

# An unexpected oxidative opening of the C-ring in Luotonin A and derivatives

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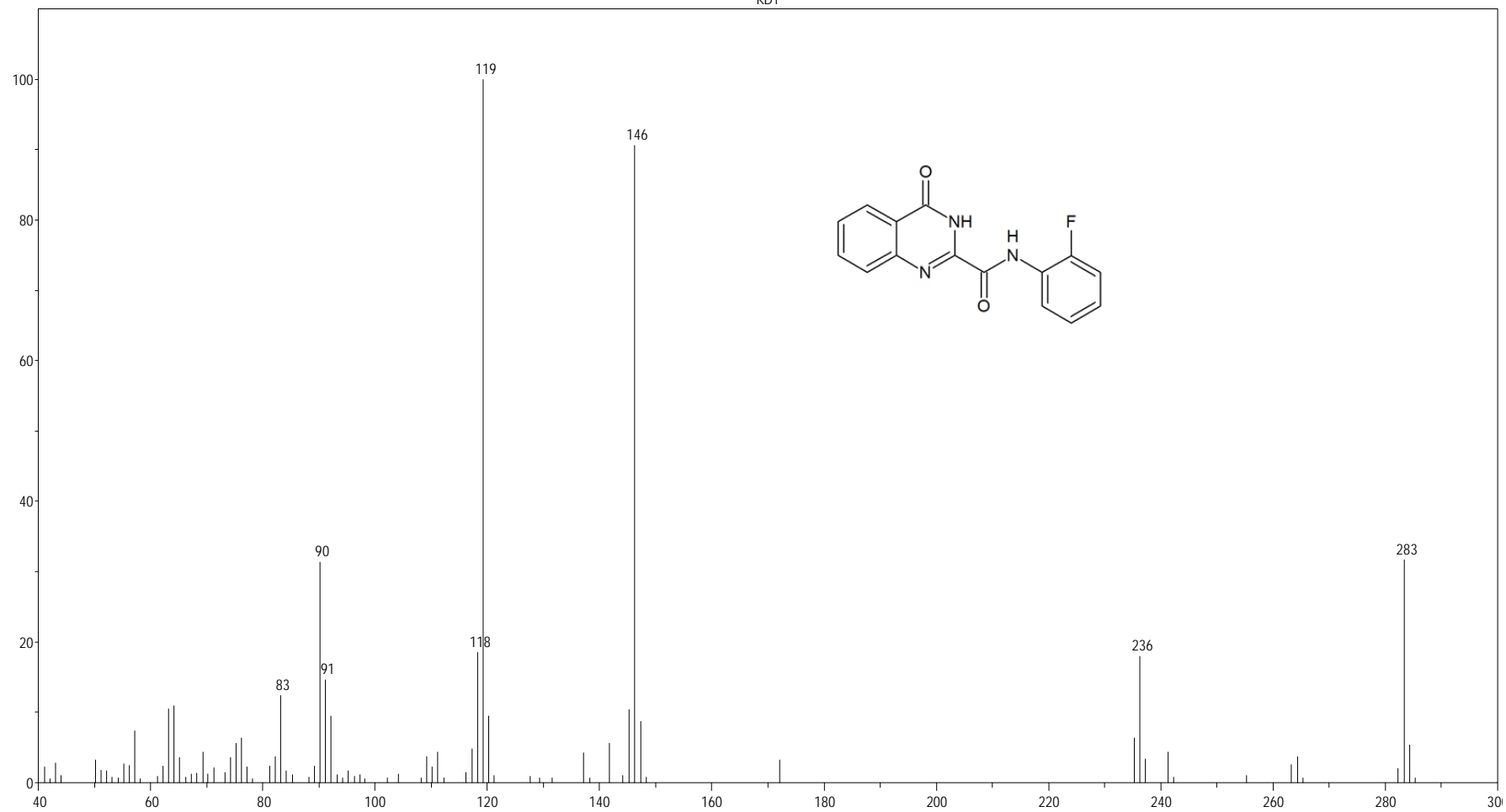
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## Supplementary Material

KD1



**Figure S1.** EI-MS of *N*-(2-fluorophenyl)-4-oxo-3,4-dihydroquinazoline-2-carboxamide (**2**)

KD1; N-(2-Fluorophenyl)-4-oxo-3,4-dihydroquinazoline-2-carboxamide / DMSO

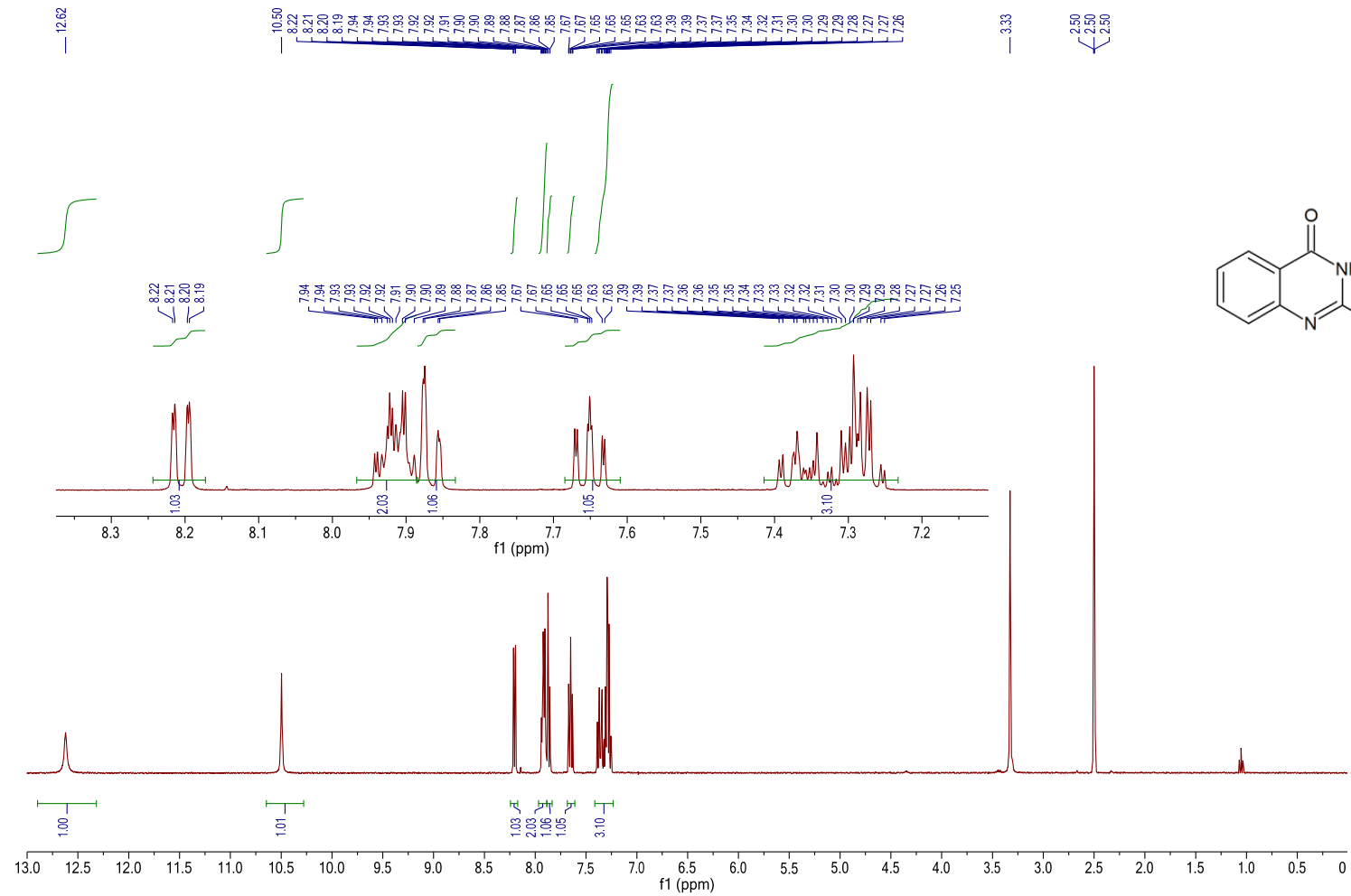


Figure S2. <sup>1</sup>H-NMR spectrum of N-(2-fluorophenyl)-4-oxo-3,4-dihydroquinazoline-2-carboxamide (2)

KD1; N-(2-Fluorophenyl)-4-oxo-3,4-dihydroquinazoline-2-carboxamide / DMSO C13APT

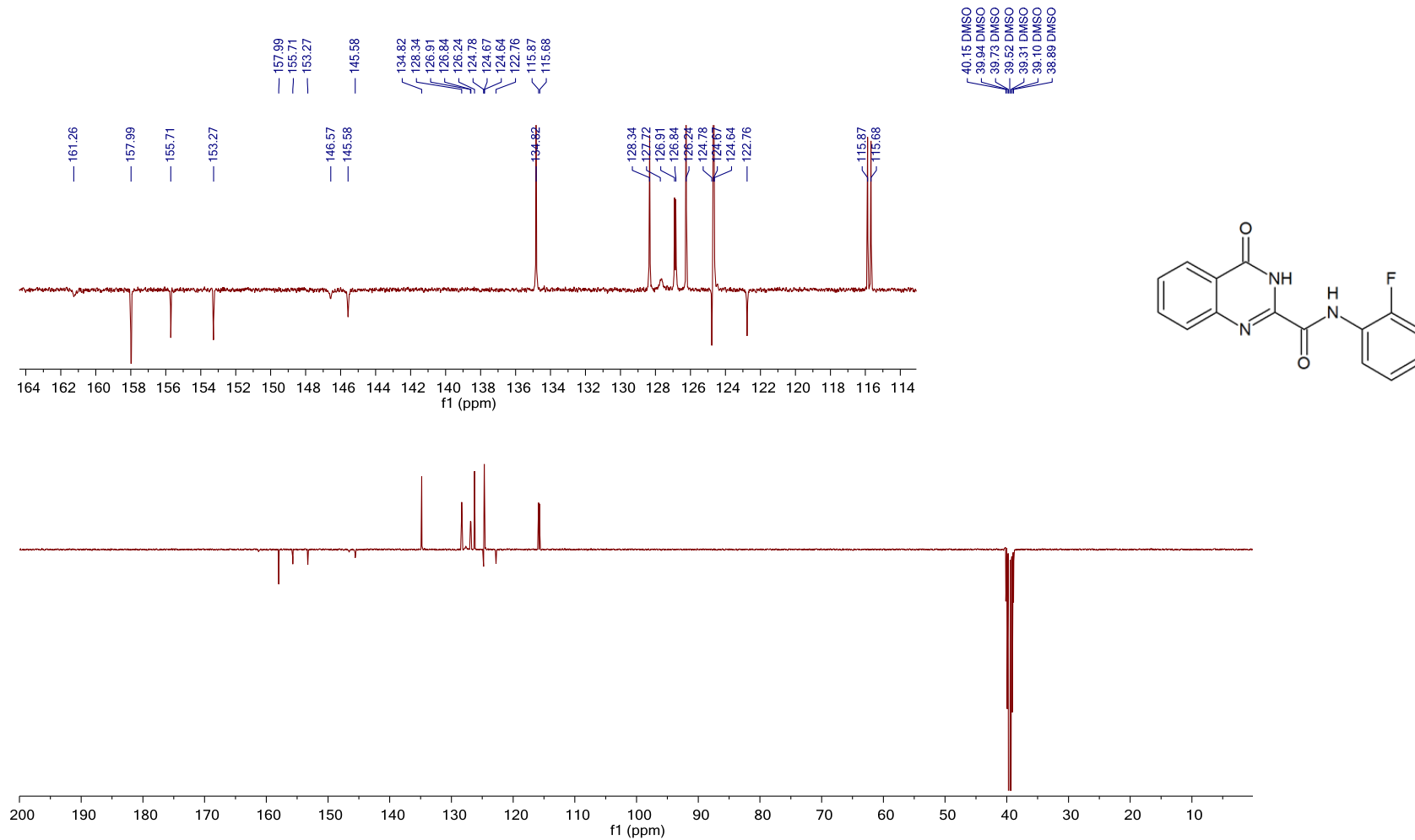
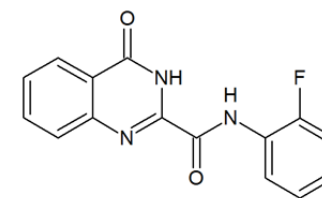
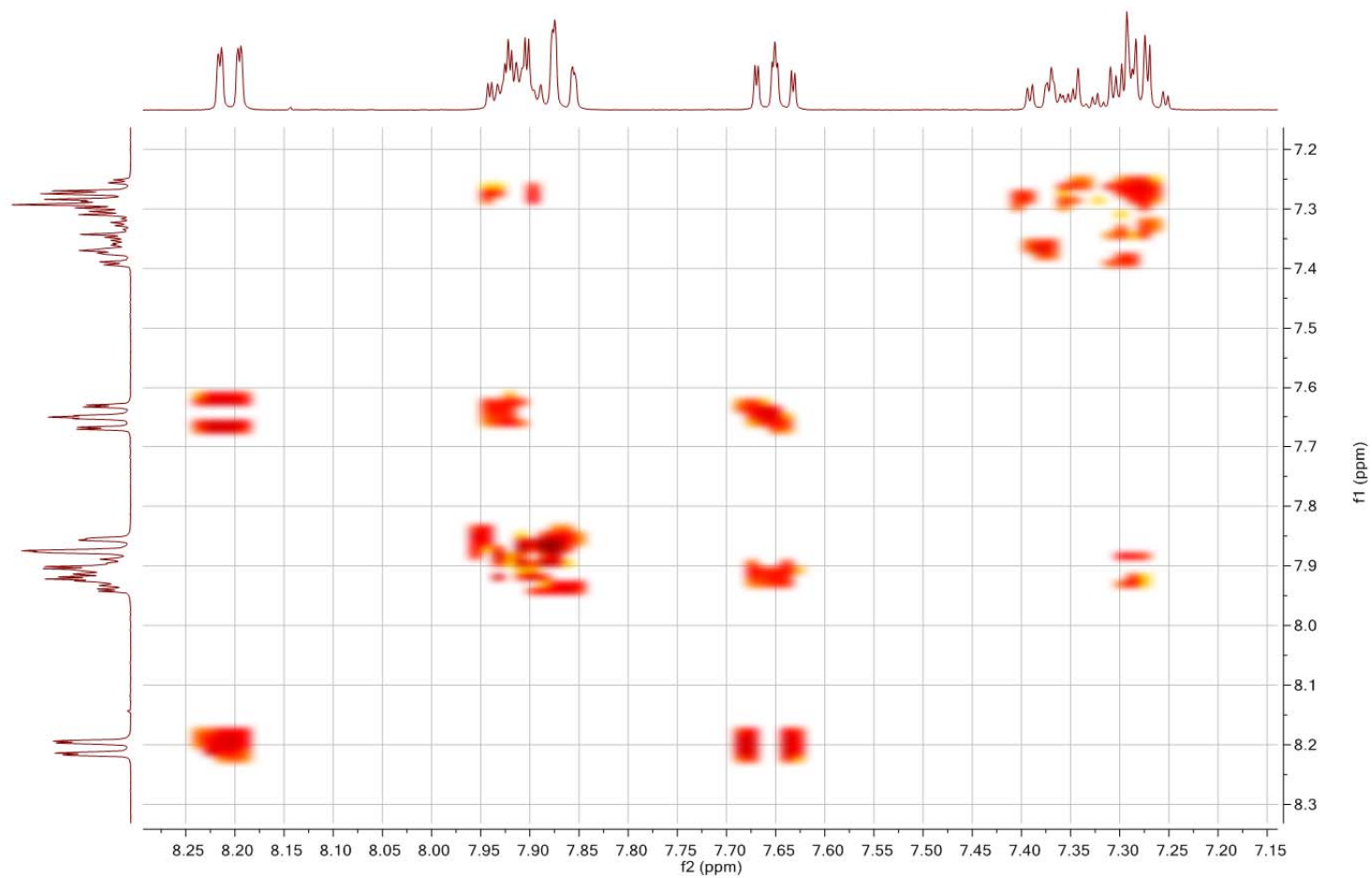


