

Supporting Information

Eurotiumins A–E, Five New Alkaloids from the Marine-Derived Fungus *Eurotium* sp. SCSIO F452

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Computational Details

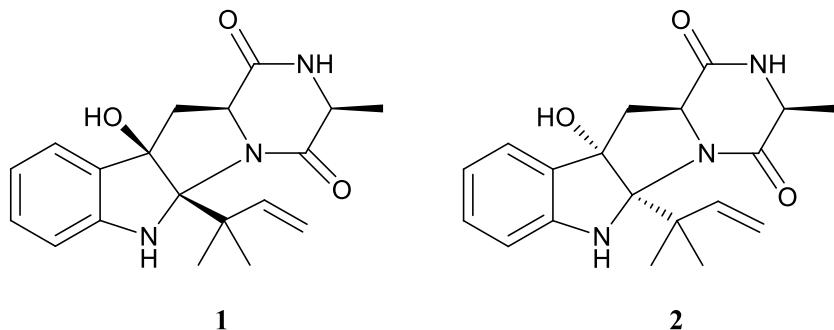


Figure S1. Structures applied for theoretical calculations of **1**, and **2**.

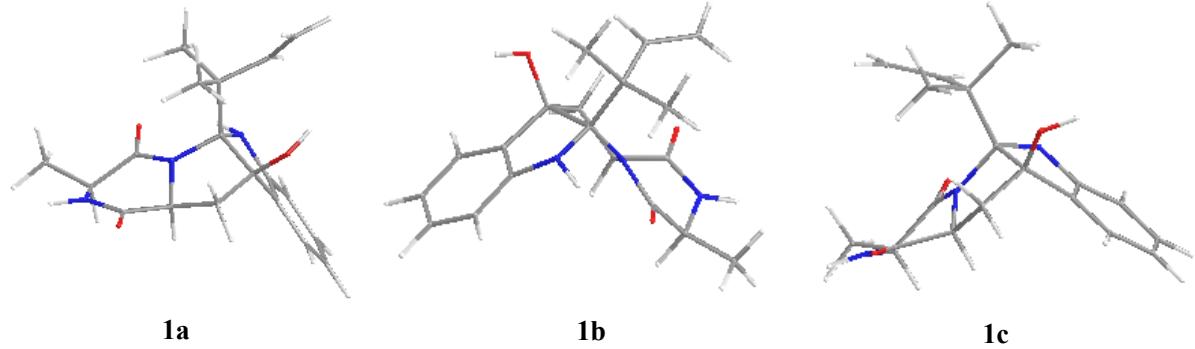
Table S1. Relative thermal energies (ΔE), relative free energies (ΔG), and equilibrium populations (P) of low-energy conformers of structures **1** and **2** in MeOH.

conformer	ΔE (kcal/mol) ^a	ΔG (kcal/mol) ^a	P (%) ^b
Compound 1			
1a	0.0	0.0	69.7
1b	1.22	1.29	8.0
1c	1.33	1.31	7.6
1d	1.50	1.33	7.3
1e	1.62	1.56	5.0
1f^c	1.82	1.99	2.4
Compound 2			
2a	0.0	0.0	38.3
2b	0.35	0.31	22.8
2c	0.63	0.51	16.3
2d	0.58	0.70	11.7
2e	0.66	0.85	9.2
2f^c	1.87	1.82	1.8

^a At the M06-2X/def2-TZVP/ IEFPCM level of theory.

^b From ΔG values at 298.15 K.

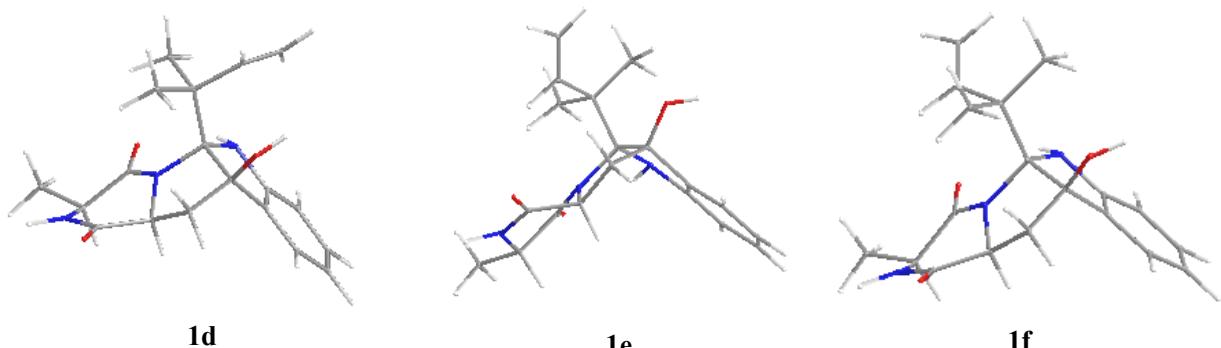
^c Conformer not applied to ECD/TDDFT calculations.



1a

1b

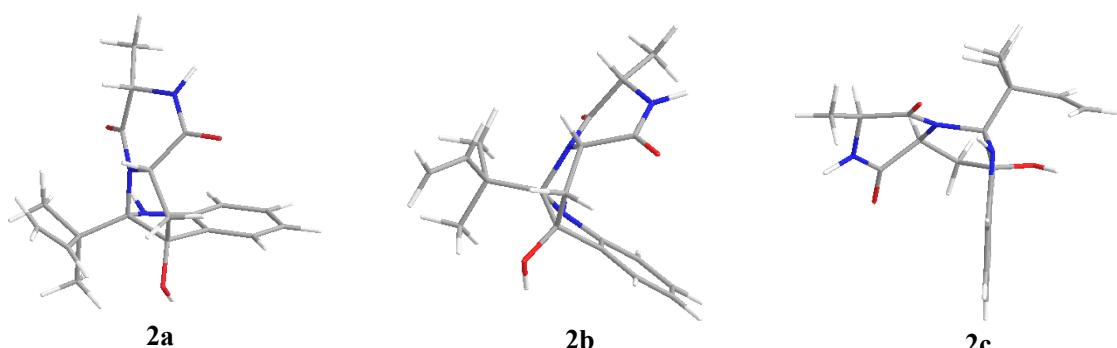
1c



1d

1e

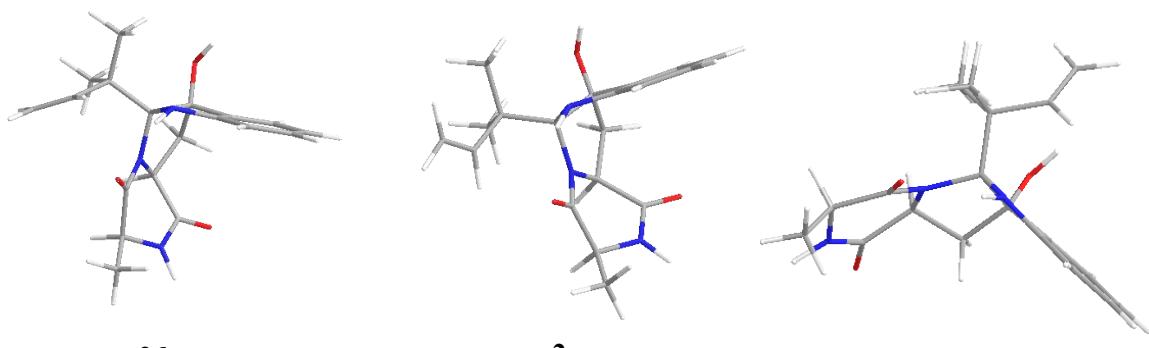
1f



2a

2b

2c



2d

2e

2f

Figure S2. Conformations of low-energy conformers of **1**, and **2**.

Figure S3. The ^1H NMR spectrum of eurotiumin A (**1**) in CD_3COCD_3 .

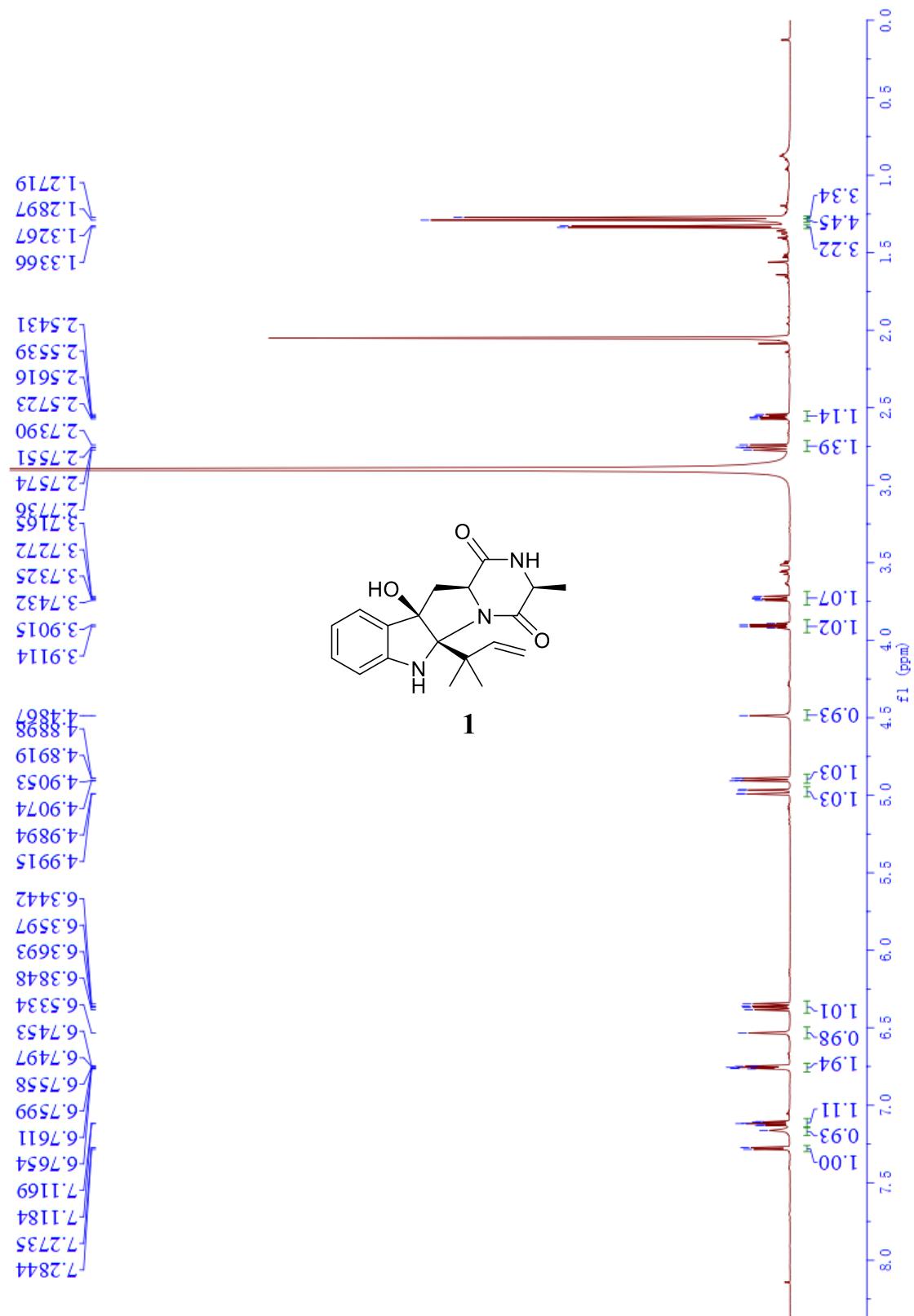


Figure S4. The ^{13}C NMR spectrum of eurotiumin A (**1**) in CD_3COCD_3 .

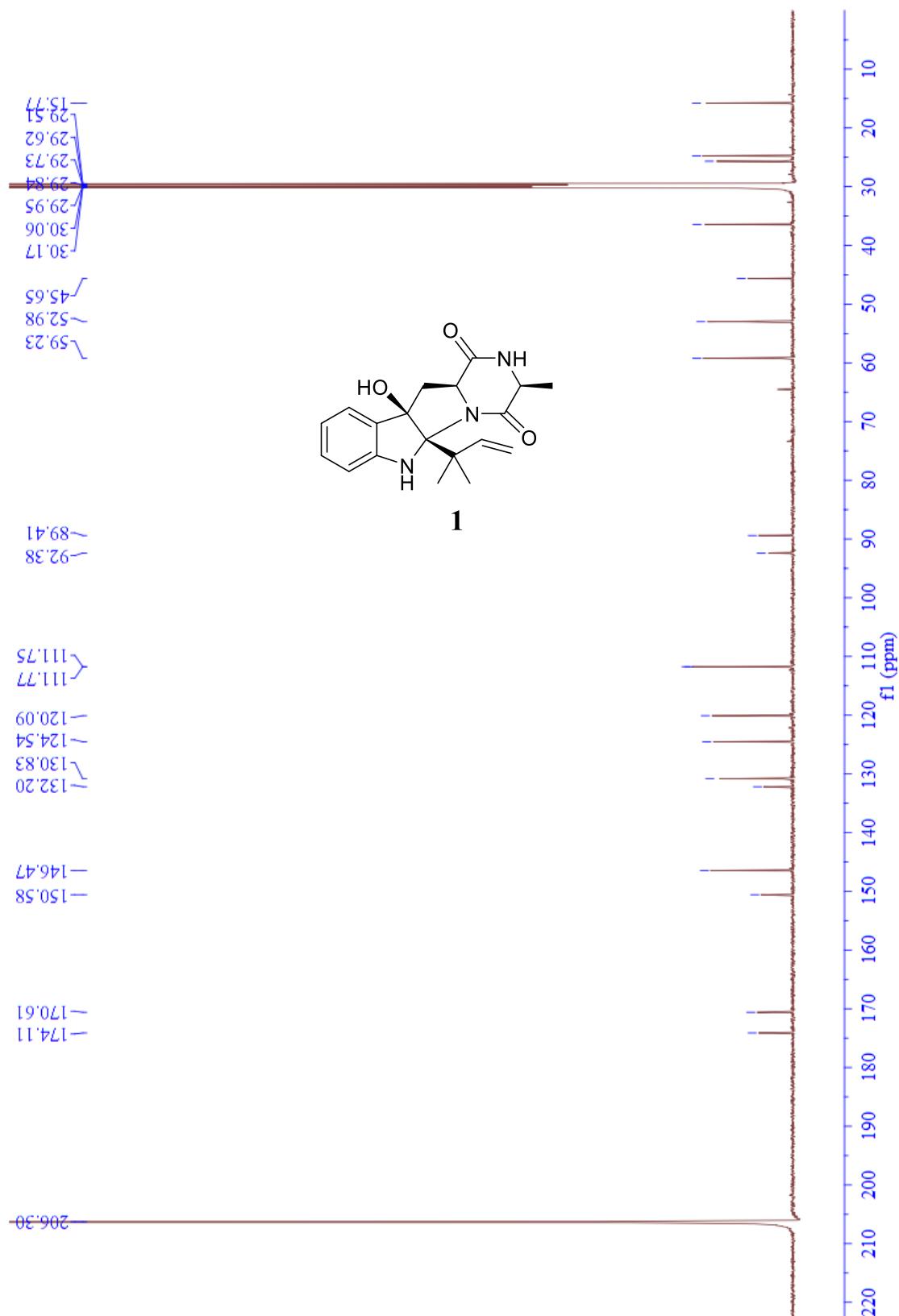


Figure S5. The HSQC spectrum of eurotiumin A (**1**) in CD₃COCD₃.

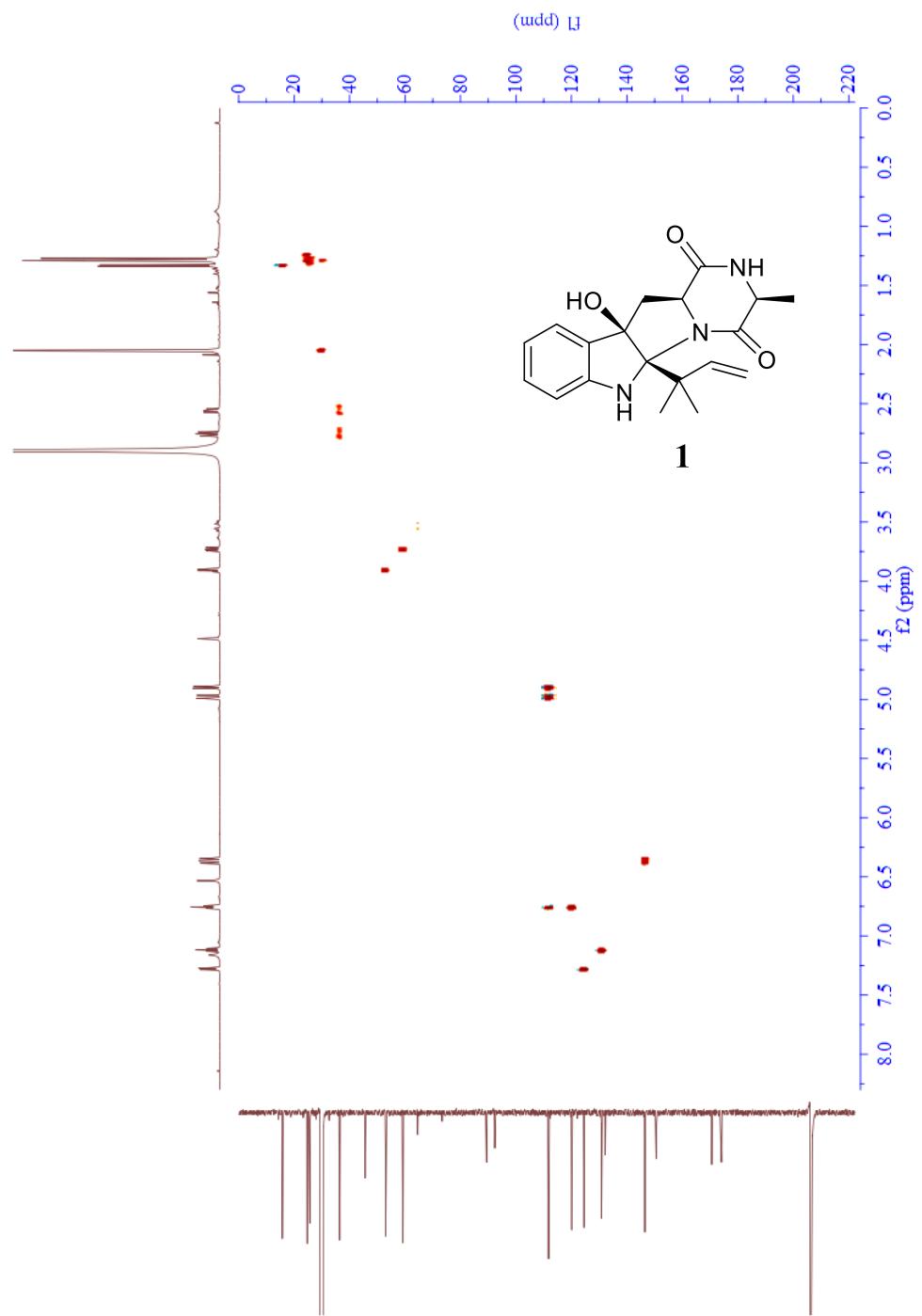


Figure S6. The HMBC spectrum of eurotumin A (**1**) in CD_3COCD_3 .

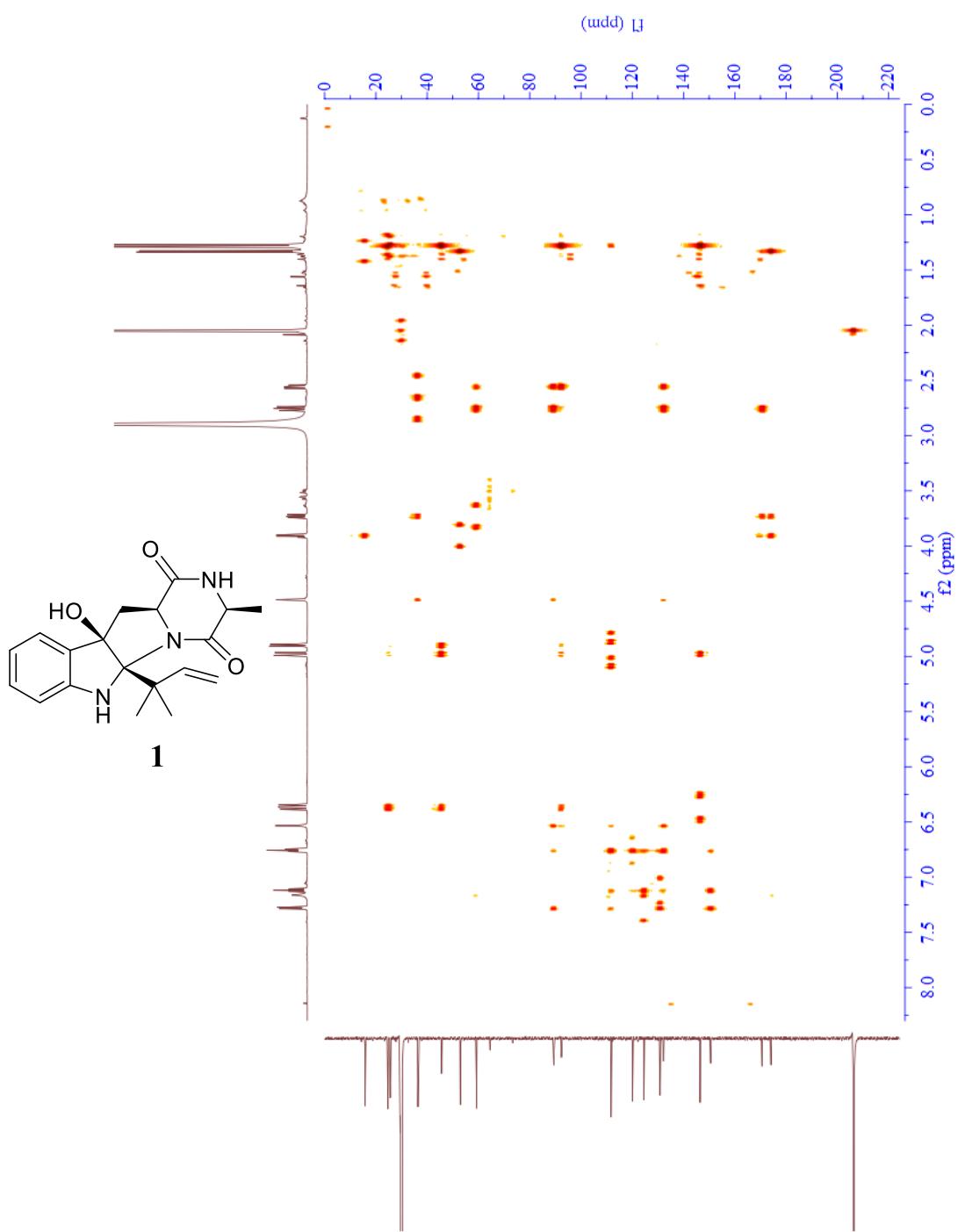


Figure S7. The ^1H - ^1H COSY spectrum of eurotiumin A (**1**) in CD_3COCD_3 .

