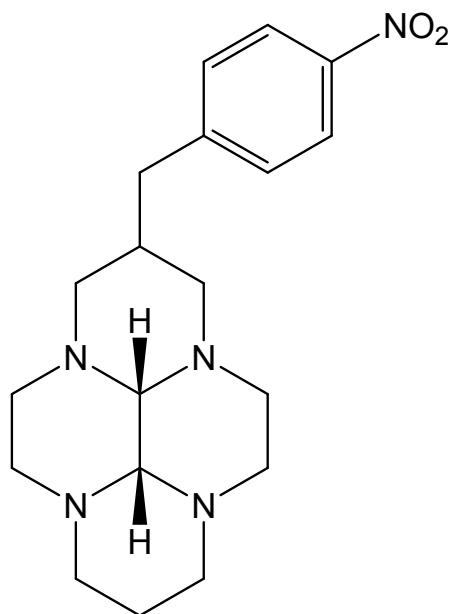
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Compound 4:



Chemical Formula: C₁₉H₂₇N₅O₂

Exact Mass: 357,2165

Molecular Weight: 357,4500

m/z: 357.2165 (100.0%), 358.2198 (20.5%), 359.2232 (2.0%), 358.2135 (1.8%)

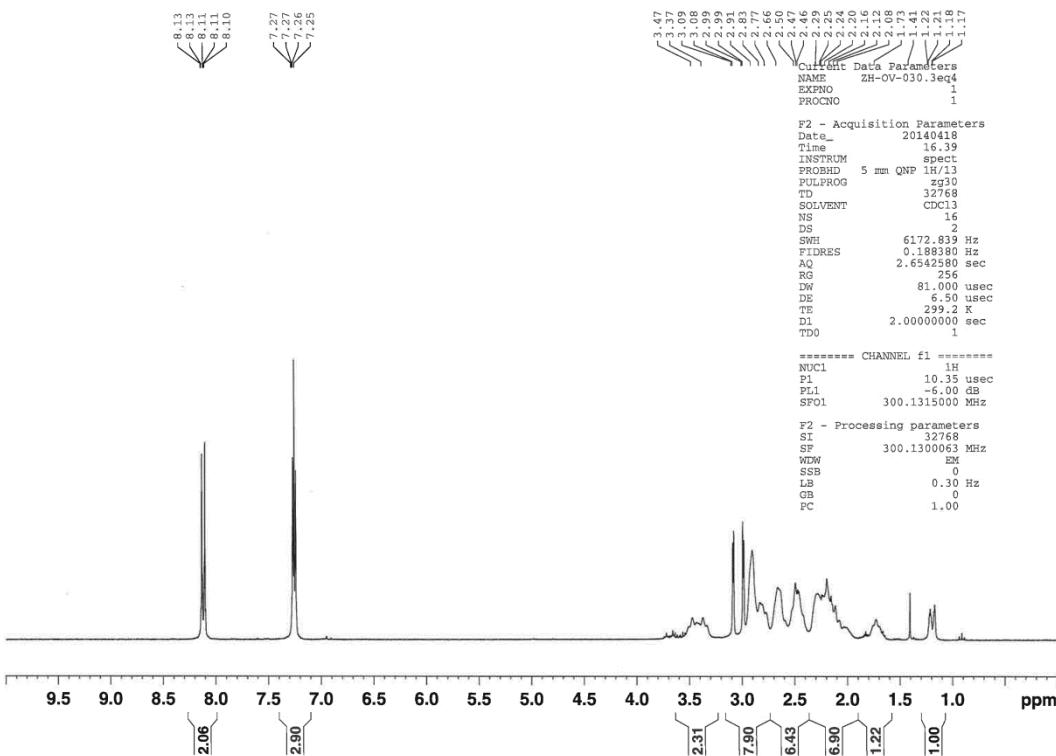


Figure S1. ^1H NMR spectrum (300 MHz, CDCl_3 , 25 °C) of compound **4**

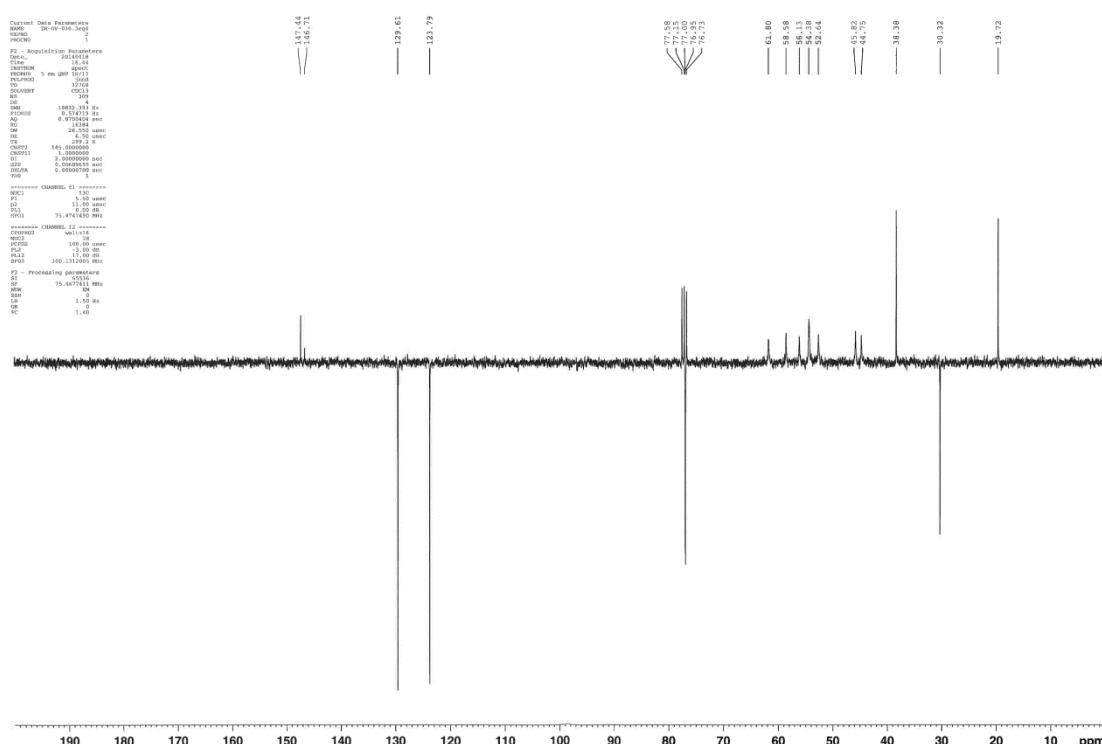


Figure S2. ^{13}C NMR spectrum (300 MHz, CDCl_3 , 25 °C) of compound **4**



Analysis Info

Sample Name **ZH-OV-030**
Analysis Name X014257CYC.d
Method Positif.m

Acquisition Date 21/05/2014 15:55:25

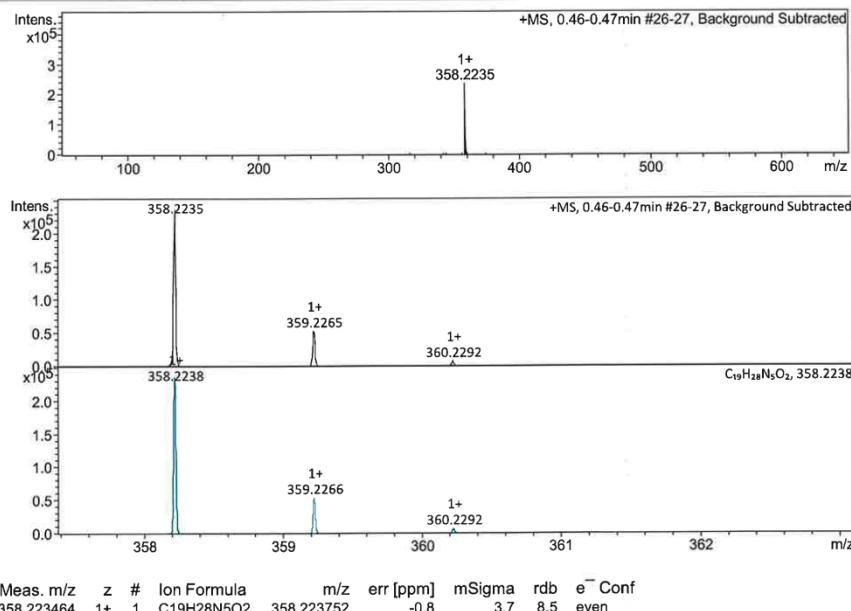
Laboratory
Instrument / Ser# maXis 255552.00086

Acquisition Parameter

Source Type ESI
Focus Not active
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Scan End 3000 m/z

Ion Polarity Positive
Set Capillary 4500 V
Set End Plate Offset -500 V
Set Collision Cell RF 1000.0 Vpp

Set Nebulizer 0.6 Bar
Set Dry Heater 200 °C
Set Dry Gas 7.0 l/min
Set Divert Valve Waste



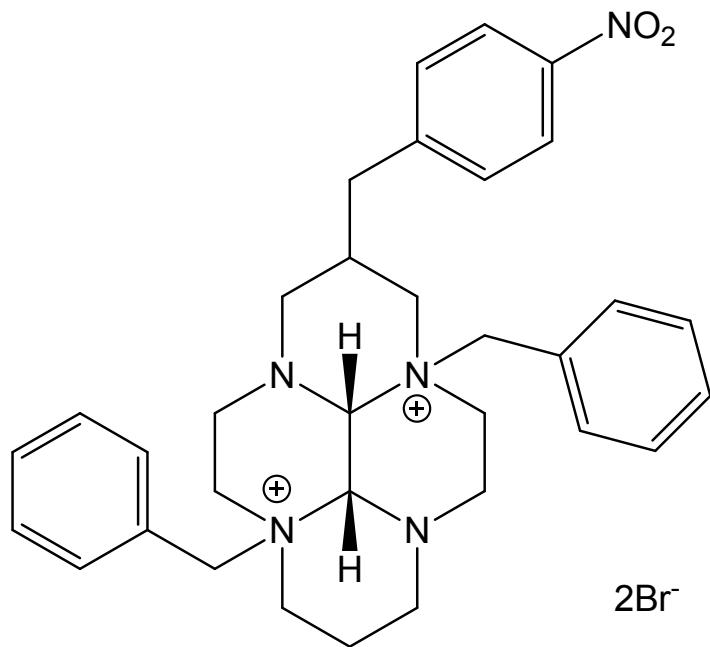
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Figure S3. HRMS spectrum (ESI) of compound 4

Compound 5:



Chemical Formula: C₃₃H₄₁Br₂N₅O₂

Exact Mass: 697,1627

Molecular Weight: 699,5189

m/z: 699.1607 (100.0%), 697.1627 (51.4%), 701.1586 (48.6%), 700.1640 (35.7%), 698.1661 (18.3%), 702.1620 (17.4%), 701.1674 (6.2%), 699.1694 (3.2%), 703.1653 (3.0%), 700.1577 (1.8%)

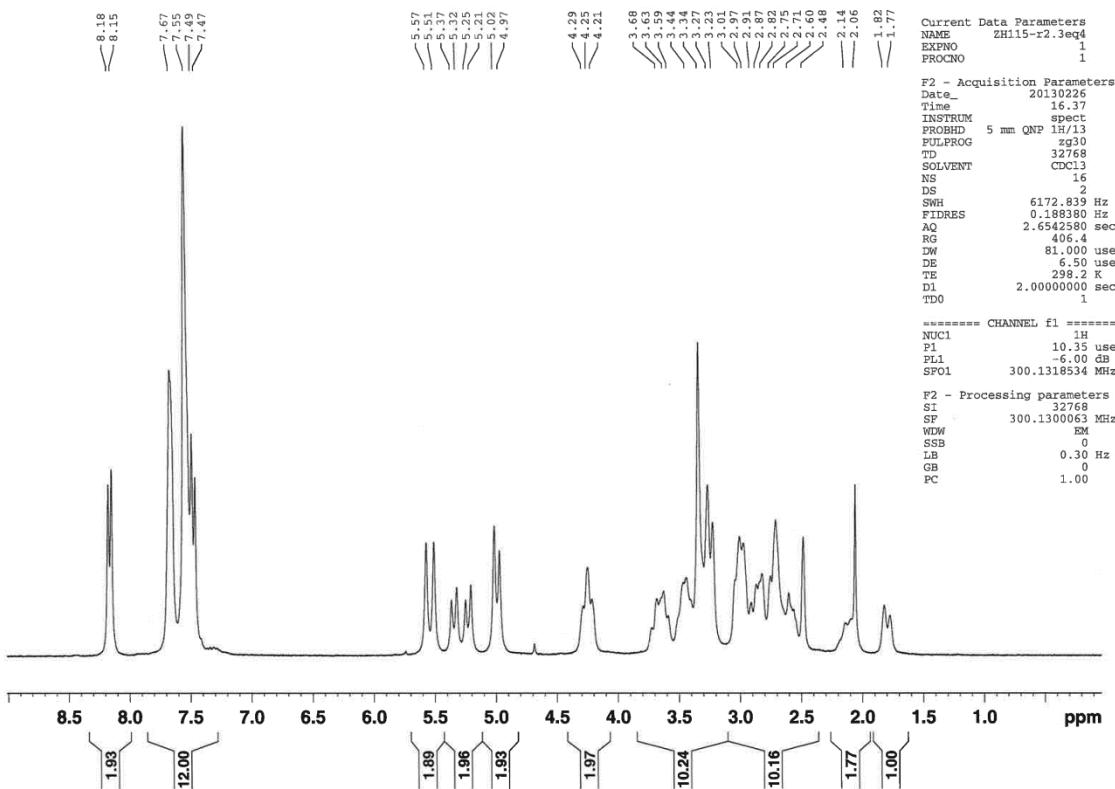


Figure S4. ^1H NMR spectrum (300 MHz, ^6d -DMSO, 25 °C) of compound 5

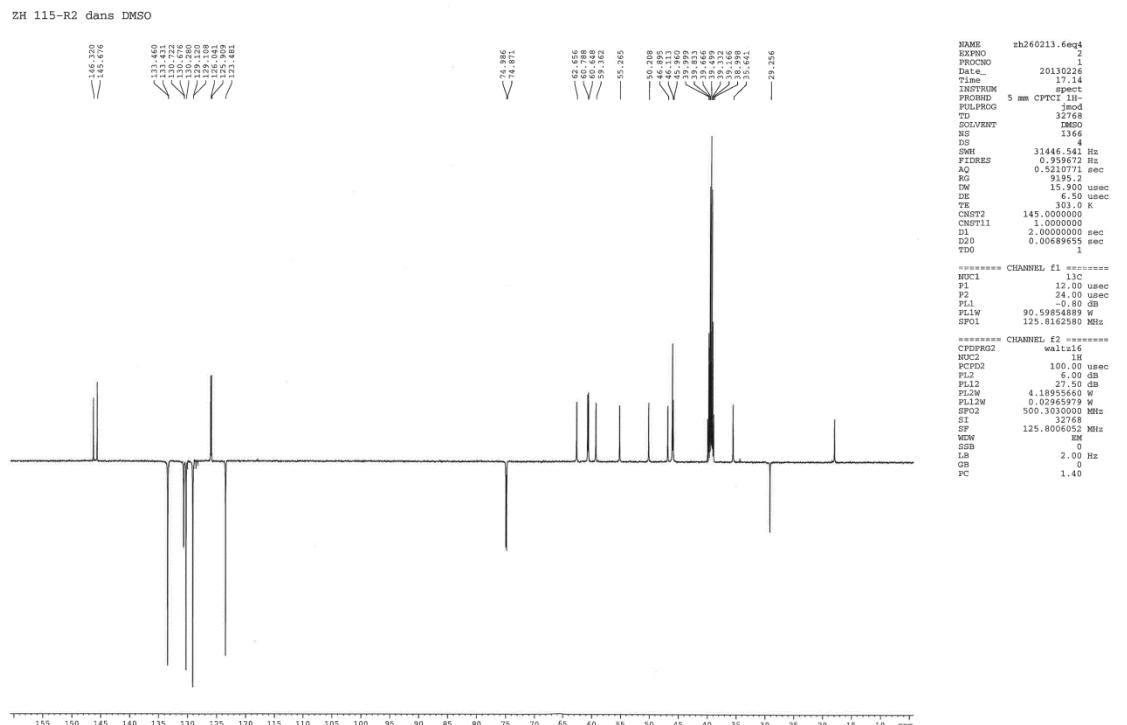


Figure S5. ^{13}C NMR spectrum (300 MHz, ^6d -DMSO, 25 °C) of compound 5



Analysis Info

Sample Name ZH-OV-032
Analysis Name X014643CYC.d
Method Positif.m

Acquisition Date 11/06/2014 16:18:47

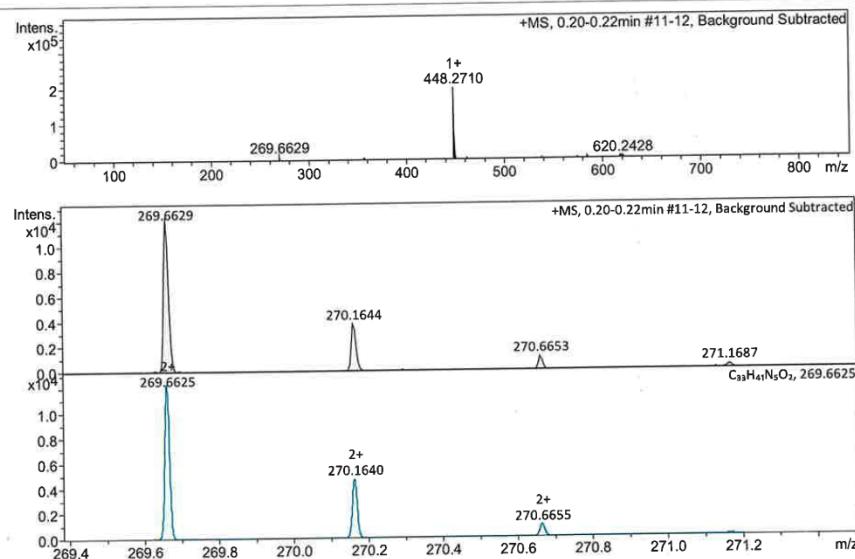
Laboratory
Instrument / Ser# maXis 255552.00086

Acquisition Parameter

Source Type ESI
Focus Not active
Scan Begin 50 m/z
Scan End 3000 m/z

Ion Polarity Positive
Set Capillary 4500 V
Set End Plate Offset -500 V
Set Collision Cell RF 1000.0 Vpp

Set Nebulizer 0.6 Bar
Set Dry Heater 200 °C
Set Dry Gas 7.0 l/min
Set Divert Valve Waste