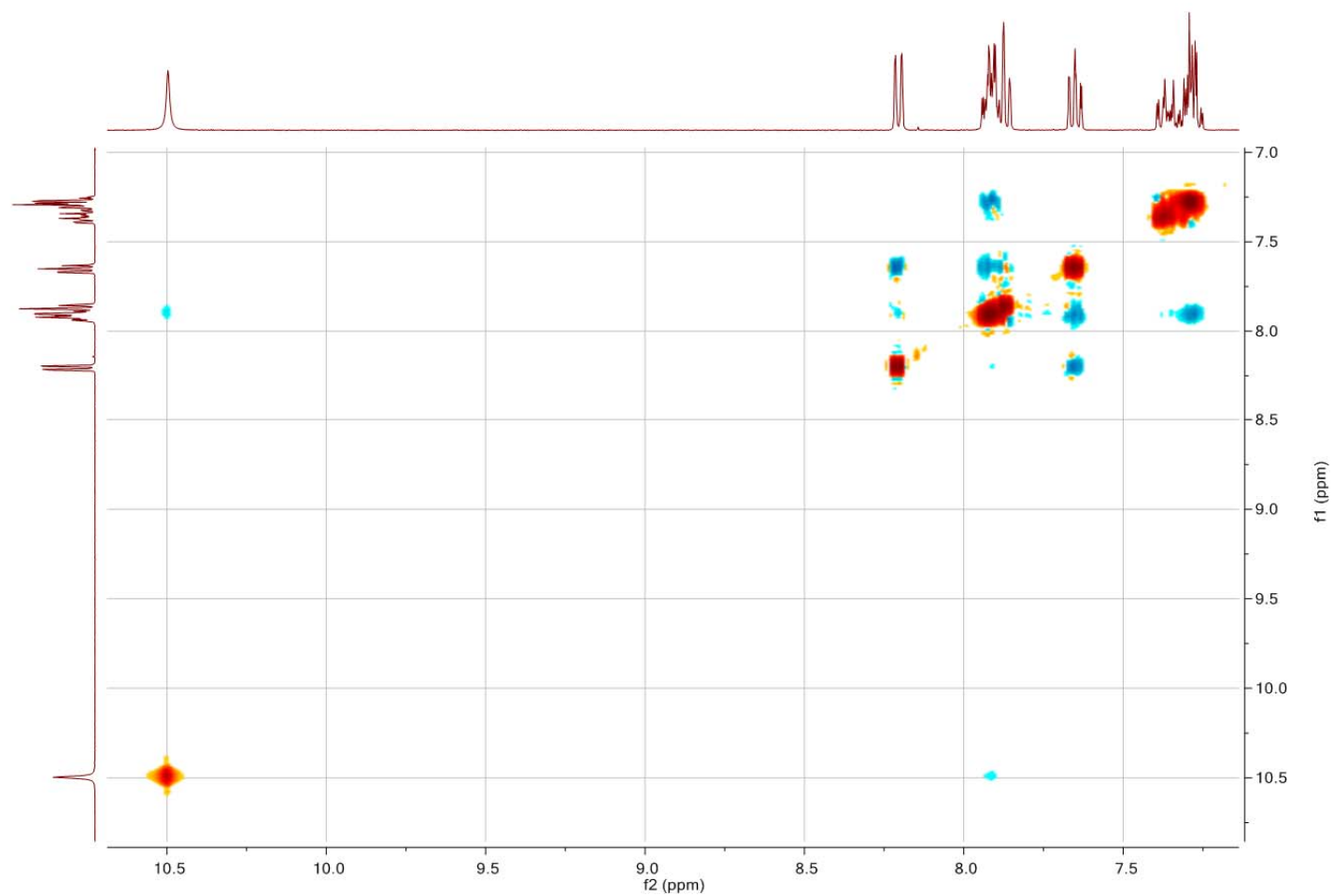
Figure S3. <sup>13</sup>C-NMR spectrum of N-(2-fluorophenyl)-4-oxo-3,4-dihydroquinazoline-2-carboxamide (2)

KD1; N-(2-Fluorophenyl)-4-oxo-3,4-dihydroquinazoline-2-carboxamide / DMSO COSY



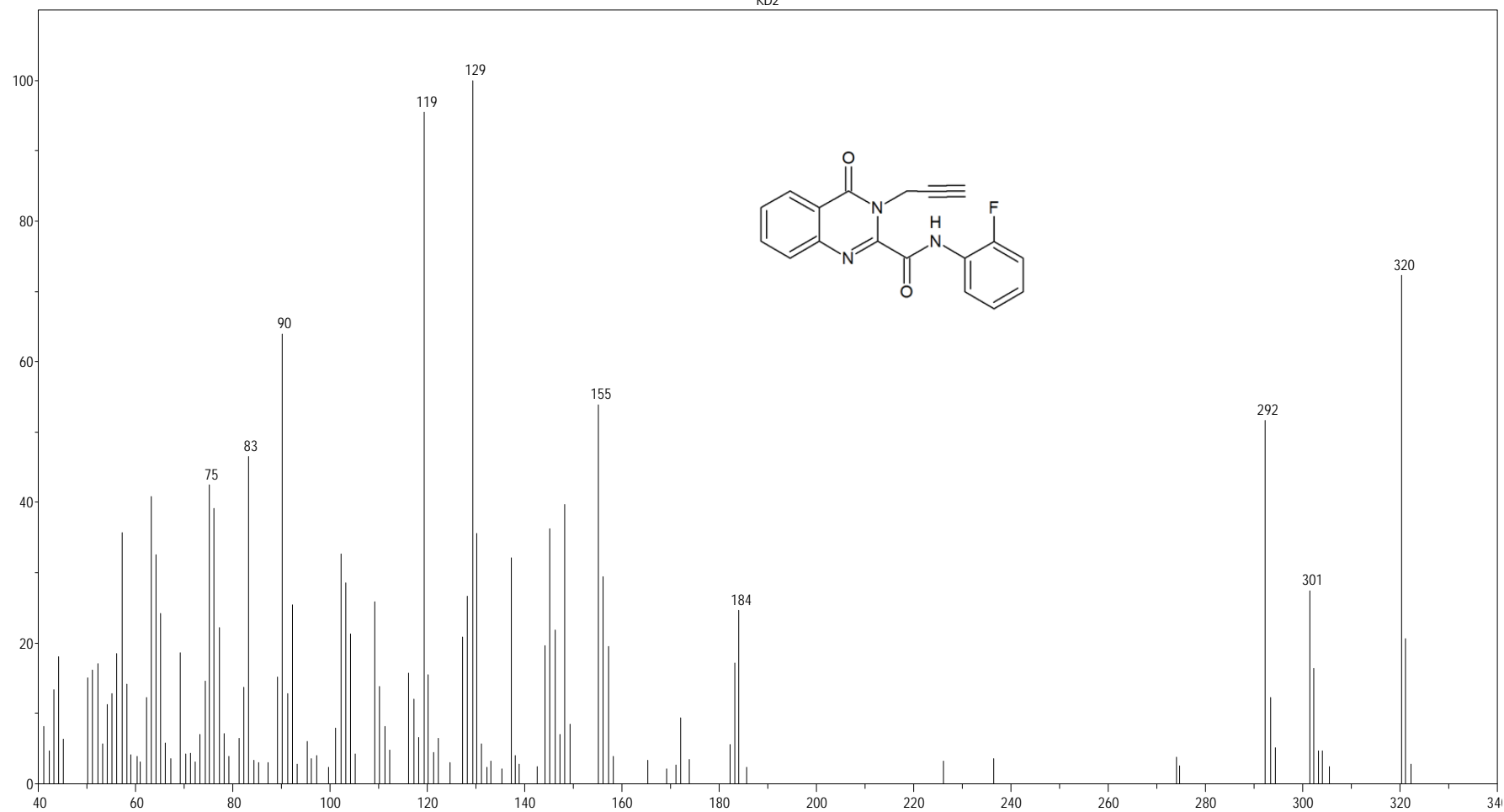
**Figure S4.** COSY spectrum of *N*-(2-fluorophenyl)-4-oxo-3,4-dihydroquinazoline-2-carboxamide (2)

KD1; N-(2-Fluorophenyl)-4-oxo-3,4-dihydroquinazoline-2-carboxamide / DMSO NOESY



**Figure S5.** NOESY spectrum of N-(2-fluorophenyl)-4-oxo-3,4-dihydroquinazoline-2-carboxamide (2)

KD2



**Figure S6.** EI-MS of *N*-(2-fluorophenyl)-4-oxo-3-(prop-2-yn-1-yl)-3,4-dihydroquinazoline-2-carboxamide (**3**)

KD2; N-(2-Fluorophenyl)-4-oxo-3-(prop-2-yn-1-yl)-3,4-dihydroquinazoline-2-carboxamide / CDCl<sub>3</sub> 1H