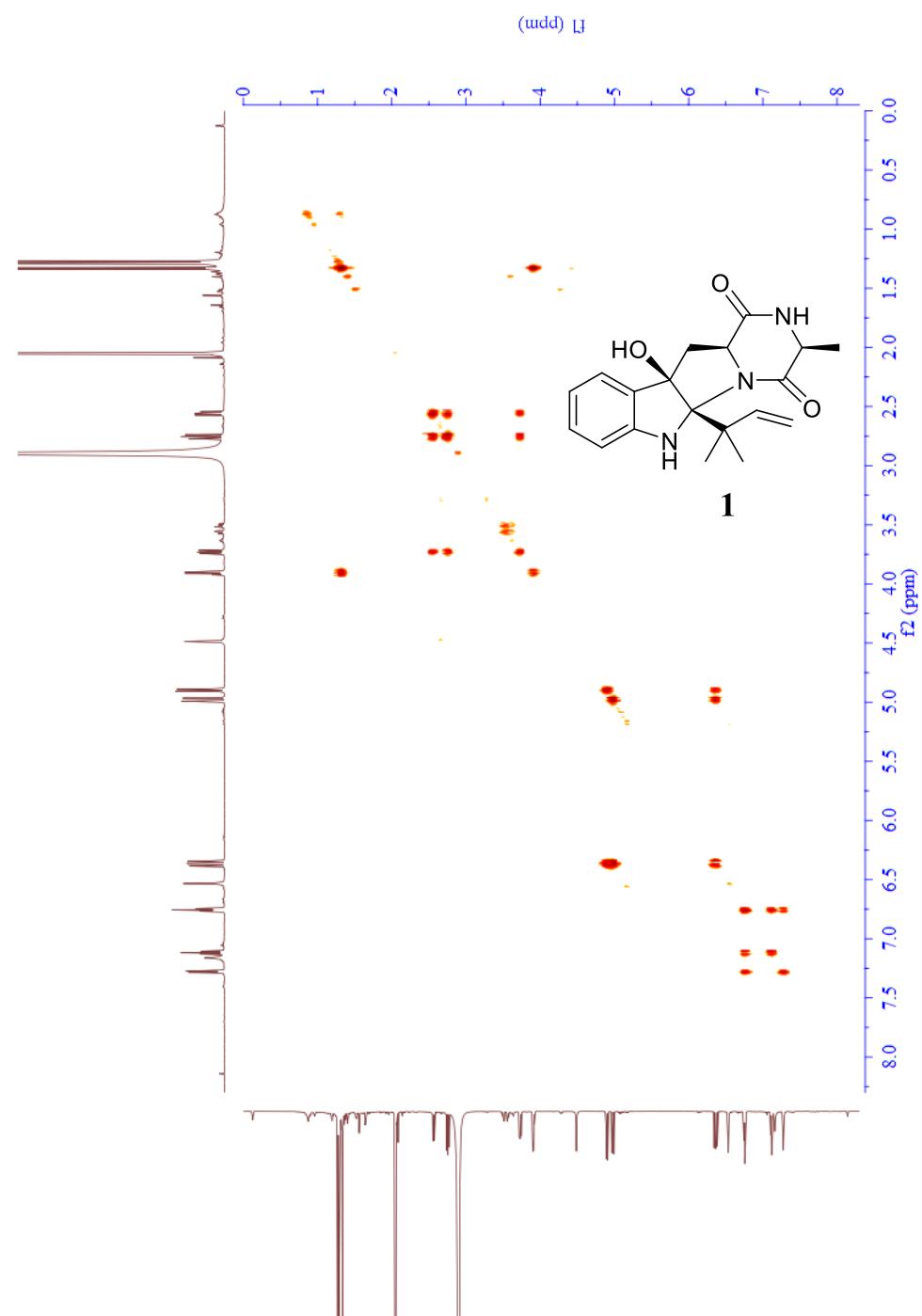


Figure S8. The NOESY spectrum of eurotiumin A (**1**) in CD_3COCD_3 .

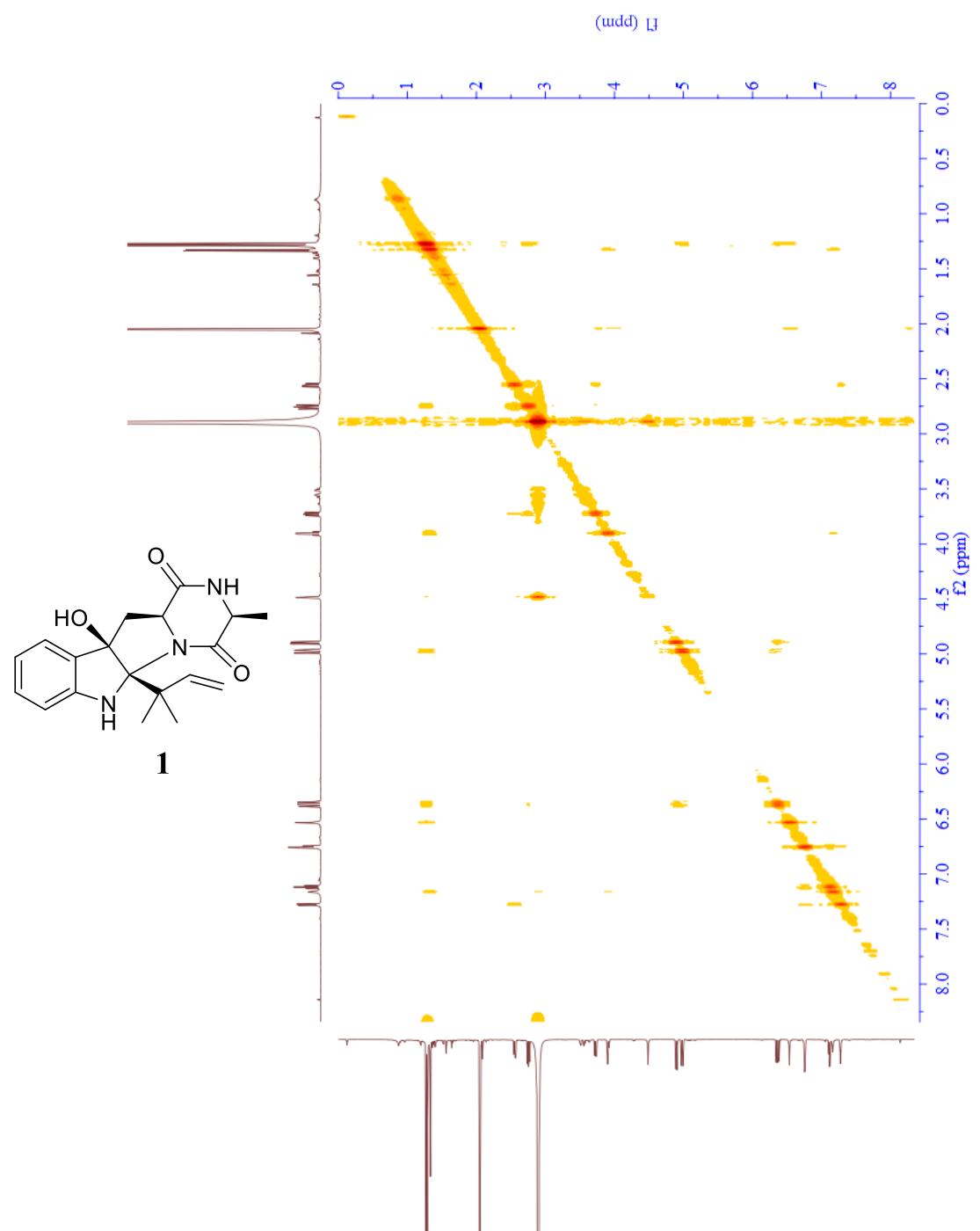
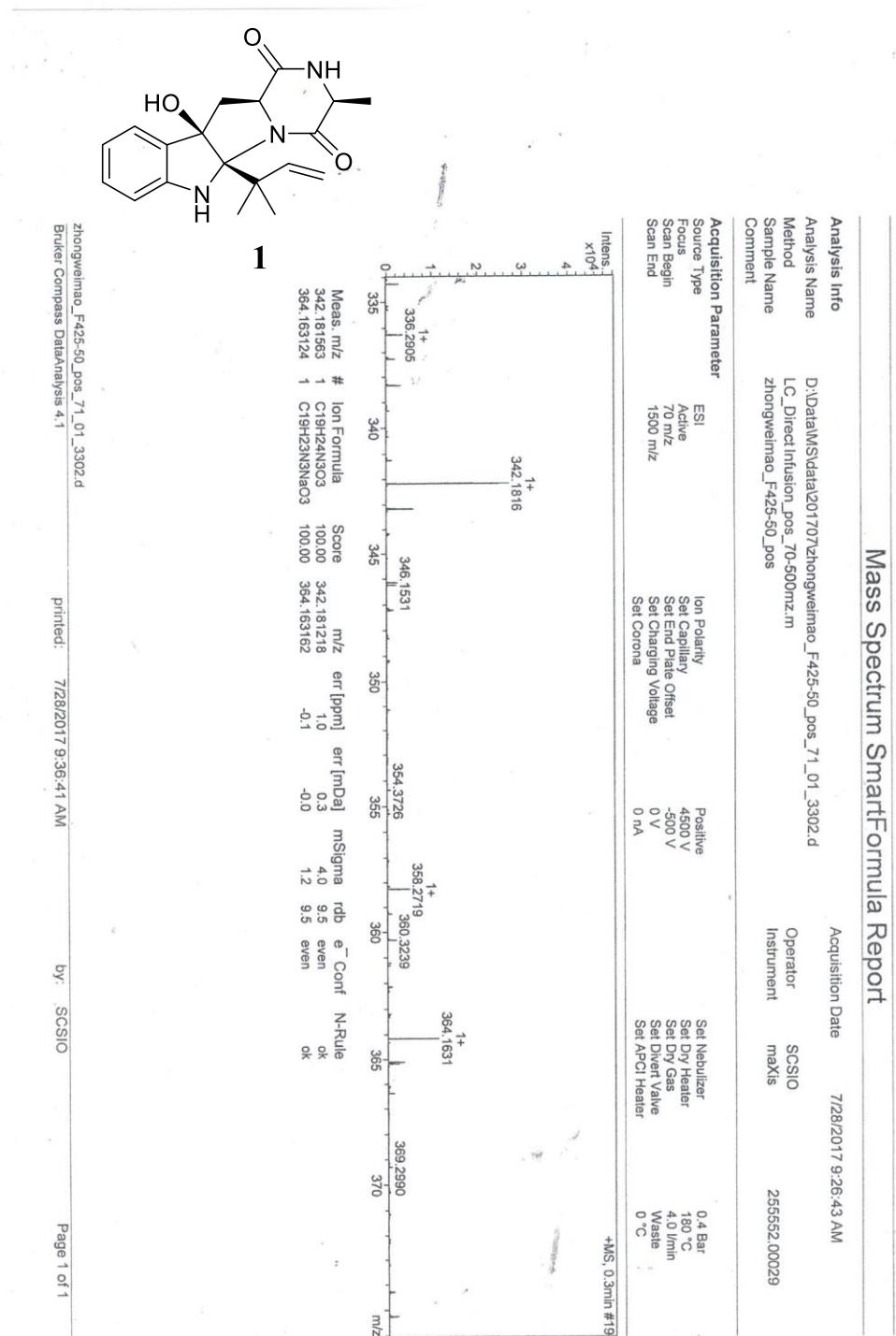


Figure S9. The HRESIMS spectrum of eurotiumin A (**1**).



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Figure S10. The IR spectrum of eurotiumin A (**1**).

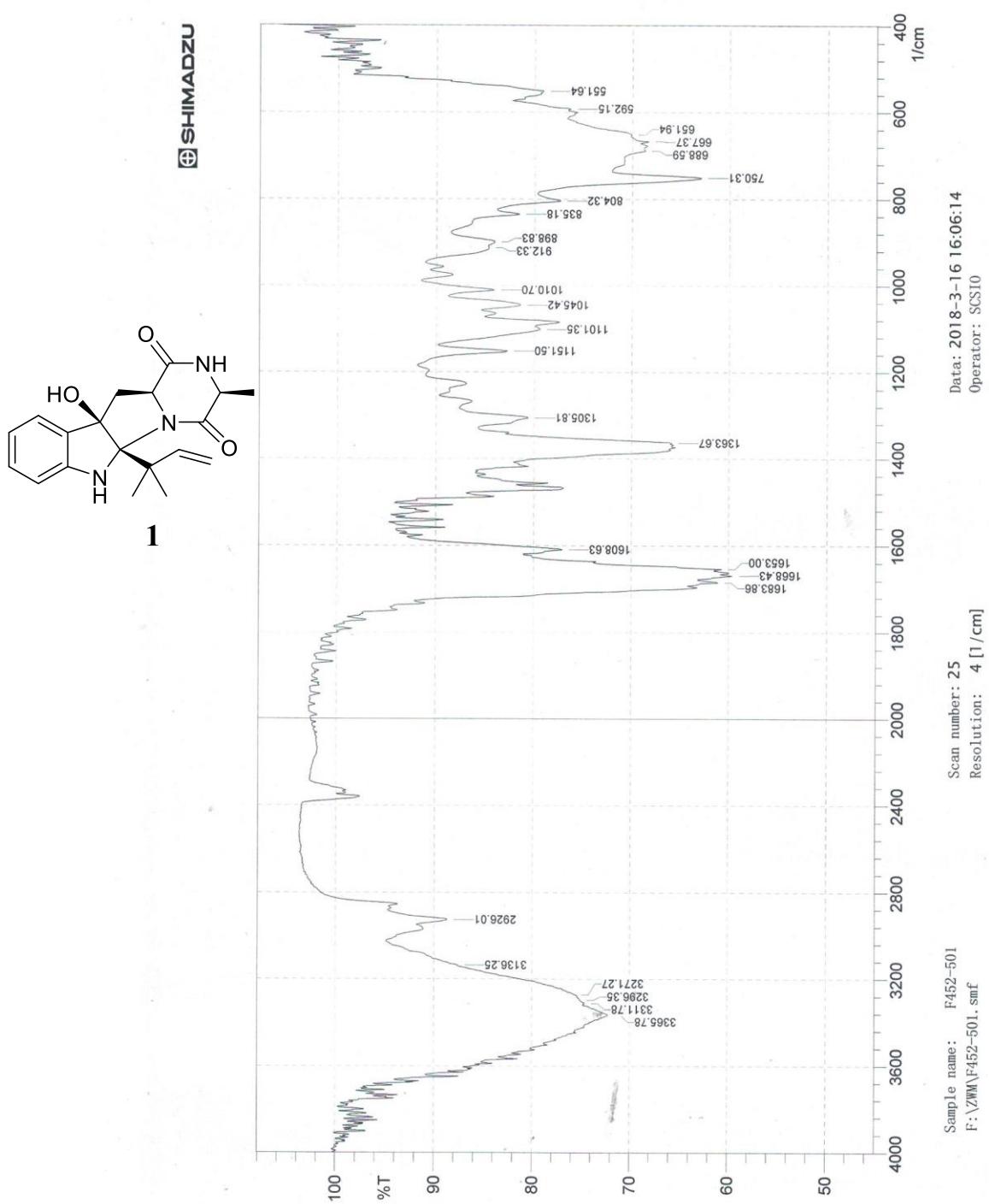
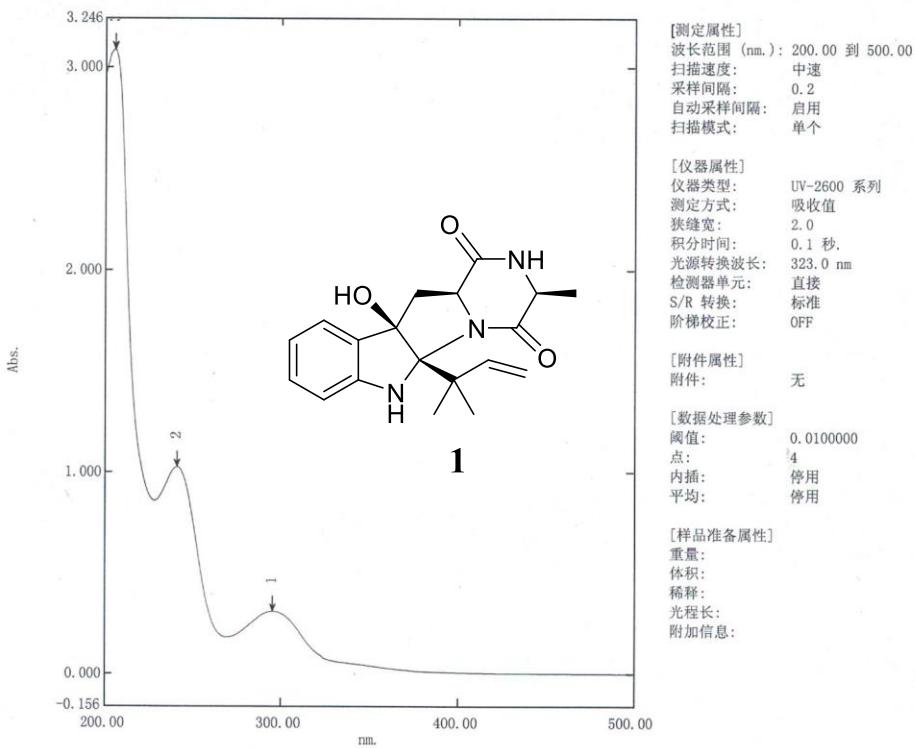


Figure S11. The UV spectrum of eurotiumin A (**1**).

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No.	P/V	波长(nm)	吸收值	描述
1	①	295.00	0.308	
2	①	241.00	1.024	
3	①	205.60	3.091	

Figure S12. The ^1H NMR spectrum of eurotiumin B (**2**) in CD_3COCD_3 .