Meas. m/z	z	#	Ion Formula	m/z	err [ppm]	mSigma	rdb	e ⁻ Conf
269.662909	2+	1	C21H45N7O9	269.663389	-1.8	28.4	3.0	even
	2+	2	C18H37N17O3	269.662715	-0.7	32.5	9.0	even
	2+	3	C33H41N5O2	269.662464	-1.7	39.6	16.0	even
	2+	4	C21H50BrN9O2	269.662993	0.3	386.5	1.0	even
448.270973	1+	1	C26H34N5O2	448.270702	0.6	1.6	12.5	even
618.244036	1+	1	C33H41BrN5O2	618.243814	0.4	73.8	15.5	even
	1+	2	C18H37BrN17O3	618.244317	-0.5	119.7	8.5	even
	1+	3	C17H41BrN13O7	618.242979	1.7	131.1	3.5	even

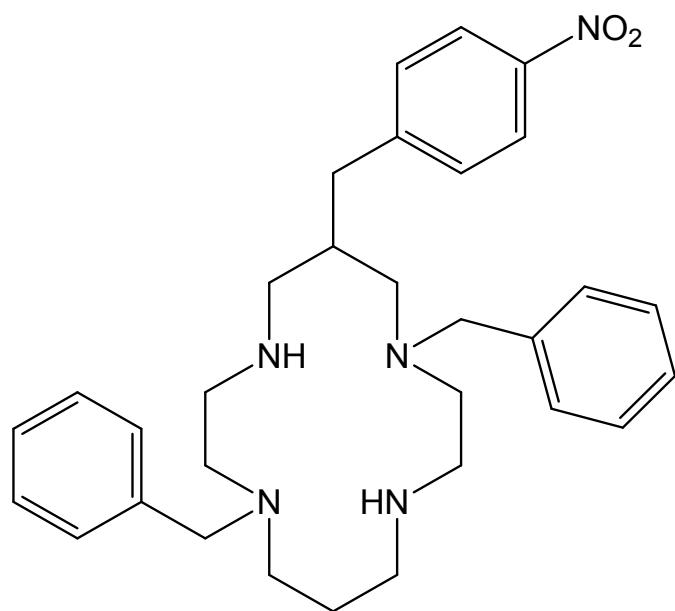
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Figure S6. HRMS spectrum (ESI) of compound 5

Compound 6:



Chemical Formula: C₃₁H₄₁N₅O₂

Exact Mass: 515,3260

Molecular Weight: 515,6895

m/z: 515.3260 (100.0%), 516.3294 (33.5%), 517.3327 (5.4%), 516.3231 (1.8%)

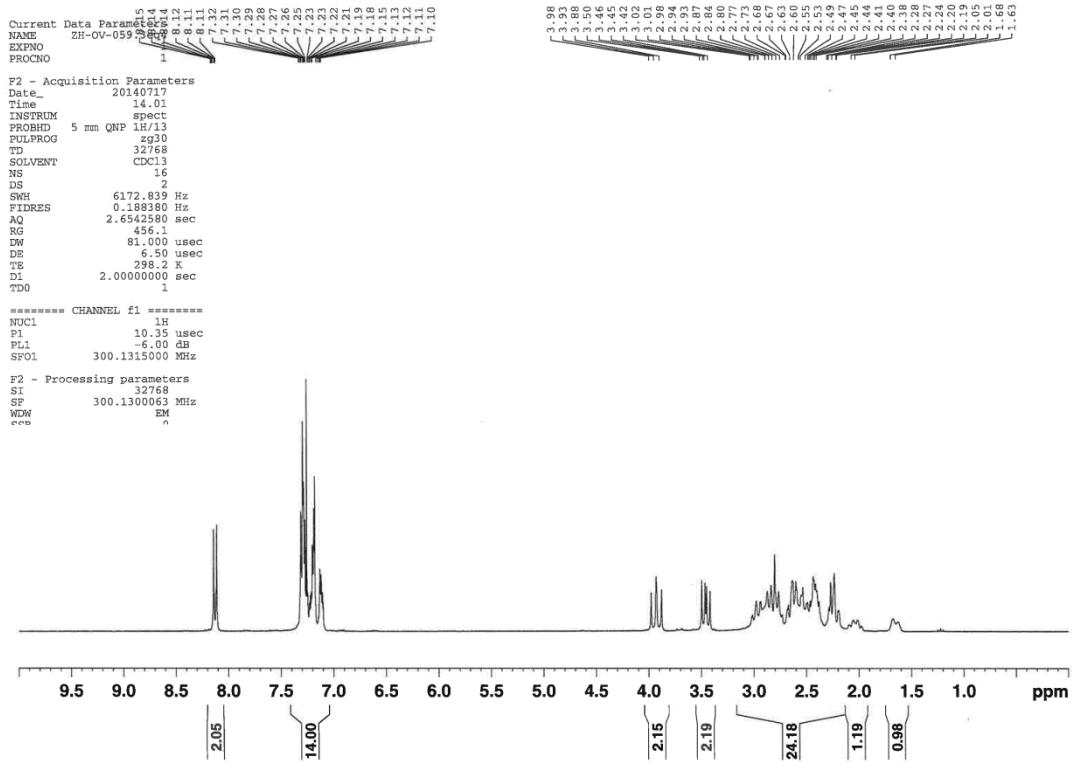


Figure S7. ¹H NMR spectrum (300 MHz, CDCl₃, 25 °C) of compound **6**

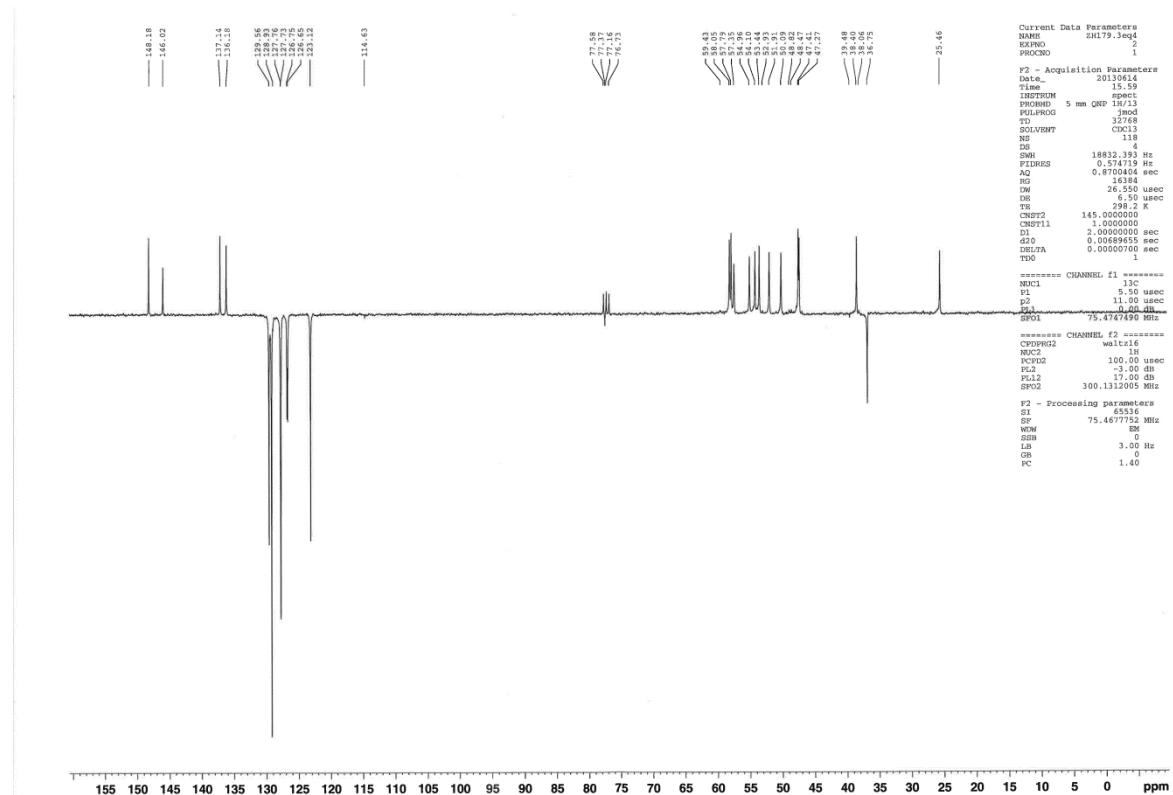


Figure S8. ¹³C NMR spectrum (300 MHz, CDCl₃, 25 °C) of compound **6**



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Plate-forme de Spectrométrie de Masse Haute Résolution

HRMS

Analysis Info

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Analysis Name **X016329CYC.d**
Method **Positif.m**

Acquisition Date **15/10/2014 11:28:29**

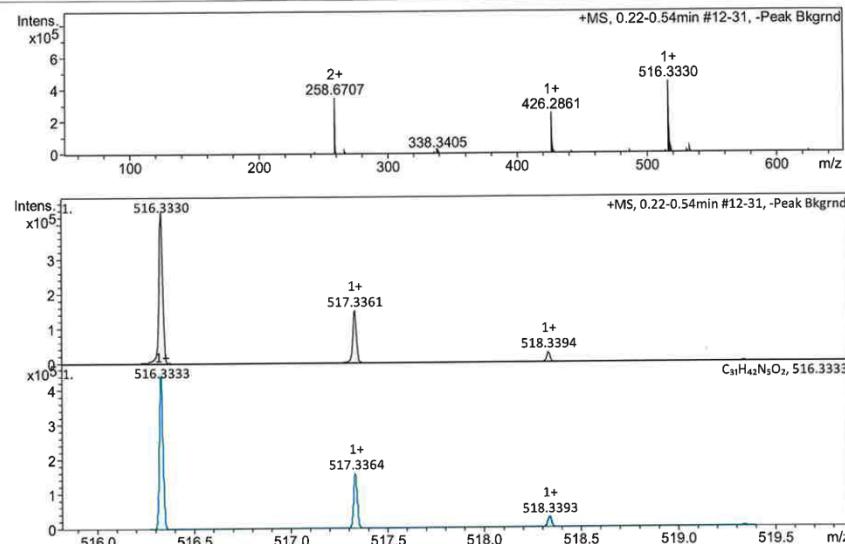
Laboratory
Instrument / Ser# **maXis 255552.00086**

Acquisition Parameter

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Focus **Not active**
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Scan End **3000 m/z**

Ion Polarity **Positive**
Set Capillary **4500 V**
Set End Plate Offset **-500 V**
Set Collision Cell RF **500.0 Vpp**

Set Nebulizer **0.6 Bar**
Set Dry Heater **200 °C**
Set Dry Gas **7.0 l/min**
Set Divert Valve **Waste**



Meas. m/z	z	#	Ion Formula	m/z	err [ppm]	mSigma	rdb	e ⁻ Conf
258.670656	2+	1	C ₃₁ H ₄₃ N ₅ O ₂	258.670289	-1.4	6.3	13.0	even
426.286123	1+	1	C ₂₄ H ₃₆ N ₅ O ₂	426.286352	-0.5	15.6	9.5	even
516.332964	1+	1	C ₃₀ H ₄₆ N ₆ O ₂	516.331965	1.9	3.8	8.5	even
	1+	2	C ₃₁ H ₄₂ N ₅ O ₂	516.333302	-0.7	8.6	13.5	even

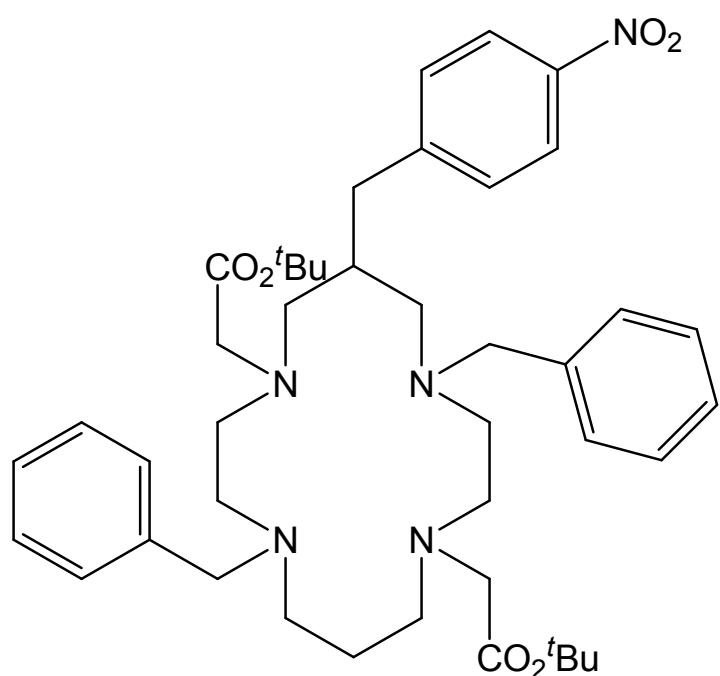
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Figure S9. HRMS spectrum (ESI) of compound **6**

Compound 7:



Chemical Formula: C₄₃H₆₁N₅O₆

Exact Mass: 743,4622

Molecular Weight: 743,9743

m/z: 743.4622 (100.0%), 744.4655 (46.5%), 745.4689 (10.6%), 744.4592 (1.8%),
746.4722 (1.6%), 745.4664 (1.2%)