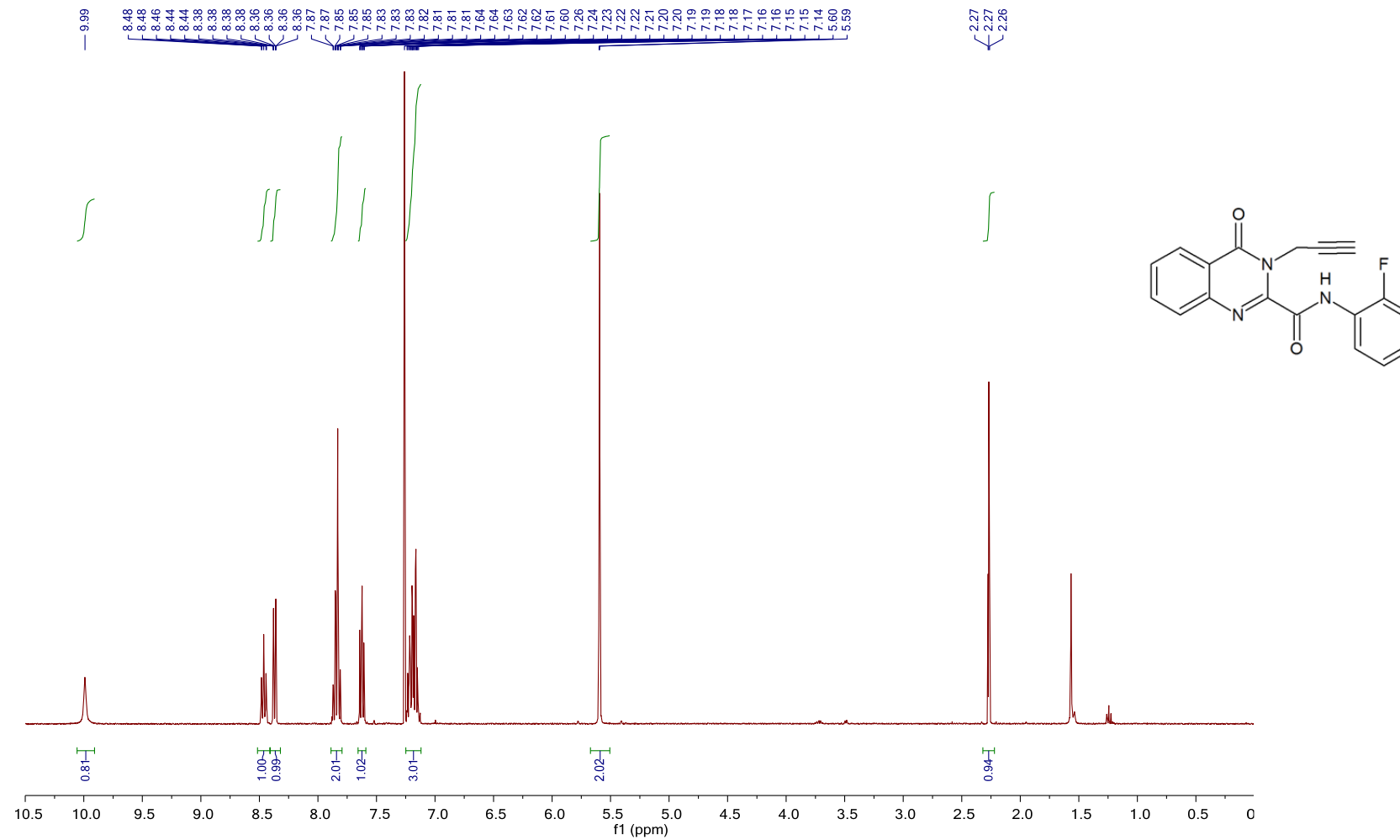
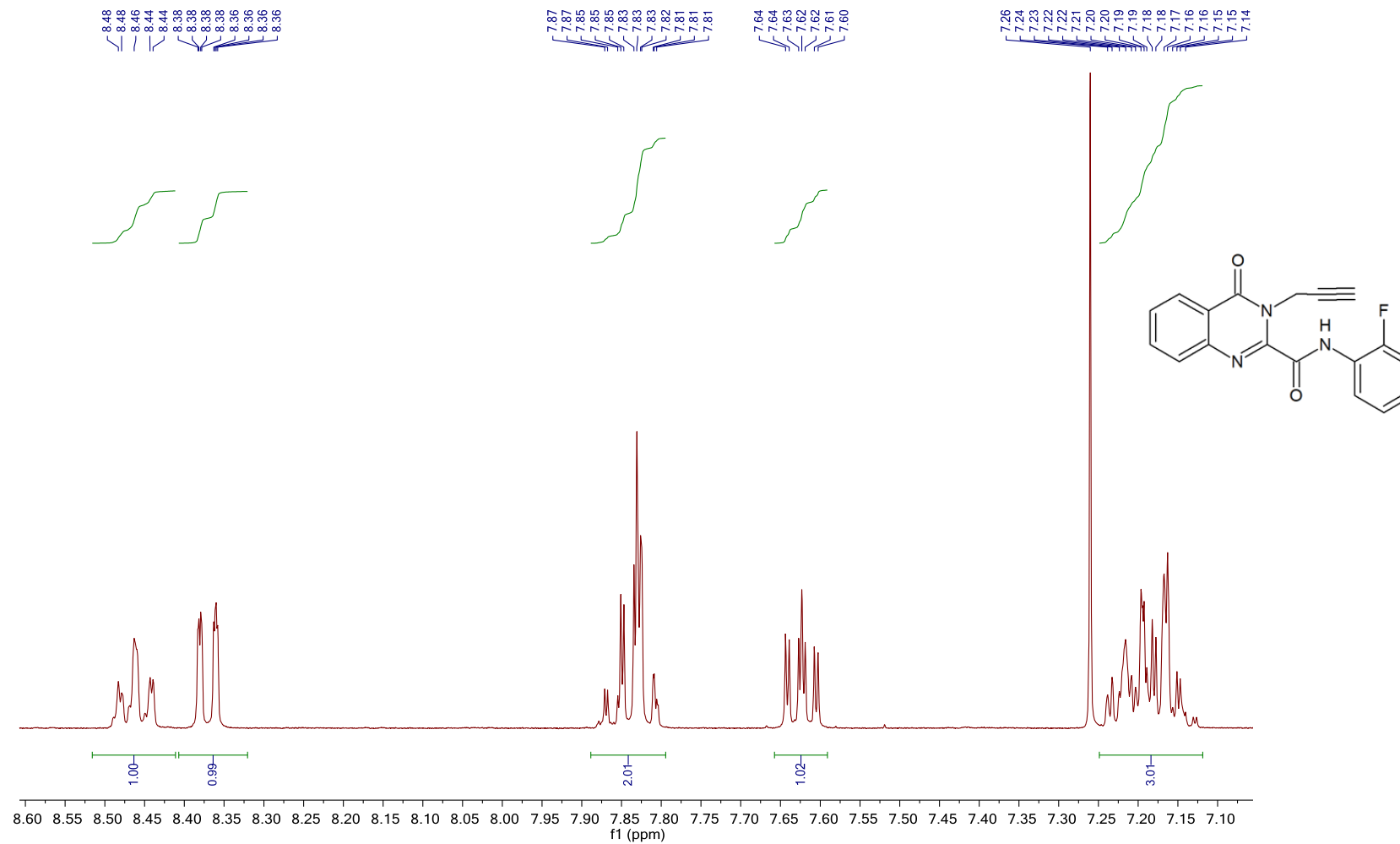


Figure S7. <sup>1</sup>H-NMR spectrum of N-(2-fluorophenyl)-4-oxo-3-(prop-2-yn-1-yl)-3,4-dihydroquinazoline-2-carboxamide (3)

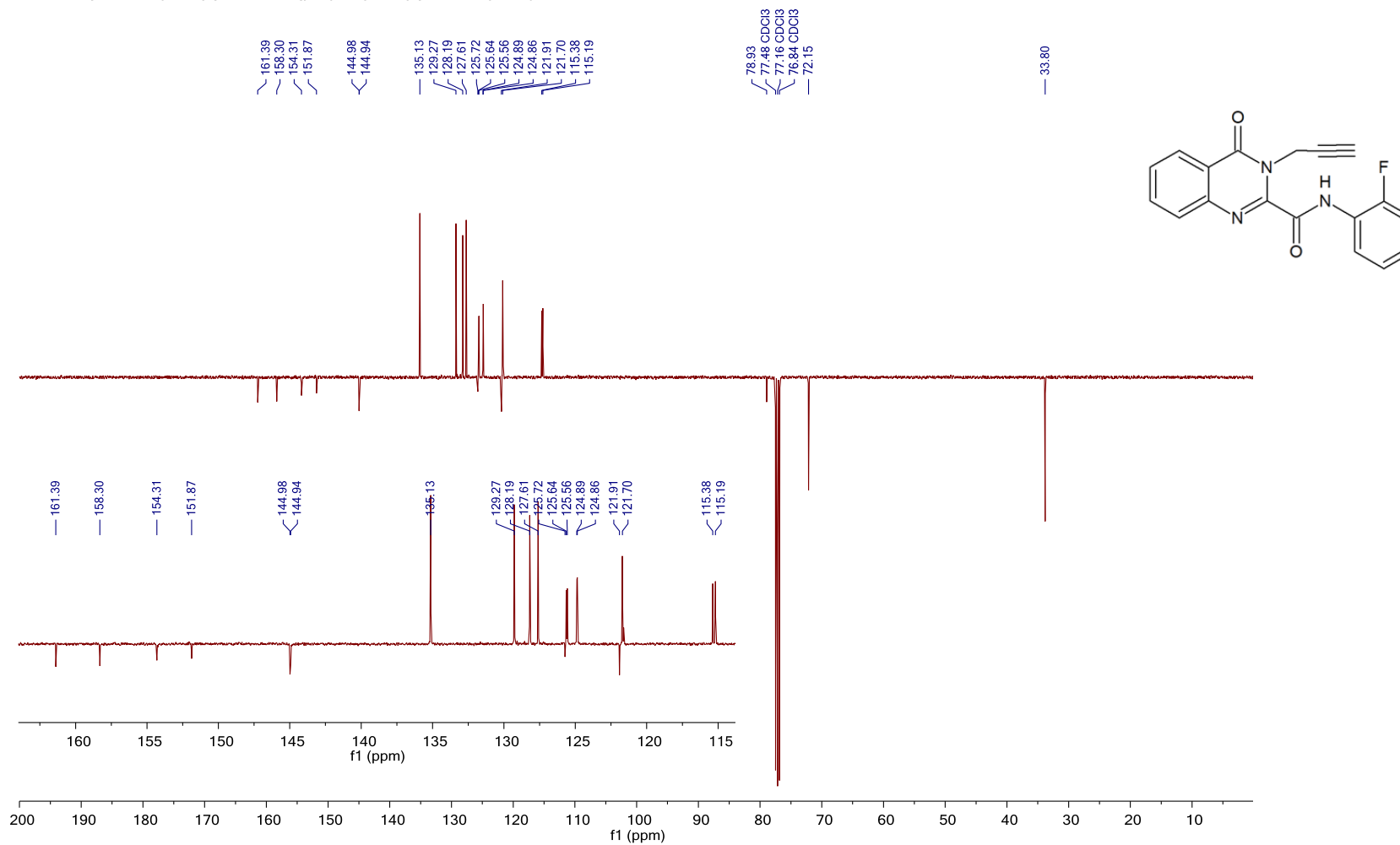


KD2; N-(2-Fluorophenyl)-4-oxo-3-(prop-2-yn-1-yl)-3,4-dihydroquinazoline-2-carboxamide / CDCl<sub>3</sub> 1H



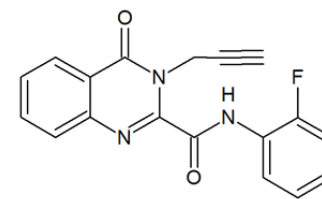
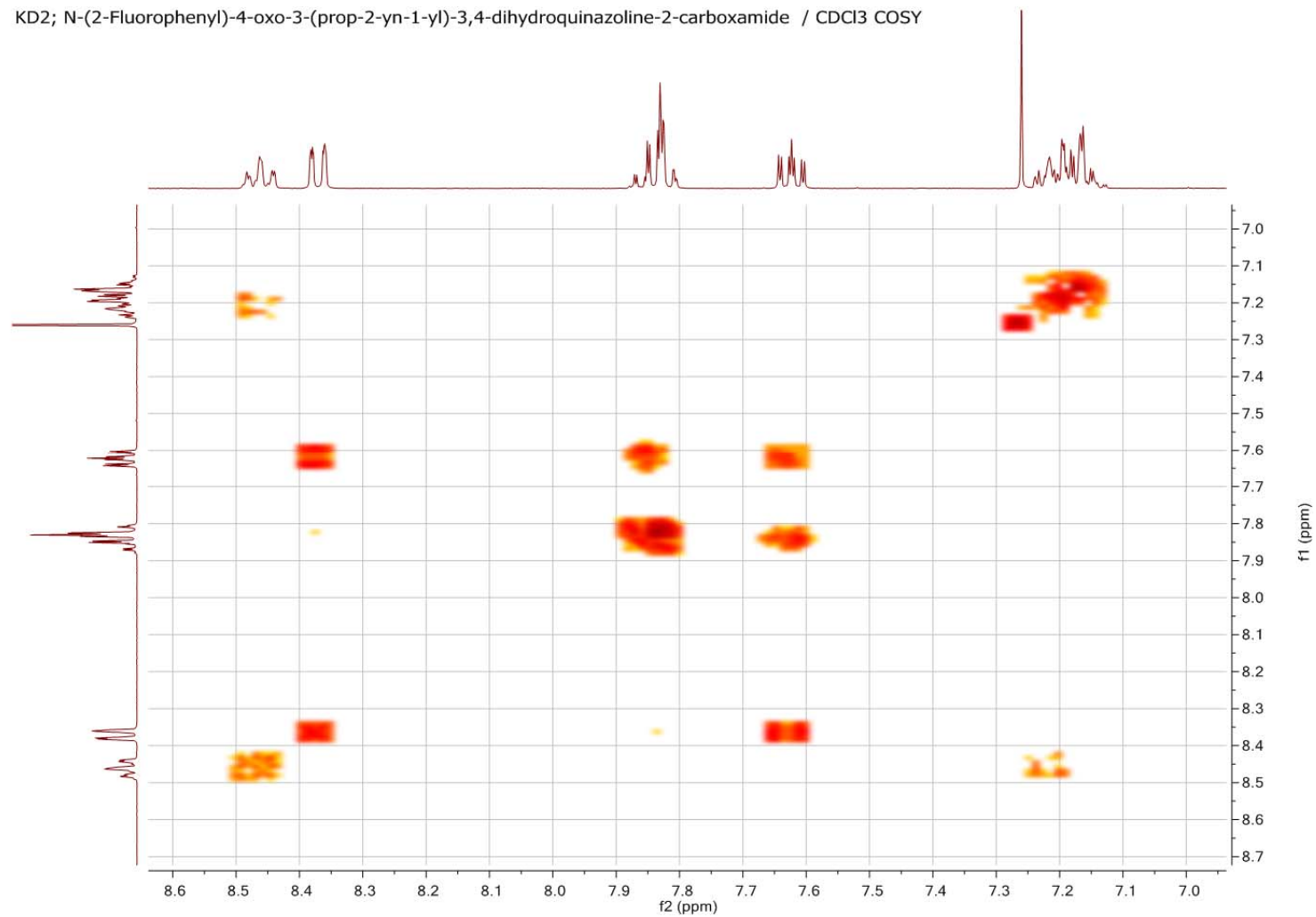
**Figure S8.** <sup>1</sup>H-NMR spectrum of N-(2-fluorophenyl)-4-oxo-3-(prop-2-yn-1-yl)-3,4-dihydroquinazoline-2-carboxamide (3)

KD2; N-(2-Fluorophenyl)-4-oxo-3-(prop-2-yn-1-yl)-3,4-dihydroquinazoline-2-carboxamide / CDCl<sub>3</sub> C13APT