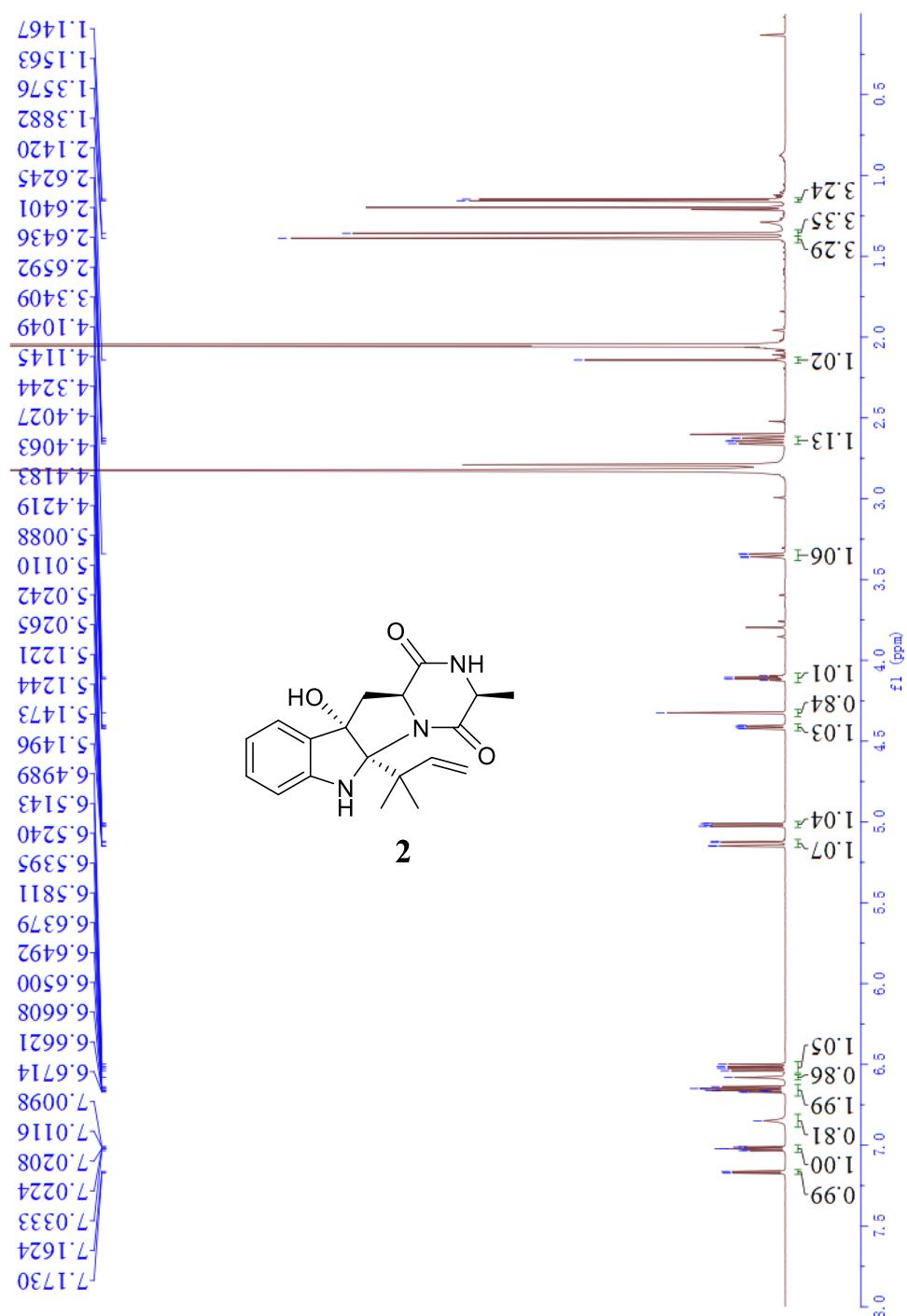


Figure S13. The ^{13}C NMR spectrum of eurotiumin B (**2**) in CD_3COCD_3 .

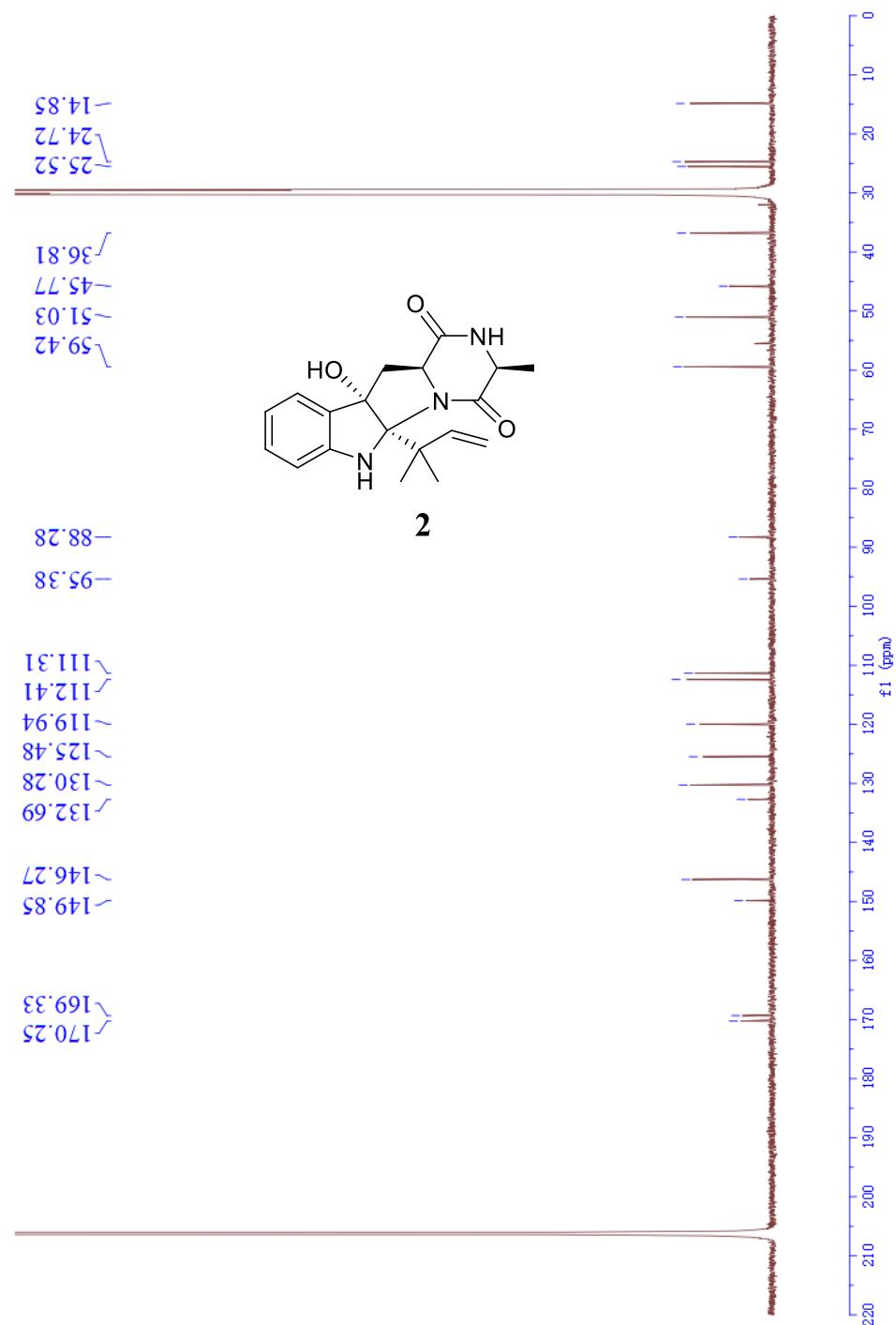


Figure S14. The HSQC spectrum of eurotiumin B (**2**) in CD₃COCD₃.

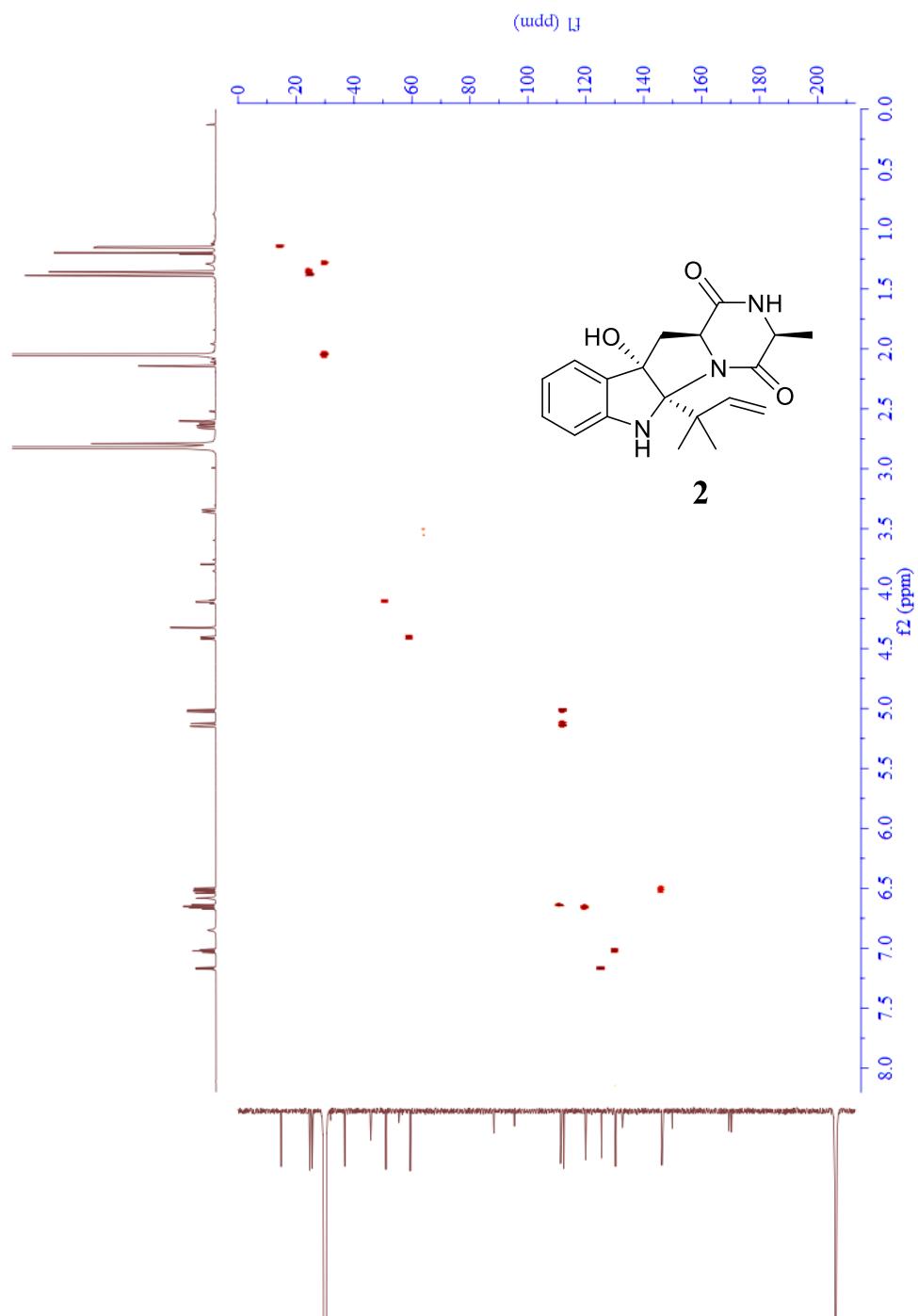


Figure S15. The HMBC spectrum of eurotiumin B (**2**) in CD₃COCD₃.

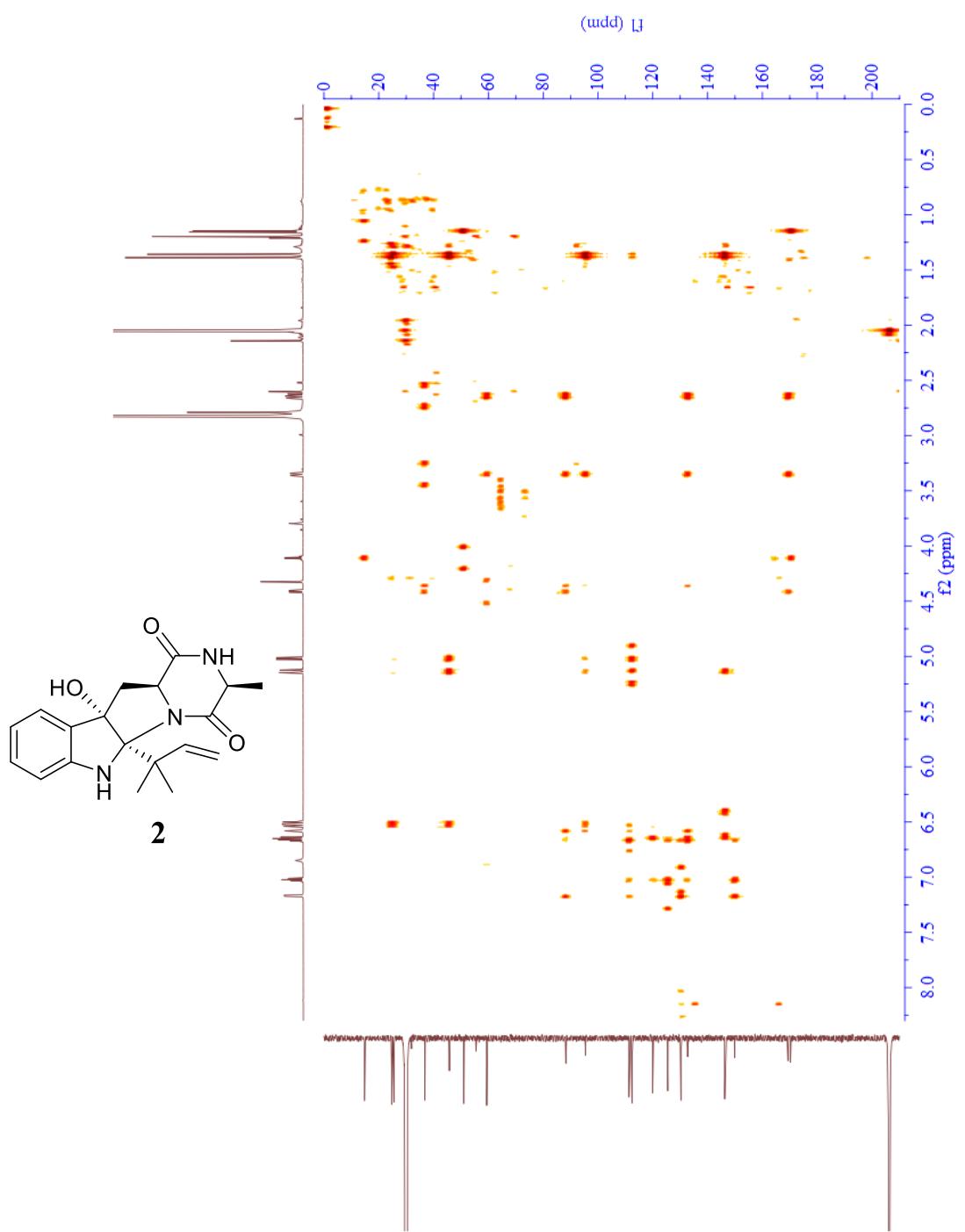


Figure S16. The ^1H - ^1H COSY spectrum of eurotiumin B (**2**) in CD_3COCD_3 .

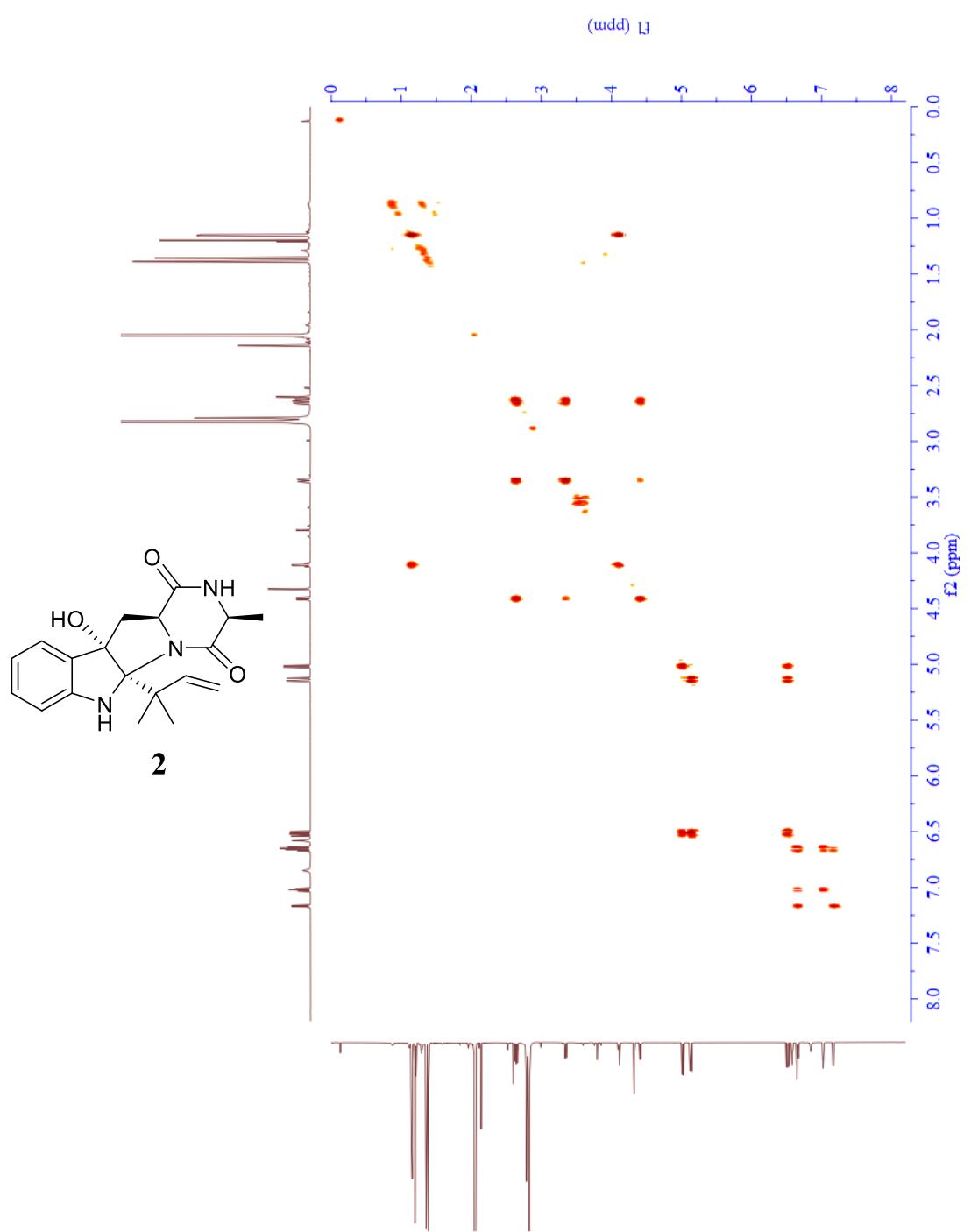


Figure S17. The NOESY spectrum of eurotiumin B (**2**) in CD_3COCD_3 .

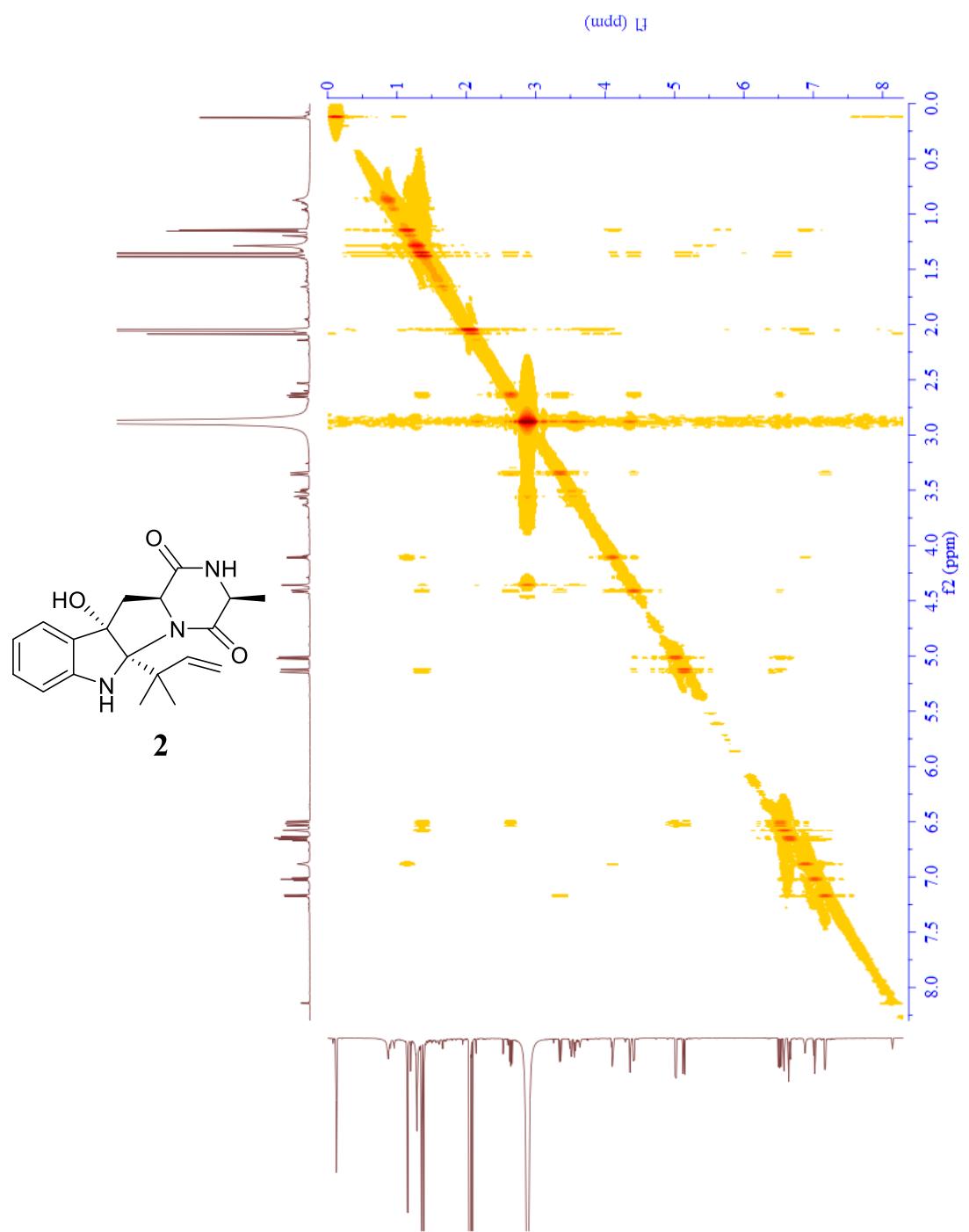
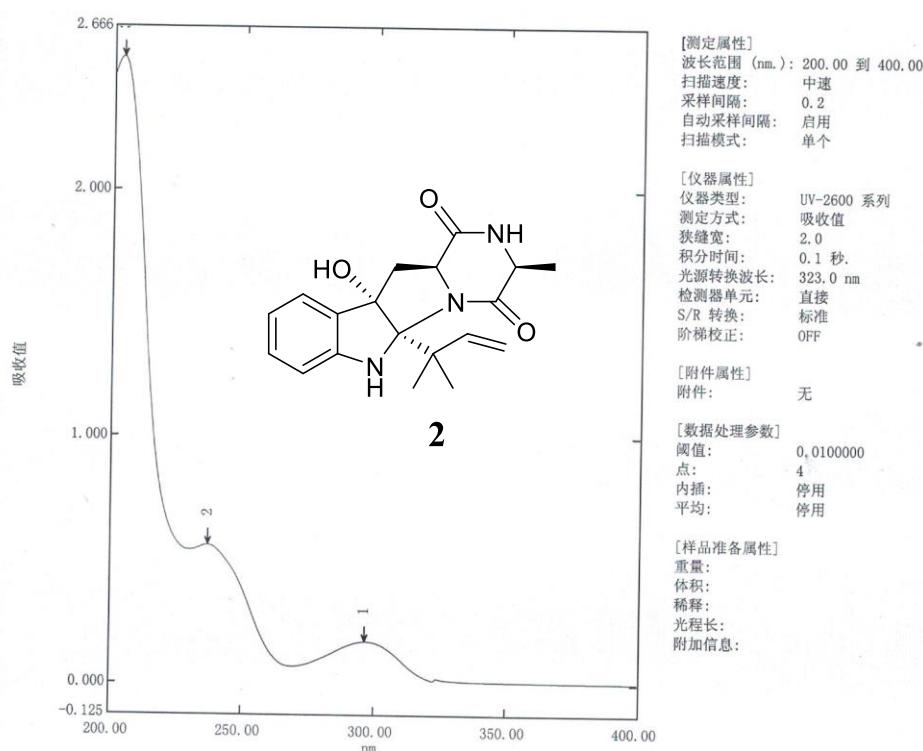


Figure S18. The HRESIMS spectrum of eurotiumin B (2).