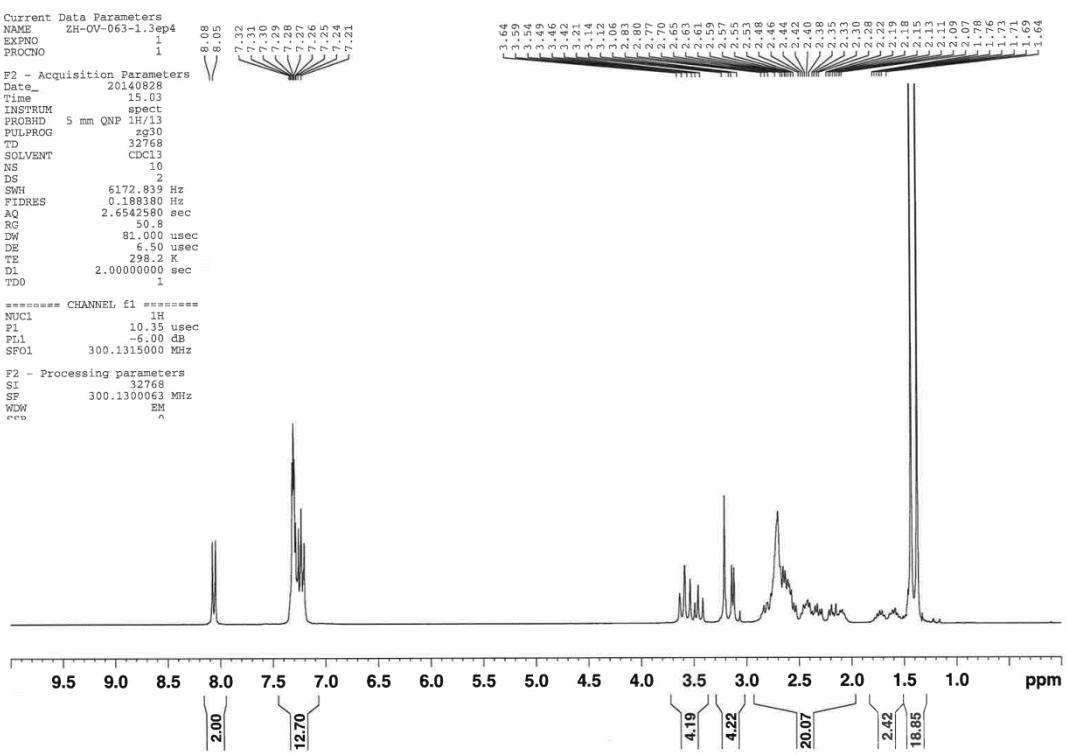


Figure S10. ¹H NMR spectrum (300 MHz, CDCl₃, 25 °C) of compound 7

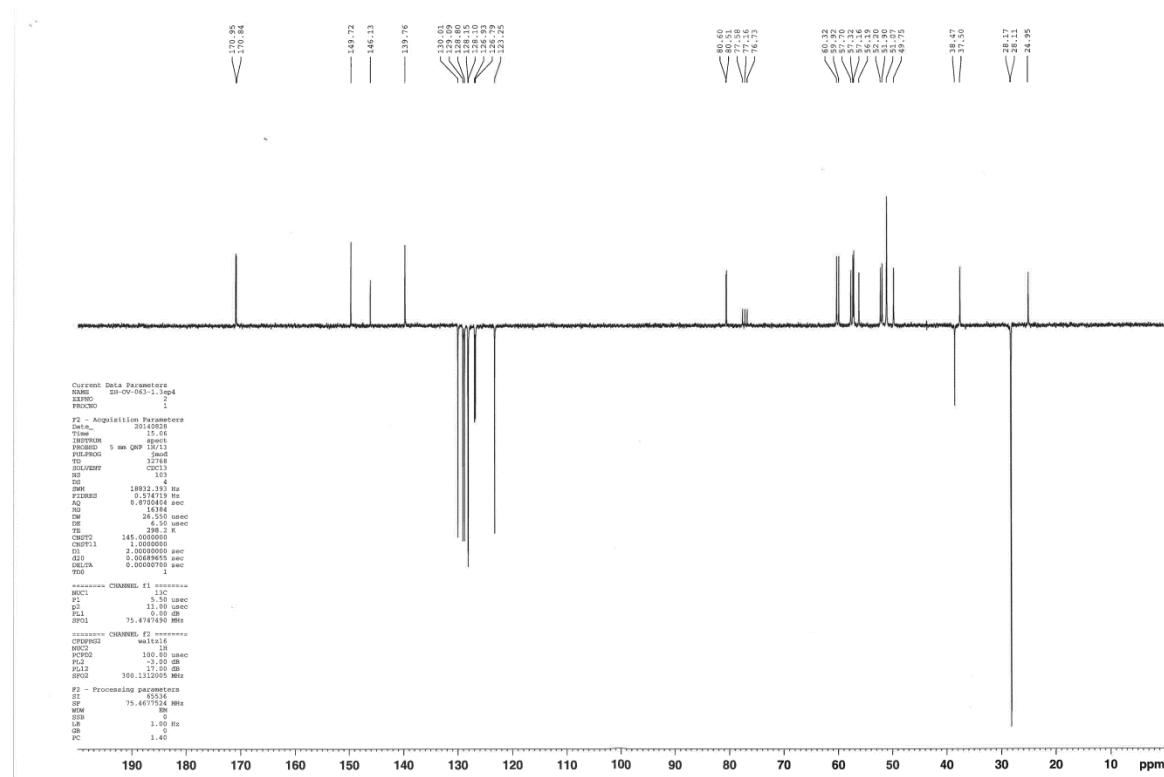


Figure S11. ¹³C NMR spectrum (300 MHz, CDCl₃, 25 °C) of compound 7

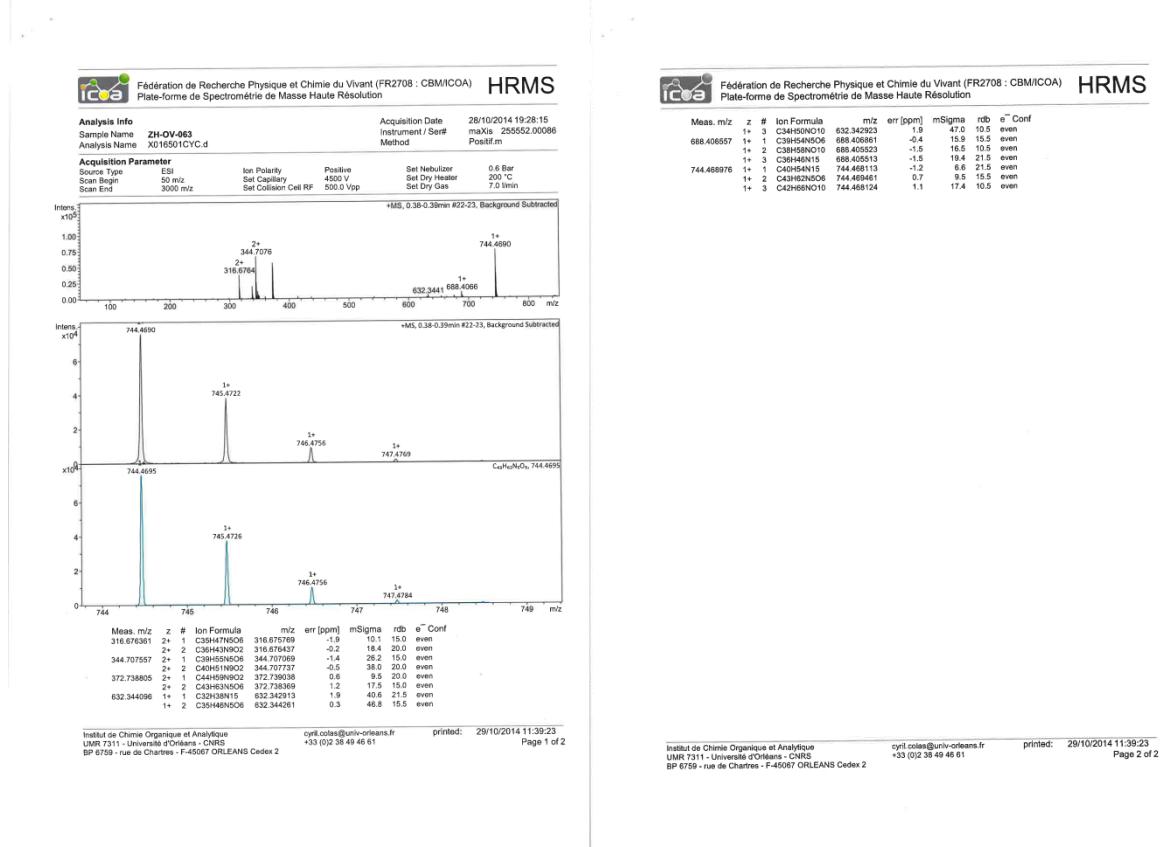
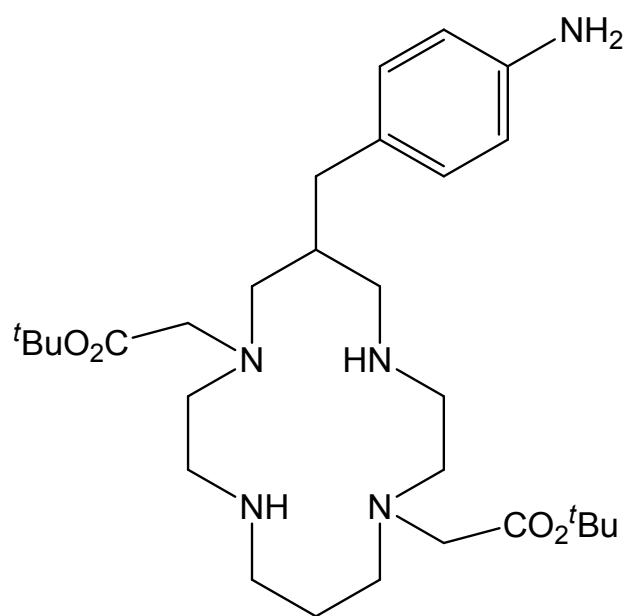


Figure S12. HRMS spectrum (ESI) of compound 7

Compound 8:



Chemical Formula: $\text{C}_{29}\text{H}_{51}\text{N}_5\text{O}_4$

Exact Mass: 533,3941

Molecular Weight: 533,7463

m/z: 533.3941 (100.0%), 534.3975 (31.4%), 535.4008 (4.7%), 534.3911 (1.8%)

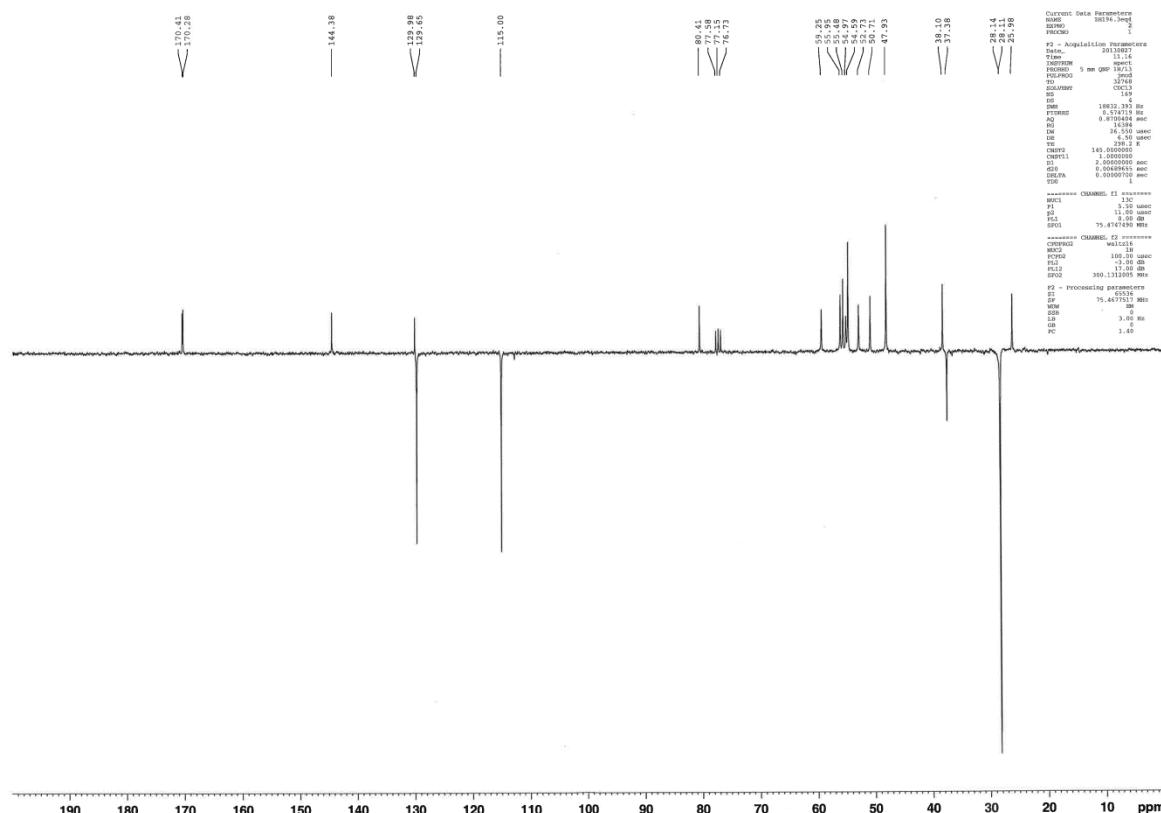
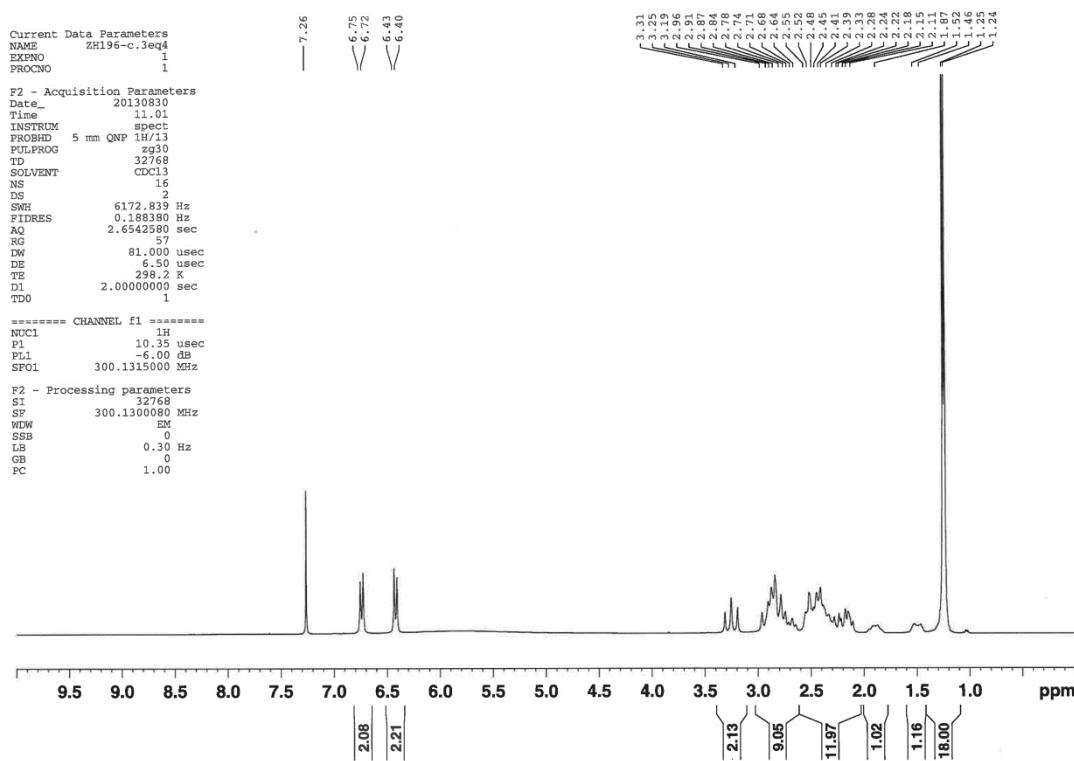


Figure S14. ¹³C NMR spectrum (300 MHz, CDCl₃, 25 °C) of compound 8



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HRMS

Analysis Info

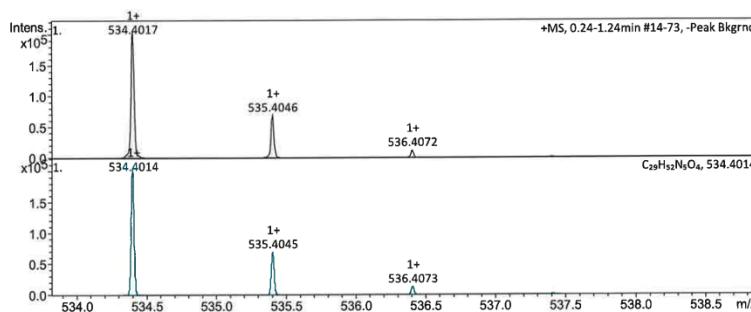
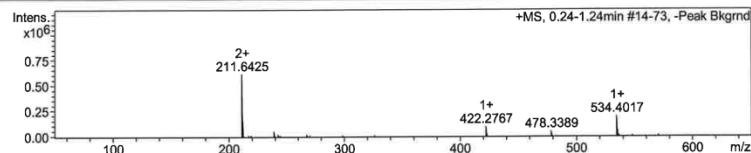
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Analysis Name **X010457CYC.d**
Method **positif+uv.m**

Acquisition Date **27/09/2013 16:22:55**

Laboratory
Instrument / Ser# **maXis 255552.00086**

Acquisition Parameter

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Focus **Not active** Set Capillary **4500 V** Set Dry Heater **200 °C**
Scan Begin **50 m/z** Set End Plate Offset **-500 V** Set Dry Gas **7.0 l/min**
Scan End **3000 m/z** Set Collision Cell RF **1000.0 Vpp** Set Divert Valve **Waste**



Meas. m/z	z	#	Ion Formula	m/z	err [ppm]	mSigma	rdb	e ⁻	Conf
211.642547	2+	1	C ₂₂ H ₃₃ N ₉	211.642397	-0.7	7.7	11.0	even	
239.673648	2+	2	C ₂₁ H ₃₇ N ₅ O ₄	211.641729	3.9	17.3	6.0	even	
267.704781	2+	1	C ₃₀ H ₄₉ N ₉	239.673698	-0.2	4.6	11.0	even	
422.276661	1+	1	C ₂₁ H ₃₆ N ₅ O ₄	239.673029	-2.6	8.5	6.0	even	
478.338912	1+	1	C ₂₅ H ₄₄ N ₅ O ₄	267.704998	0.8	12.3	11.0	even	
534.401667	1+	1	C ₂₉ H ₅₂ N ₅ O ₄	267.704329	-1.7	23.3	6.0	even	
534.401667	1+	2	C ₃₀ H ₄₈ N ₉	267.704299	1.1	16.4	6.5	even	
534.401667	1+	2	C ₃₀ H ₄₈ N ₉	534.401382	0.3	9.0	6.5	even	
534.401667	1+	2	C ₃₀ H ₄₈ N ₉	534.402719	-0.5	3.5	6.5	even	
534.401667	1+	2	C ₃₀ H ₄₈ N ₉	534.402719	-2.0	13.2	11.5	even	

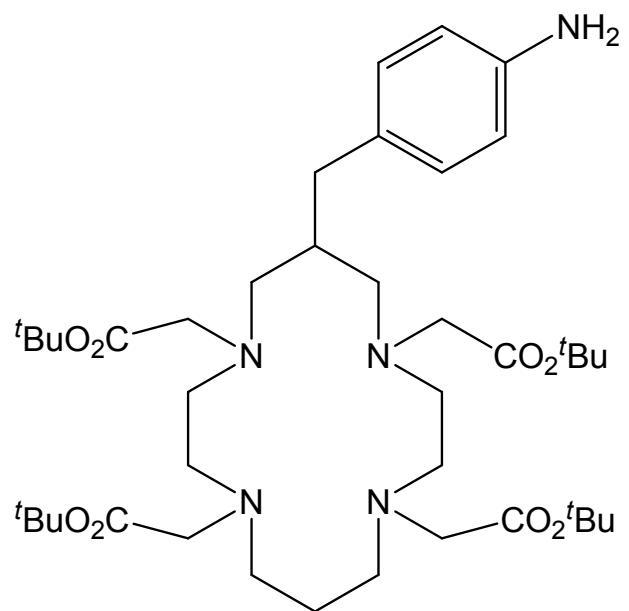
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Figure S15. HRMS spectrum (ESI) of compound 8

Compound 9:



Chemical Formula: C₄₁H₇₁N₅O₈

Exact Mass: 761,5303

Molecular Weight: 762,0311

m/z: 761.5303 (100.0%), 762.5336 (44.3%), 763.5370 (9.6%), 762.5273 (1.8%),
763.5345 (1.6%), 764.5403 (1.3%)