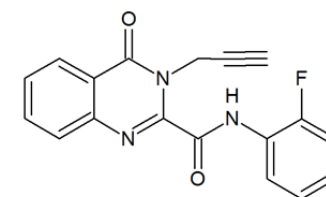
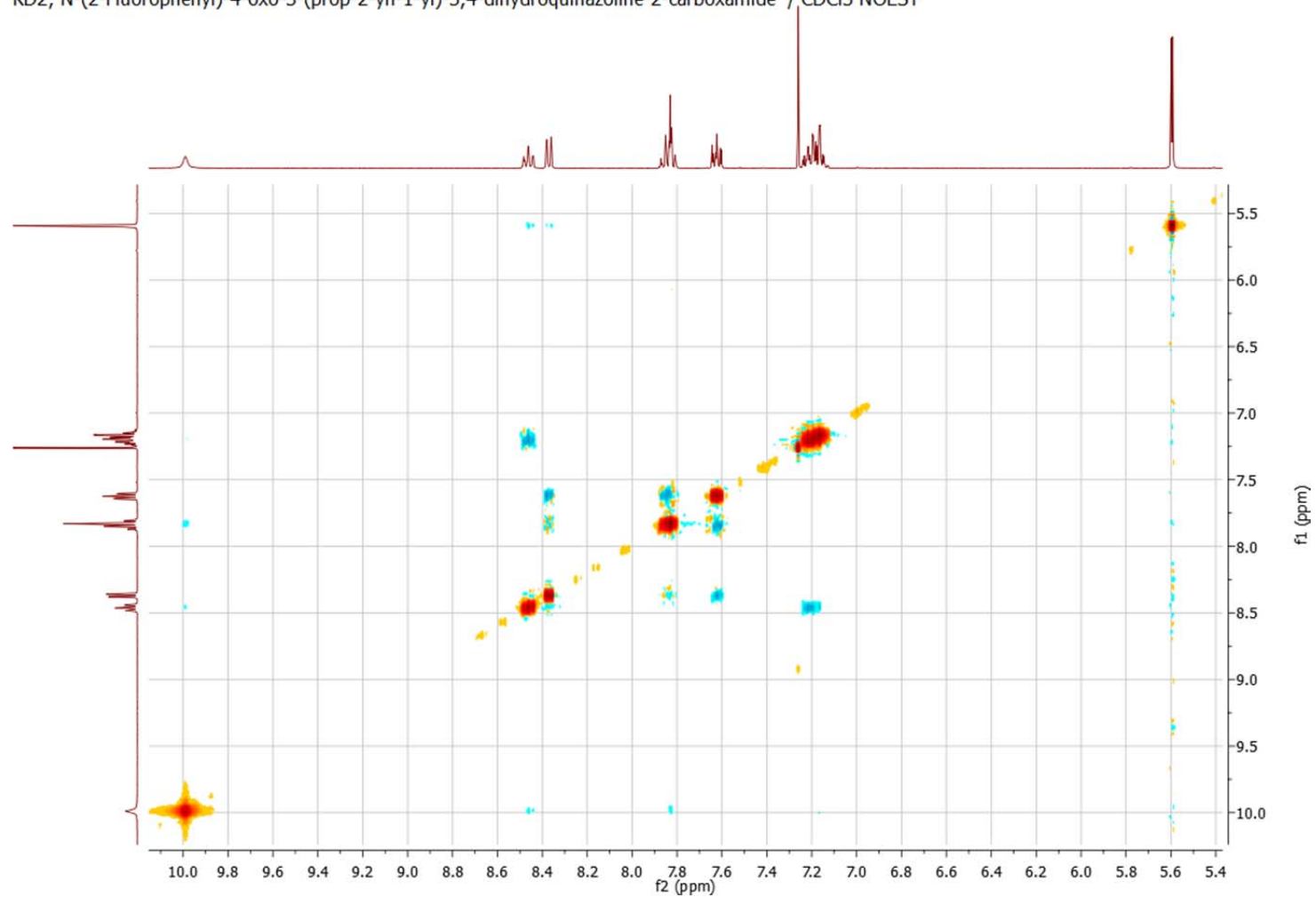
**Figure S9.** <sup>13</sup>C-NMR spectrum of N-(2-fluorophenyl)-4-oxo-3-(prop-2-yn-1-yl)-3,4-dihydroquinazoline-2-carboxamide (3)

KD2; N-(2-Fluorophenyl)-4-oxo-3-(prop-2-yn-1-yl)-3,4-dihydroquinazoline-2-carboxamide / CDCl<sub>3</sub> COSY



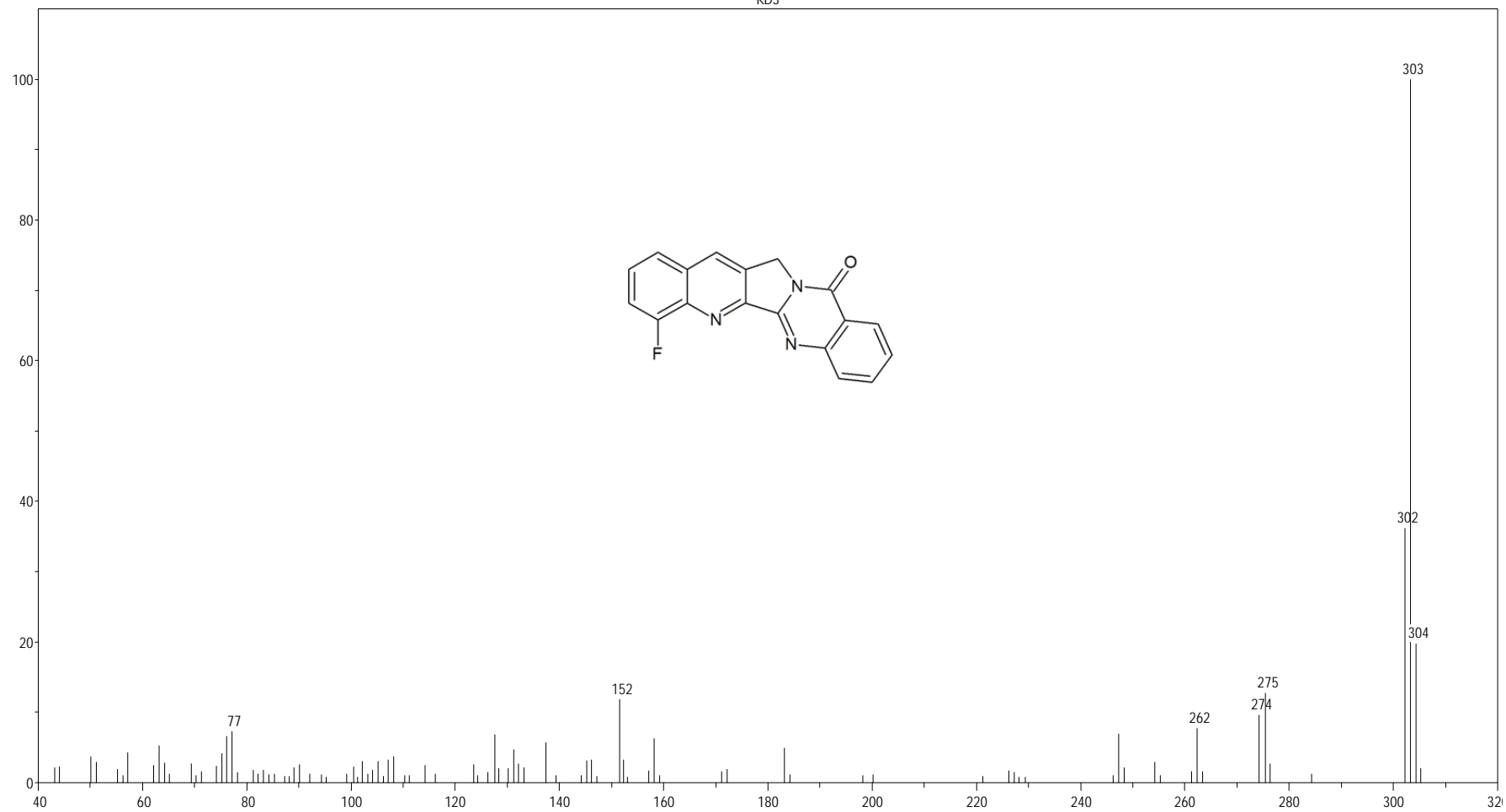
**Figure S10.** COSY spectrum of *N*-(2-fluorophenyl)-4-oxo-3-(prop-2-yn-1-yl)-3,4-dihydroquinazoline-2-carboxamide (**3**)

KD2; N-(2-Fluorophenyl)-4-oxo-3-(prop-2-yn-1-yl)-3,4-dihydroquinazoline-2-carboxamide / CDCl3 NOESY



**Figure S11.** NOESY spectrum of *N*-(2-fluorophenyl)-4-oxo-3-(prop-2-yn-1-yl)-3,4-dihydroquinazoline-2-carboxamide (3)

KD3



**Figure S12.** EI-MS of 4-fluoroquinolino[2',3':3,4]pyrrolo[2,1-b]quinazolin-11(13H)-one (**4**)

KD3; 4-Fluoroquinolino[2',3':3,4]pyrrolo[2,1-b]quinazolin-11(13H)-one (12-Fluoro-Luotonin A) / CDCl<sub>3</sub> 1H

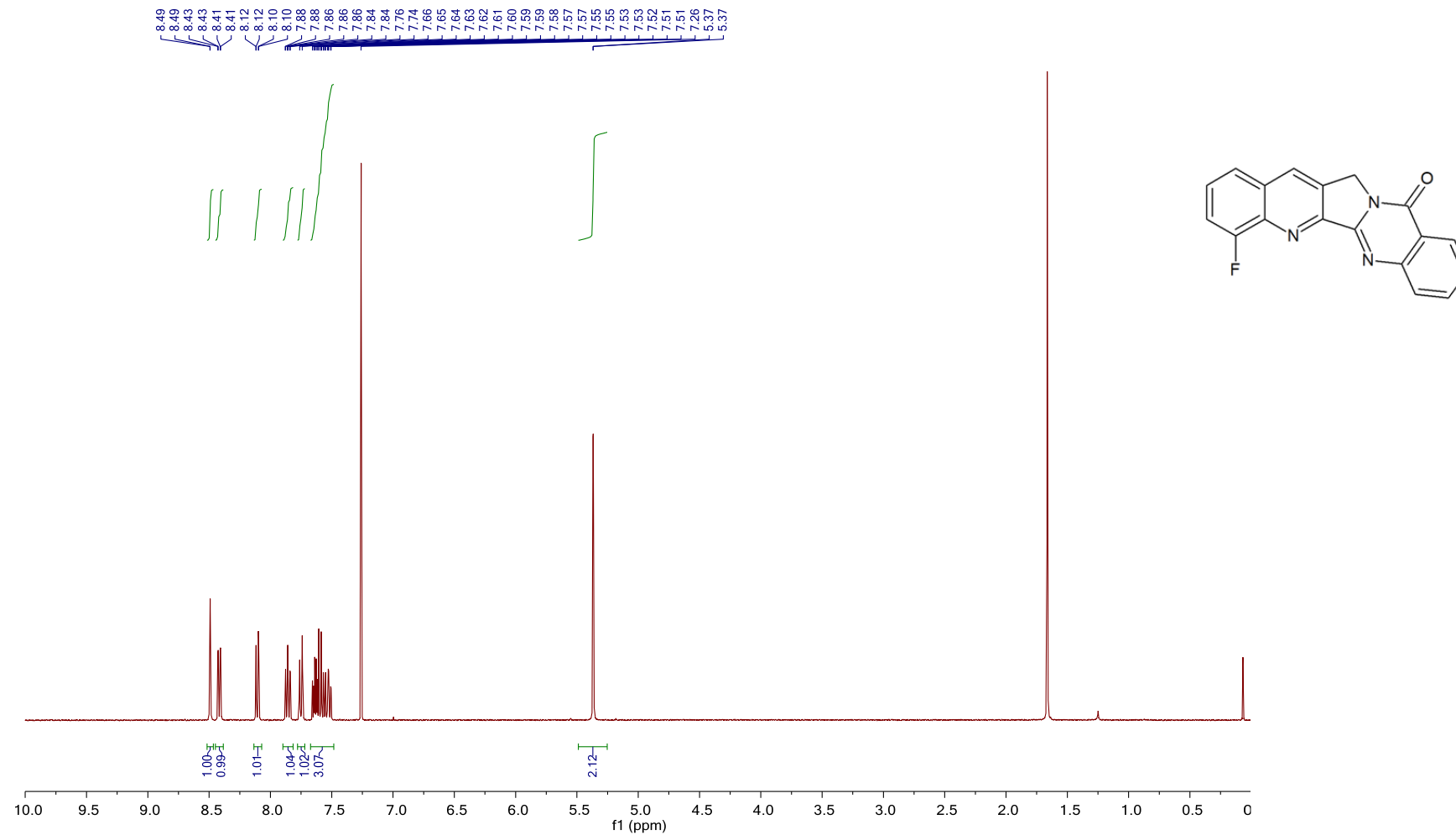


Figure S13. <sup>1</sup>H-NMR spectrum of 4-fluoroquinolino[2',3':3,4]pyrrolo[2,1-b]quinazolin-11(13H)-one (4)

KD3; 4-Fluoroquinolino[2',3':3,4]pyrrolo[2,1-b]quinazolin-11(13H)-one (12-Fluoro-Luotonin A) / CDCl<sub>3</sub> 1H

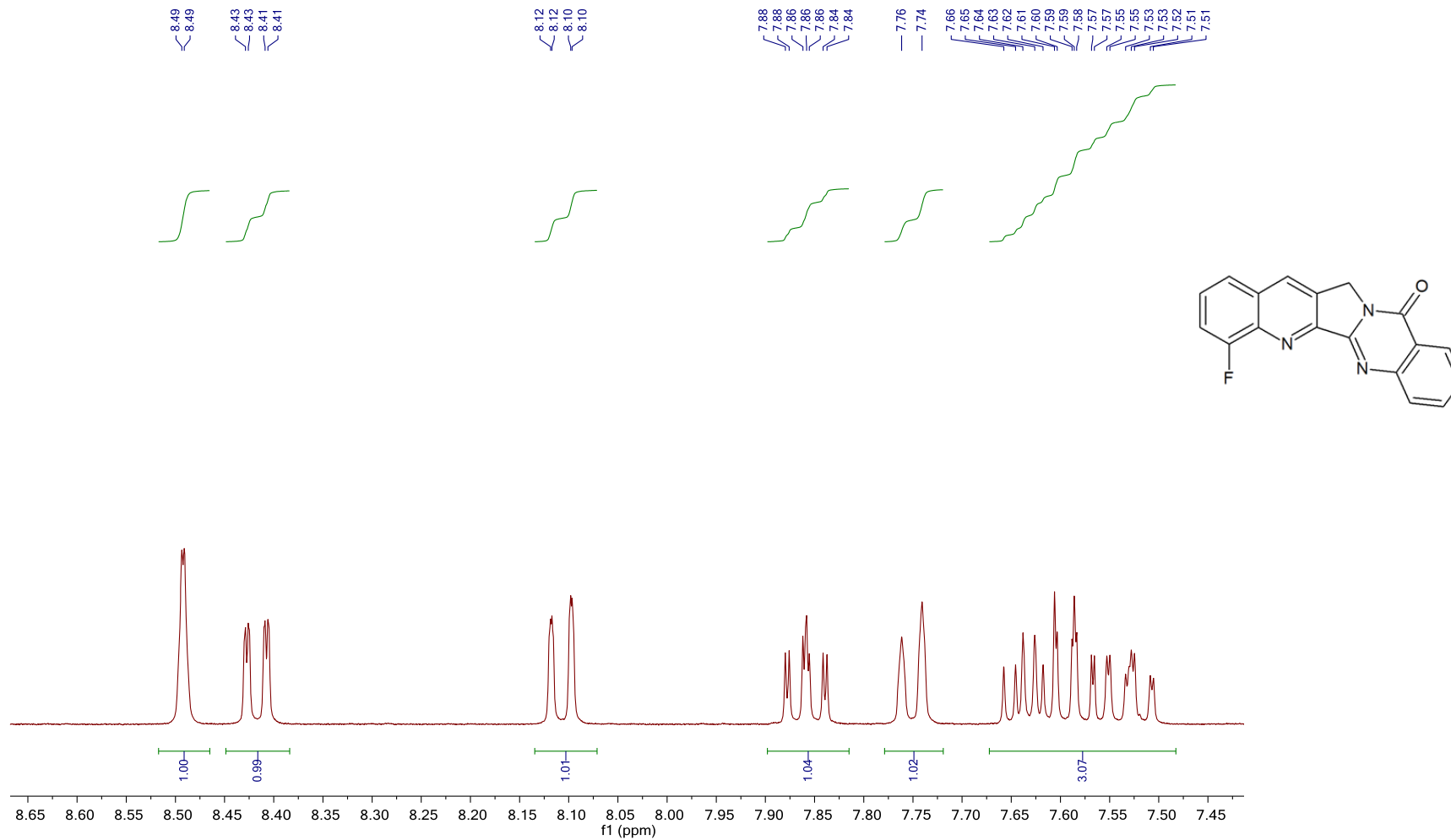


Figure S14. <sup>1</sup>H-NMR spectrum of 4-fluoroquinolino[2',3':3,4]pyrrolo[2,1-b]quinazolin-11(13H)-one (4)