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数据集: F452-51-2 - RawData



No.	P/V	波长 (nm)	吸收值	描述
1	①	296.40	0.168	
2	①	237.00	0.561	
3	①	203.60	2.539	

Figure S19. The IR spectrum of eurotiumin B (2).

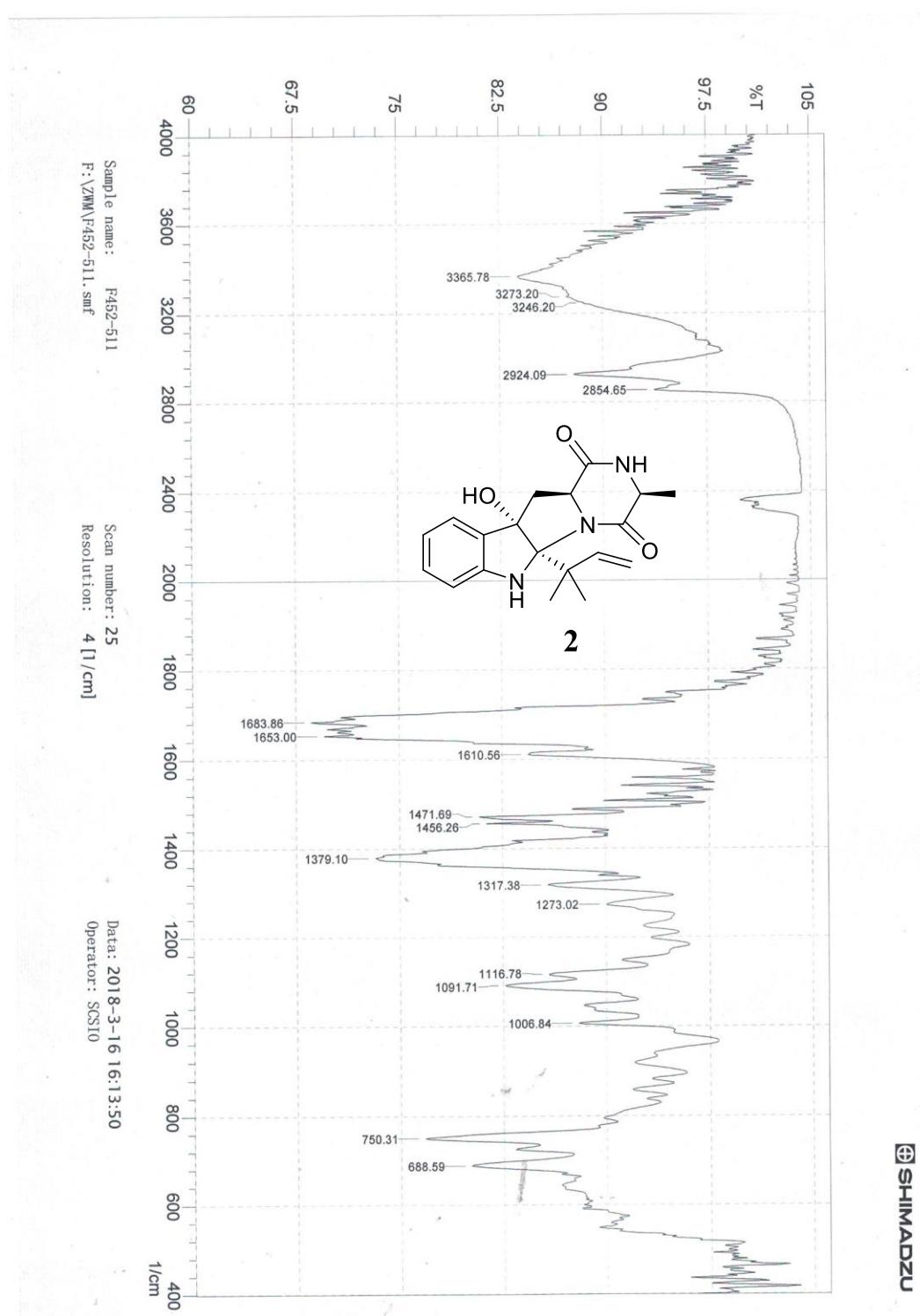


Figure S20. The UV spectrum of eurotiumin B (2).

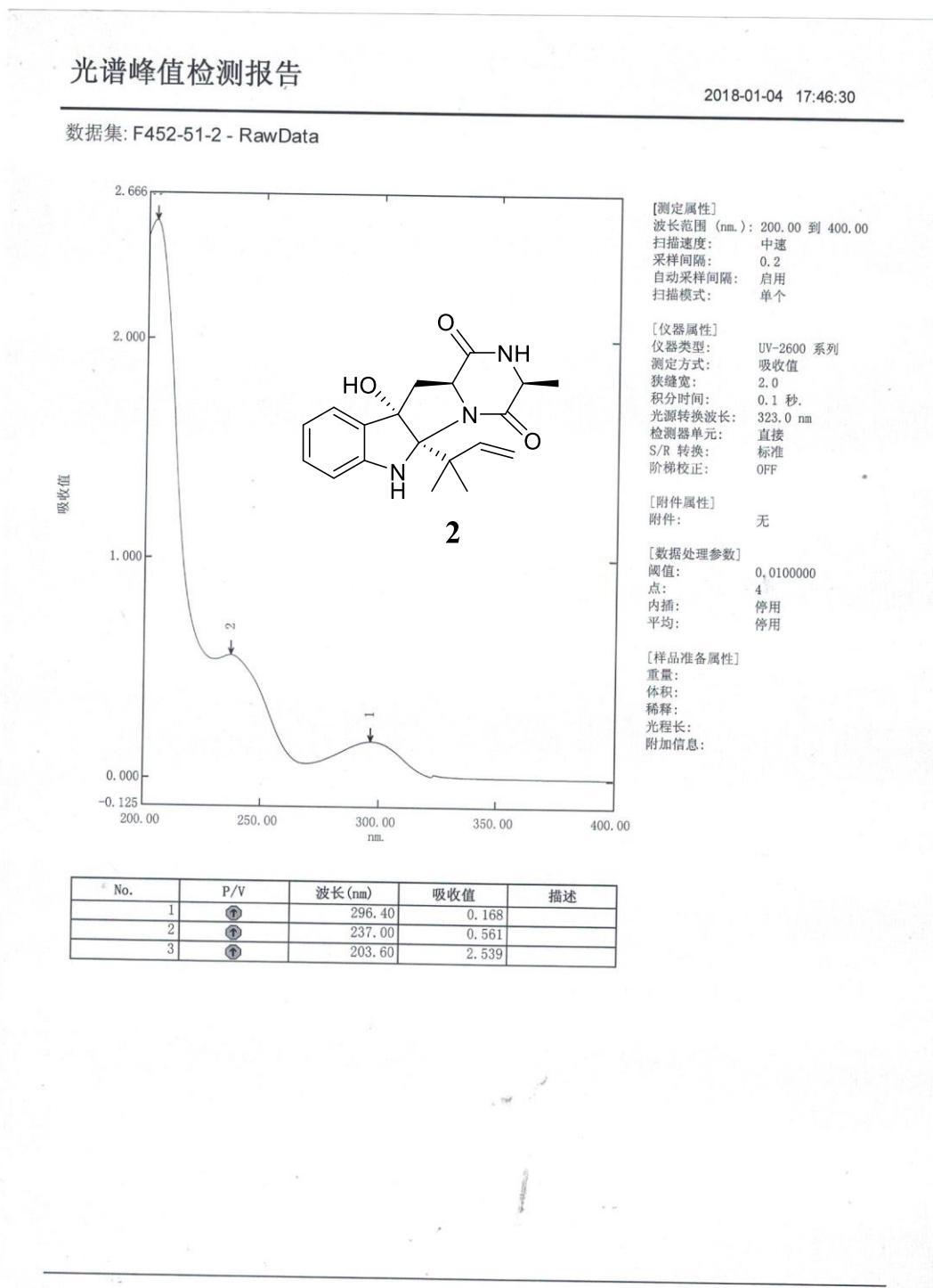


Figure S21. The ^1H NMR spectrum of eurotiumin C (**3**) in $\text{DMSO}-d_6$.

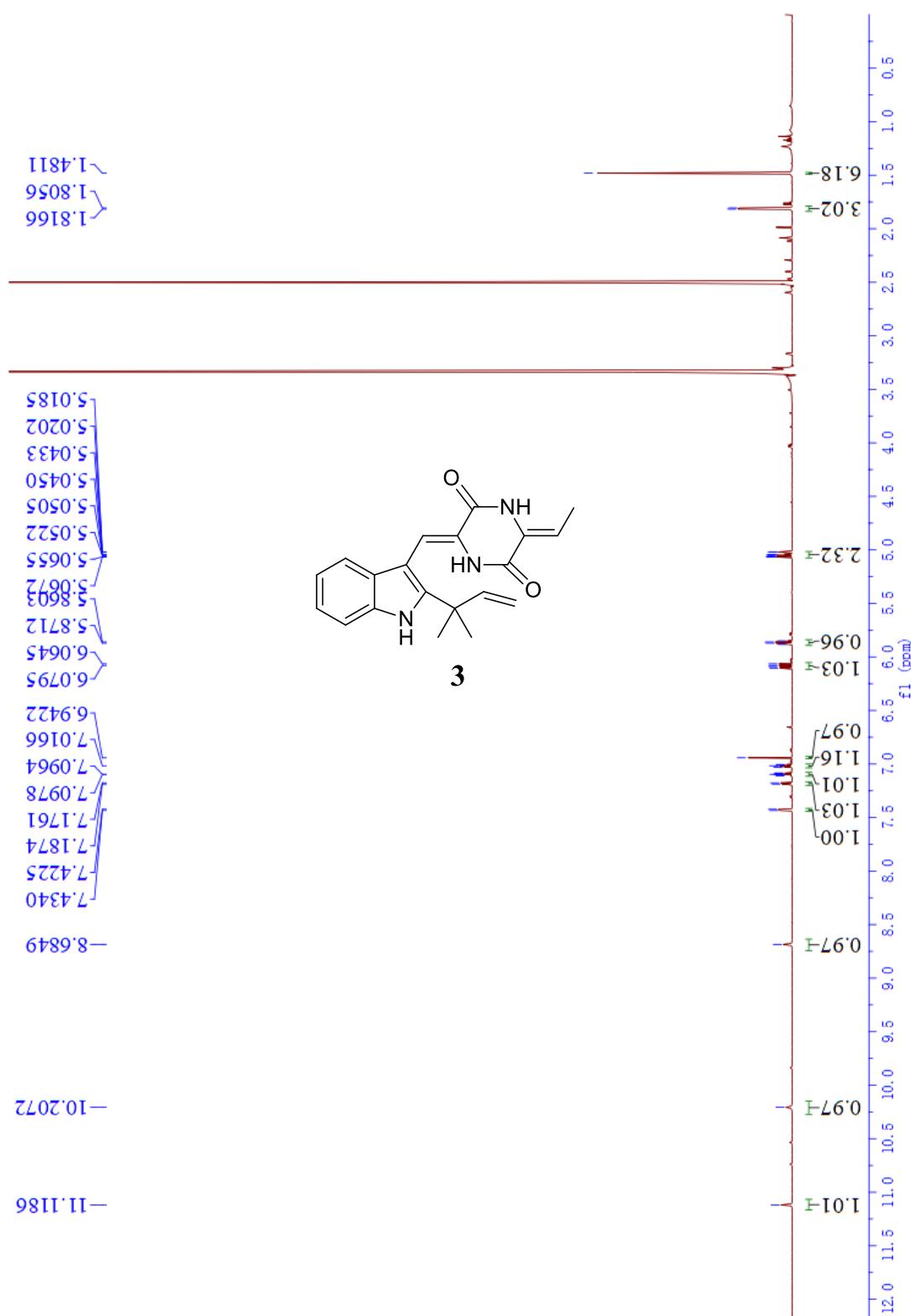


Figure S22. The ^{13}C NMR spectrum of eurotiumin C (**3**) in $\text{DMSO}-d_6$.

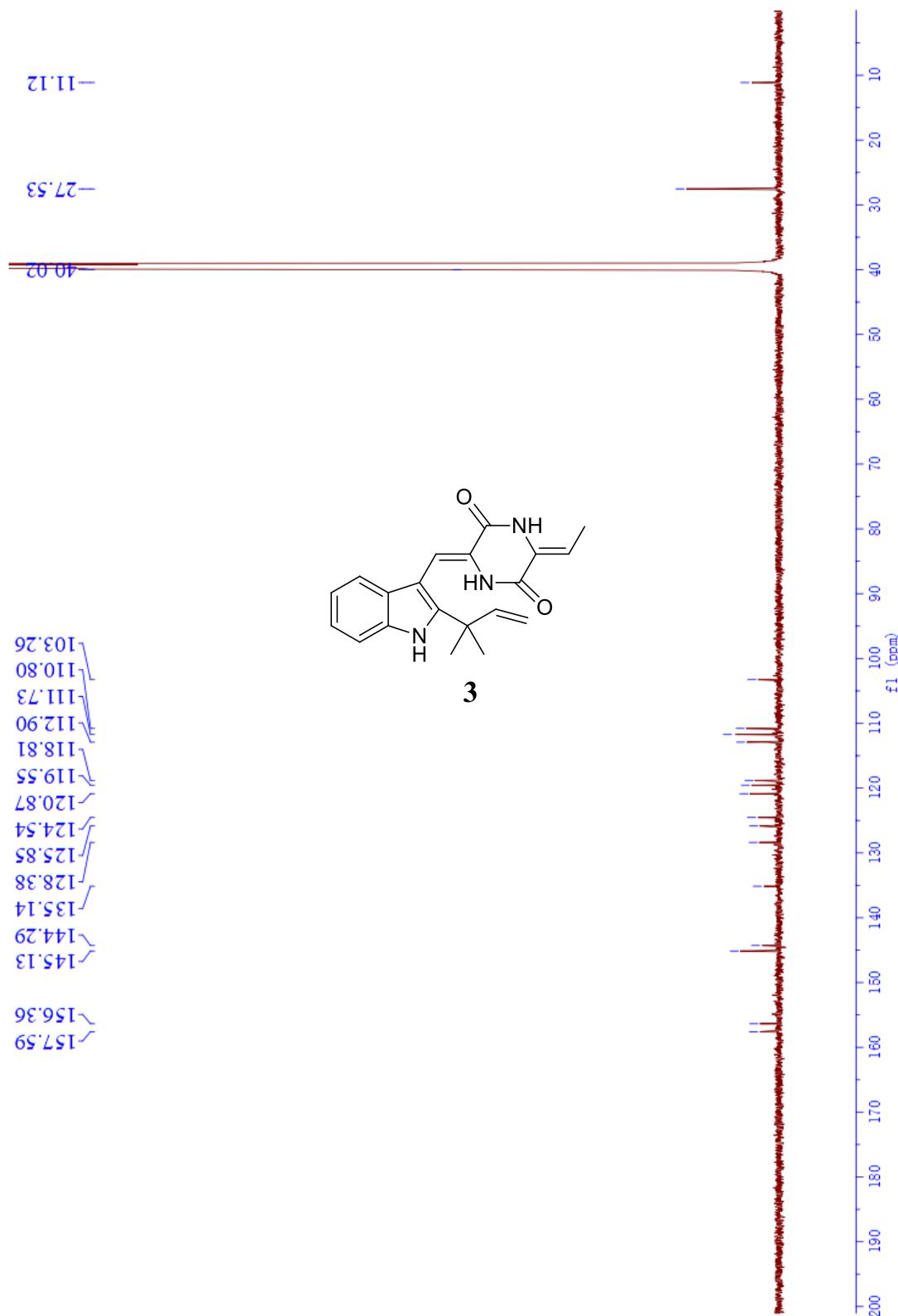


Figure S23. The HSQC spectrum of eurotiumin C (**3**) in DMSO-*d*₆.

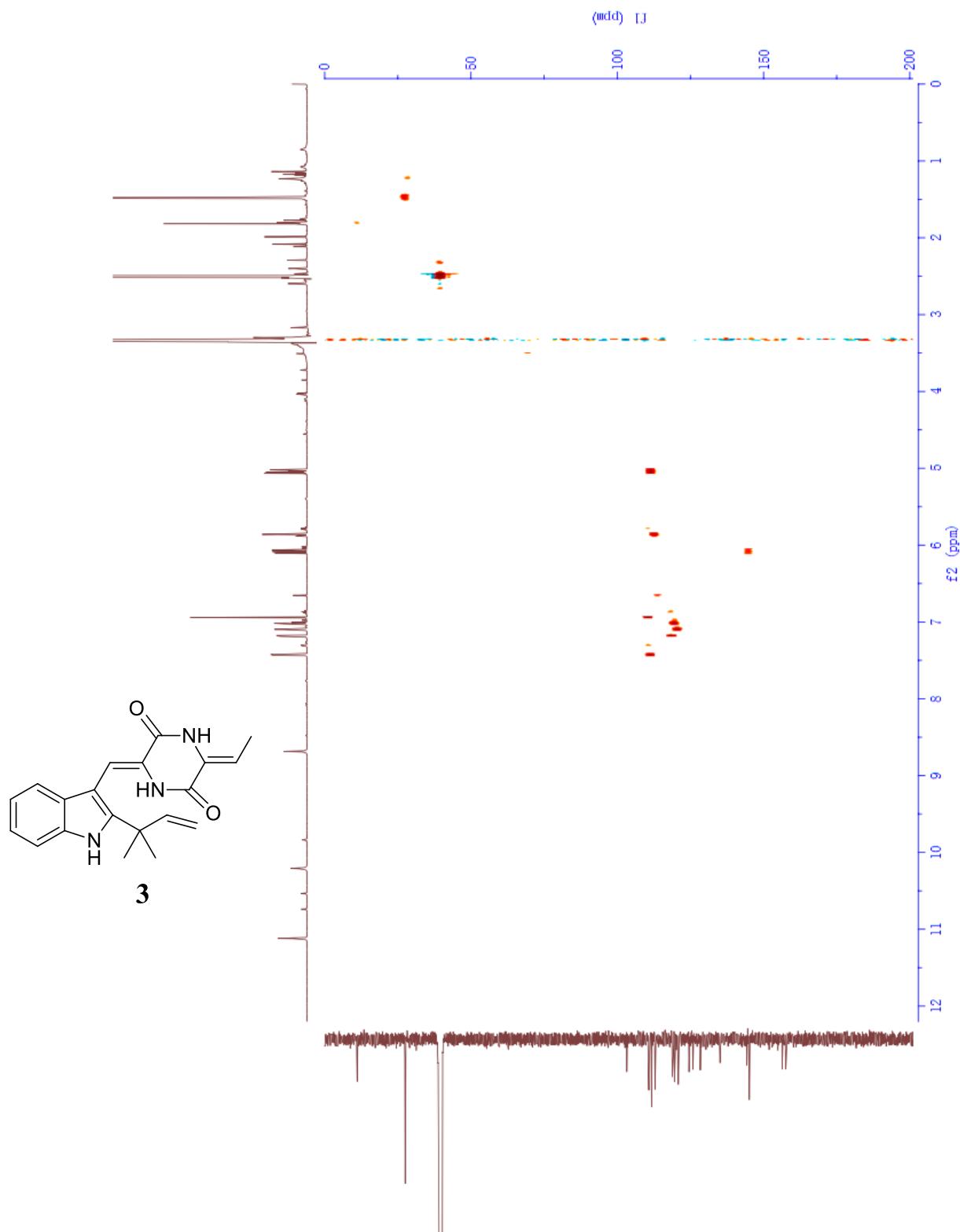


Figure S24. The HMBC spectrum of eurotiumin C (**3**) in DMSO-*d*₆.