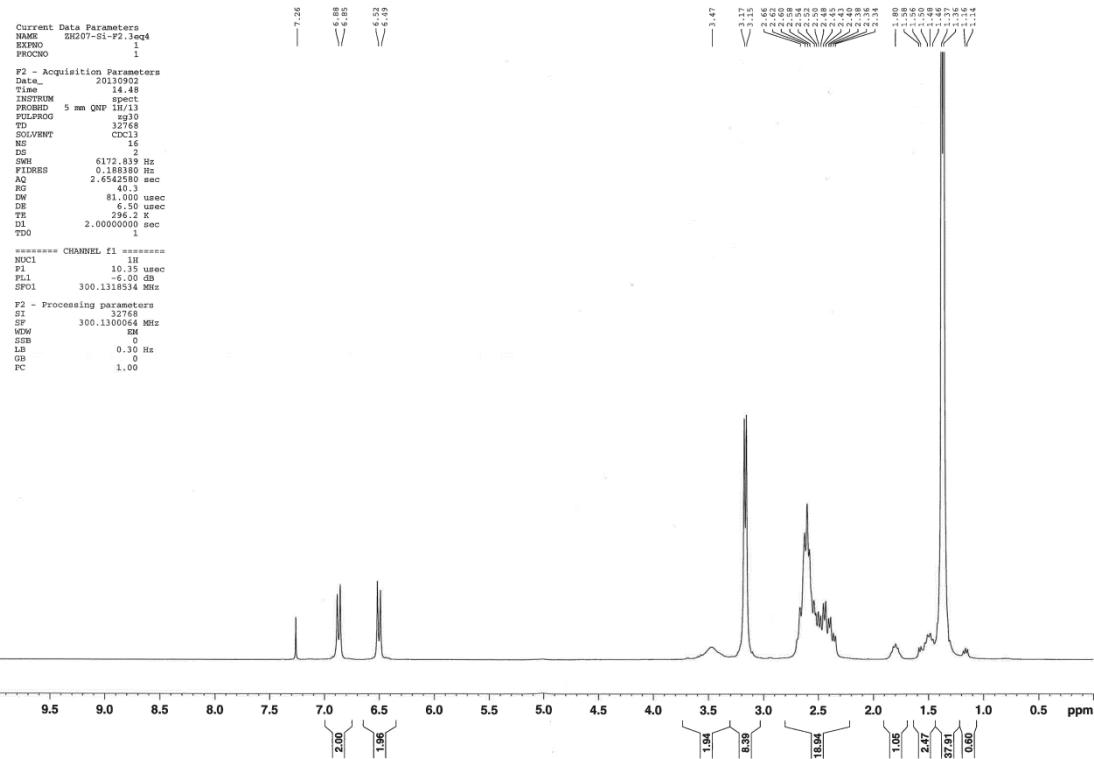


Figure S16. ^1H NMR spectrum (300 MHz, CDCl_3 , 25 °C) of compound **9**

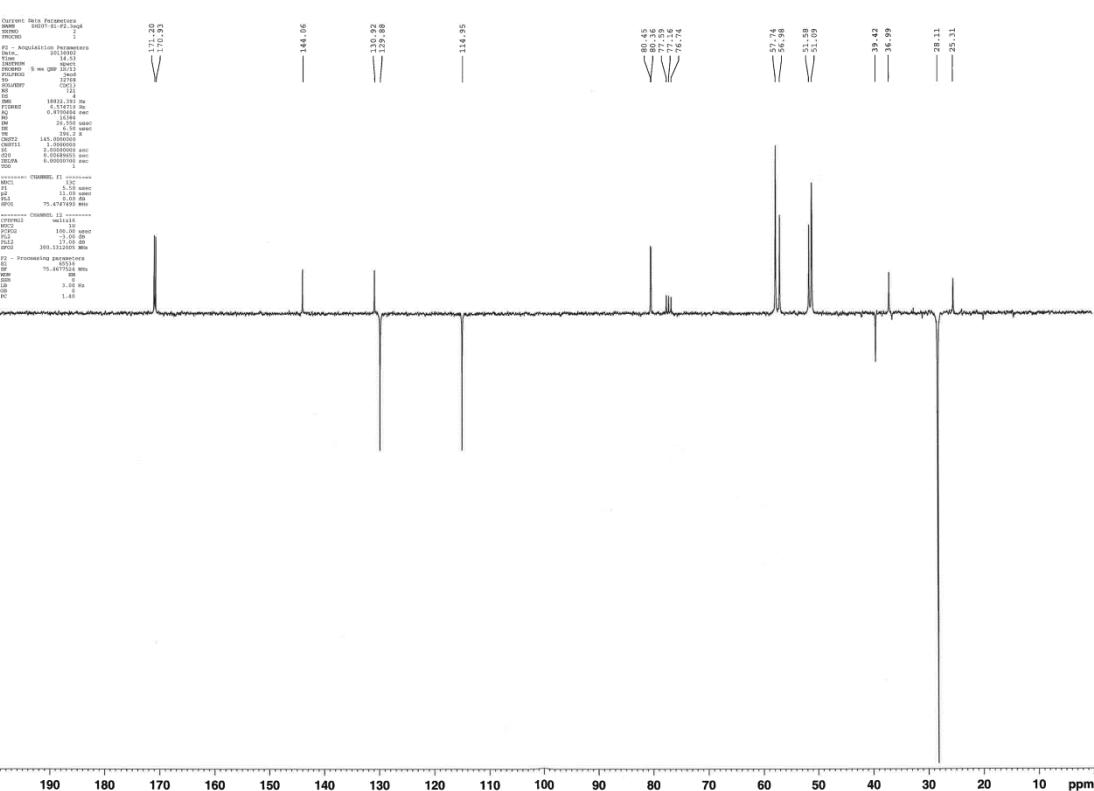


Figure S17. ^{13}C NMR spectrum (300 MHz, CDCl_3 , 25 °C) of compound **9**



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HRMS

Analysis Info

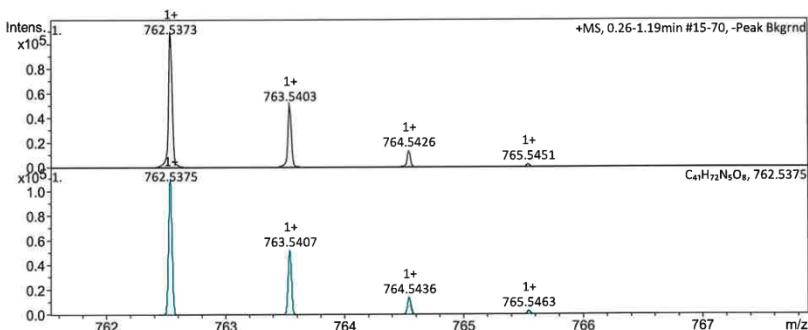
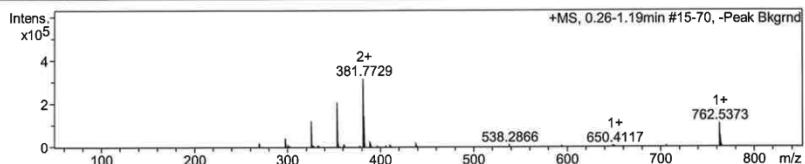
Sample Name **ZH207**
Analysis Name X010463CYC.d
Method positif+uv.m

Acquisition Date 27/09/2013 16:36:29

Laboratory
Instrument / Ser# maXis 255552.00086

Acquisition Parameter

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Focus	Not active	Set Capillary	4500 V	Set Dry Heater	200 °C
Scan Begin	50 m/z	Set End Plate Offset	-500 V	Set Dry Gas	7.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	1000.0 Vpp	Set Divert Valve	Waste



Meas. m/z	z	#	Ion Formula	m/z	err [ppm]	mSigma	rdb	e⁻ Conf
269.647730	2+	1	C25H41N5O8	269.647208	-1.9	6.4	8.0	even
	2+	2	C26H37N9O4	269.647877	0.5	9.9	13.0	even
297.679047	2+	1	C29H49N5O8	297.678508	-1.8	1.0	8.0	even
	2+	2	C30H45N9O4	297.679177	-0.4	10.8	13.0	even
325.710273	2+	1	C34H53N9O4	325.710477	0.6	2.3	13.0	even
	2+	2	C33H57N5O8	325.709808	-1.4	9.8	8.0	even
353.741615	2+	1	C38H61N9O4	353.741777	-0.5	11.4	13.0	even
	2+	2	C37H65N5O8	353.741108	1.4	22.9	8.0	even
381.772920	2+	1	C41H73N5O8	381.772409	1.3	6.1	8.0	even
	2+	2	C42H69N9O4	381.773077	0.4	18.2	13.0	even
762.537265	1+	1	C41H72N5O8	762.537541	-0.4	4.6	8.5	even
	1+	2	C38H64N15O2	762.536193	-1.4	6.1	14.5	even
	1+	3	C40H76N012	762.536203	-1.4	6.9	3.5	even

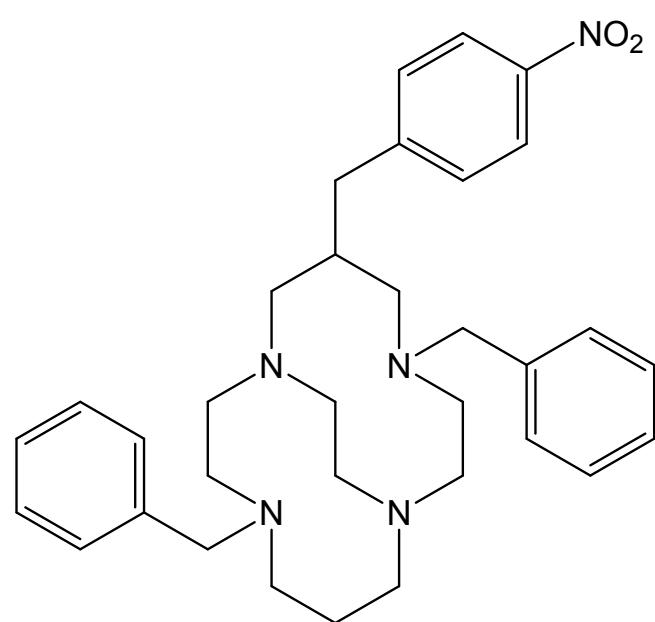
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Figure S18. HRMS spectrum (ESI) of compound **9**

Compound 10:



Chemical Formula: C₃₃H₄₃N₅O₂

Exact Mass: 541,3417

Molecular Weight: 541,7268

m/z: 541.3417 (100.0%), 542.3450 (35.7%), 543.3484 (6.2%), 542.3387 (1.8%)

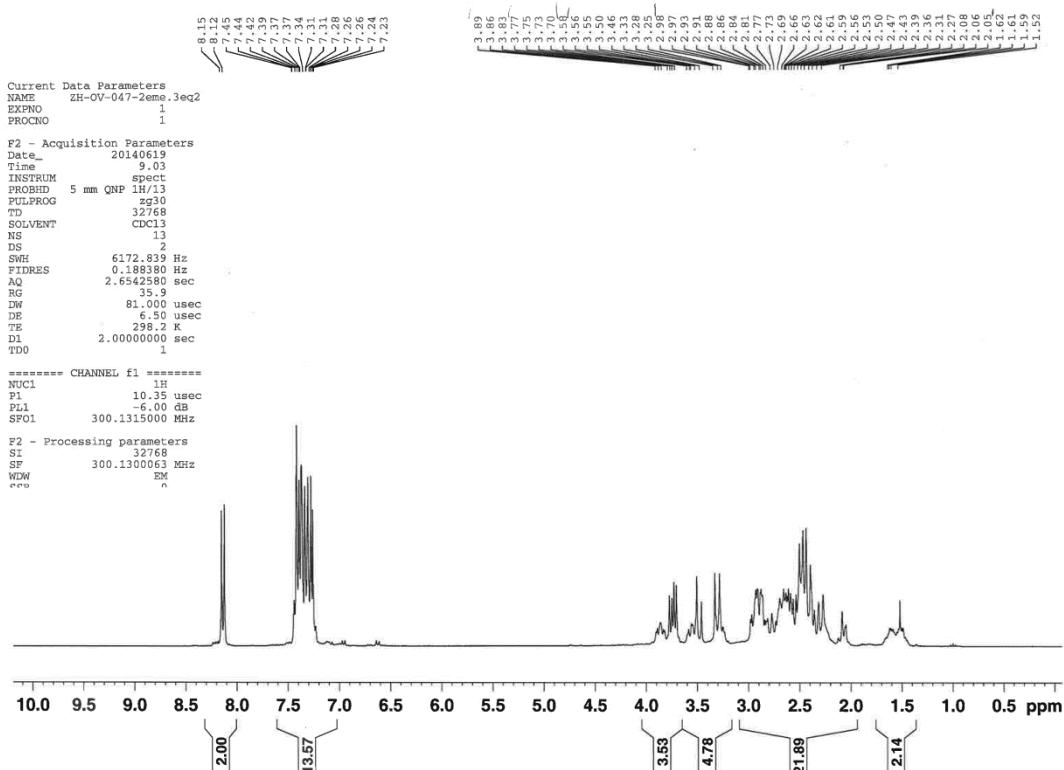


Figure S19. ^1H NMR spectrum (300 MHz, CDCl_3 , 25 °C) of compound **10**

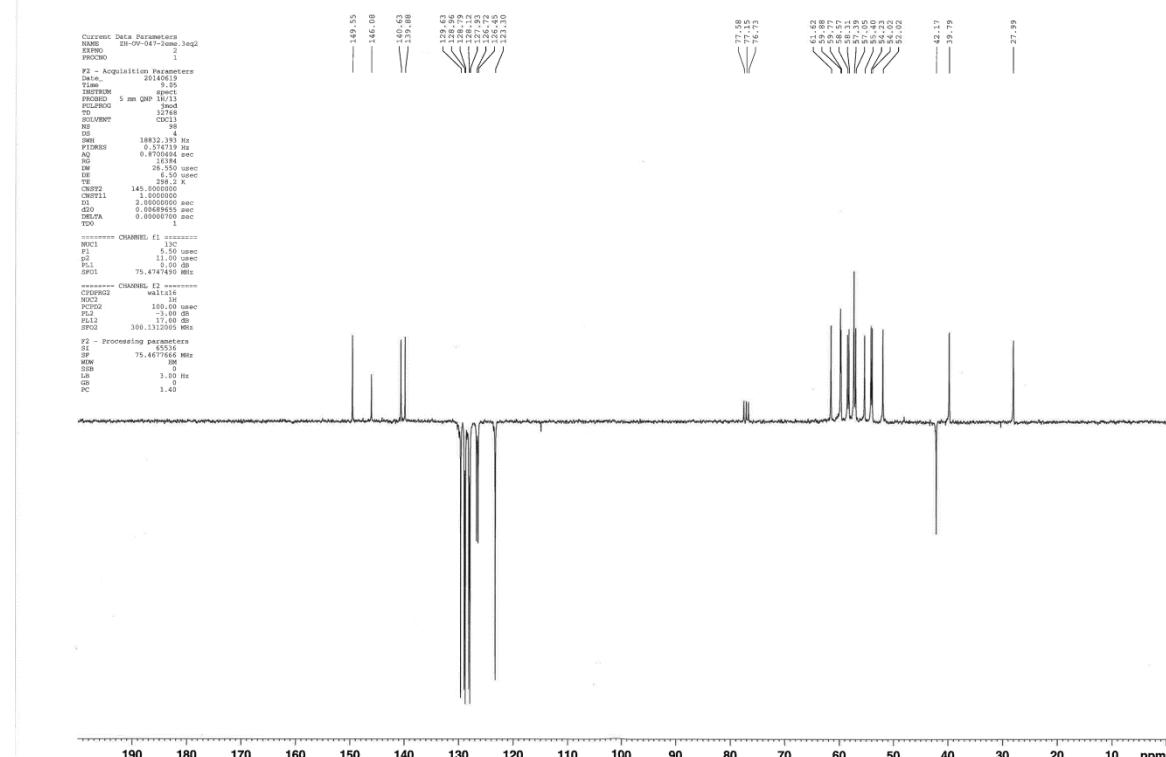
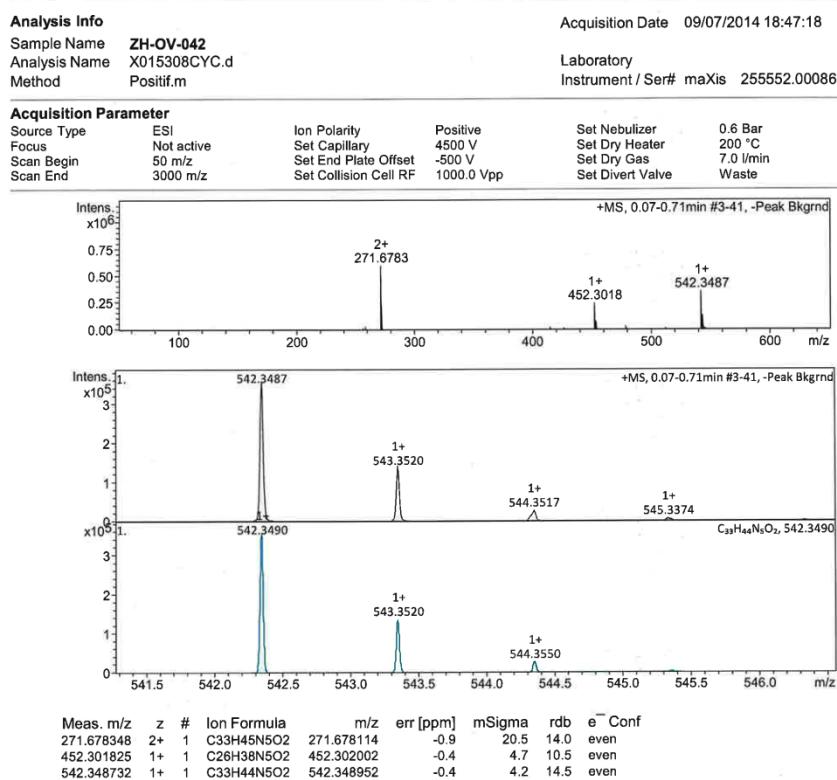


Figure S20. ^{13}C NMR spectrum (300 MHz, CDCl_3 , 25 °C) of compound **10**



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HRMS



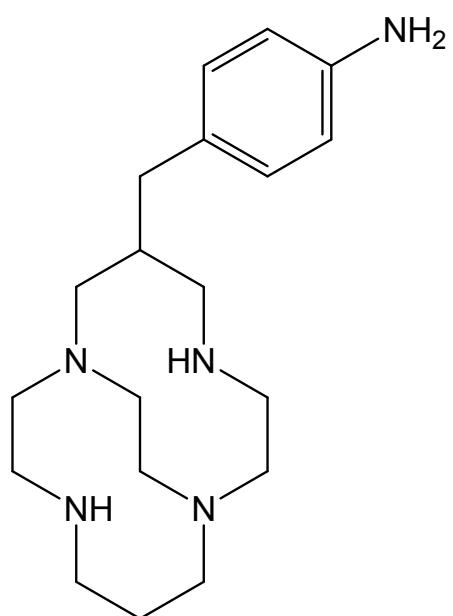
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Figure S21. HRMS spectrum (ESI) of compound 10

Compound 11:



Chemical Formula: C₁₉H₃₃N₅

Exact Mass: 331,2736

Molecular Weight: 331,4988

m/z: 331.2736 (100.0%), 332.2770 (20.5%), 333.2803 (2.0%), 332.2706 (1.8%)