KD3; 4-Fluoroquinolino[2',3':3,4]pyrrolo[2,1-b]quinazolin-11(13H)-one (12-Fluoro-Luotonin A) CDCl<sub>3</sub> C13APT

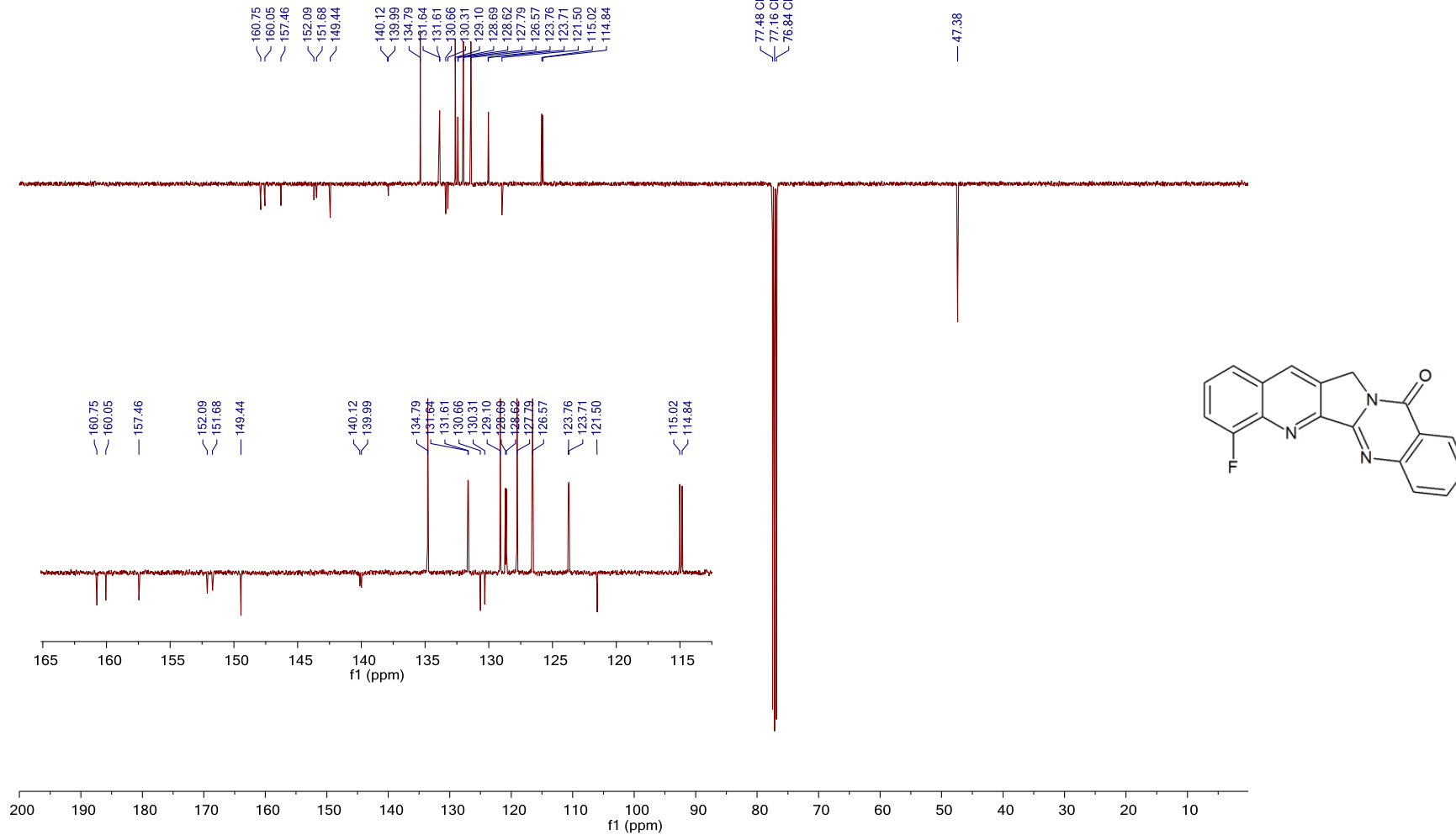


Figure S15. <sup>13</sup>C-NMR spectrum of 4-fluoroquinolino[2',3':3,4]pyrrolo[2,1-b]quinazolin-11(13H)-one (4)



KD3; 4-Fluoroquinolino[2',3':3,4]pyrrolo[2,1-b]quinazolin-11(13H)-one (12-Fluoro-Luotonin A) / CDCl<sub>3</sub> COSY

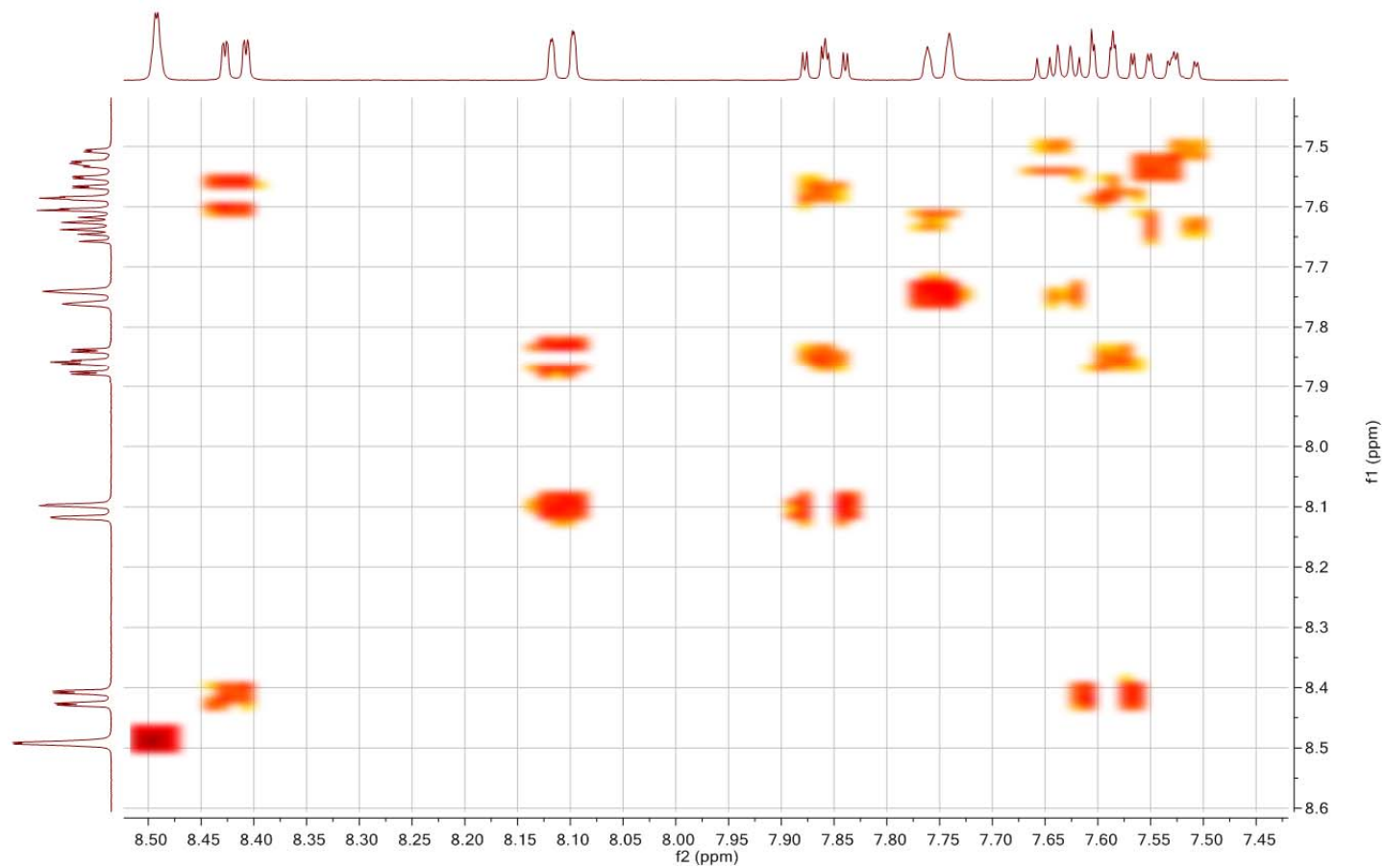


Figure S16. COSY spectrum of 4-fluoroquinolino[2',3':3,4]pyrrolo[2,1-b]quinazolin-11(13H)-one (4)

KD3; 4-Fluoroquinolino[2',3':3,4]pyrrolo[2,1-b]quinazolin-11(13H)-one (12-Fluoro-Luotonin A) / CDCl<sub>3</sub> NOESY