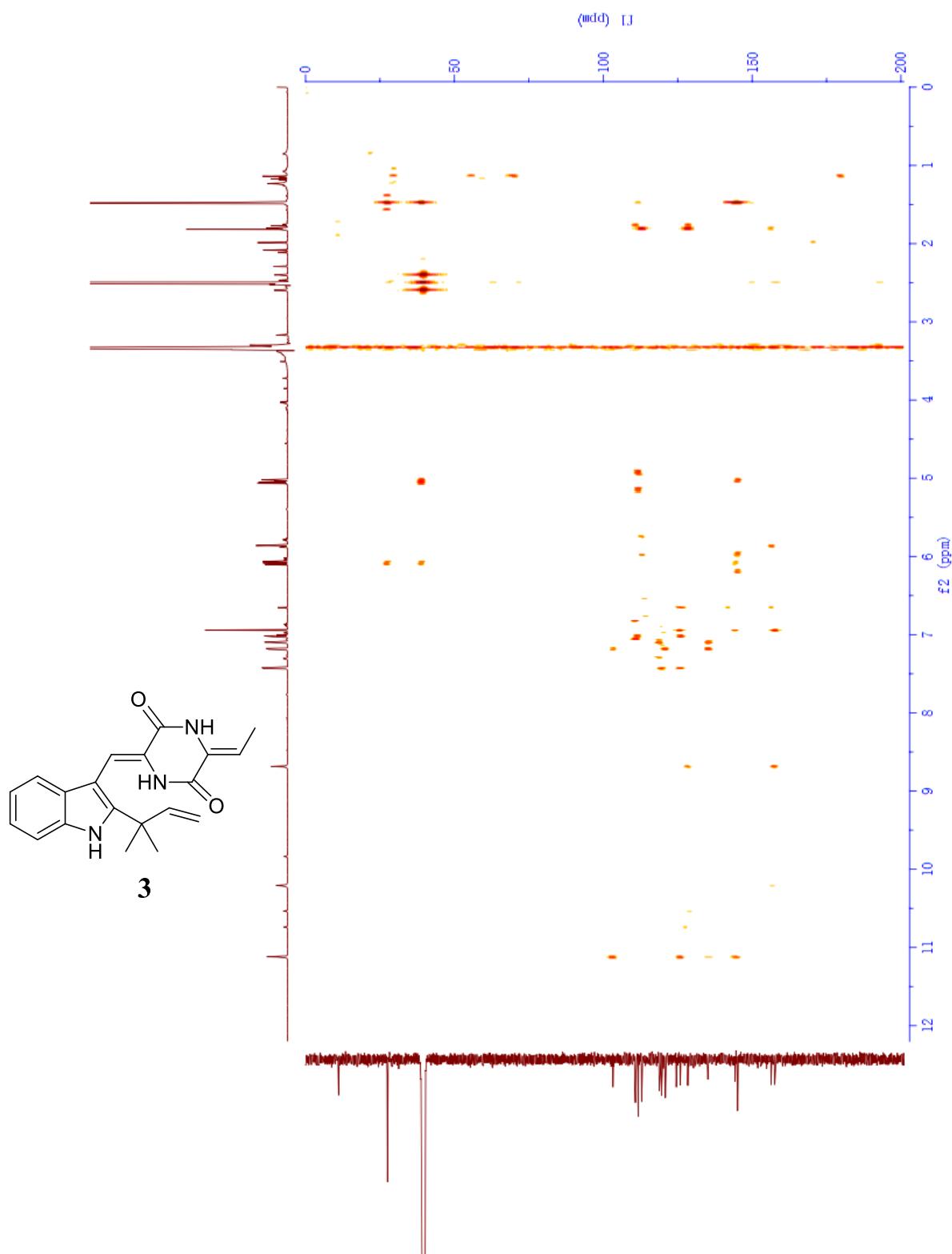


Figure S25. The ^1H - ^1H COSY spectrum of eurotiumin C (**3**) in $\text{DMSO}-d_6$.

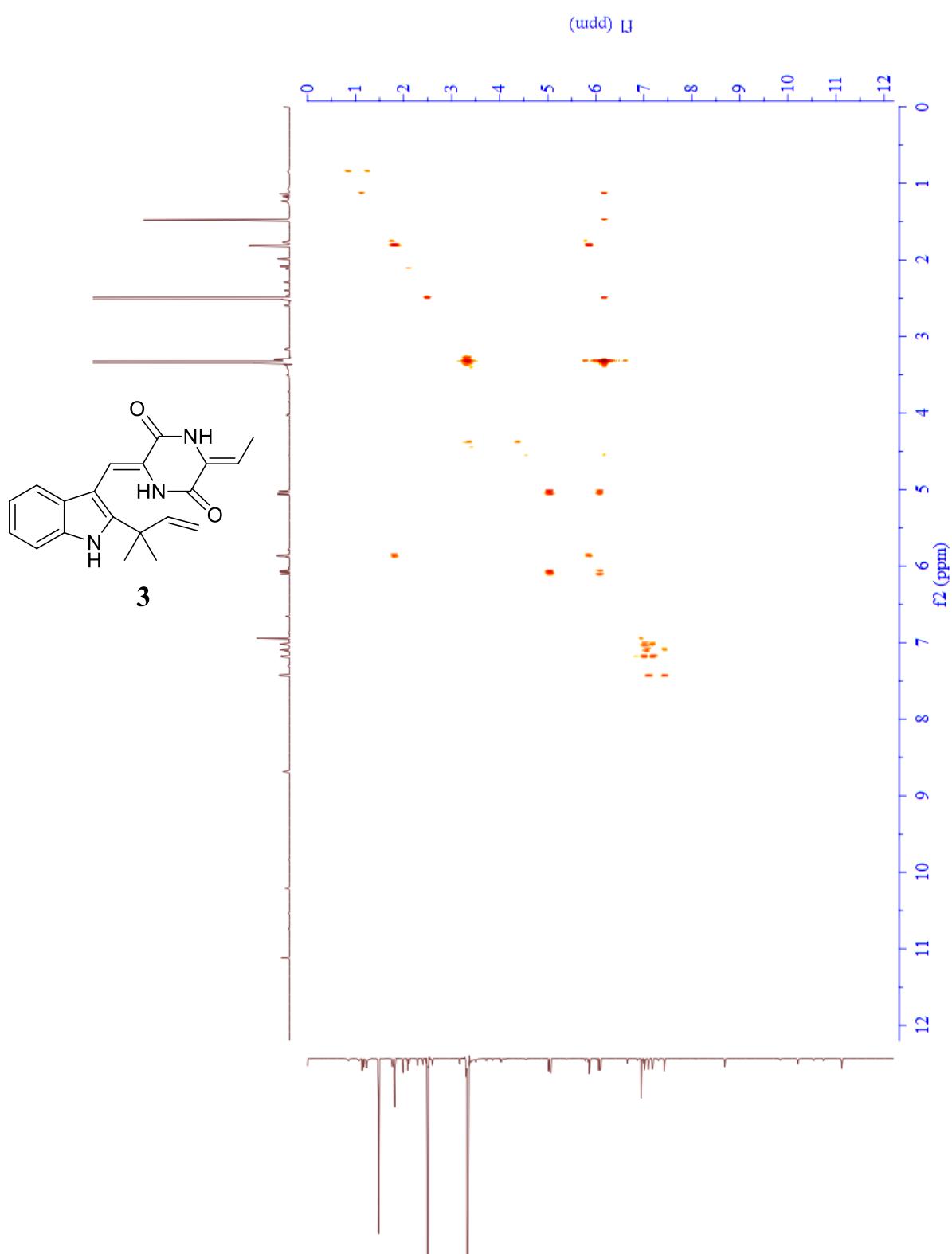


Figure S26. The NOESY spectrum of eurotiumin C (**3**) in $\text{DMSO}-d_6$.

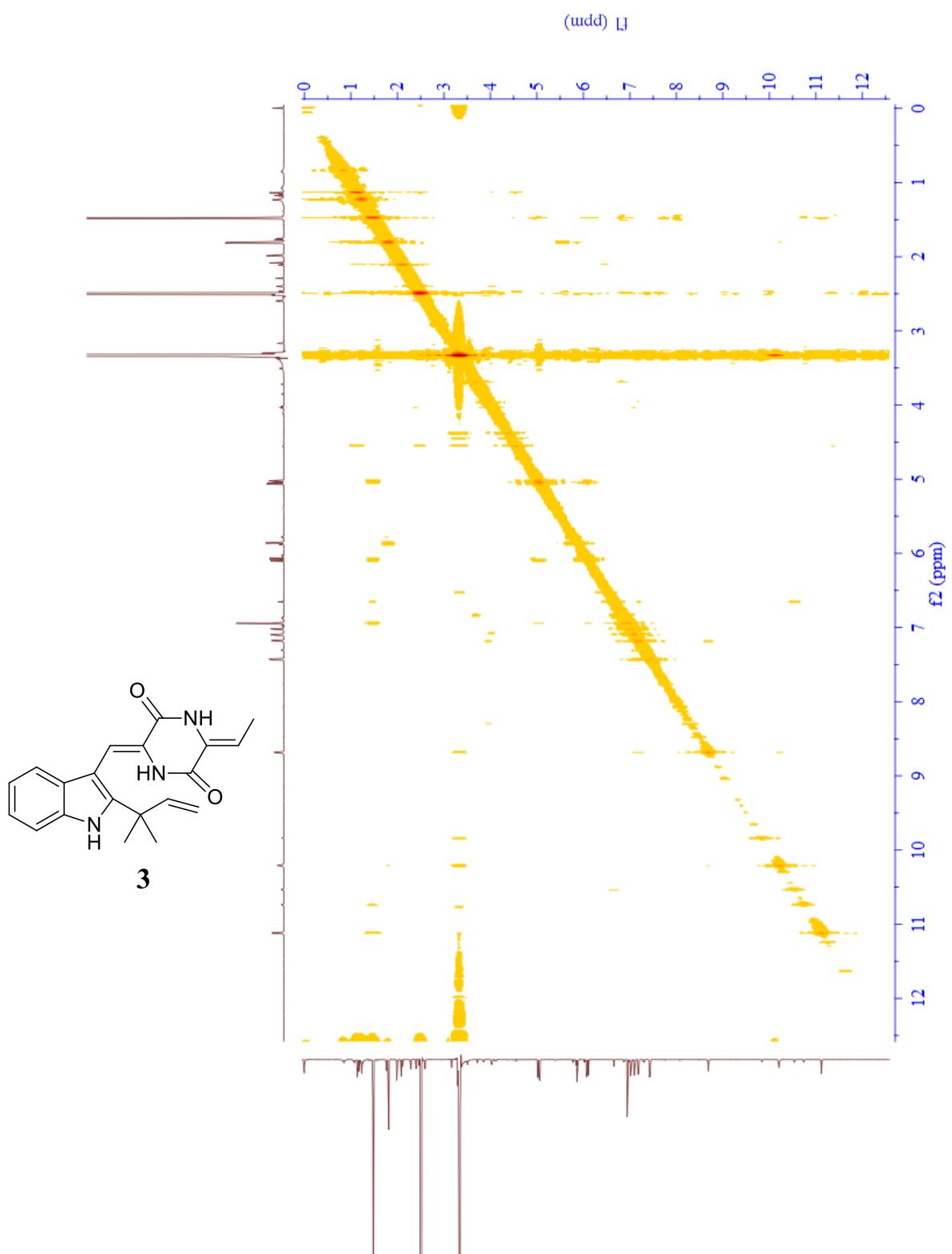
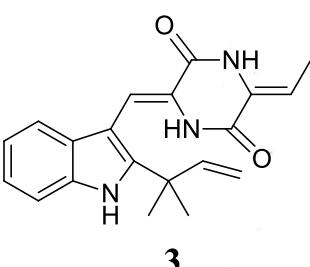
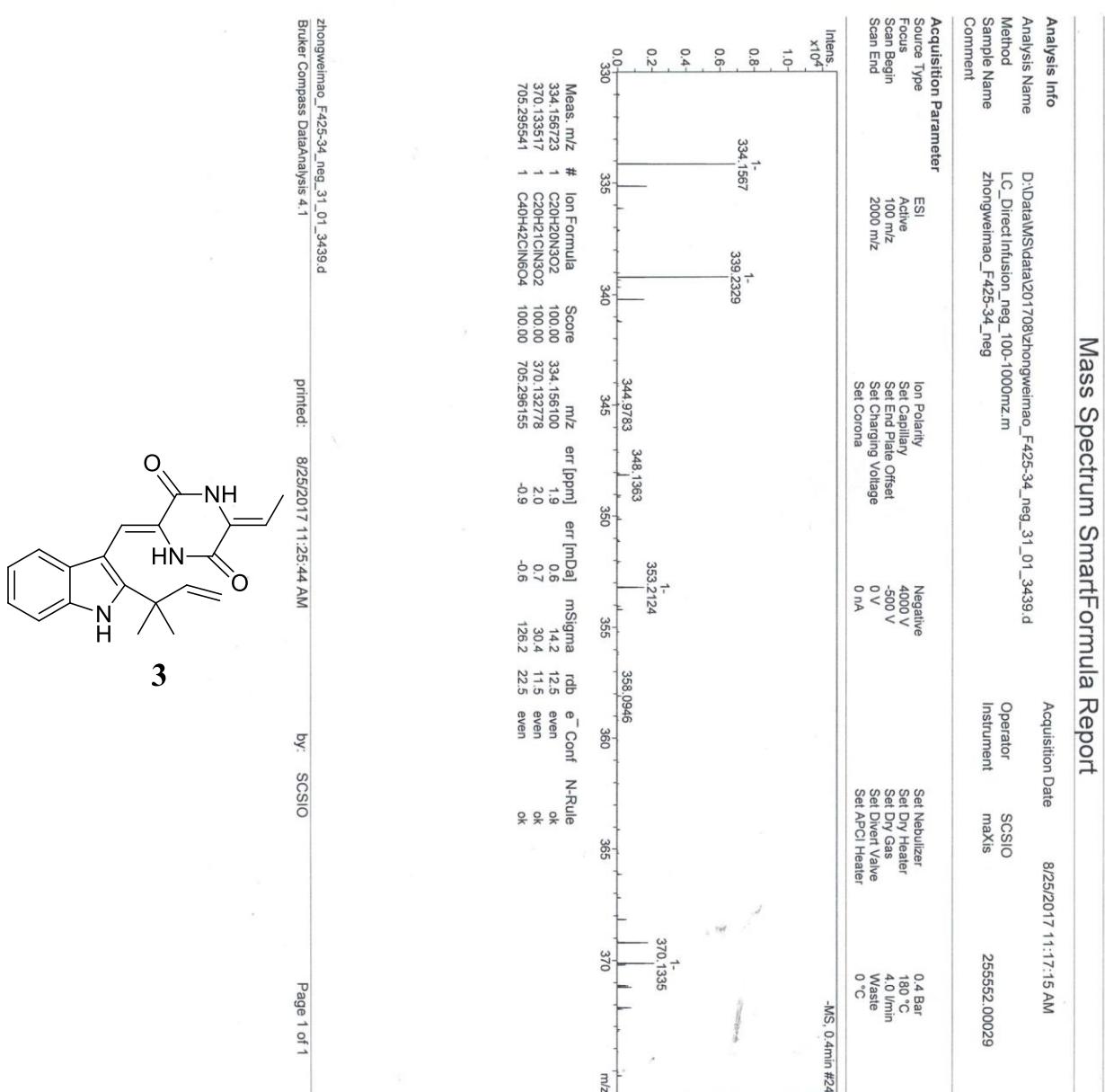


Figure S27. The HRESIMS spectrum of eurotiumin C (**3**).



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Figure S28. The IR spectrum of eurotiumin C (3).

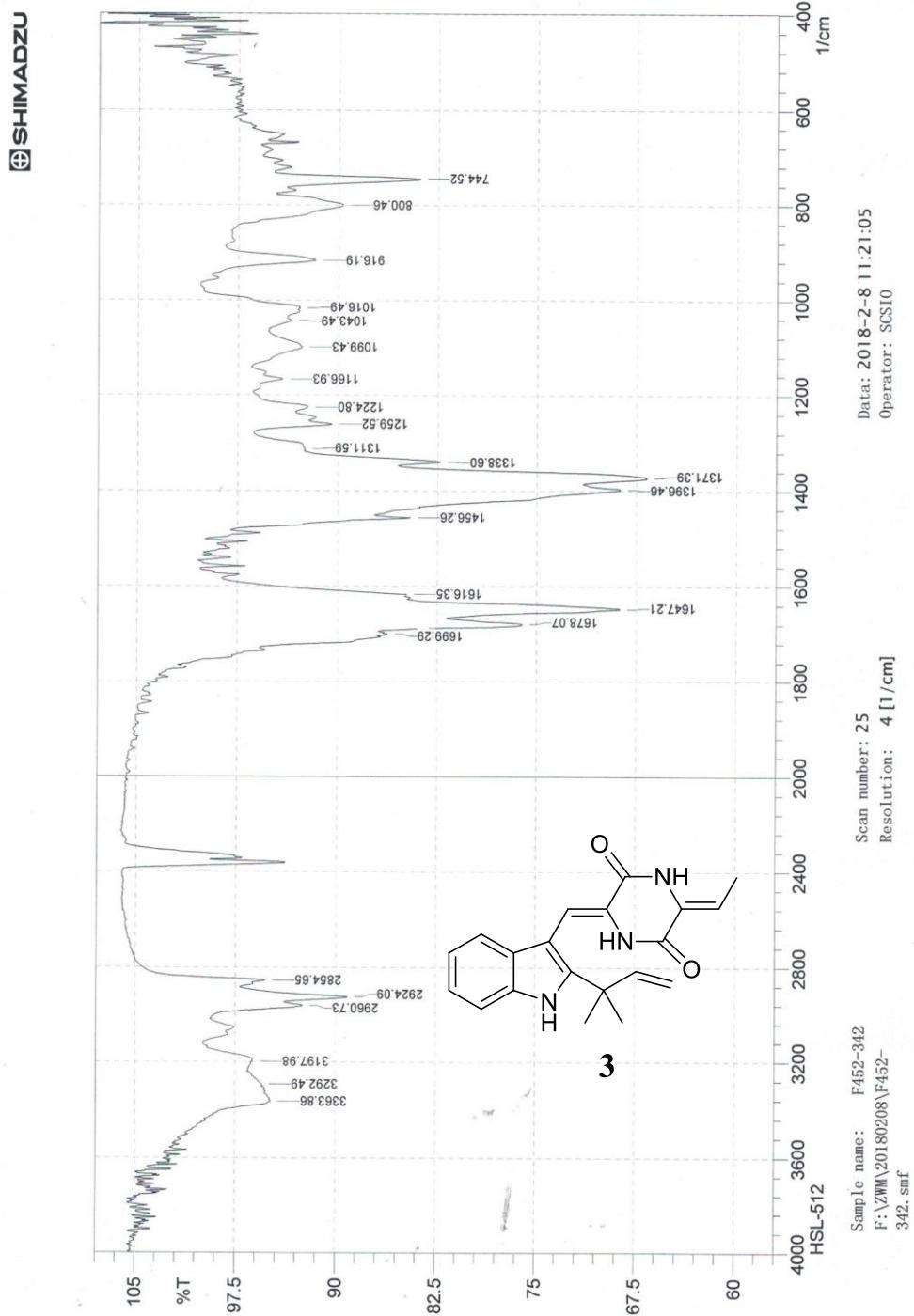
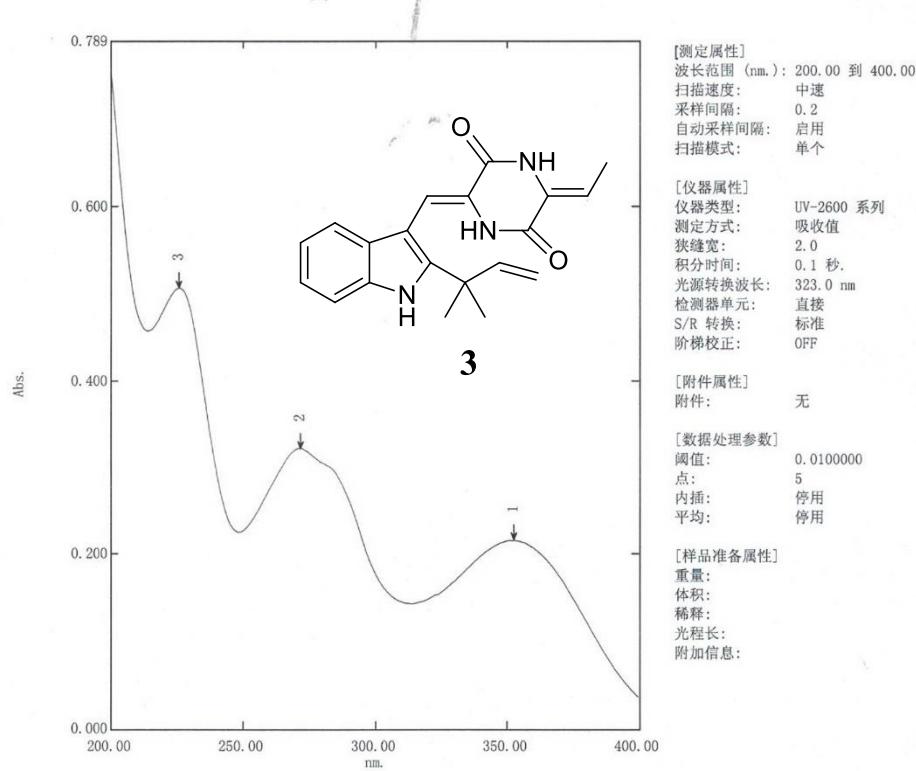


Figure S29. The UV spectrum of eurotiumin C (3).