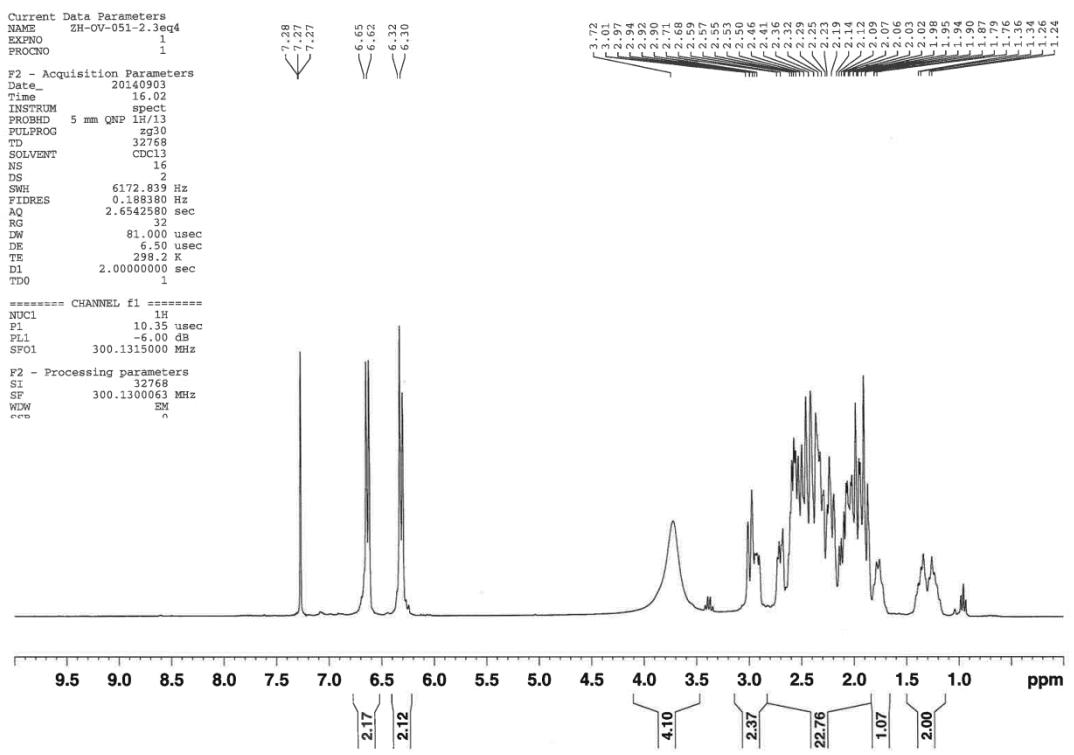


Figure S22. ¹H NMR spectrum (300 MHz, CDCl₃, 25 °C) of compound 11

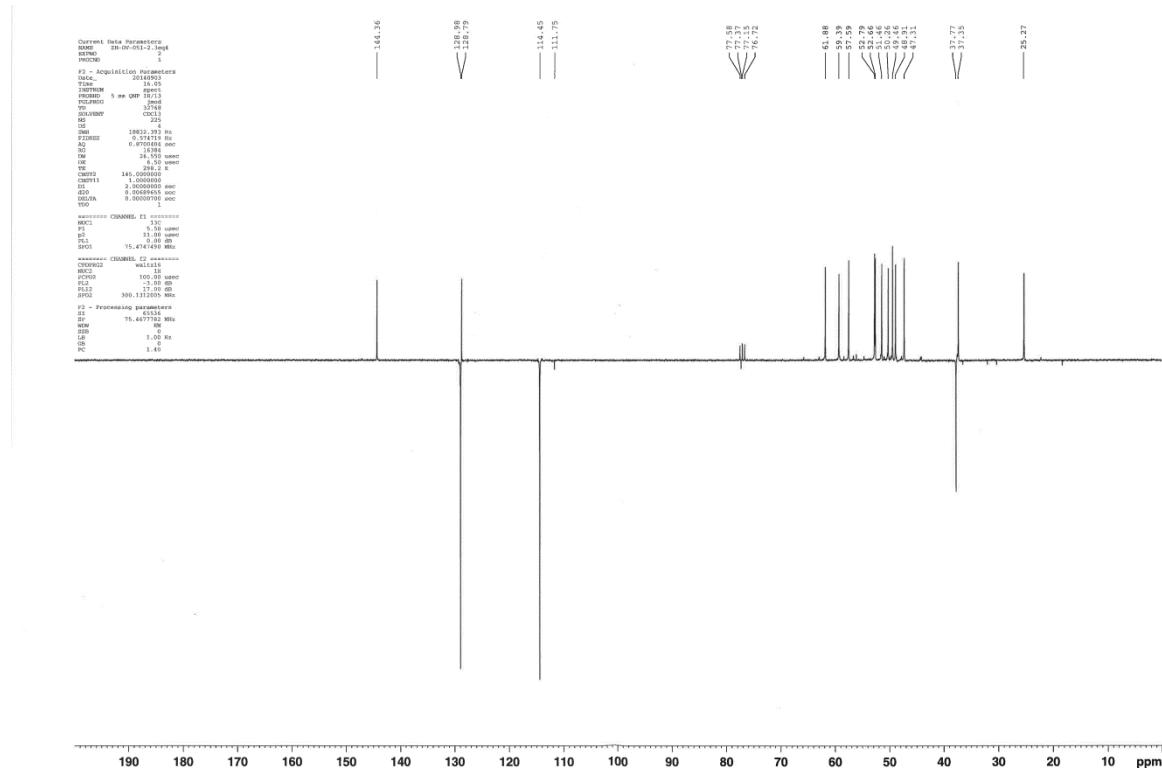


Figure S23. ¹³C NMR spectrum (300 MHz, CDCl₃, 25 °C) of compound 11



Analysis Info

Sample Name ZH-OV-051
Analysis Name X015309CYC_24632.d
Method Positif.m

Acquisition Date 10/07/2014 00:54:07

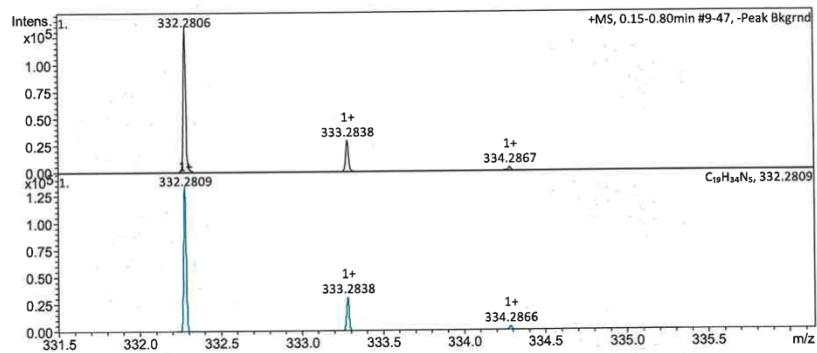
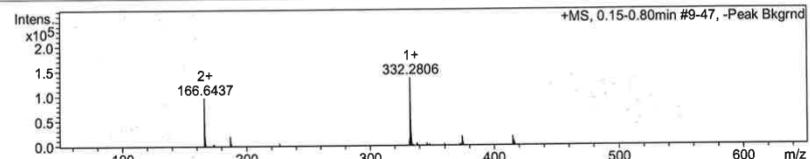
Laboratory
Instrument / Ser# maXis 255552.00086

Acquisition Parameter

Source Type ESI
Focus Not active
Scan Begin 50 m/z
Scan End 3000 m/z

Ion Polarity Positive
Set Capillary 4500 V
Set End Plate Offset 500 V
Set Collision Cell RF 1000.0 Vpp

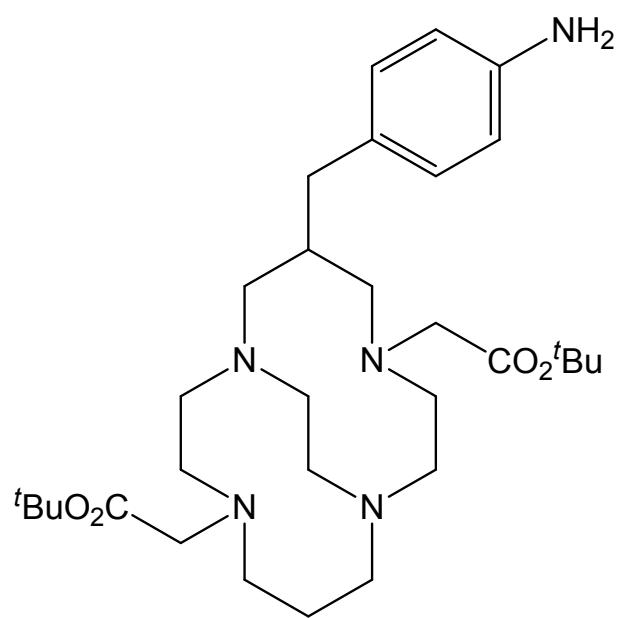
Set Nebulizer 0.6 Bar
Set Dry Heater 200 °C
Set Dry Gas 7.0 l/min
Set Divert Valve Waste



Meas. m/z	z	#	Ion Formula	m/z	err [ppm]	mSigma	rdb	e ⁻ Conf
166.643692	2+	1	C ₁₉ H ₃₅ N ₅	166.644074	-2.3	2.1	5.0	even
	2+	2	C ₁₈ H ₃₉ N ₄ O ₄	166.643406	-1.7	12.8	0.0	even
187.649079	2+	1	C ₂₁ H ₃₇ N ₅ O	187.649357	-1.5	6.1	6.0	even
332.280636	1+	1	C ₁₉ H ₃₄ N ₅	332.280873	0.7	7.6	5.5	even
374.291383	1+	1	C ₂₁ H ₃₆ N ₅ O	374.291437	-0.1	4.4	6.5	even

Figure S24. HRMS spectrum (ESI) of compound 11

Compound 12:



Chemical Formula: C₃₁H₅₃N₅O₄

Exact Mass: 559,4098

Molecular Weight: 559,7836

m/z: 559.4098 (100.0%), 560.4131 (33.5%), 561.4165 (5.4%), 560.4068 (1.8%)

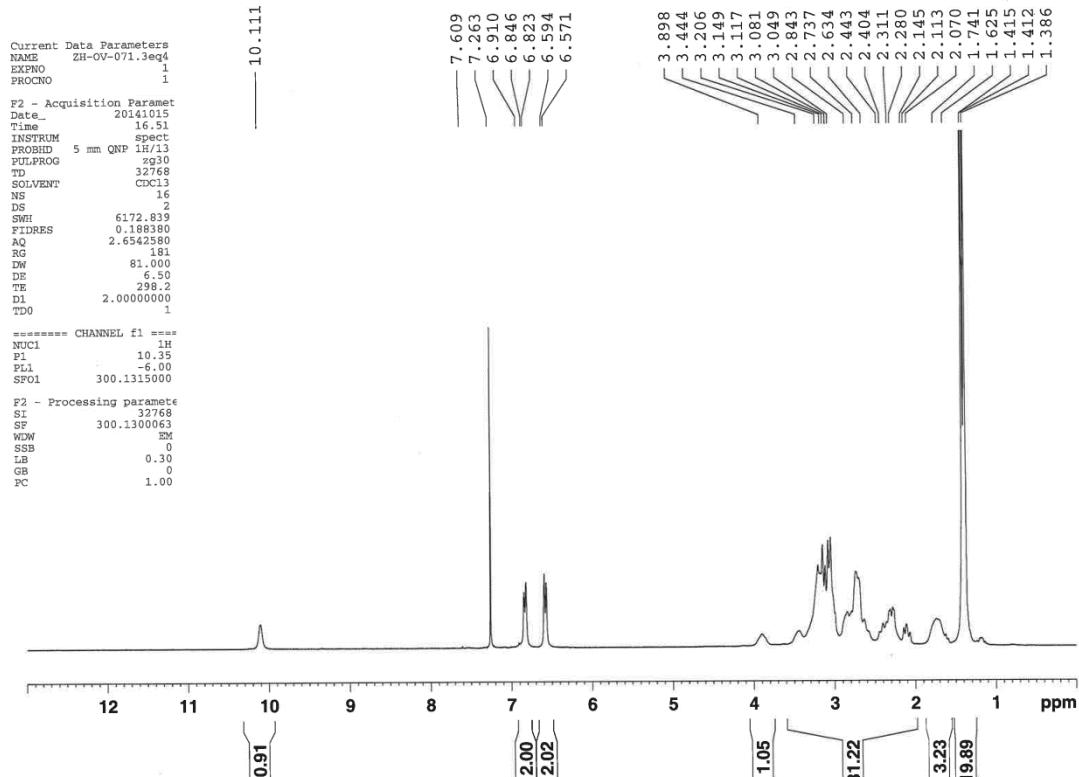


Figure S25. ¹H NMR spectrum (300 MHz, CDCl₃, 25 °C) of compound **12**

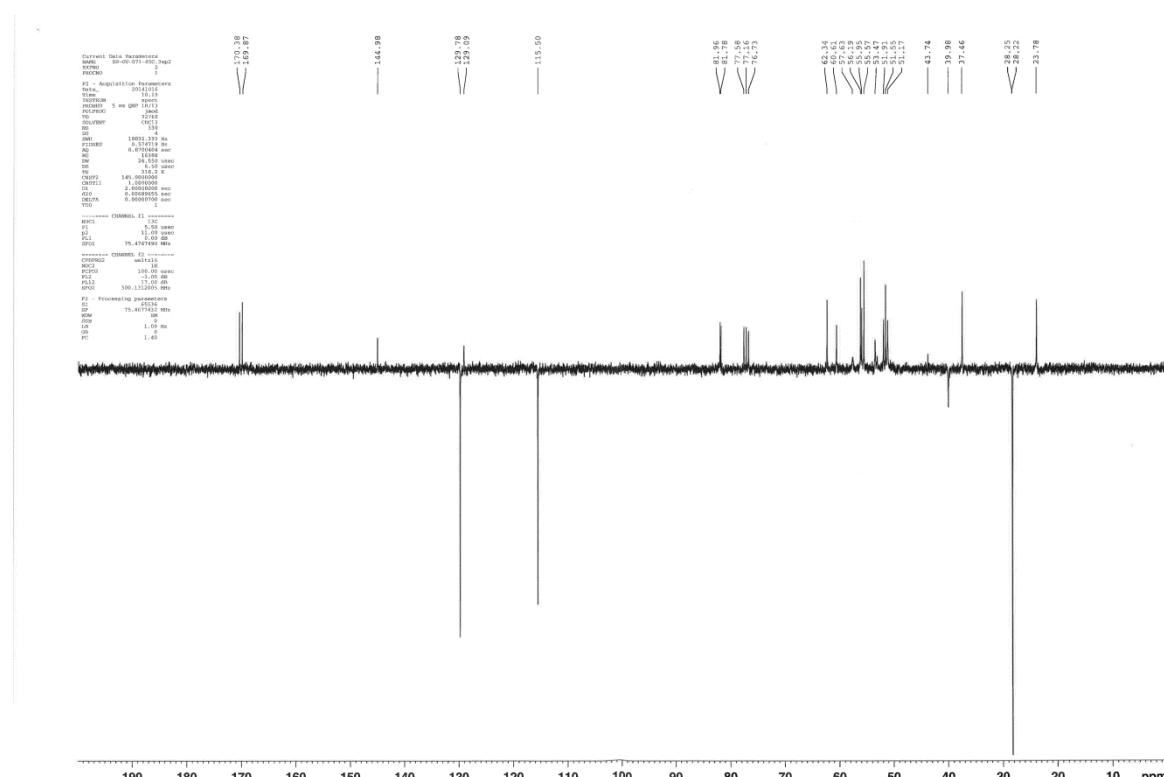


Figure S26. ¹³C NMR spectrum (300 MHz, CDCl₃, 25 °C) of compound **12**



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HRMS

Analysis Info

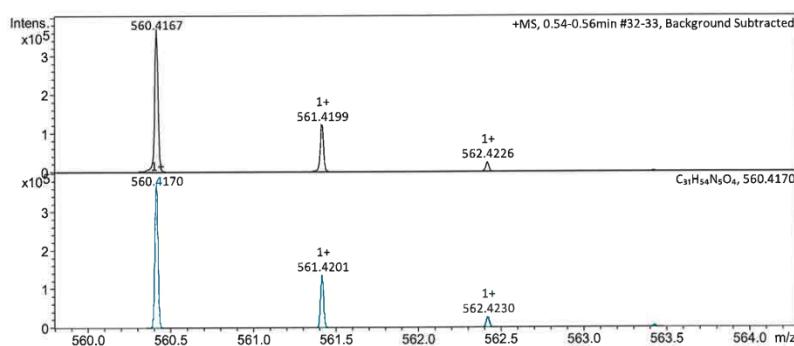
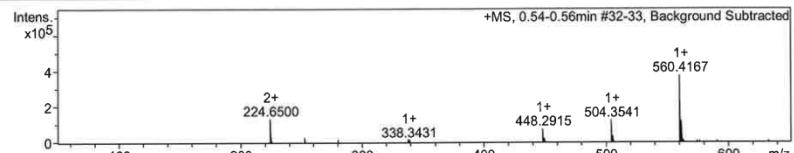
Sample Name ZH-OV-064
Analysis Name X016328CYC.d
Method Positif.m

Acquisition Date 15/10/2014 11:26:23

Laboratory
Instrument / Ser# maXis 255552.00086

Acquisition Parameter

Source Type ESI
Focus Not active
Scan Begin 50 m/z
Scan End 3000 m/z
Ion Polarity Positive
Set Capillary 4500 V
Set End Plate Offset -500 V
Set Collision Cell RF 500.0 Vpp
Set Nebulizer 0.6 Bar
Set Dry Heater 200 °C
Set Dry Gas 7.0 l/min
Set Divert Valve Waste



Meas. m/z	z	#	Ion Formula	m/z	err [ppm]	mSigma	rdb	e ⁻ Conf
224.649966	2+	1	C ₂₃ H ₃₉ N ₅ O ₄	224.649554	1.8	8.5	7.0	even
252.681379	2+	2	C ₂₄ H ₃₅ N ₉	224.650223	1.1	20.0	12.0	even
448.291534	1+	1	C ₂₇ H ₄₇ N ₅ O ₄	252.680854	2.1	4.8	7.0	even
504.354111	1+	1	C ₂₈ H ₄₃ N ₉	252.681523	0.6	13.0	12.0	even
560.416672	1+	1	C ₂₇ H ₄₆ N ₅ O ₄	448.291831	0.7	8.5	7.5	even
	1+	2	C ₃₀ H ₅₈ N ₈ O ₈	504.354431	-0.6	4.5	7.5	even
	1+	2	C ₃₁ H ₅₄ N ₅ O ₄	560.415694	1.7	5.7	2.5	even
	1+	2	C ₃₁ H ₅₄ N ₅ O ₄	560.417032	-0.6	17.0	7.5	even

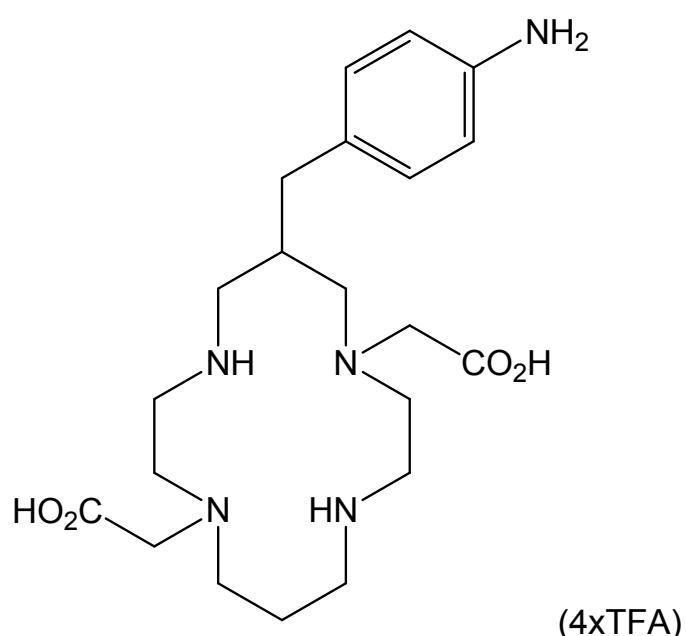
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Figure S27. HRMS spectrum (ESI) of compound 12

Compound 13:



Chemical Formula: C₂₁H₃₅N₅O₄
Exact Mass: 421.2689

Molecular Weight: 421,5337

m/z: 421.2689 (100.0%), 422.2723 (22.7%), 423.2756 (2.5%), 422.2659 (1.8%)