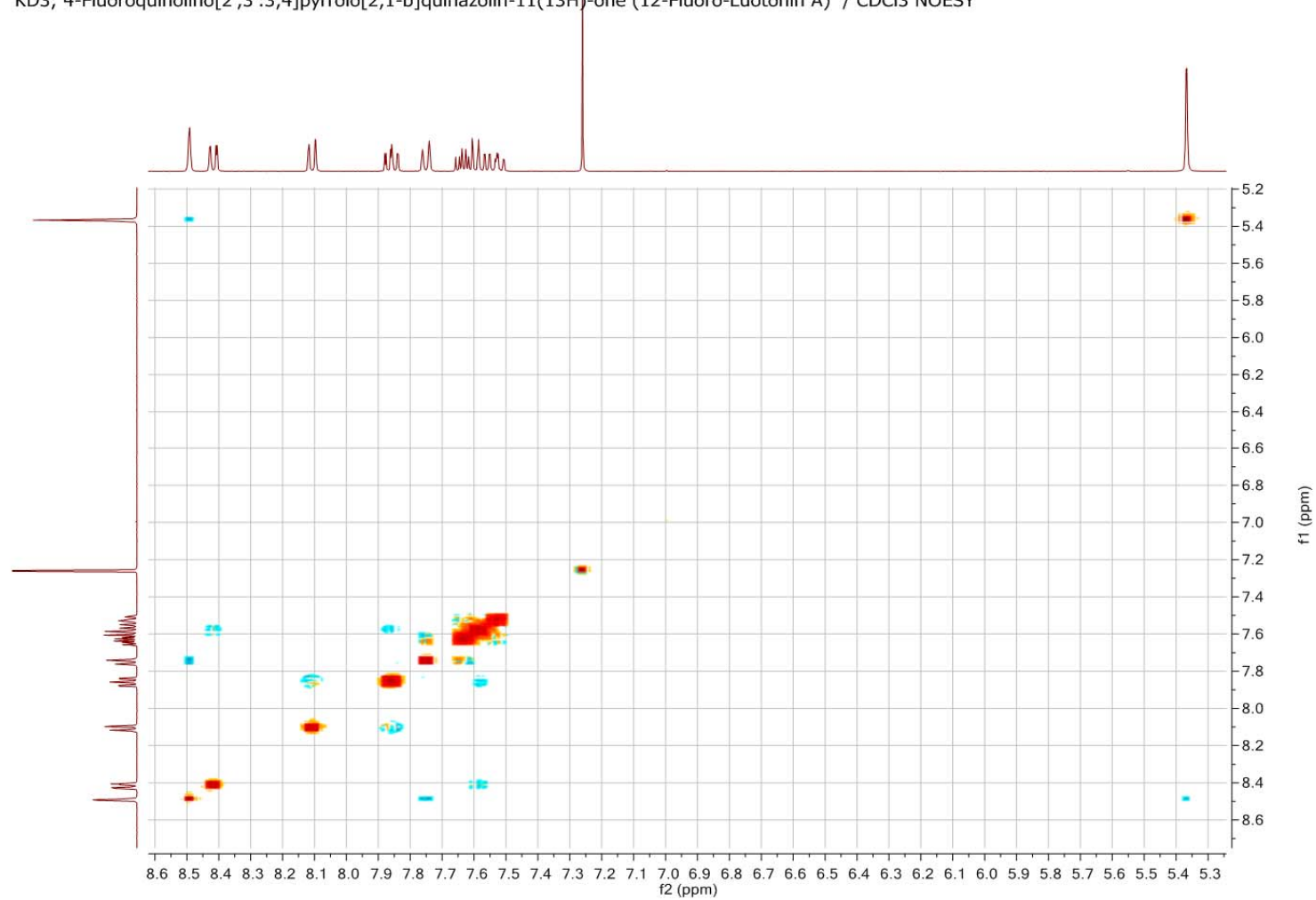
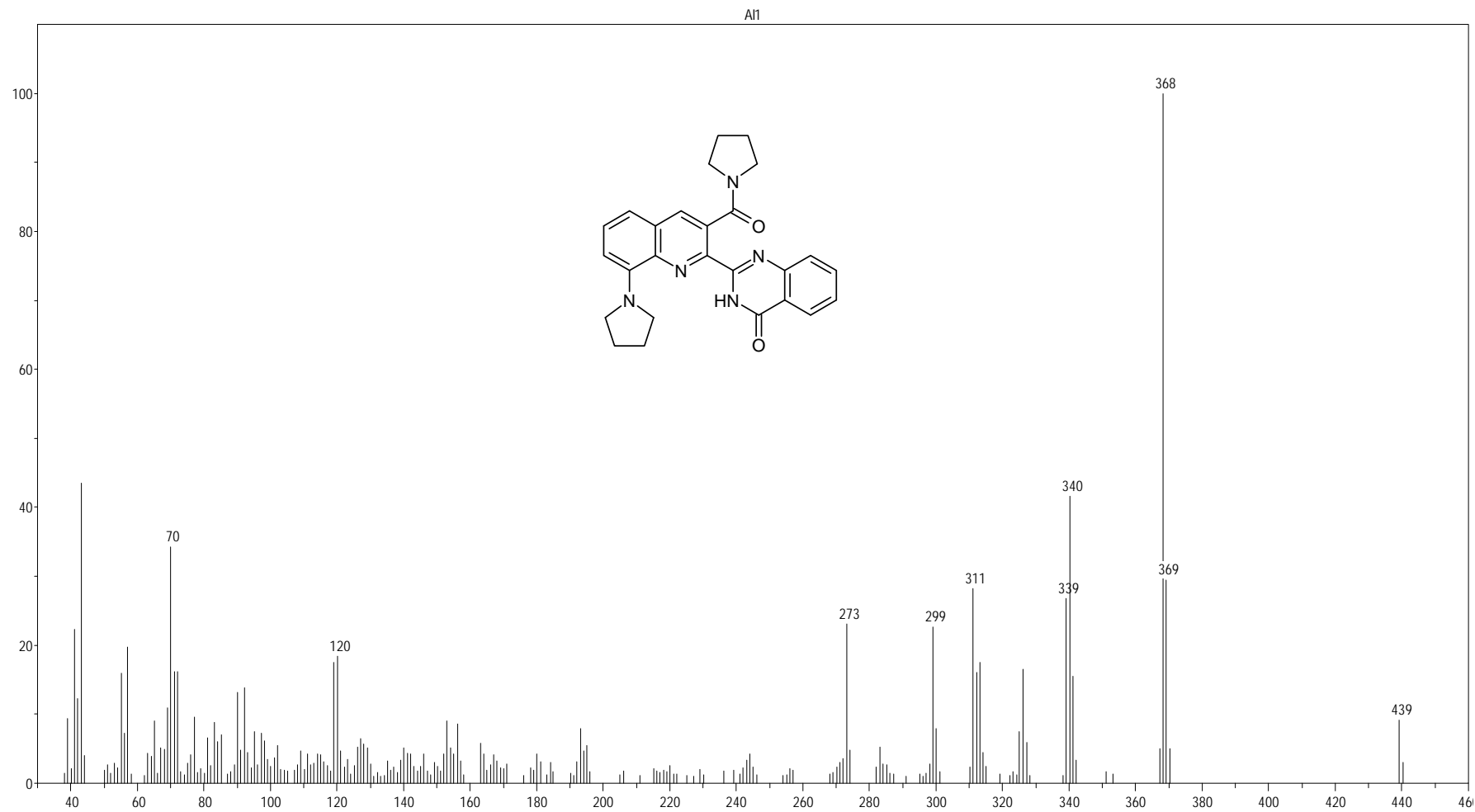
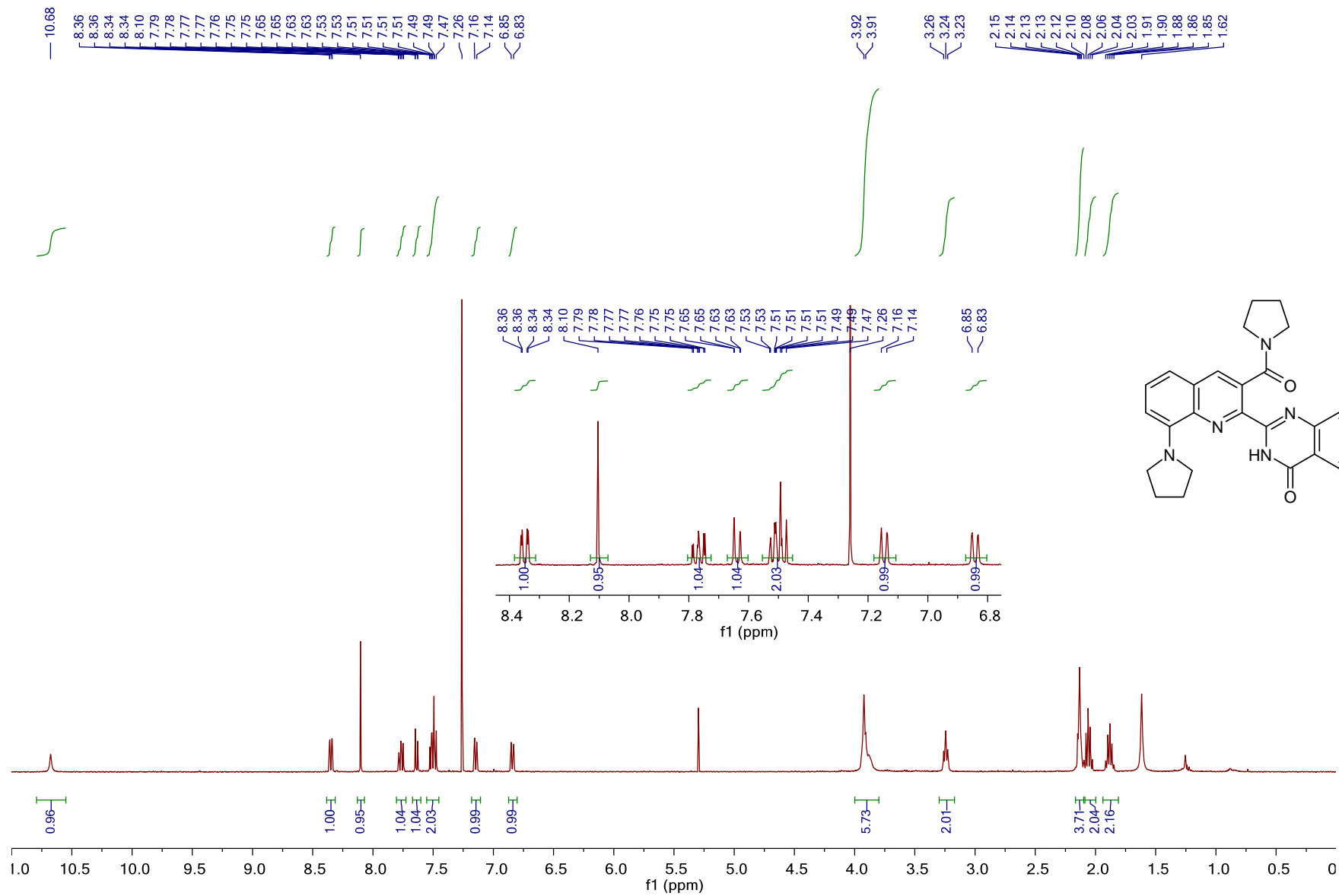


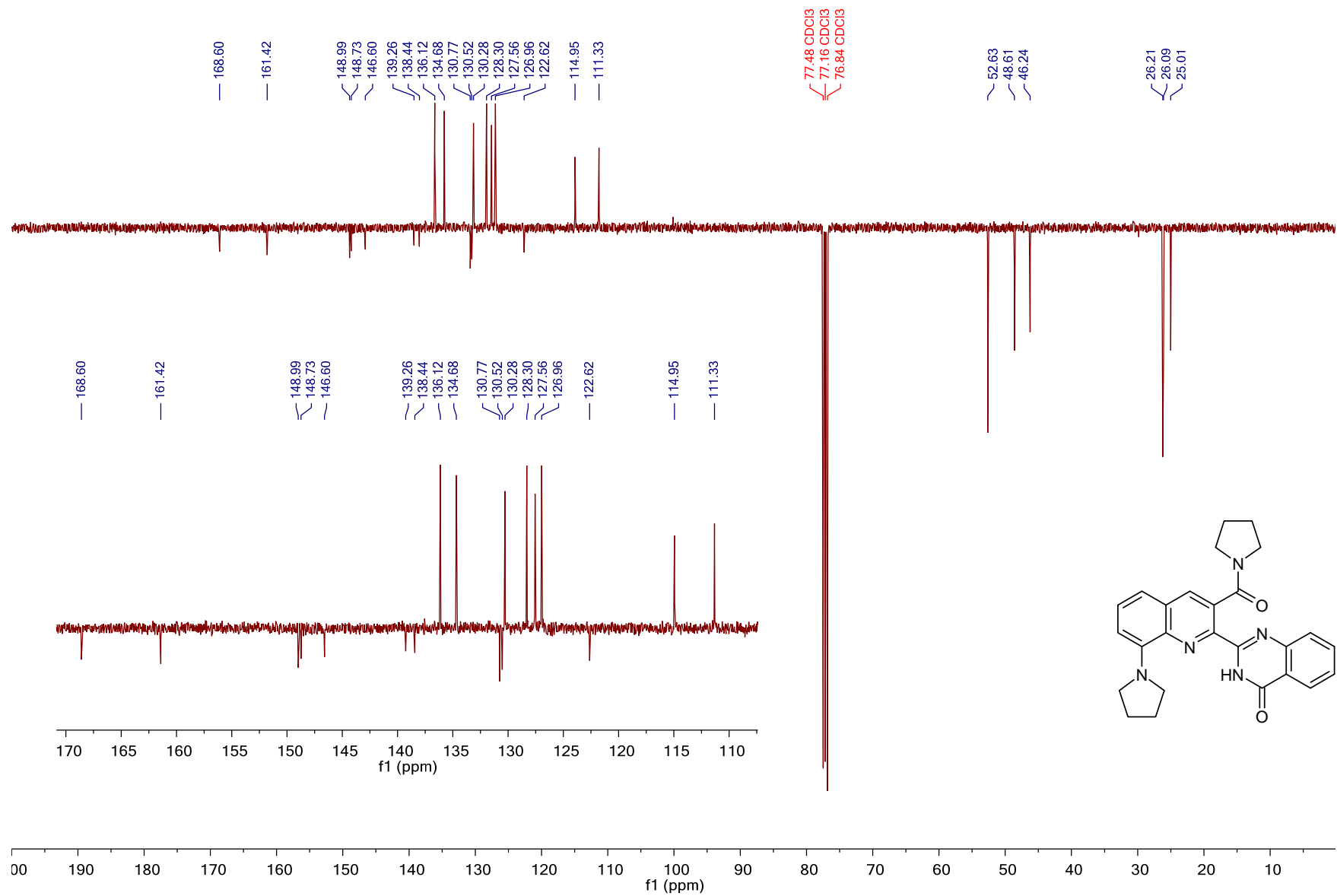
Figure S17. NOESY spectrum of 4-fluoroquinolino[2',3':3,4]pyrrolo[2,1-*b*]quinazolin-11(13*H*)-one (4)



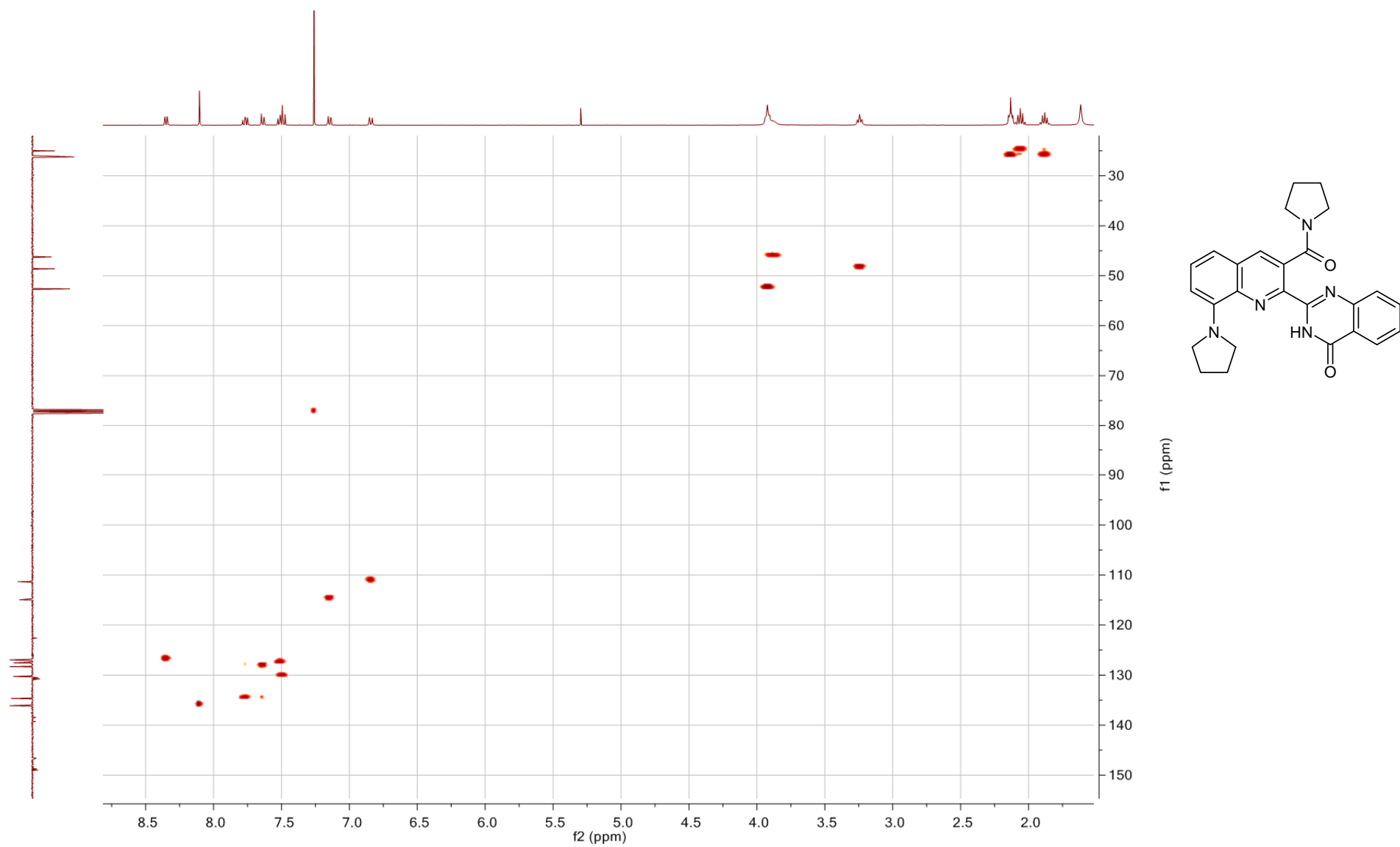
**Figure S18.** EI-MS of 2-[8-(pyrrolidin-1-yl)-3-(pyrrolidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (5)