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数据集: F452-34-2 - RawData



No.	P/V	波长(nm)	吸收值	描述
1	①	352.80	0.216	
2	①	271.80	0.321	
3	①	225.80	0.506	

Figure S30. The ^1H NMR spectrum of eurotiumin D (**4**) in CD_3COCD_3 .

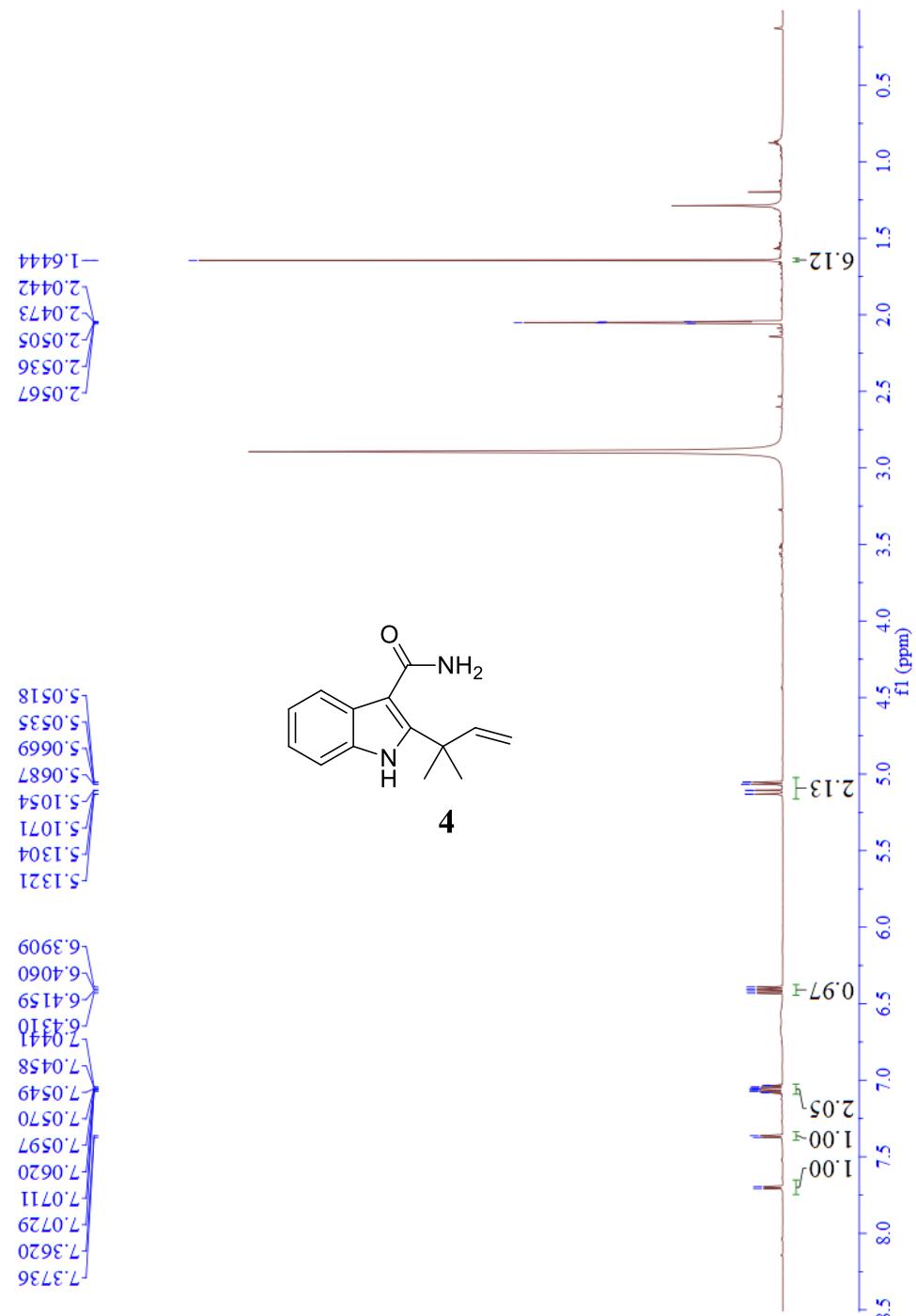


Figure S31. The ^{13}C NMR spectrum of eurotiumin D (**4**) in CD_3COCD_3 .

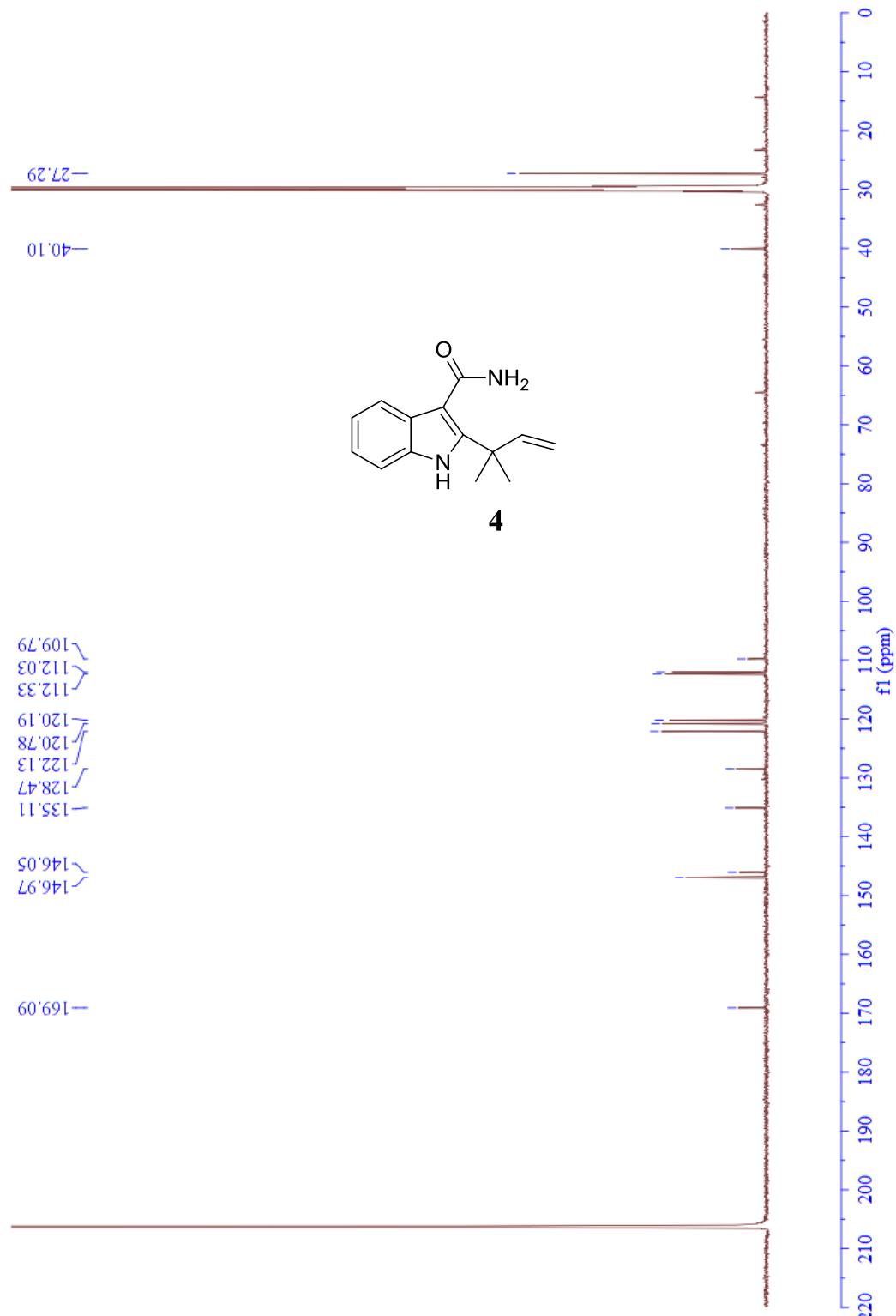


Figure S32. The HSQC spectrum of eurotiumin D (**4**) in CD₃COCD₃.

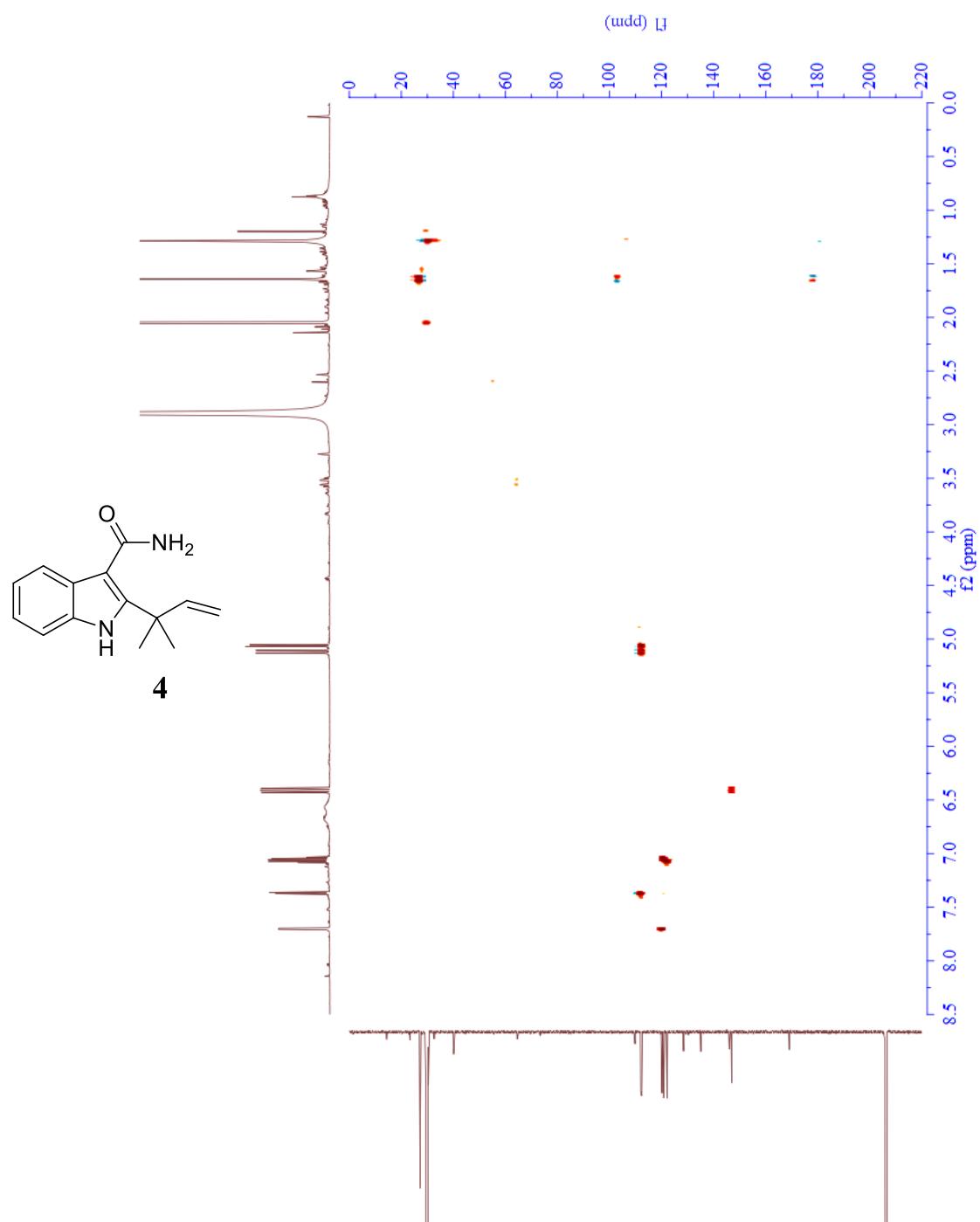


Figure S33. The HMBC spectrum of eurotiumin D (**4**) in CD₃COCD₃.

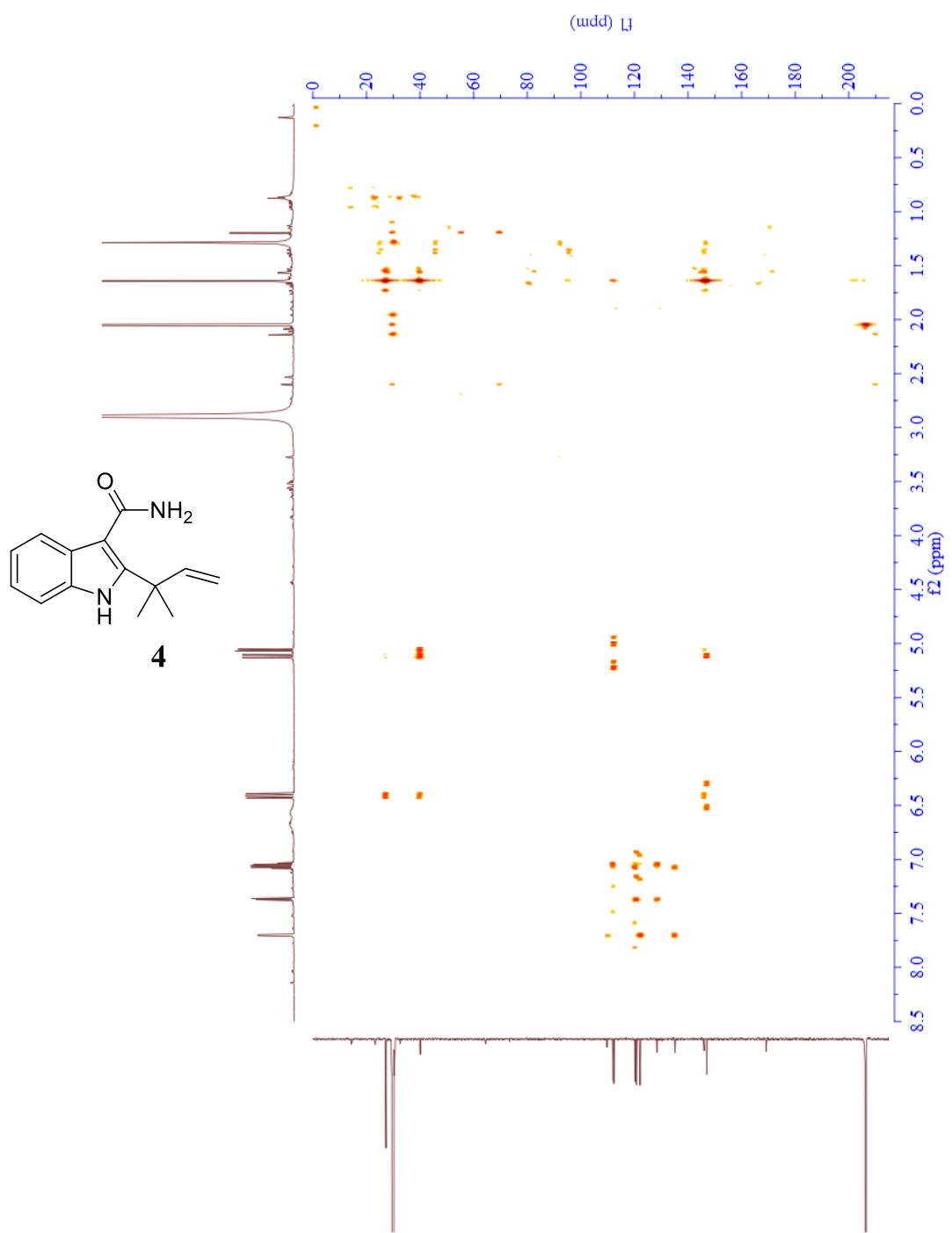


Figure S34. The ^1H - ^1H COSY spectrum of eurotiumin D (**4**) in CD_3COCD_3 .

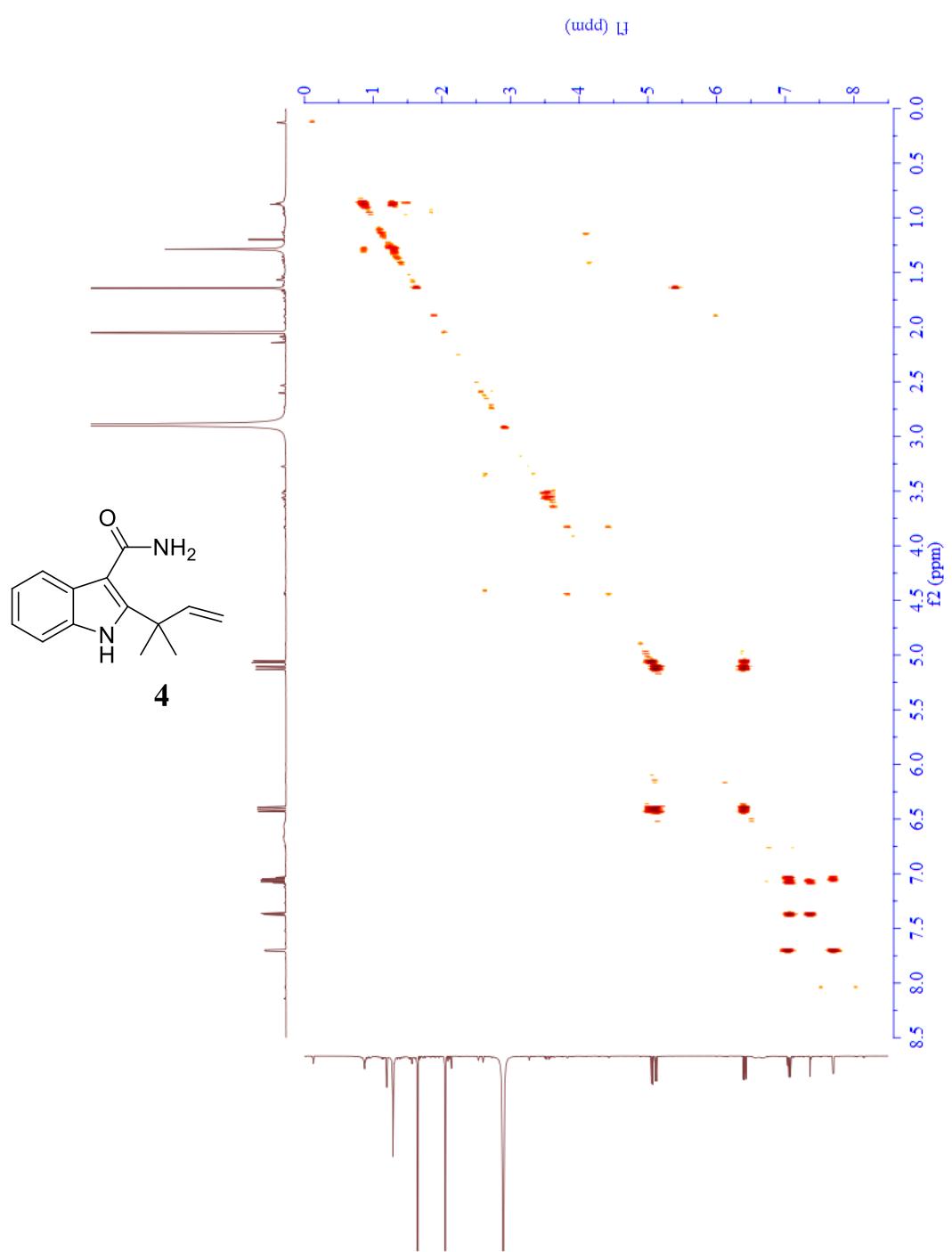


Figure S35. The NOESY spectrum of eurotiumin D (**4**) in CD_3COCD_3 .