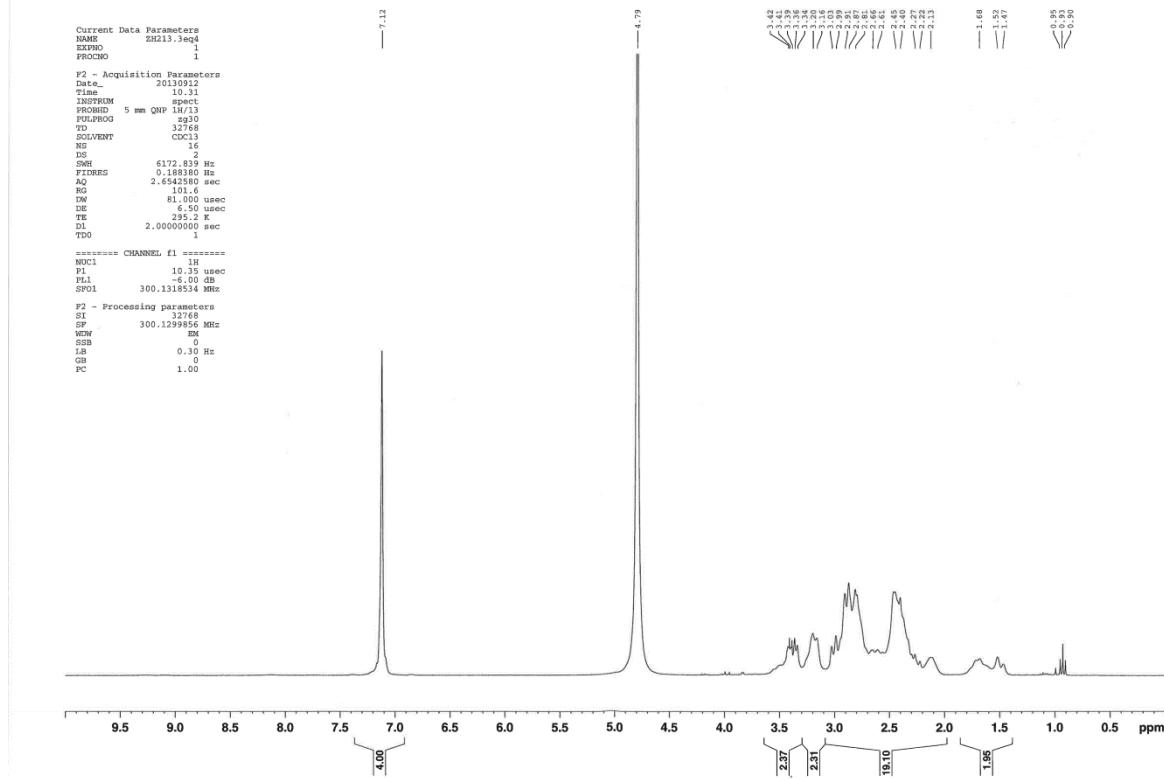


Figure S28. ^1H NMR spectrum (300 MHz, D_2O , 25 °C) of compound **13**

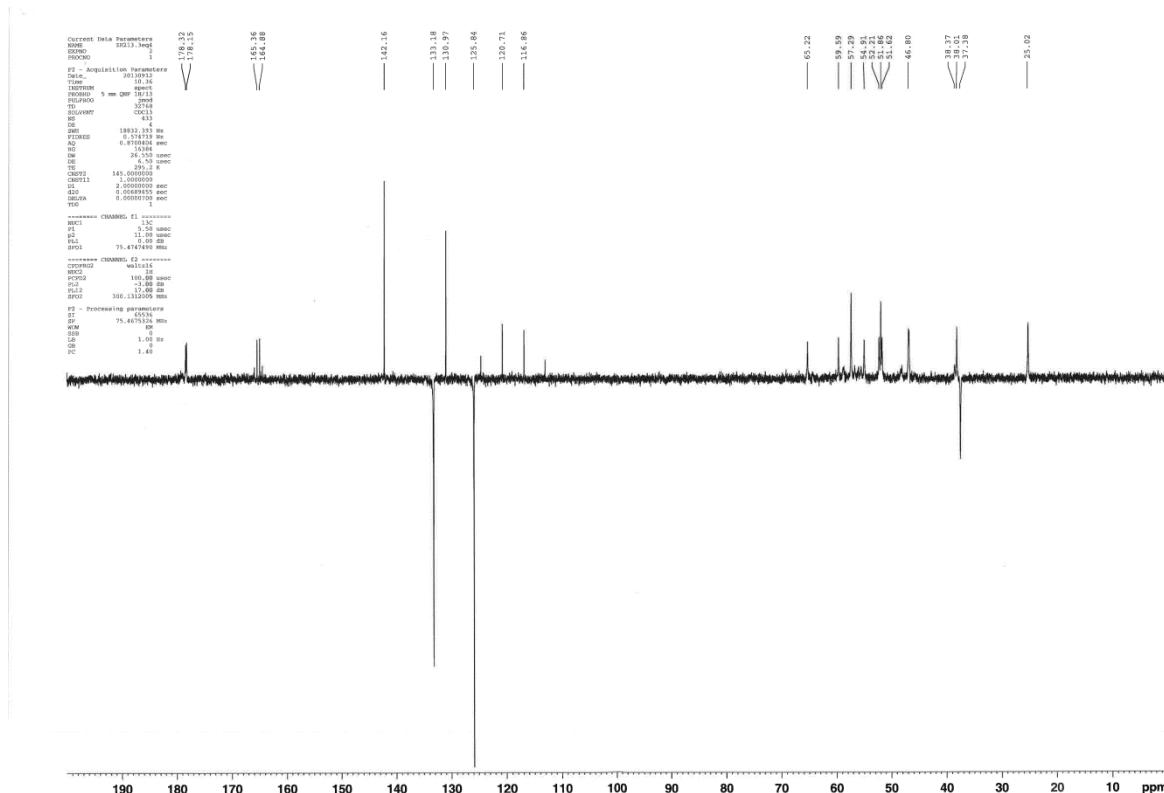


Figure S29. ^{13}C NMR spectrum (300 MHz, D_2O , 25 °C) of compound **13**



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HRMS

Analysis Info

Sample Name **ZH213**
Analysis Name **X010458CYC.d**
Method **positif+uv.m**

Acquisition Date **27/09/2013 16:25:10**

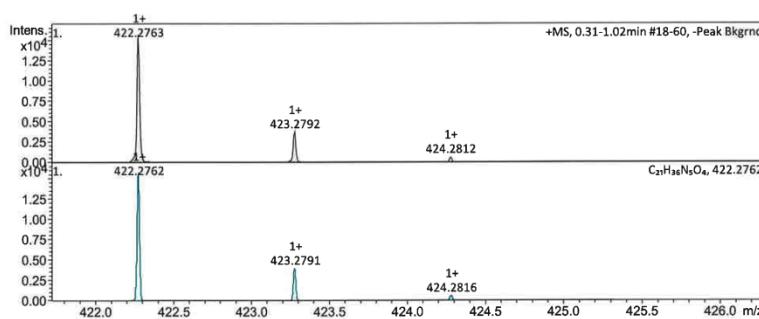
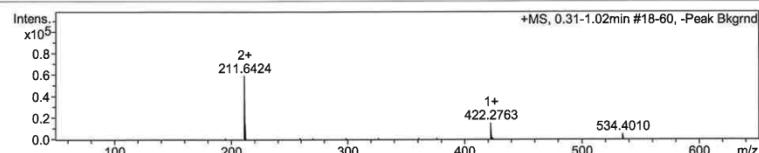
Laboratory
Instrument / Ser# **maXis 255552.00086**

Acquisition Parameter

Source Type **ESI**
Focus **Not active**
Scan Begin **50 m/z**
Scan End **3000 m/z**

Ion Polarity **Positive**
Set Capillary **4500 V**
Set End Plate Offset **-500 V**
Set Collision Cell RF **1000.0 Vpp**

Set Nebulizer **0.6 Bar**
Set Dry Heater **200 °C**
Set Dry Gas **7.0 l/min**
Set Divert Valve **Waste**



Meas. m/z	z	#	Ion Formula	m/z	err [ppm]	mSigma	rdb	e ⁻ Conf
211.642413	2+	1	C ₂₁ H ₃₇ N ₅ O ₄	211.641729	-3.2	2.6	6.0	even
	2+	2	C ₂₂ H ₃₃ N ₉	211.642397	-0.1	10.6	11.0	even
422.276344	1+	1	C ₂₁ H ₃₆ N ₅ O ₄	422.276181	-0.4	7.9	6.5	even

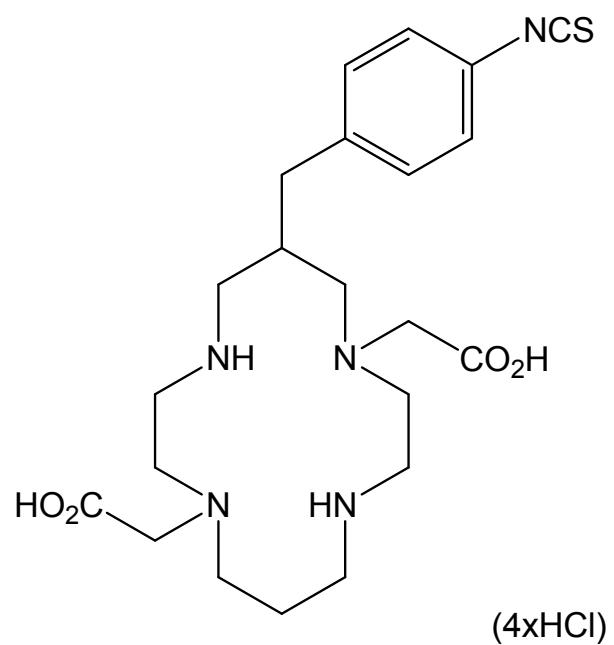
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Figure S30. HRMS spectrum (ESI) of compound **13**

Compound 14:



Chemical Formula: C₂₂H₃₃N₅O₄S

Exact Mass: 463.2253

Molecular Weight: 463,5935

m/z: 463.2253 (100.0%), 464.2287 (23.8%), 465.2211 (4.5%), 465.2320 (2.7%),
464.2224 (1.8%), 466.2245 (1.1%)

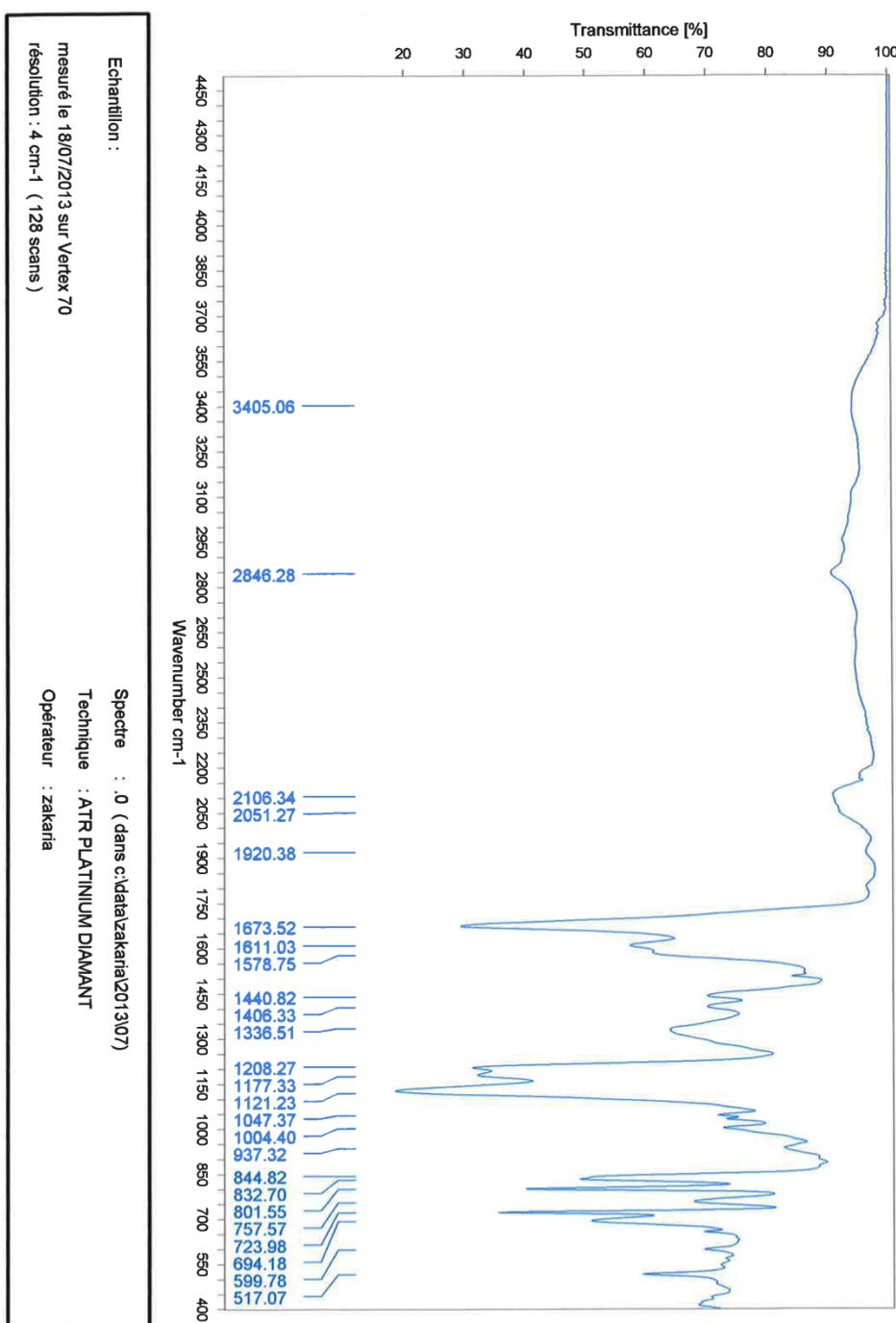


Figure S31. IR spectrum of compound 14



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HRMS

Analysis Info

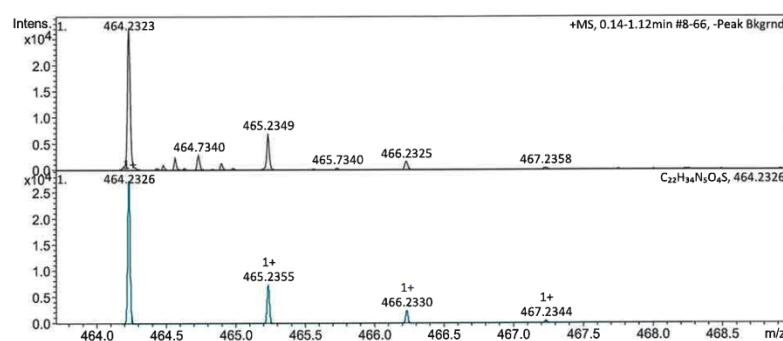
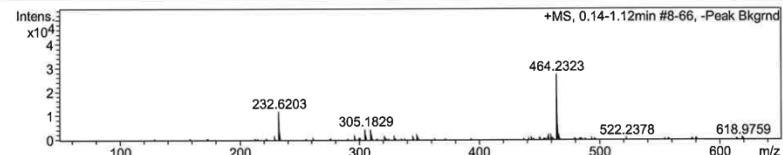
Sample Name **ZH195**
Analysis Name X010603CYC.d
Method Positif.m

Acquisition Date 09/10/2013 12:26:45

Laboratory
Instrument / Ser# maXis 255552.00086

Acquisition Parameter

Source Type	ESI	Ion Polarity	Positive	Set Nebulizer	0.6 Bar
Focus	Not active	Set Capillary	4500 V	Set Dry Heater	200 °C
Scan Begin	50 m/z	Set End Plate Offset	-500 V	Set Dry Gas	7.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	1000.0 Vpp	Set Divert Valve	Waste



Meas. m/z	z	#	Ion Formula	m/z	err [ppm]	mSigma	rdb	e ⁻ Conf
232.620274	2+	1	C ₂₂ H ₃₅ N ₅ O ₄ S	232.619939	-1.4	11.8	8.0	even
232.620608	2+	2	C ₂₃ H ₃₁ N ₉ S	232.620608	-1.4	20.4	13.0	even
464.232325	1+	1	C ₂₂ H ₃₄ N ₅ O ₄ S	464.232602	-0.6	16.9	8.5	even

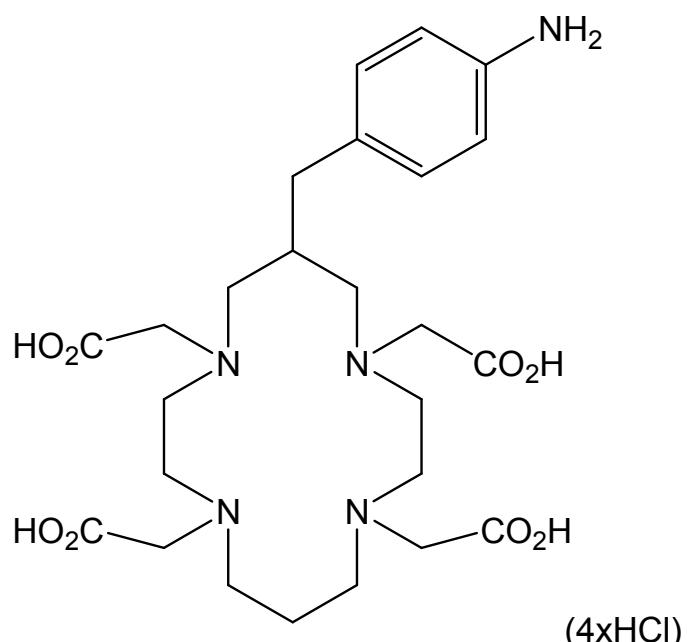
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Figure S32. HRMS spectrum (ESI) of compound **14**

Compound 15:



$C_{25}H_{39}N_5O_8$
Exact Mass: 537,2799
Mol. Wt.: 537,6059

m/e: 537,2799 (100,0%), 538,2832 (27,0%), 539,2866 (3,5%), 538,2769 (1,8%),
539,2841 (1,6%)
C, 55.85; H, 7.31; N, 13.03; O, 23.81