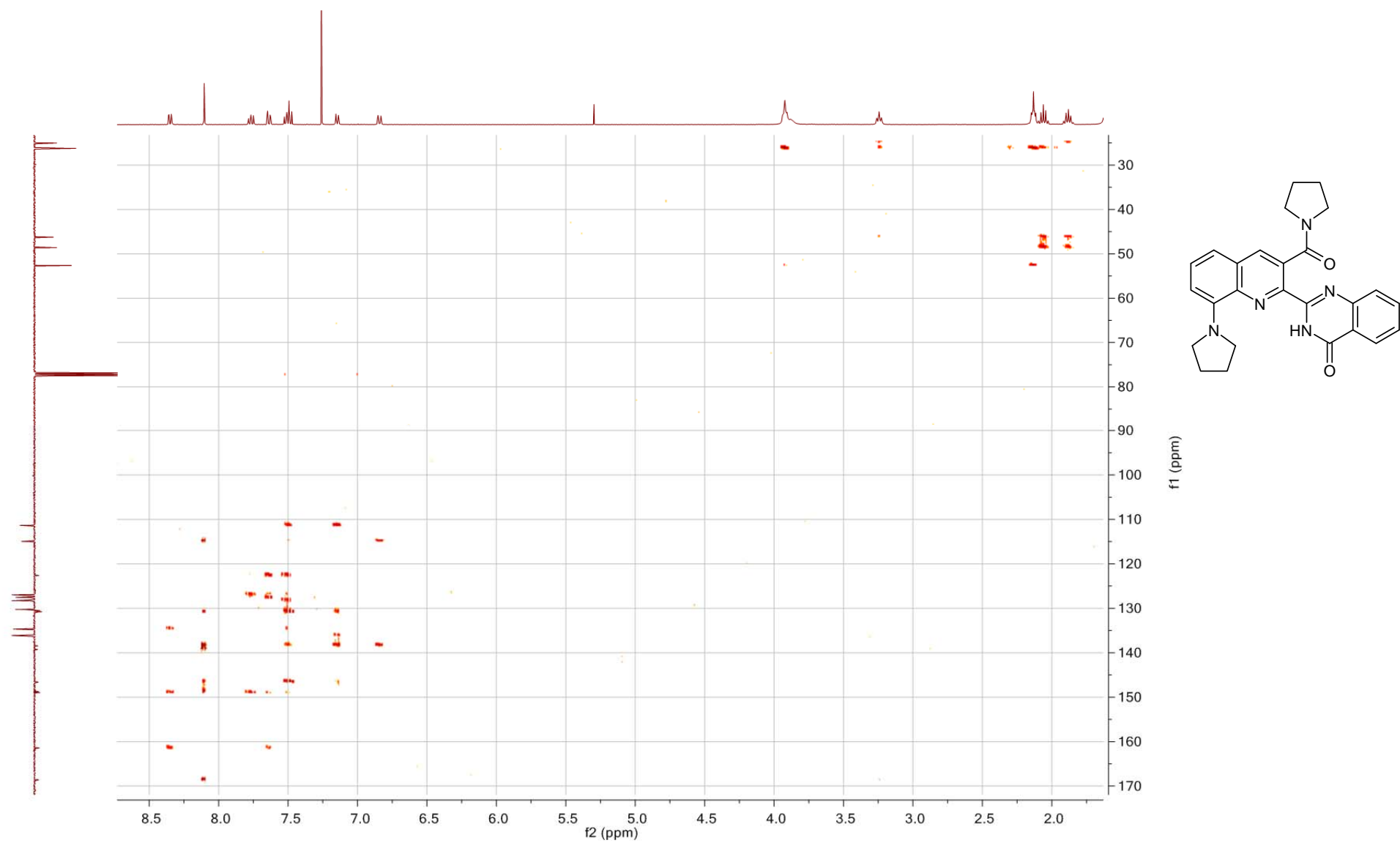
**Figure S19.** <sup>1</sup>H-NMR spectrum of 2-[8-(pyrrolidin-1-yl)-3-(pyrrolidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (5)



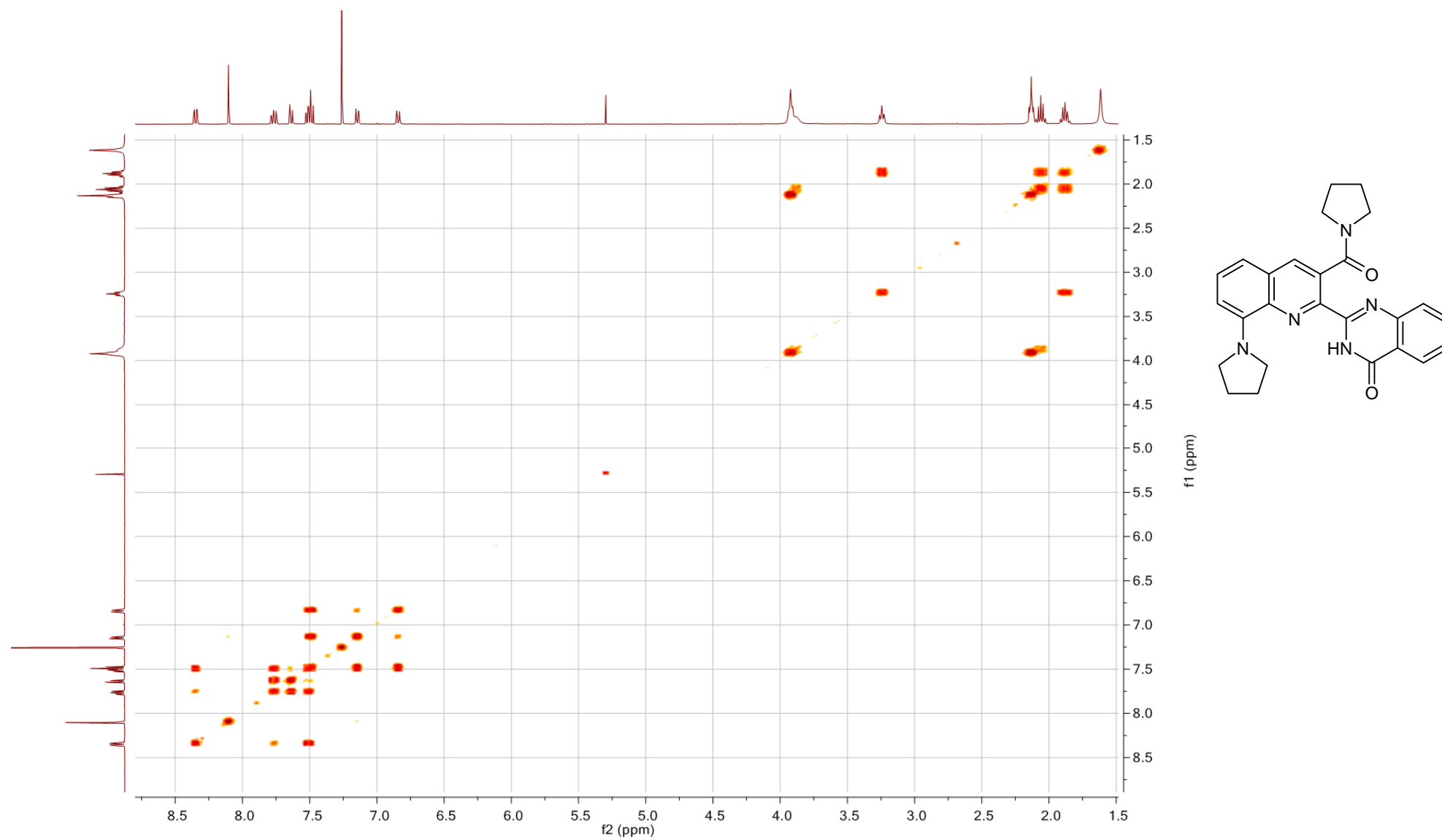
**Figure S20.** <sup>1</sup>H-NMR spectrum of 2-[8-(pyrrolidin-1-yl)-3-(pyrrolidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (5)



**Figure S21.** HSQC spectrum of 2-[8-(pyrrolidin-1-yl)-3-(pyrrolidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (5)

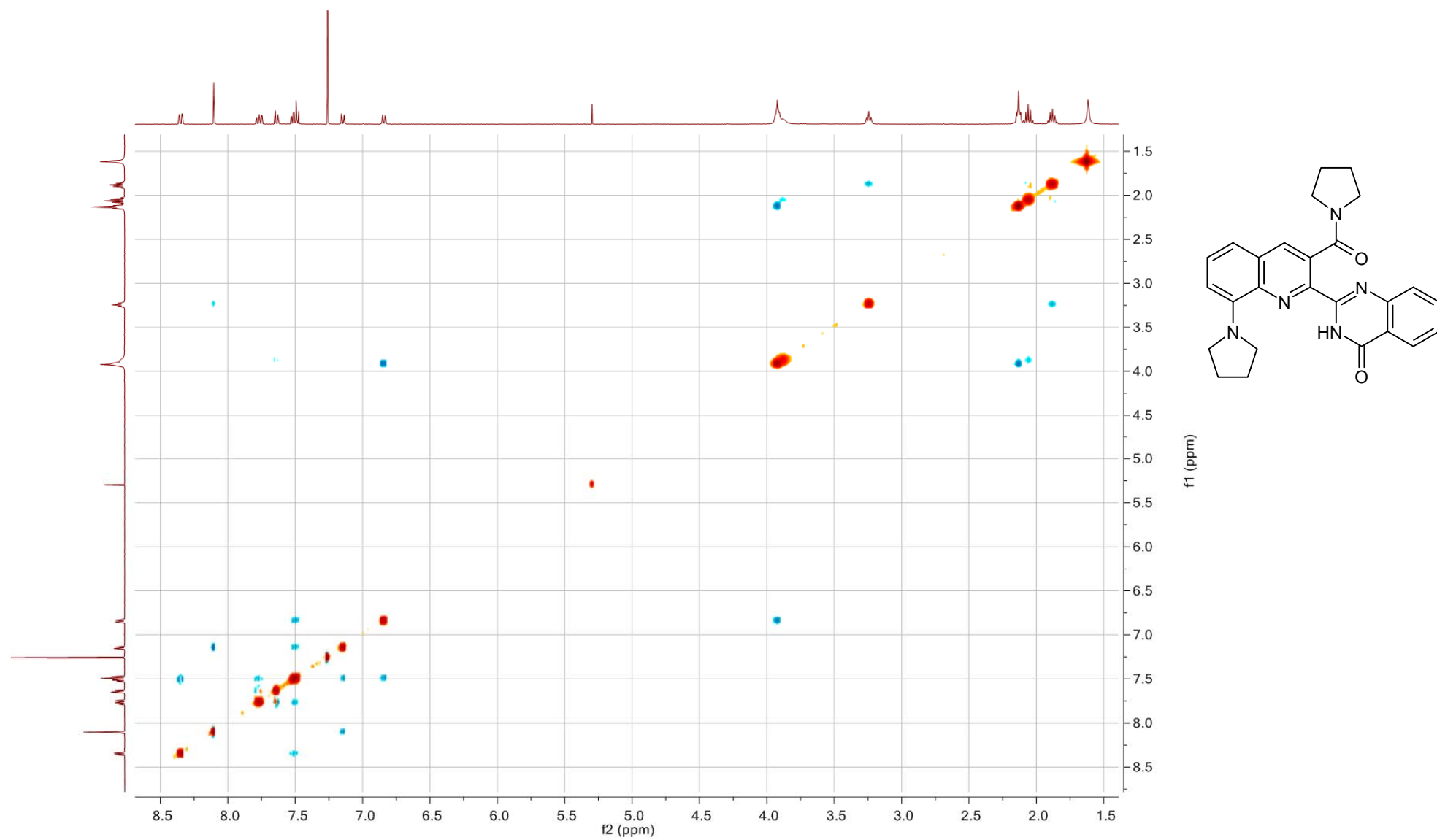


**Figure S22.** HMBC spectrum of 2-[8-(pyrrolidin-1-yl)-3-(pyrrolidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (5)