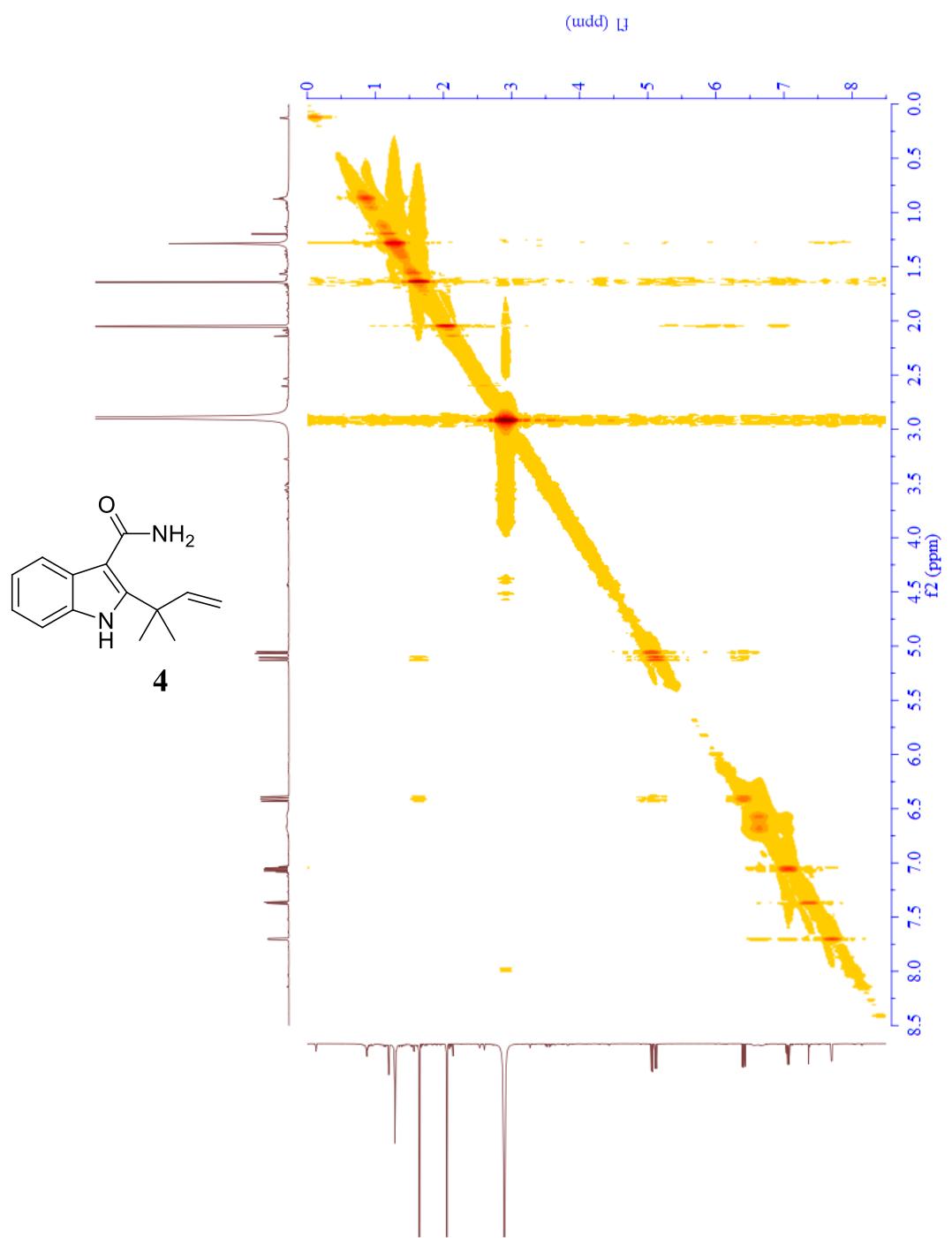
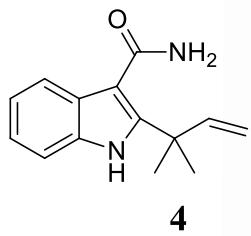


Figure S36. The HRESIMS spectrum of eurotiumin D (4).



Mass Spectrum SmartFormula Report

Analysis Info

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 Sample Name: zhongweimao_F425-47_pos
 Comment:

Acquisition Date: 7/26/2017 4:41:30 PM

Instrument: maXis
 Operator: SCS10
 255552.00029

Acquisition Parameter

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Scan End	1500 m/z	Set Charging Voltage	0 V
		Set Corona	0 nA

Intens. x10⁵

+MS, 0.2min #14

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251.1159	1	C14H16N2NaO	100.00	251.115484	-1.5	-0.4	11.1	7.5	even	ok
479.242299	1	C28H32N4NaO2	100.00	479.241747	-1.2	-0.6	31.7	14.5	even	ok

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 Bruker Compus DataAnalysis 4.1

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Figure S37. The IR spectrum of eurotiumin D (**4**).

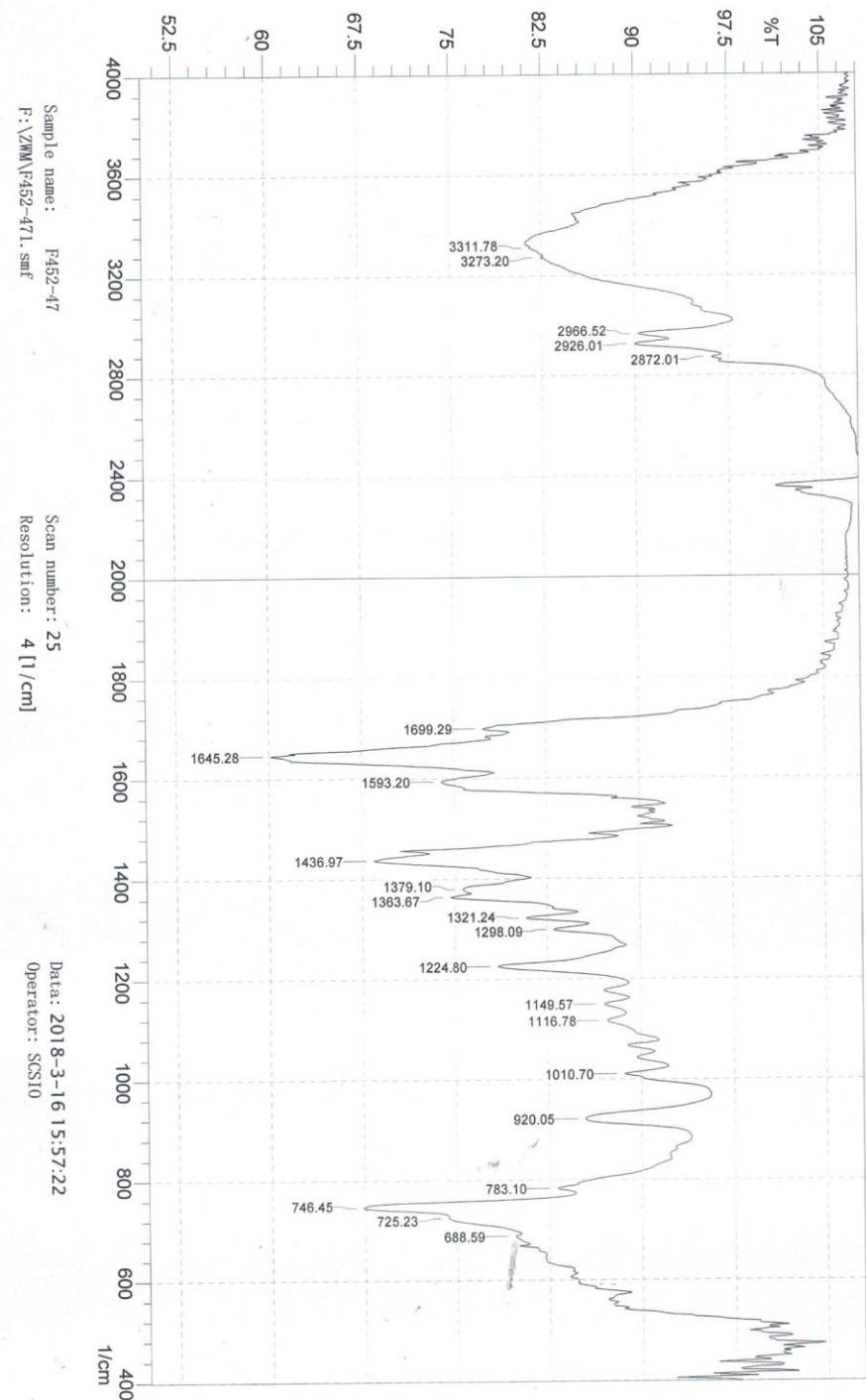
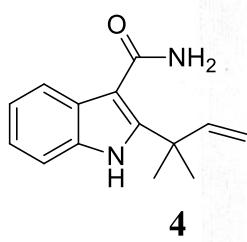


Figure S38. The UV spectrum of eurotiumin D (**4**).

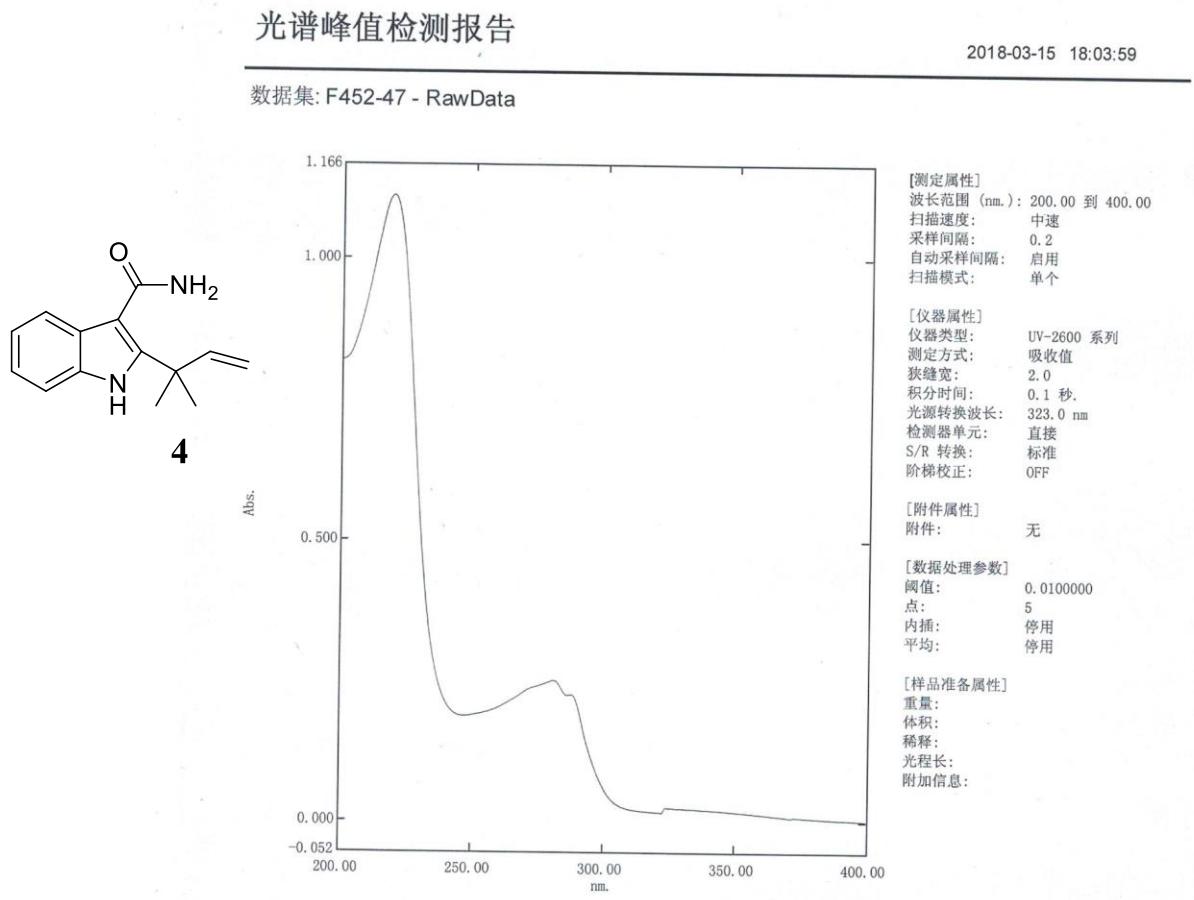


Figure S39. The ^1H NMR spectrum of eurotiumin E (**14**) in CD_3COCD_3 .

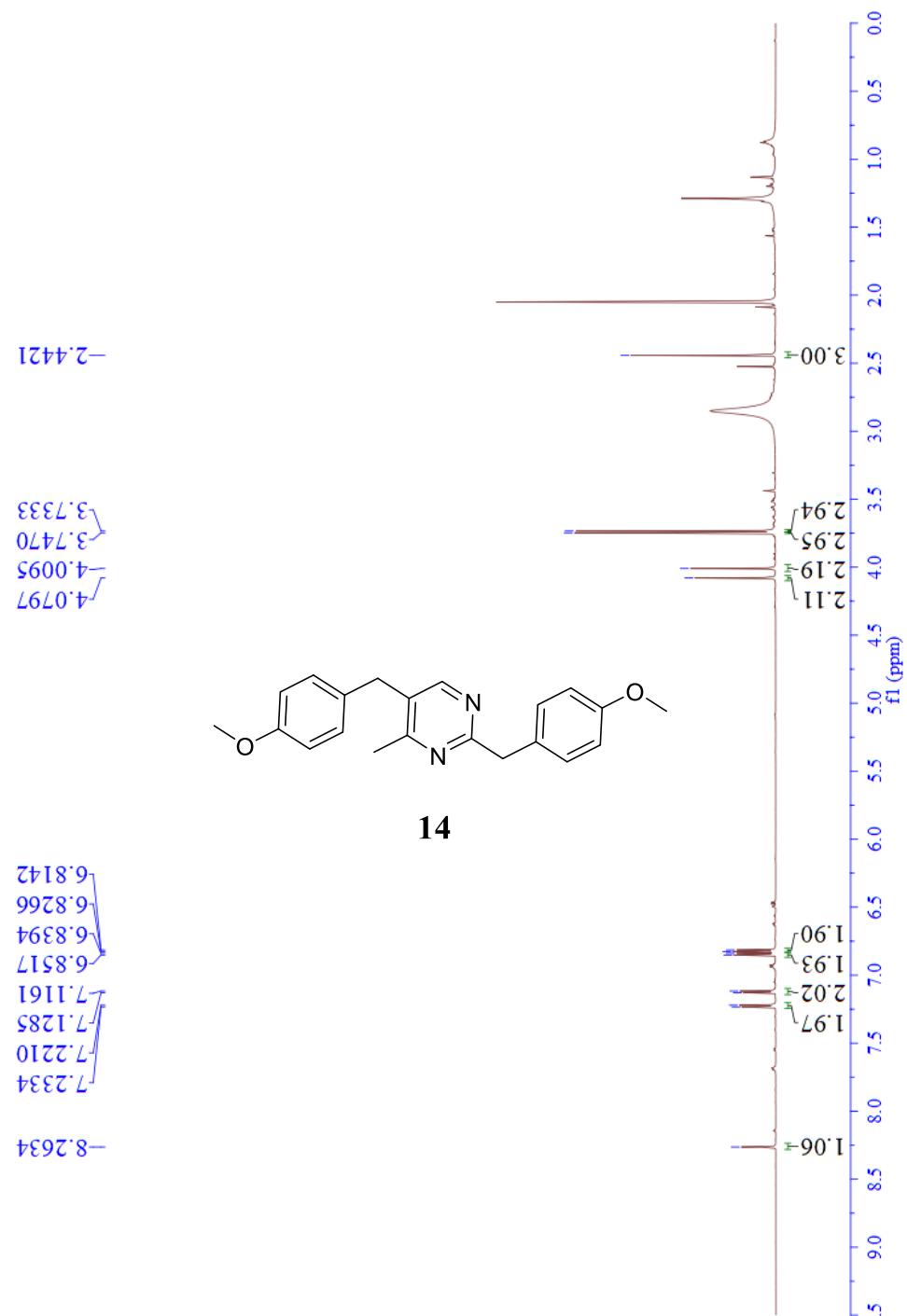


Figure S40. The ^{13}C NMR spectrum of eurotiumin E (**14**) in CD_3COCD_3 .

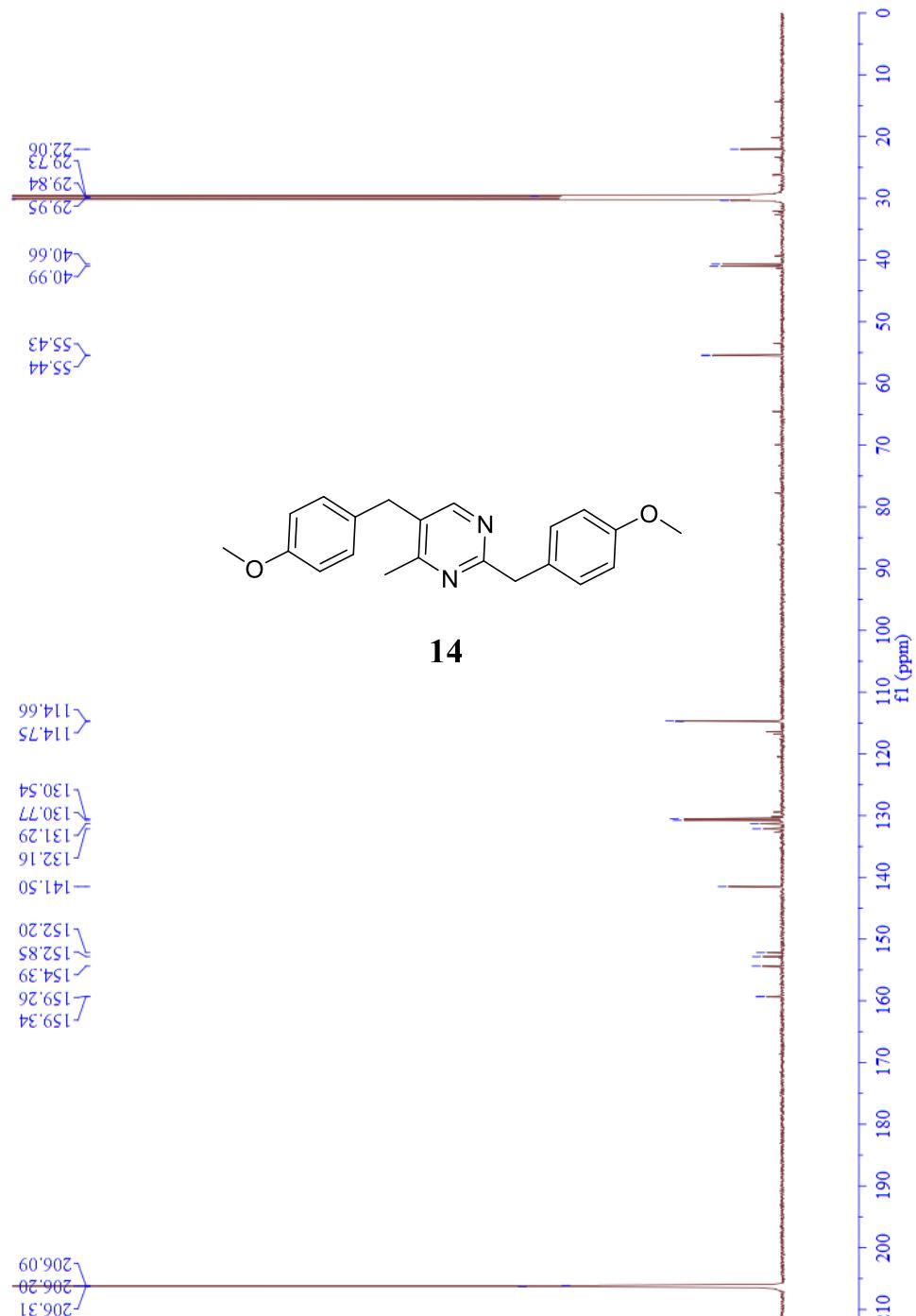


Figure S41. The HSQC spectrum of eurotiumin E (**14**) in CD₃COCD₃.

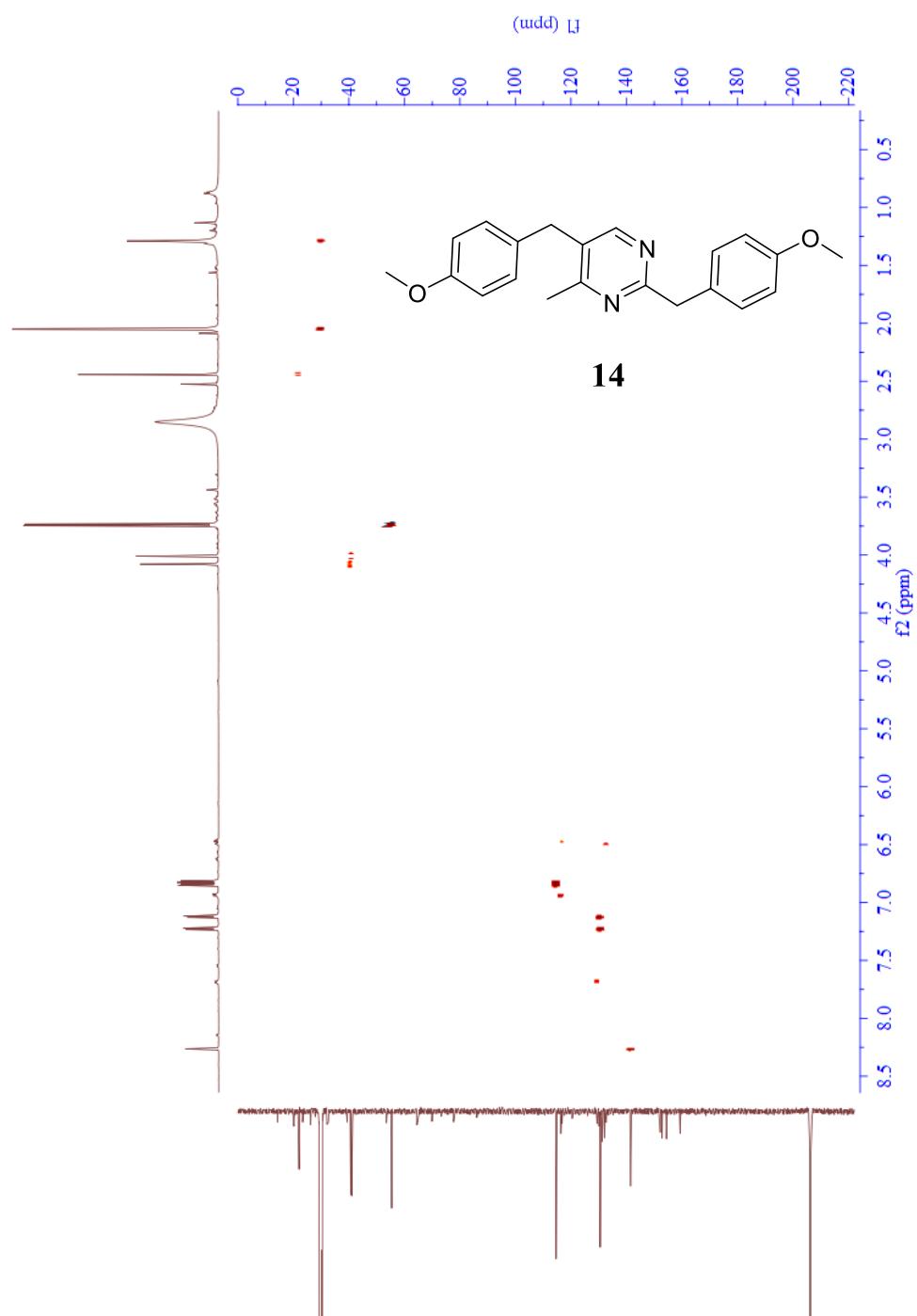


Figure S42. The HMBC spectrum of eurotiumin E (**14**) in CD_3COCD_3 .