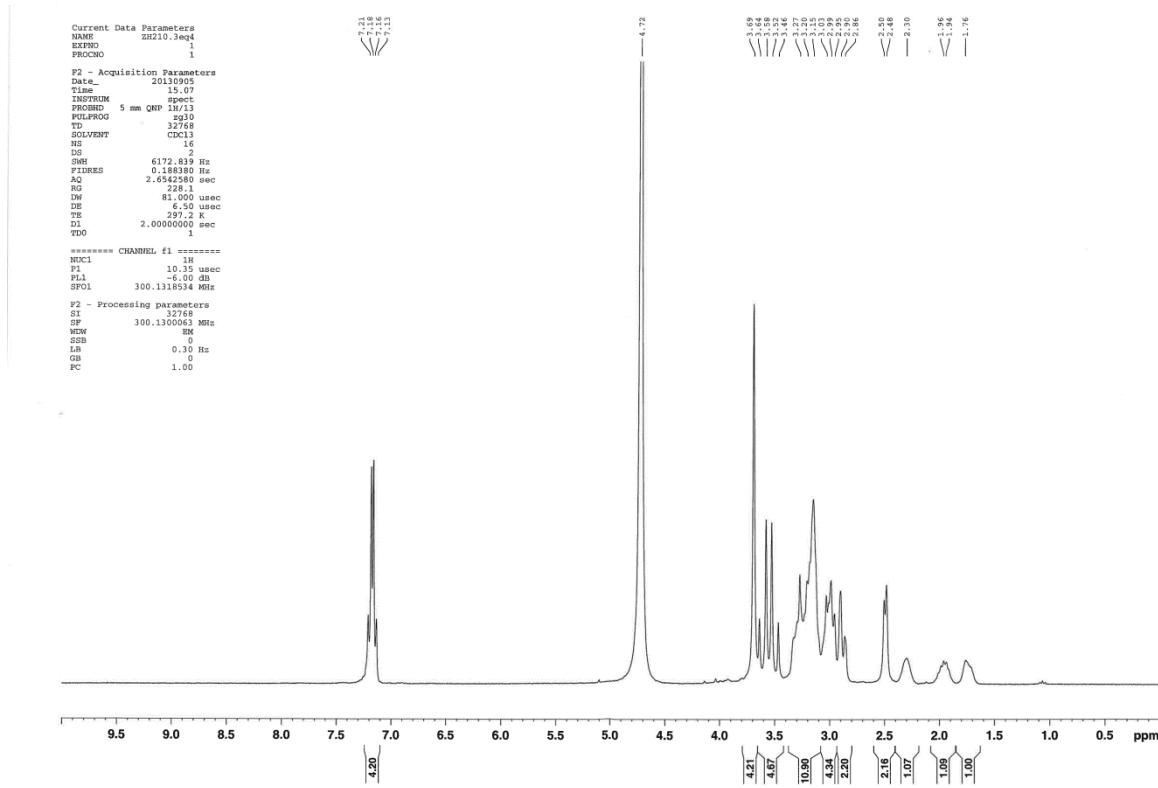


Figure S33. ¹H NMR spectrum (300 MHz, D₂O, 25 °C) of compound **15**

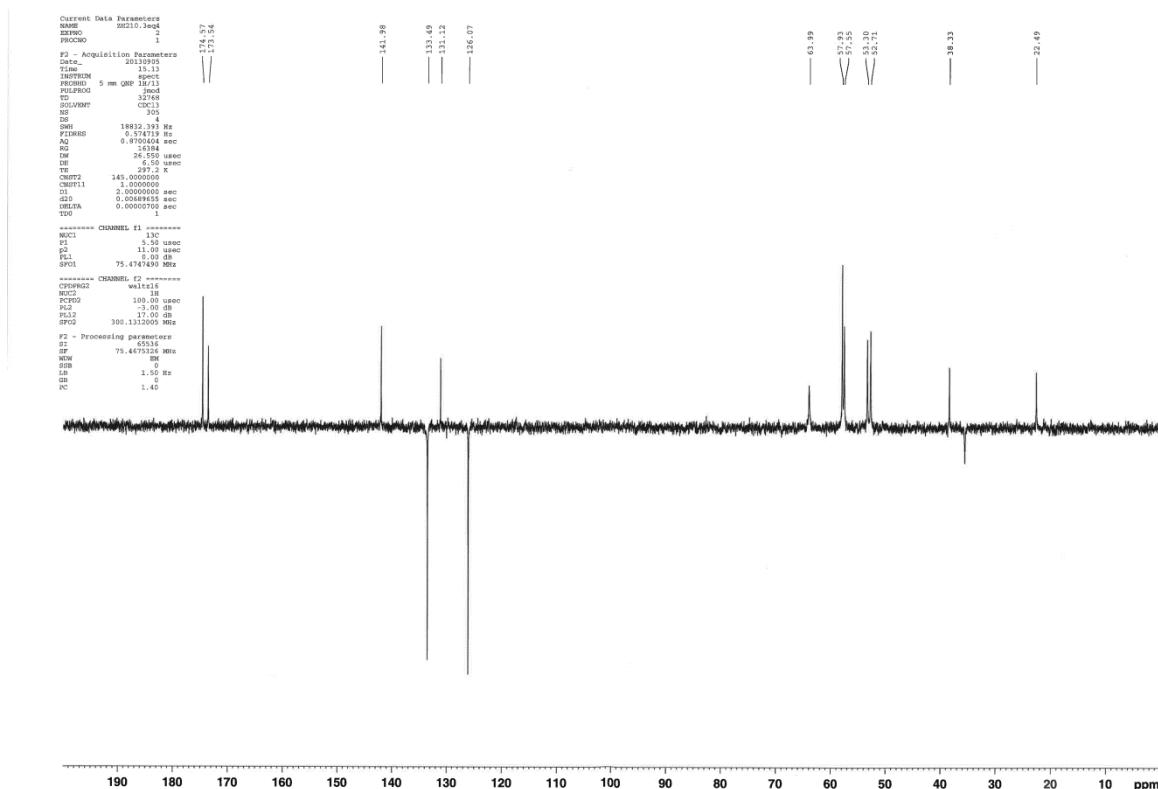


Figure S34. ¹³C NMR spectrum (300 MHz, D₂O, 25 °C) of compound **15**



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HRMS

Analysis Info

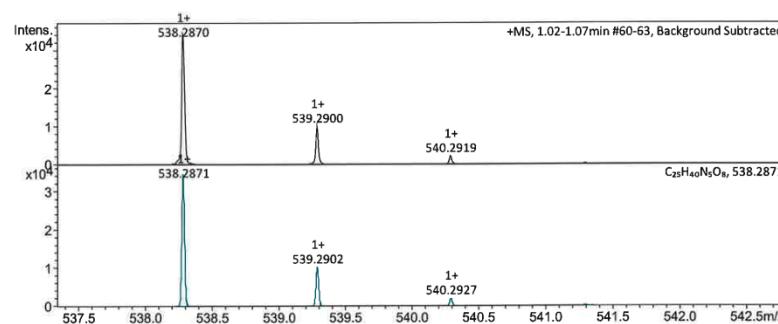
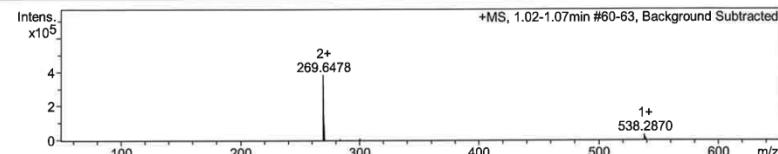
Sample Name **ZH210**
Analysis Name X010460CYC_19443.d
Method positif+uv.m

Acquisition Date 27/09/2013 20:42:10

Laboratory
Instrument / Ser# maxis 255552.00086

Acquisition Parameter

Source Type	ESI	Ion Polarity	Positive	Set Nebulizer	0.6 Bar
Focus	Not active	Set Capillary	4500 V	Set Dry Heater	200 °C
Scan Begin	50 m/z	Set End Plate Offset	-500 V	Set Dry Gas	7.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	1000.0 Vpp	Set Divert Valve	Waste



Meas. m/z	z	#	Ion Formula	m/z	err [ppm]	mSigma	rdb	e ⁻ Conf
269.647781	2+	1	C ₂₅ H ₄₁ N ₅ O ₈	269.647208	-2.1	4.2	8.0	even
269.647877	2+	2	C ₂₆ H ₃₇ N ₉ O ₄	269.647877	0.4	15.9	13.0	even
538.286999	1+	1	C ₂₅ H ₄₀ N ₅ O ₈	538.287140	-0.3	5.3	8.5	even

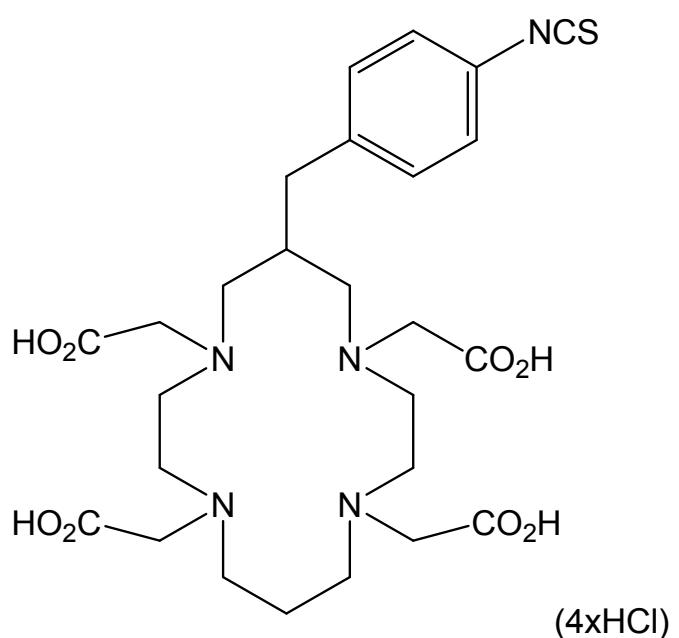
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Figure S35. HRMS spectrum (ESI) of compound **15**

Compound 16:



Chemical Formula: C₂₆H₃₇N₅O₈S

Exact Mass: 579.2363

Molecular Weight: 579,6657

m/z: 579.2363 (100.0%), 580.2396 (28.1%), 581.2321 (4.5%), 581.2430 (3.8%),
580.2333 (1.8%), 581.2405 (1.6%), 582.2354 (1.3%)

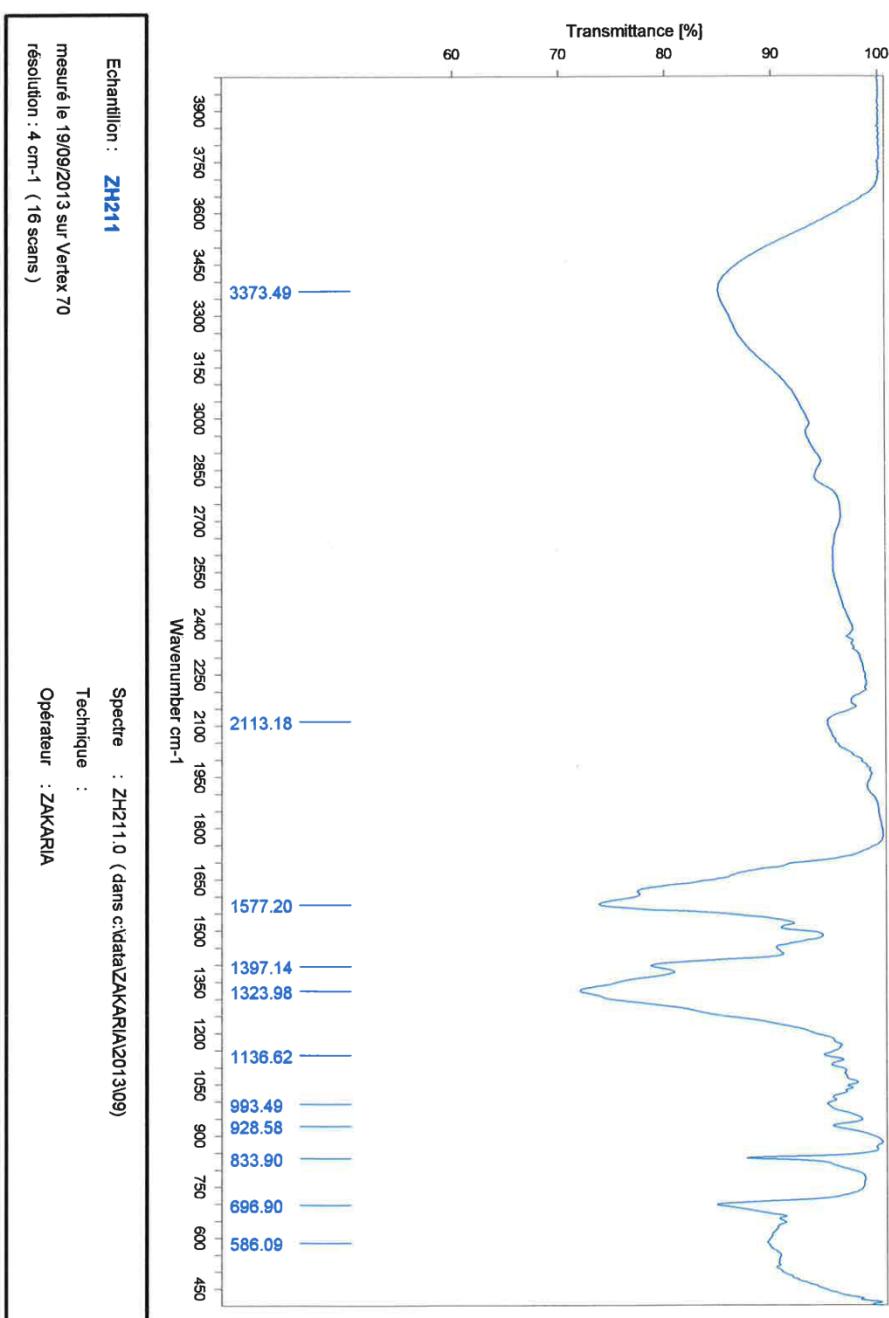
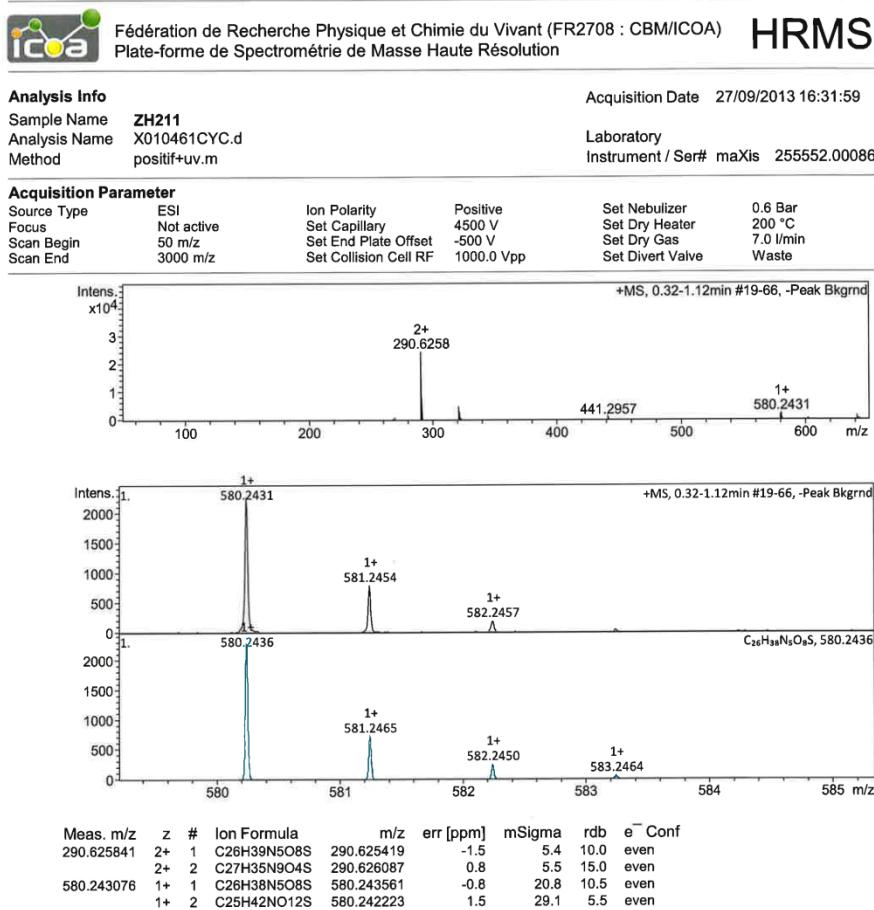


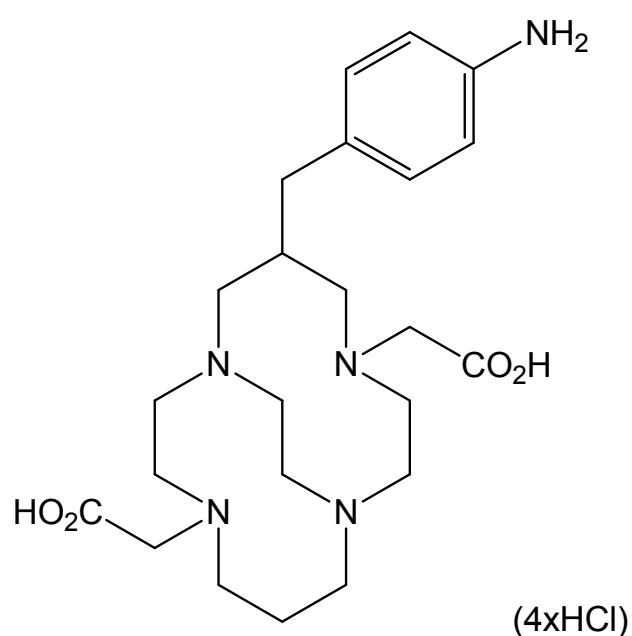
Figure S36. IR spectrum of compound 16



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Figure S37. HRMS spectrum (ESI) of compound **16**

Compound 17:



Chemical Formula: C₂₃H₃₇N₅O₄

Exact Mass: 447,2846

Molecular Weight: 447,5710

m/z: 447.2846 (100.0%), 448.2879 (24.9%), 449.2913 (3.0%), 448.2816 (1.8%)

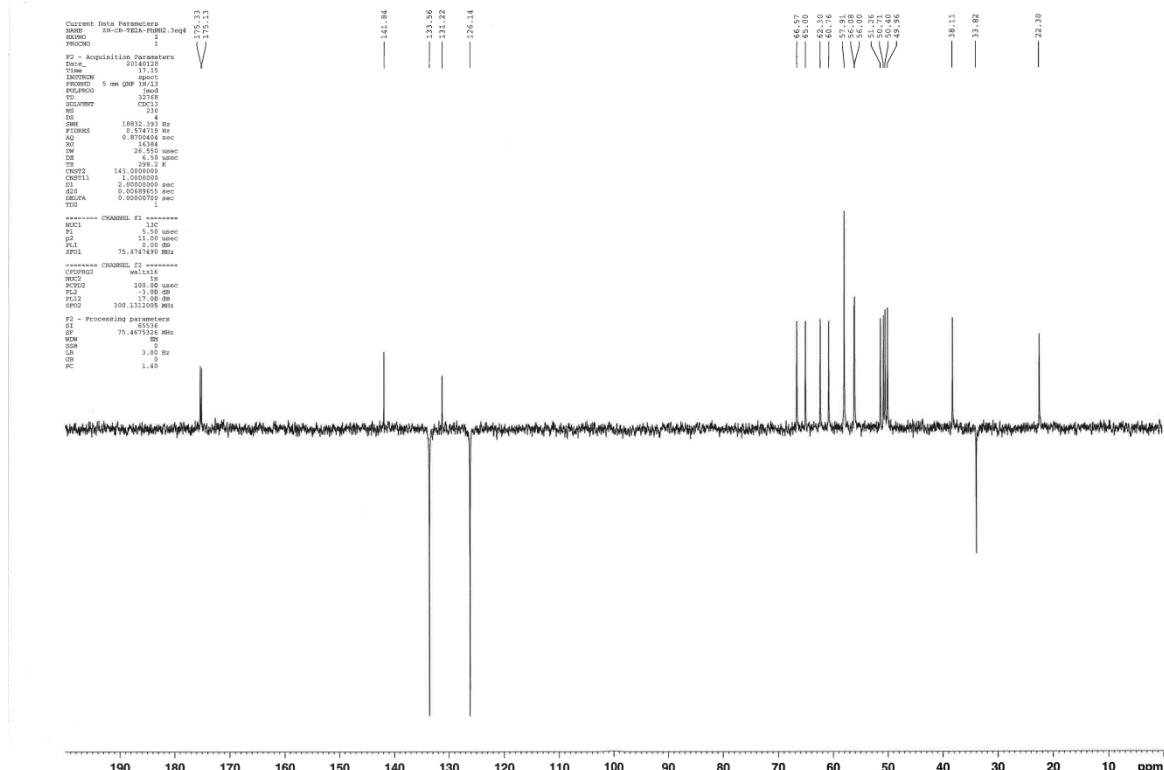
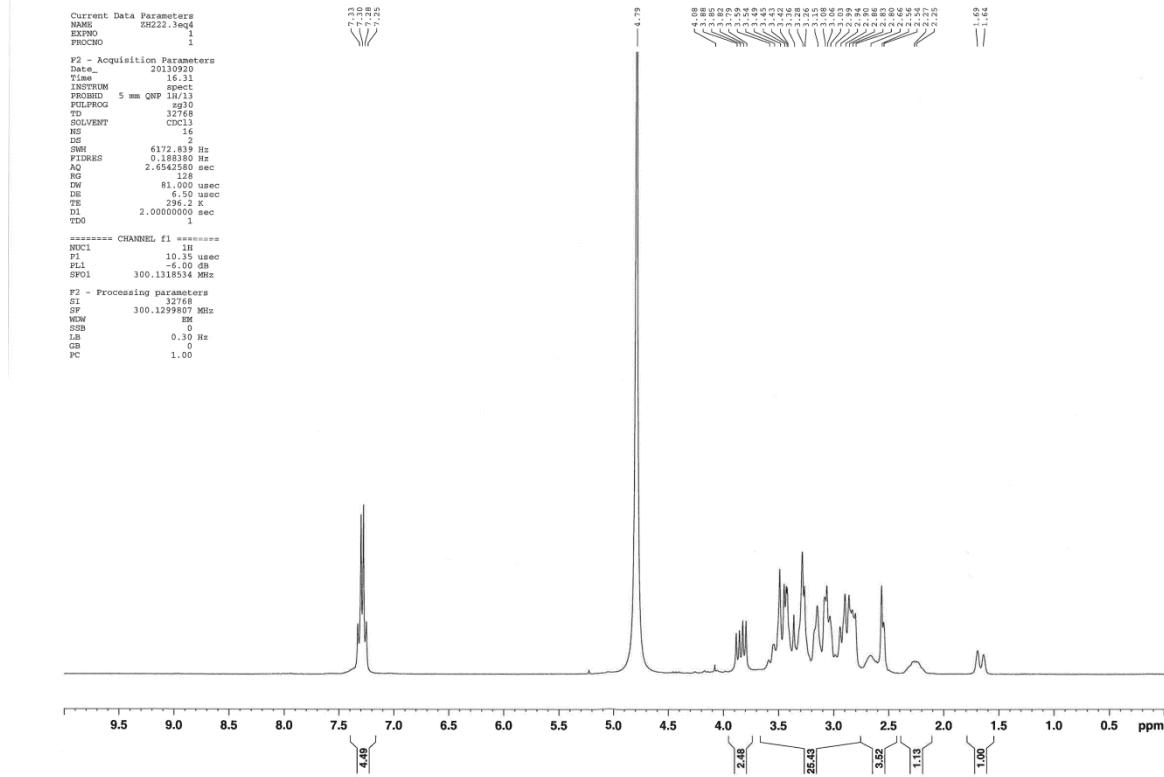


Figure S39. ^{13}C NMR spectrum (300 MHz, D_2O , 25 °C) of compound 17



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HRMS

Analysis Info

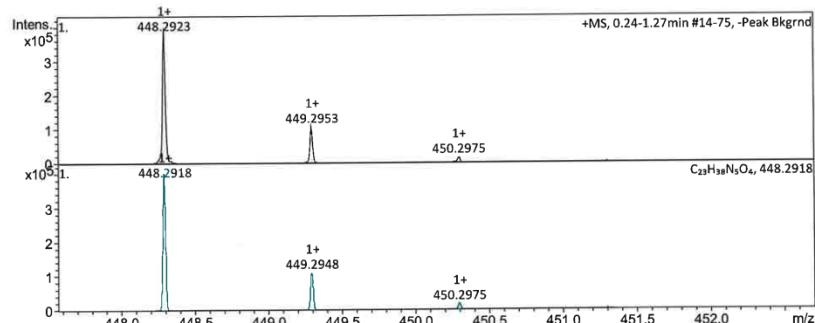
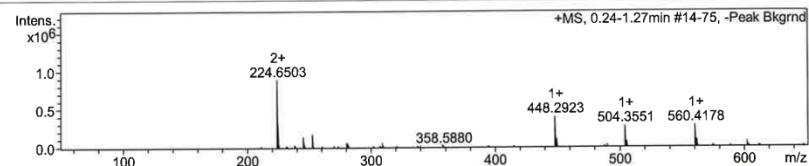
Sample Name **ZH144**
Analysis Name X010459CYC_19442.d
Method positif+uv.m

Acquisition Date 27/09/2013 20:39:55

Laboratory
Instrument / Ser# maXis 255552.00086

Acquisition Parameter

Source Type ESI Ion Polarity Positive Set Nebulizer 0.6 Bar
Focus Not active Set Capillary 4500 V 200 °C
Scan Begin 50 m/z Set End Plate Offset -500 V Set Dry Gas 7.0 l/min
Scan End 3000 m/z Set Collision Cell RF 1000.0 Vpp Set Divert Valve Waste



Meas. m/z	z	#	Ion Formula	m/z	err [ppm]	mSigma	rdb	e ⁻ Conf
224.650318	2+	1	C ₂₄ H ₃₆ N ₉	224.650223	0.4	31.0	12.0	even
	2+	2	C ₂₃ H ₃₉ N ₅ O ₄	224.649554	3.4	42.3	7.0	even
448.292340	1+	1	C ₂₃ H ₃₈ N ₅ O ₄	448.291831	-1.1	2.5	7.5	even
	1+	2	C ₂₄ H ₃₄ N ₉	448.293169	-1.8	13.8	12.5	even
504.355054	1+	1	C ₂₇ H ₄₆ N ₅ O ₄	504.354431	-1.2	6.9	7.5	even
	1+	2	C ₂₈ H ₄₂ N ₉	504.355769	-1.4	18.4	12.5	even
560.417764	1+	1	C ₃₁ H ₅₄ N ₅ O ₄	560.417032	-1.3	7.5	7.5	even
	1+	2	C ₃₂ H ₅₀ N ₉	560.418369	-1.1	18.9	12.5	even

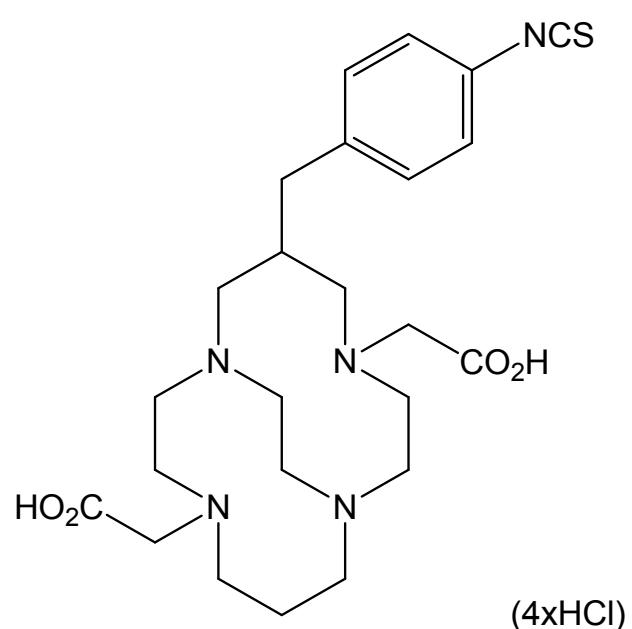
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Figure S40. HRMS spectrum (ESI) of compound 17

Compound 18:



Chemical Formula: $\text{C}_{24}\text{H}_{35}\text{N}_5\text{O}_4\text{S}$

Exact Mass: 489,2410

Molecular Weight: 489,6308

m/z: 489.2410 (100.0%), 490.2443 (26.0%), 491.2368 (4.5%), 491.2477 (3.2%),
490.2380 (1.8%), 492.2401 (1.2%)

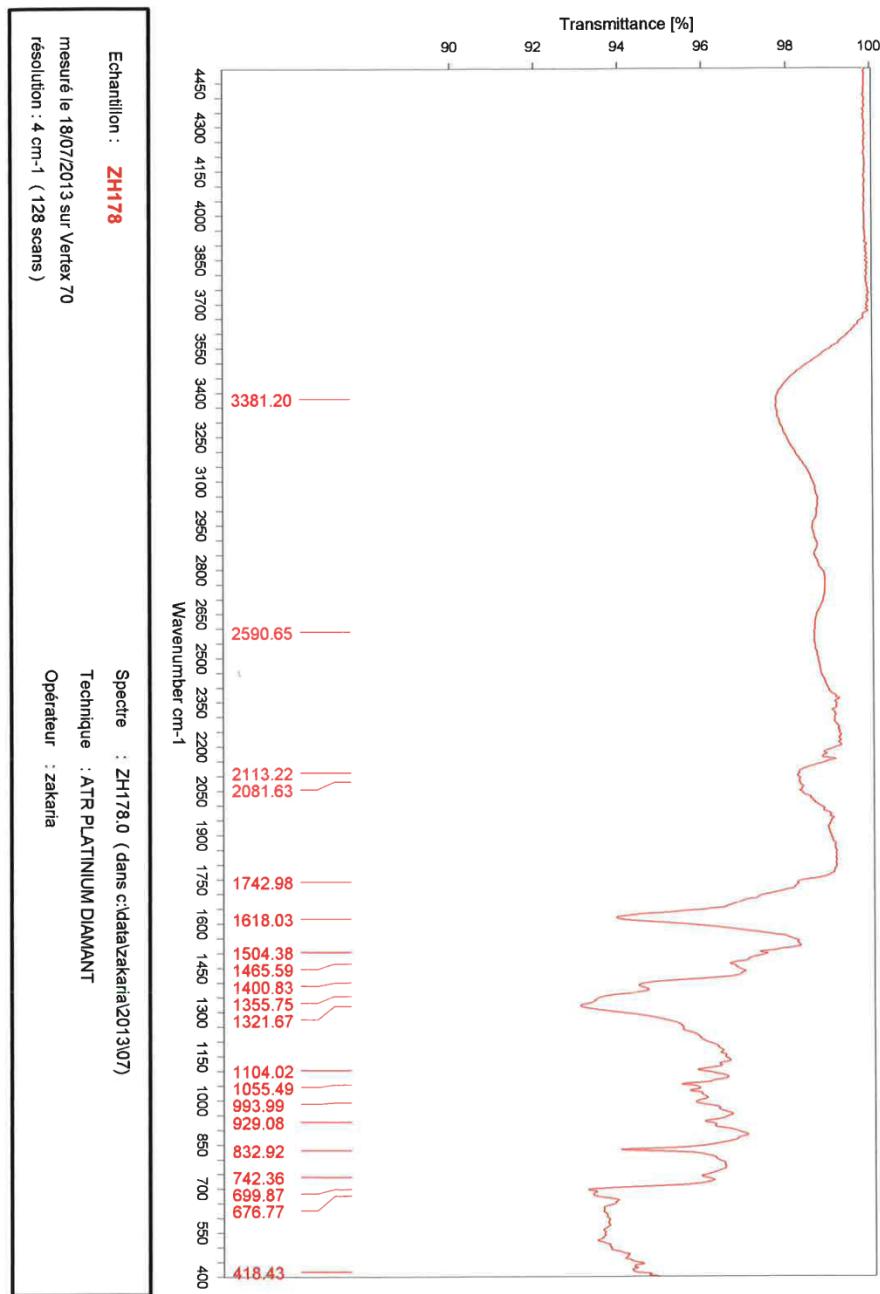


Figure S41. IR spectrum of compound 18

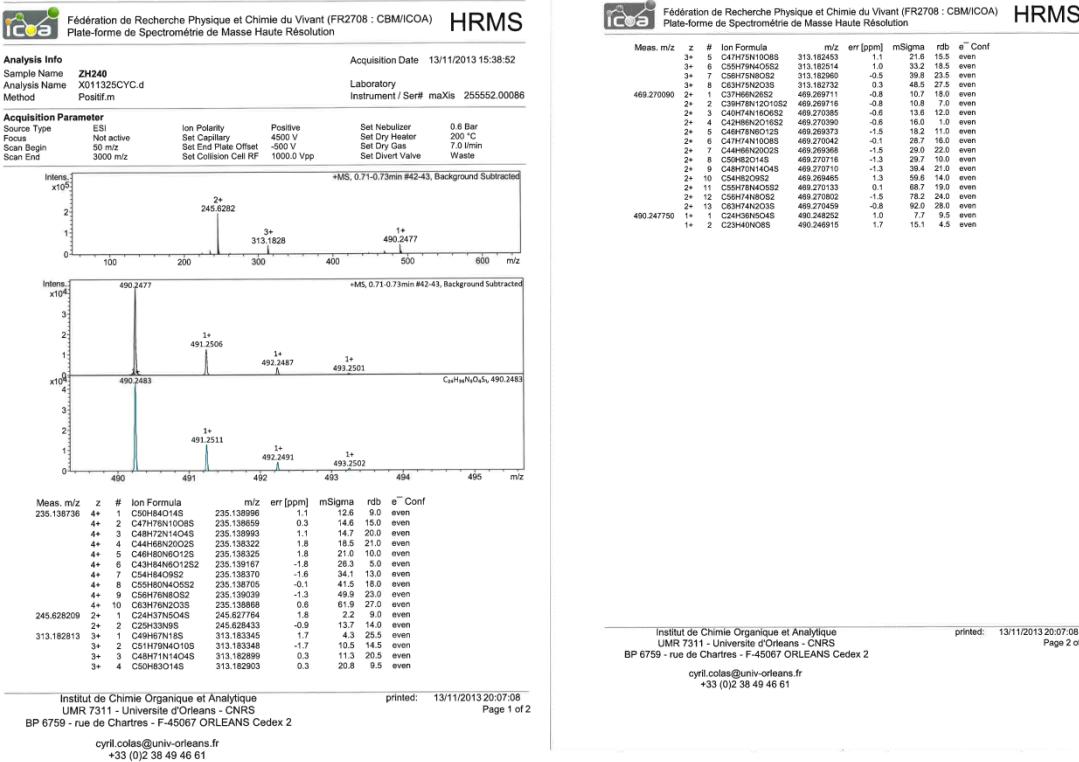


Figure S42. HRMS spectrum (ESI) of compound 18

Table TS1. Conditions used to optimize the ^{64}Cu radiolabeling of 9E7.4-CSN-Ph-te2a and ^{64}Cu -te2a-Ph-NCS

Test n°	Molar ratio :		Acetate buffer (pH)	Time (min)	Temp.
	Immunoconjugate/Cu or Ligand/Cu				
1	1.1		7	5, 15, 30, 60	RT
2	1.1		7	5, 15, 30, 60	40°C
3	1.1		5	5, 15, 30, 60	40°C
4	1.1		7	30	4°C

Table TS2. In vitro competition assay of ^{64}Cu -9E7.4-CSN-Ph-te2a and ^{64}Cu -te2a-Ph-NCS against EDTA (10000 eq.) (conditions are presented in experimental part).

	^{64}Cu -9E7.4-CSN-Ph-te2a	^{64}Cu -te2a-Ph-NCS
Before incubation of EDTA	93 %	98 %
After one night incubation at RT with EDTA	51 %	56 %

Results are expressed as radiolabeling yield

Table TS3. Raw quantitative data extracted from PET-CT image of subcutaneous multiple myeloma tumor bearing mice at 2 h and 20 h post-injection (PI) of ^{64}Cu -9E7.4-CSN-Ph-te2a.

2 h Post Injection							
VOI	Tumor	Liver	Heart	Muscle (back leg)	bladder	gut	kidney
Max (kBq/ml)	364.6	1625.9	1198.2	84.5	220.8	1351.6	542
Average	178.4	1136.5	300.4	41.1	116.4	522.7	217.4
Standard	95.9	244.5	223.9	14.8	40.9	212.9	121.9
Volume (mm³)	343	343	343	38.9	53.7	340	13
20 h Post Injection							
VOI	Tumor	Liver	Heart	Muscle (back leg)	bladder	gut	kidney
Max (kBq/ml)	279.9	505.5	221.4	41.8	146.2	361.4	164,1
Average	112.7	315.9	110.2	17.0	68	164.5	96
Standard	60.2	85.8	39.4	6.4	27.6	68.7	37.9
Volume (mm³)	339	339	339	40.3	53.9	339	13

The volumes of interest (VOI) were manually plotted to assess the uptake of organs and tumor (in kBq/ml) by using AW Volume Share 5 (AW 4.6) software from General Electric.

Table TS4. Radiolabeling monitoring of ^{64}Cu -9E7.4-CSN-Ph-te2a (a) and ^{64}Cu -te2a-Ph-NCS (b) at different pH and temperature conditions.

	pH 7; RT		pH 7; 40°C		pH 5; 40°C		pH 7; 4°C	
	a	b	a	b	a	b	a	b
5 min	62 %	30 %	63 %	72 %	73 %	64 %	-	-
15 min	78 %	74 %	86 %	84 %	86 %	70 %	-	-
30 min	80 %	-	89 %	-	86 %	-	71 %	-
60 min	82 %	88 %	90 %	90 %	91 %	93 %	-	-

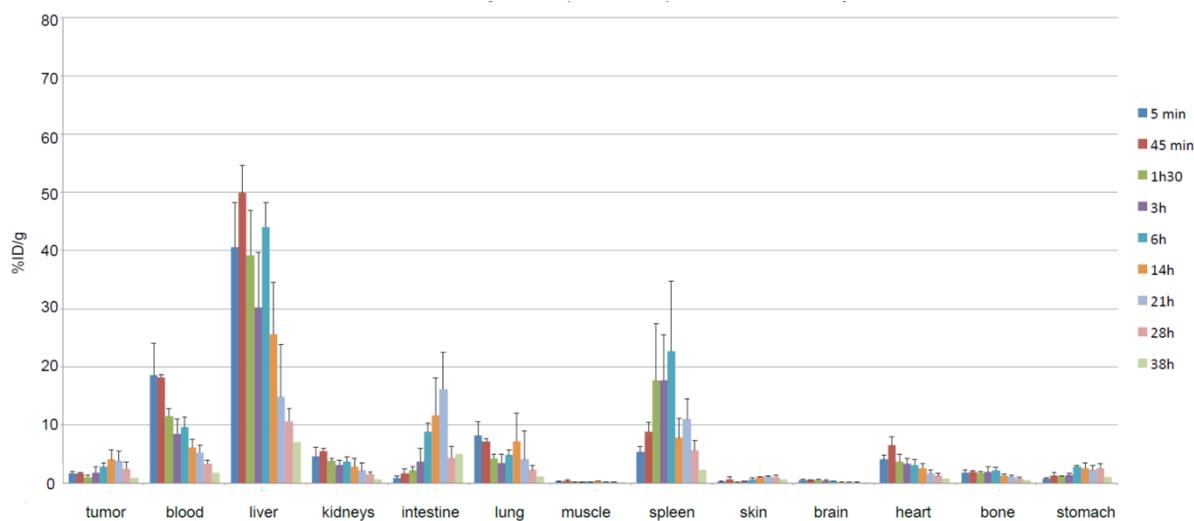


Figure S43. Biodistribution of ^{125}I -9E7.4 in subcutaneous multiple myeloma tumor bearing mice showing the large uptake in liver and gut especially at 21h post-injection.

Figure S44. Characterization of 9E7.4 mAb specificity by flow cytometry. Staining with 9E7.4 mAb (black histogram) and an IgG2a,κ isotype control (white histogram) followed by a PE-conjugated anti-rat IgG secondary antibody was performed on CD138+ 5T33 cell line. Flow cytometry was performed on a BD FACS Calibur™ Flow Cytometry System.