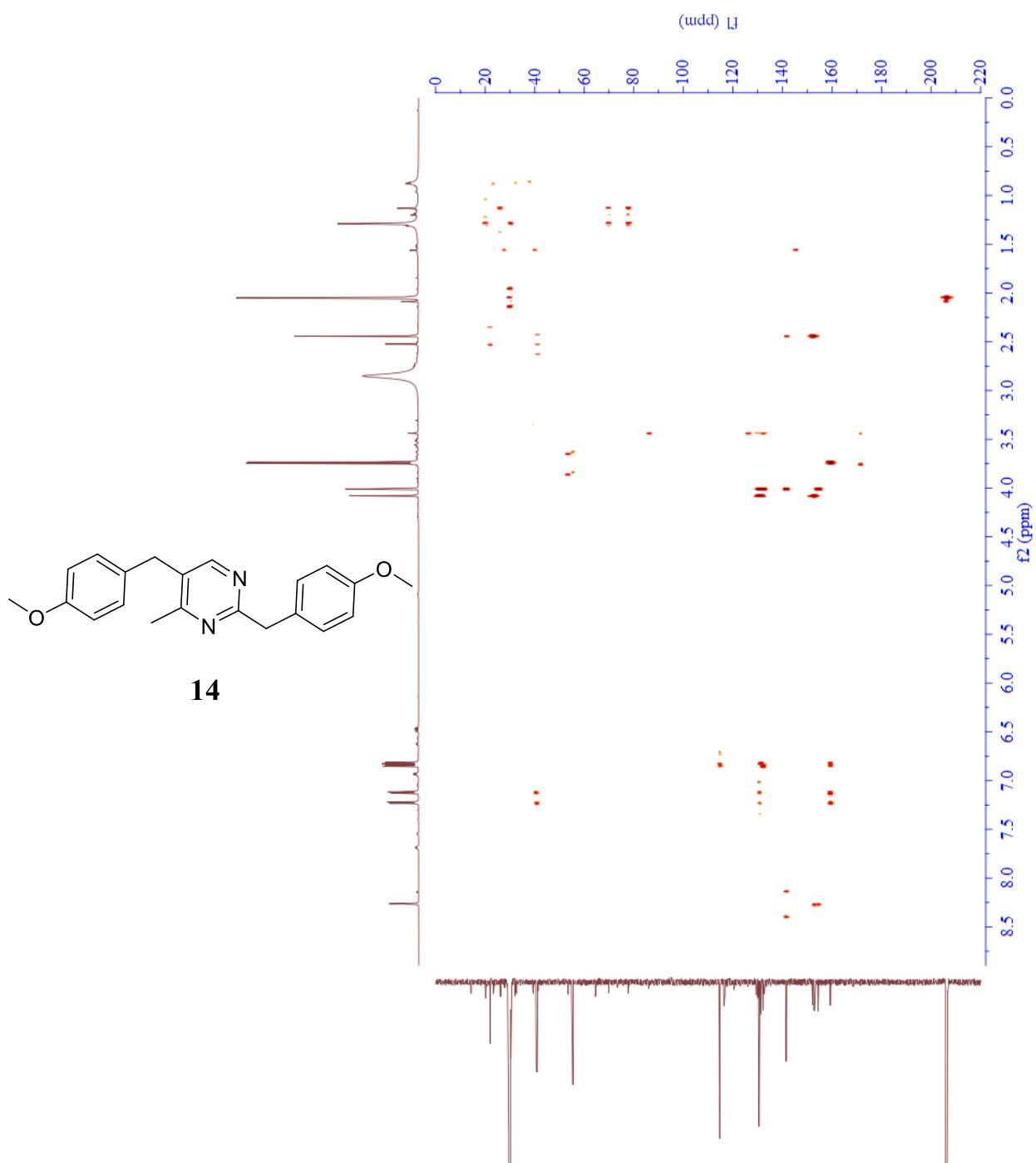


Figure S43. The ^1H - ^1H COSY spectrum of eurotiumin E (**14**) in CD_3COCD_3 .

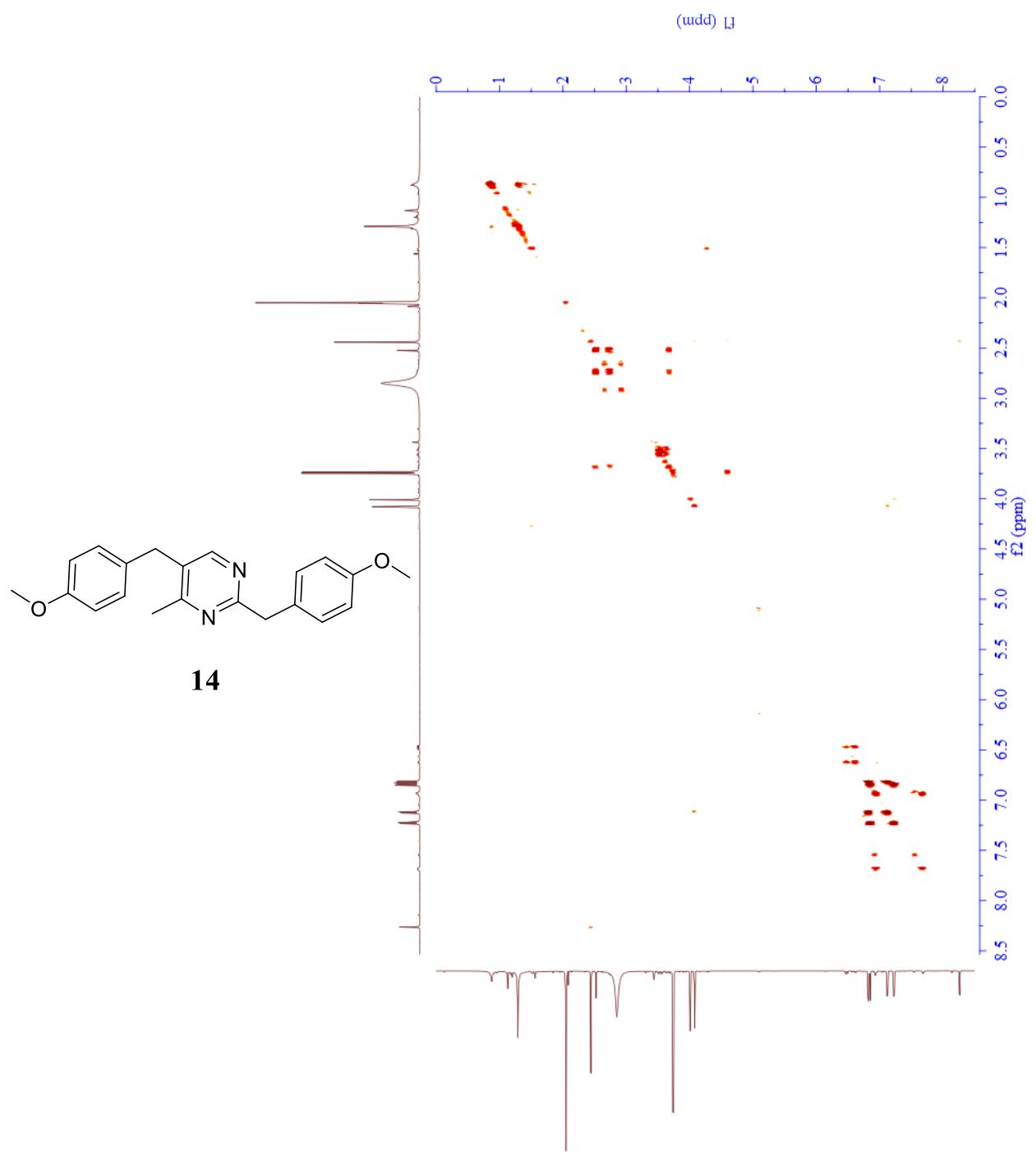
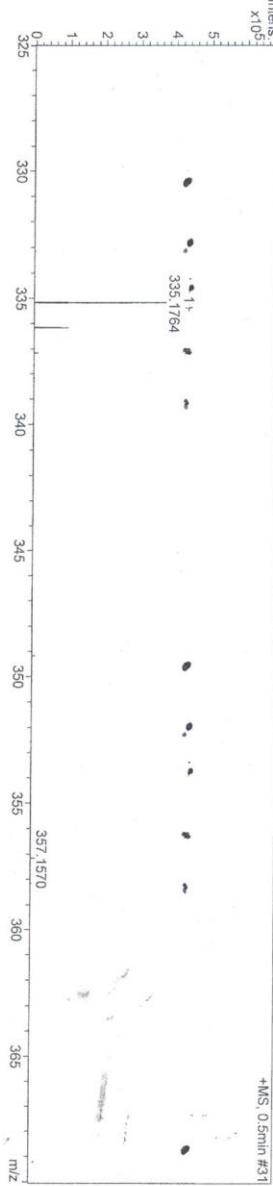


Figure S44. The HRESIMS spectrum of eurotinmin E (**14**).

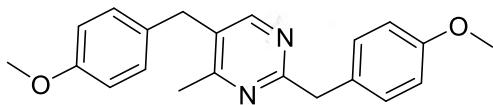
Mass Spectrum SmartFormula Report

Analysis Info		Acquisition Date	7/14/2017 10:05:06 AM
Analysis Name	D:\Data\MS\data\201707\zhongweimao_F425-46_pos_42_01_3239.d	Operator	SCSIO
Method	LC Direct Infusion pos. 70-500mz.m	Instrument	maxxis
Sample Name	zhongweimao_F425-46_pos	Comment	255552.00029

Acquisition Parameter		Intens.	+MS, 0.5min #31	
Source Type	ESI	Ion Polarity	Positive	
Focus	Active	Set Capillary	4500 V	
Scan Begin	70 m/z	Set End Plate Offset	-500 V	
Scan End	1500 m/z	Set Charging Voltage	0 V	
		Set Corona	0 nA	
			Set Nebulizer	0.4 Bar
			Set Dry Heater	180 °C
			Set Dry Gas	4.0 l/min
			Set Diver Valve	Waste
			Set APCI Heater	0 °C



Meas. m/z	#	Ion Formula	Score	m/z	err [ppm]	err [mDa]	mSigma	rdb	e⁻-Conf	N-Rule
335.176409	1	C21H23N2O2	100.00	335.175404	-3.0	-1.0	14.1	11.5	even	ok
357.156990	1	C21H22N2NaO2	100.00	357.157349	1.0	0.4	13.1	11.5	even	ok
691.322866	1	C42H44N4NaO4	100.00	691.325477	-0.3	-0.2	12.1	22.5	even	ok



14

zhongweimao_F425-46_pos_42_01_3239.d

Bruker Compass DataAnalysis 4.1

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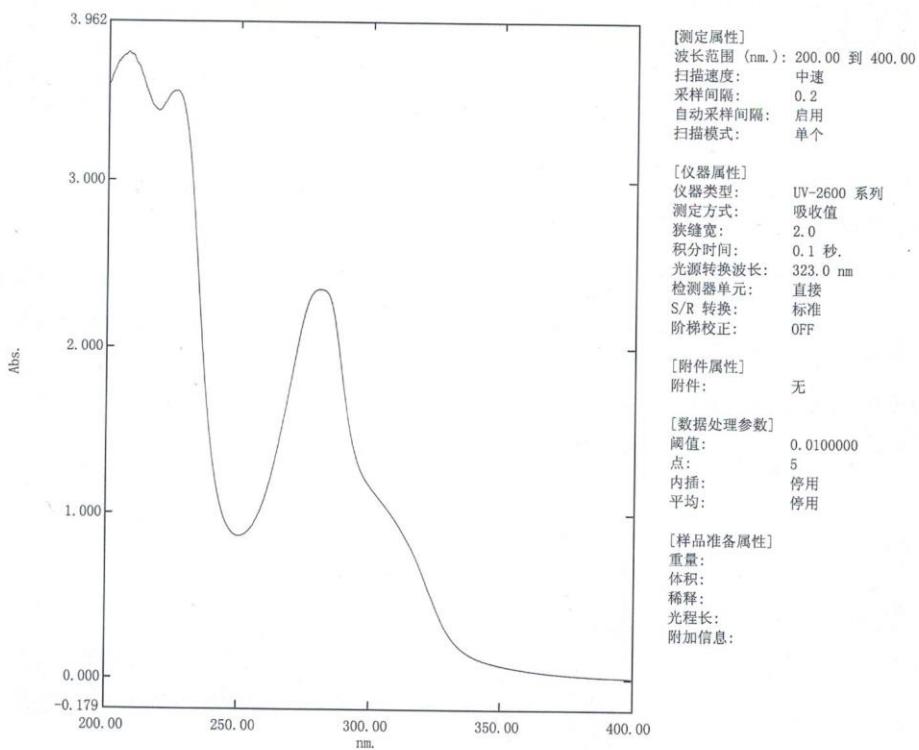
Page 1 of 1

Figure S45. The UV spectrum of eurotiumin E (14).

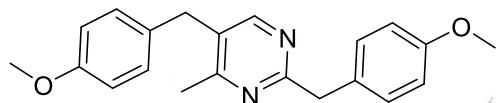
光谱峰值检测报告

2018-03-15 17:57:40

数据集: F452-46-1 - RawData



No.	P/V	波长(nm)	吸收值	描述
1	①	280.40	2.346	
2	①	226.20	3.541	
3	①	207.60	3.773	



14

MS and NMR data of compounds 5–13

Compound **5**: yellow solid, positive HRESIMS m/z 482.2775 [M + Na]⁺ (calcd for C₂₉H₃₇N₃NaO₂, 482.2778). ¹³C NMR (acetone-*d*₆, 175 MHz), δ_{C} : 144.4 (C-2), 104.8 (C-3), 127.6 (C-3a), 110.9 (C-4), 133.4 (C-5), 125.4 (C-6), 126.4 (C-7), 134.6 (C-7a), 116.8 (C-8), 125.1 (C-9), 160.3 (C-10), 52.3 (C-12), 166.7 (C-13), 40.1 (C-15), 146.1 (C-16), 112.4 (C-17), 27.9 (C-18/19), 20.8 (C-20), 35.1 (C-21), 123.0 (C-22), 131.9 (C-23), 25.9 (C-24), 17.9 (C-25), 32.6 (C-26), 123.4 (C-27), 133.2 (C-28), 25.9 (C-29), 17.9 (C-30).

Compound **6**: yellow solid, positive ESIMS m/z 414.4 [M + Na]⁺. ¹³C NMR (acetone-*d*₆, 175 MHz), δ_{C} : 144.3 (C-2), 105.0 (C-3), 125.4 (C-3a), 117.7 (C-4), 121.2 (C-5), 123.2 (C-6), 126.8 (C-7), 134.9 (C-7a), 110.7 (C-8), 127.4 (C-9), 160.2 (C-10), 52.2 (C-12), 166.9 (C-13), 40.1 (C-15), 146.1 (C-16), 112.4 (C-17), 27.9 (C-18/19), 20.7 (C-20), 28.9 (C-21), 123.2 (C-22), 133.4 (C-23), 25.9 (C-24), 17.9 (C-25).

Compound **7**: yellow solid, positive HRESIMS m/z 392.2344 [M + H]⁺ (calcd for C₂₄H₃₀N₃O₂, 392.2333). ¹³C NMR (acetone-*d*₆, 125 MHz), δ_{C} : 145.2 (C-2), 103.8 (C-3), 127.2 (C-3a), 118.6 (C-4), 134.0 (C-5), 123.1 (C-6), 112.3 (C-7), 134.7 (C-7a), 111.8 (C-8), 125.5 (C-9), 160.8 (C-10), 52.2 (C-12), 167.1 (C-13), 40.0 (C-15), 145.9 (C-16), 112.2 (C-17), 27.9 (C-18/19), 20.8 (C-20), 35.0 (C-21), 125.5 (C-22), 131.9 (C-23), 25.8 (C-24), 17.8 (C-25).

Compound **8**: red solid, positive HRESIMS m/z 460.2967 [M + H]⁺ (calcd for C₂₉H₃₈N₃O₂, 460.2959). ¹³C NMR (acetone-*d*₆, 175 MHz), δ_{C} : 142.7 (C-2), 103.0 (C-3), 127.6 (C-3a), 131.8 (C-4), 131.7 (C-5), 124.3 (C-6), 110.0 (C-7), 135.5 (C-7a), 113.4 (C-8), 130.2 (C-9), 159.3 (C-10), 52.2 (C-12), 166.8 (C-13), 39.8 (C-15), 146.4 (C-16), 111.7 (C-17), 27.5 (C-18/19), 21.2 (C-20), 28.7 (C-21), 127.6 (C-22), 131.0 (C-23), 25.8 (C-24), 18.2 (C-25), 31.9 (C-26), 127.6 (C-27), 131.1 (C-28), 25.9 (C-29), 17.9 (C-30).

Compound **9**: yellow solid, negative ESIMS m/z 338.2 [M - H]⁻. ¹³C NMR (dimethyl sulfoxide-*d*₆, 175 MHz), δ_{C} : 144.2 (C-2), 103.8 (C-3), 126.2 (C-3a), 111.5 (C-4), 119.5 (C-5), 120.7 (C-6), 119.3 (C-7), 135.1 (C-7a), 111.3 (C-8), 125.1 (C-9), 165.8 (C-10), 79.1 (C-12), 161.4 (C-13), 39.1 (C-15), 145.2 (C-16), 111.7 (C-17), 27.8 (C-18), 27.5 (C-19), 24.7 (C-20).

Compound **10**: yellow oil, positive HRESIMS m/z 322.1560 [M + H]⁺ (calcd for C₁₉H₂₀N₃O₂, 322.1550). ¹³C NMR (acetone-*d*₆, 125 MHz), δ_{C} : 145.3 (C-2), 104.2 (C-3), 127.1 (C-3a), 119.7 (C-4), 120.9 (C-5), 122.3 (C-6), 112.5 (C-7), 136.3 (C-7a), 112.2 (C-8), 126.3 (C-9), 157.8 (C-10), 136.1 (C-12), 156.6 (C-13), 40.1 (C-15), 145.9 (C-16), 112.4 (C-17), 27.9 (C-18/19), 100.1 (C-20).

Compound **11**: yellow oil, positive HRESIMS m/z 392.1972 [M + H]⁺ (calcd for C₂₃H₂₆N₃O₃,

392.1969). ^{13}C NMR (acetone- d_6 , 125 MHz) , δ_{C} : 146.9 (C-2), 104.3 (C-3), 127.3 (C-3a), 119.2 (C-4), 134.8 (C-5), 123.5 (C-6), 112.5 (C-7), 135.0 (C-7a), 117.3 (C-8), 124.6 (C-9), 157.5 (C-10), 152.6 (C-12), 160.6 (C-13), 40.2 (C-15), 145.7 (C-16), 112.7 (C-17), 28.1 (C-18/19), 35.2 (C-21), 125.4 (C-22), 131.9 (C-23), 25.8 (C-24), 17.9 (C-25).

Compound **12**: yellow oil, positive HRESIMS m/z 462.3121 [M + H] $^+$ (calcd for $\text{C}_{29}\text{H}_{40}\text{N}_3\text{O}_2$, 462.3115). ^{13}C NMR (acetone- d_6 , 125 MHz) , δ_{C} : 141.5 (C-2), 104.2 (C-3), 129.1 (C-3a), 115.2 (C-4), 134.0 (C-5), 123.0 (C-6), 123.5 (C-7), 132.4 (C-7a), 29.7 (C-8), 54.7 (C-9), 168.8 (C-10), 50.9 (C-12), 168.0 (C-13), 39.1 (C-15), 145.9 (C-16), 112.5 (C-17), 28.1 (C-18), 28.0 (C-19), 20.0 (C-20), 34.7 (C-21), 124.6 (C-22), 131.7 (C-23), 25.8 (C-24), 18.0 (C-25), 31.5 (C-26), 123.0 (C-27), 133.0 (C-28), 25.9 (C-29), 18.0 (C-30).

Compound **13**: white solid, positive ESIMS m/z 245 [M + H] $^+$. ^{13}C NMR (acetone- d_6 , 125 MHz) , δ_{C} : 166.9 (C-1), 45.9 (C-3), 22.8 (C-4), 29.3 (C-5), 60.0 (C-6), 170.9 (C-7), 57.6 (C-9), 38.1 (C-10), 137.4 (C-1'), 131.0 (C-2'/6'), 131.0 (C-3'/5'), 128.0 (C-4').