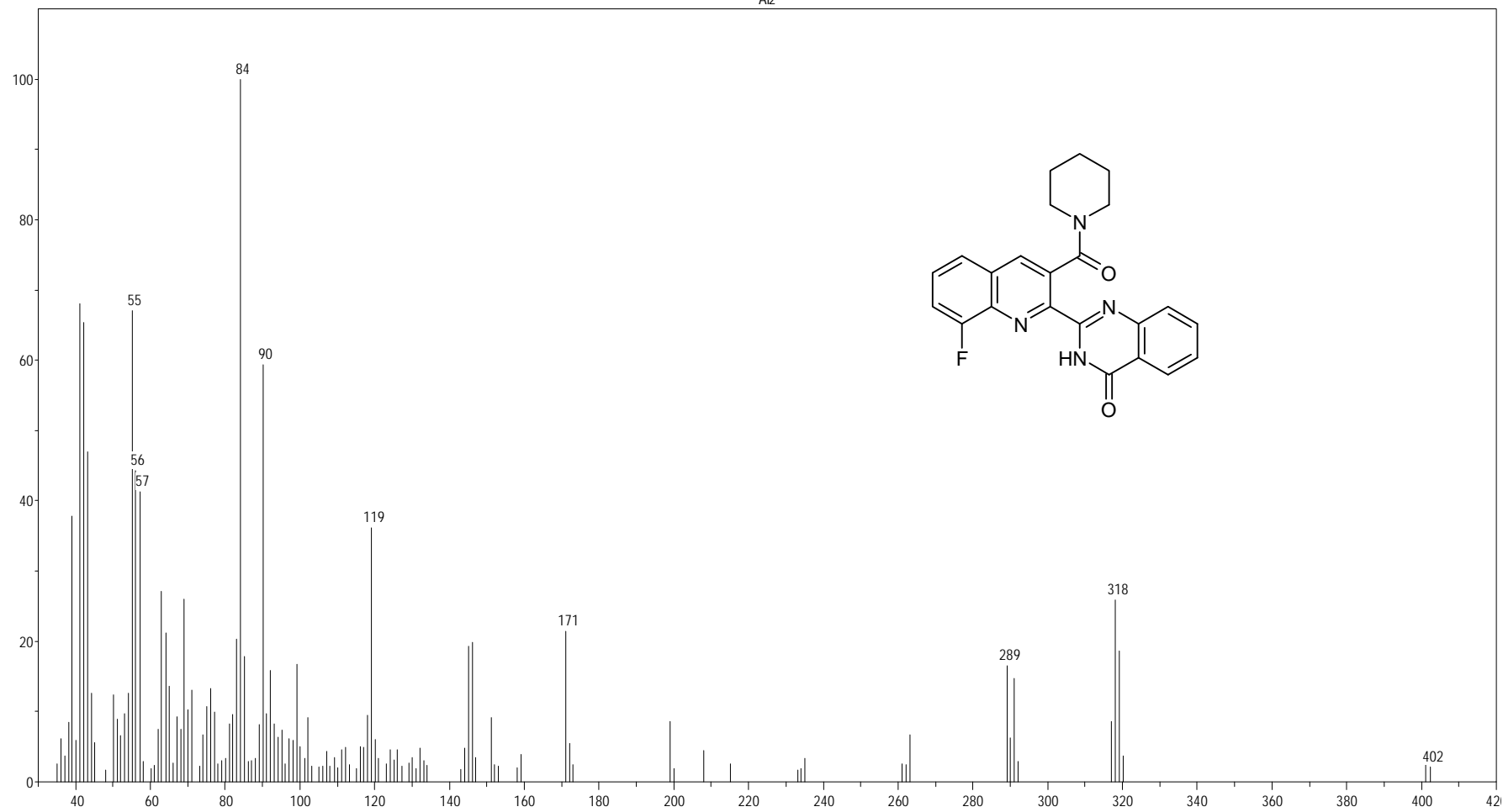


**Figure S23.** COSY spectrum of 2-[8-(pyrrolidin-1-yl)-3-(pyrrolidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (5)





**Figure S24.** NOESY spectrum of 2-[8-(pyrrolidin-1-yl)-3-(pyrrolidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (**5**)



**Figure S25.** EI-MS of 2-[8-fluoro-3-(piperidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (**6**)

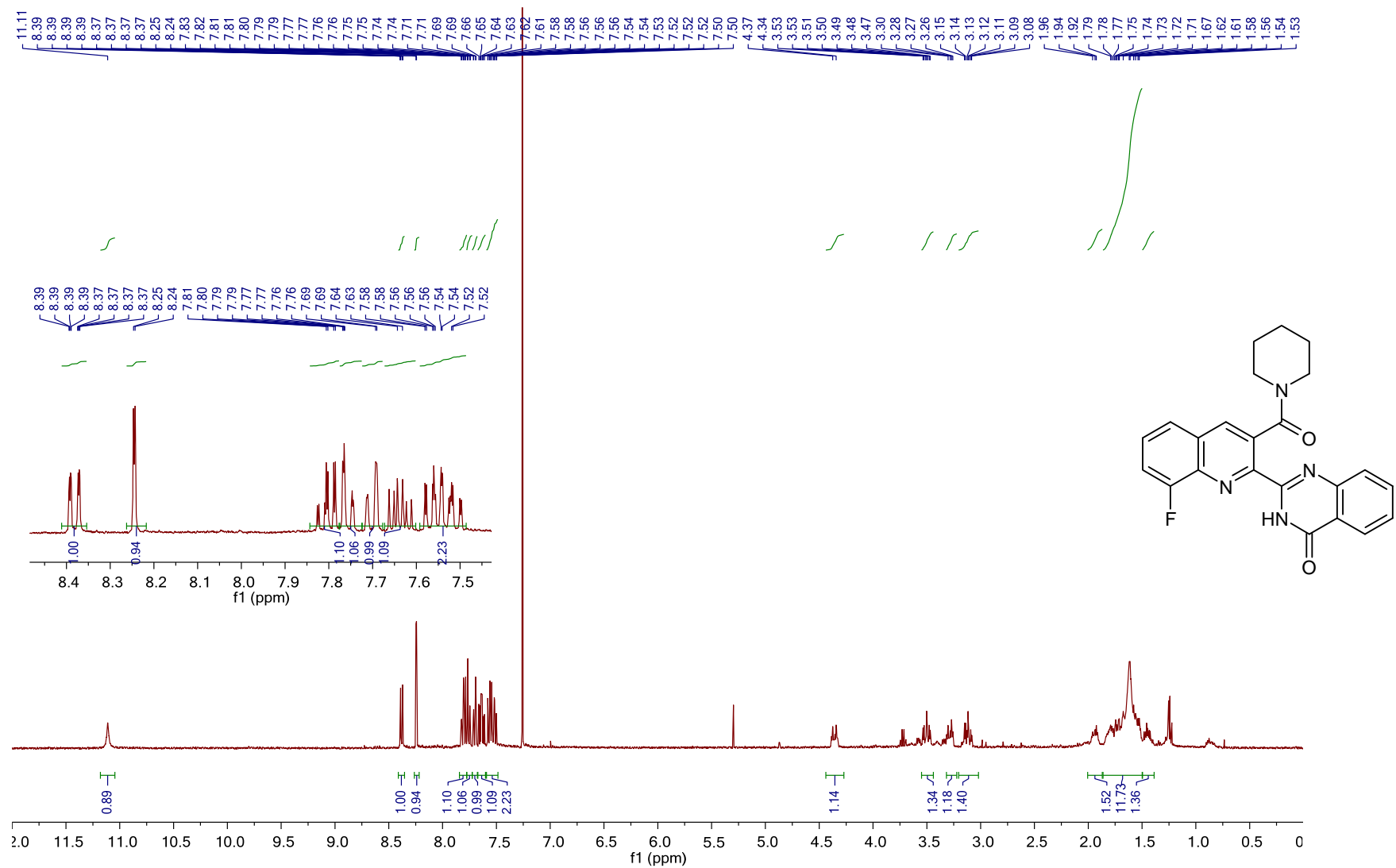
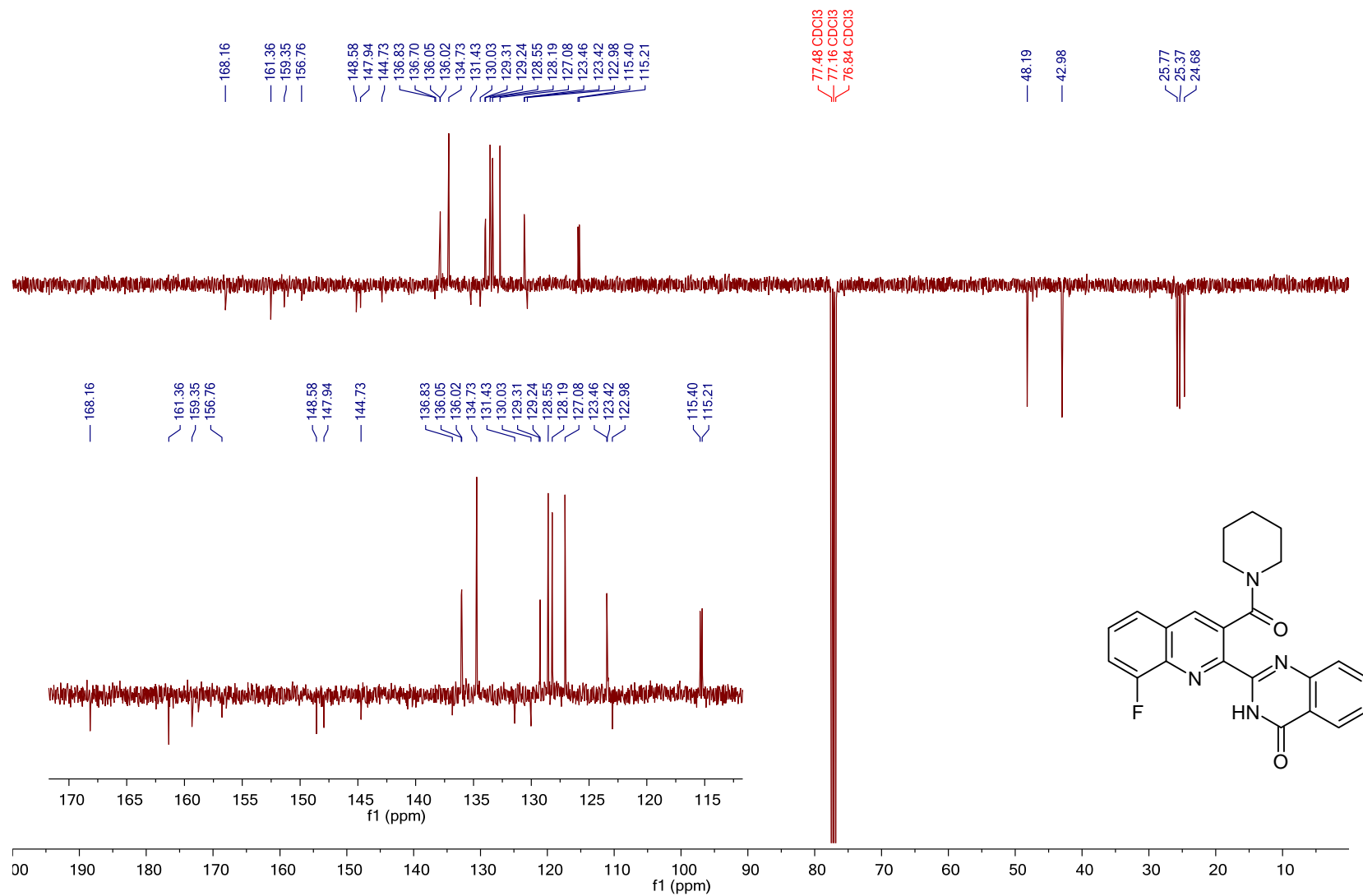


Figure S26. <sup>1</sup>H-NMR spectrum of 2-[8-fluoro-3-(piperidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (6)



**Figure S27.** <sup>13</sup>C-NMR spectrum of 2-[8-fluoro-3-(piperidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (**6**)

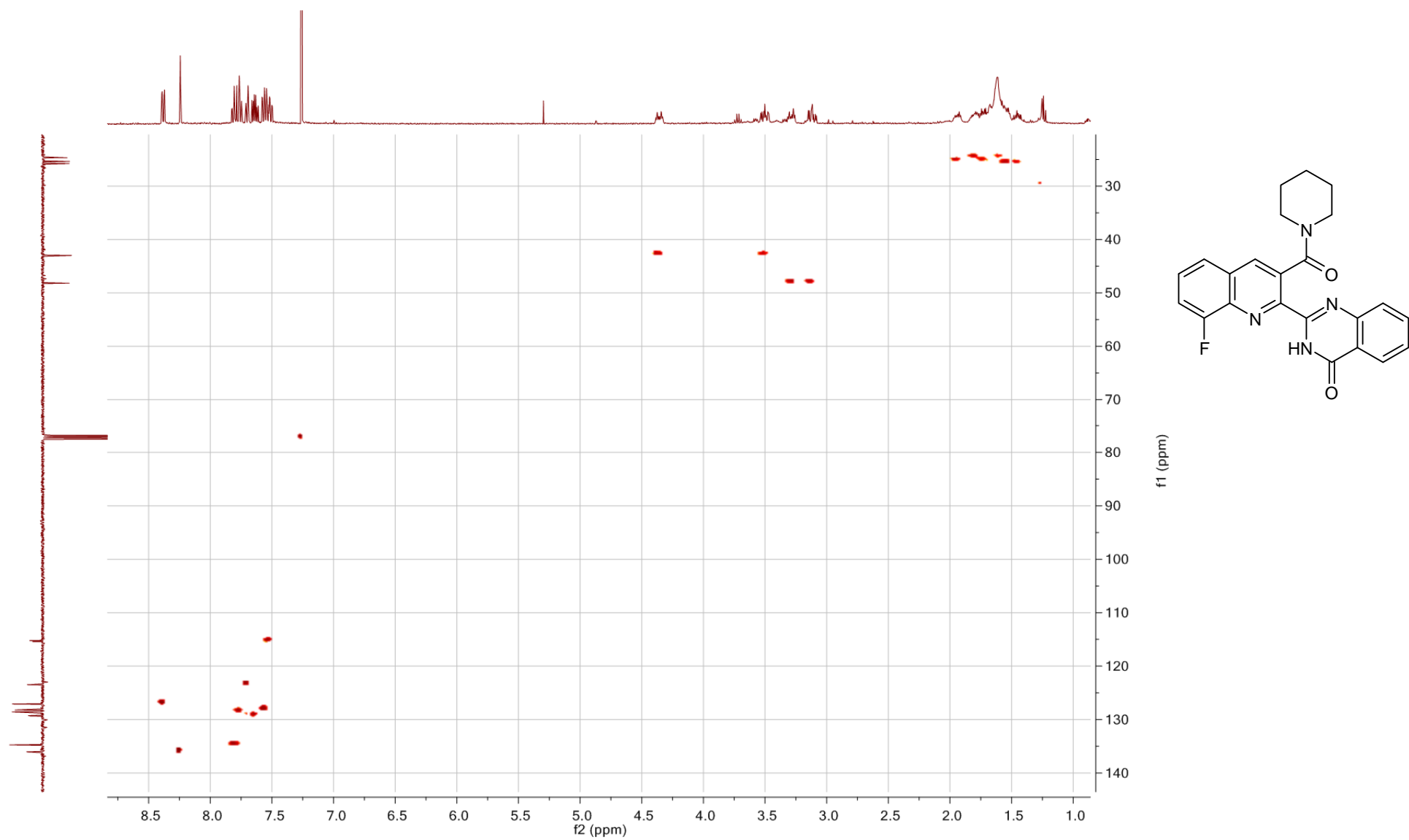
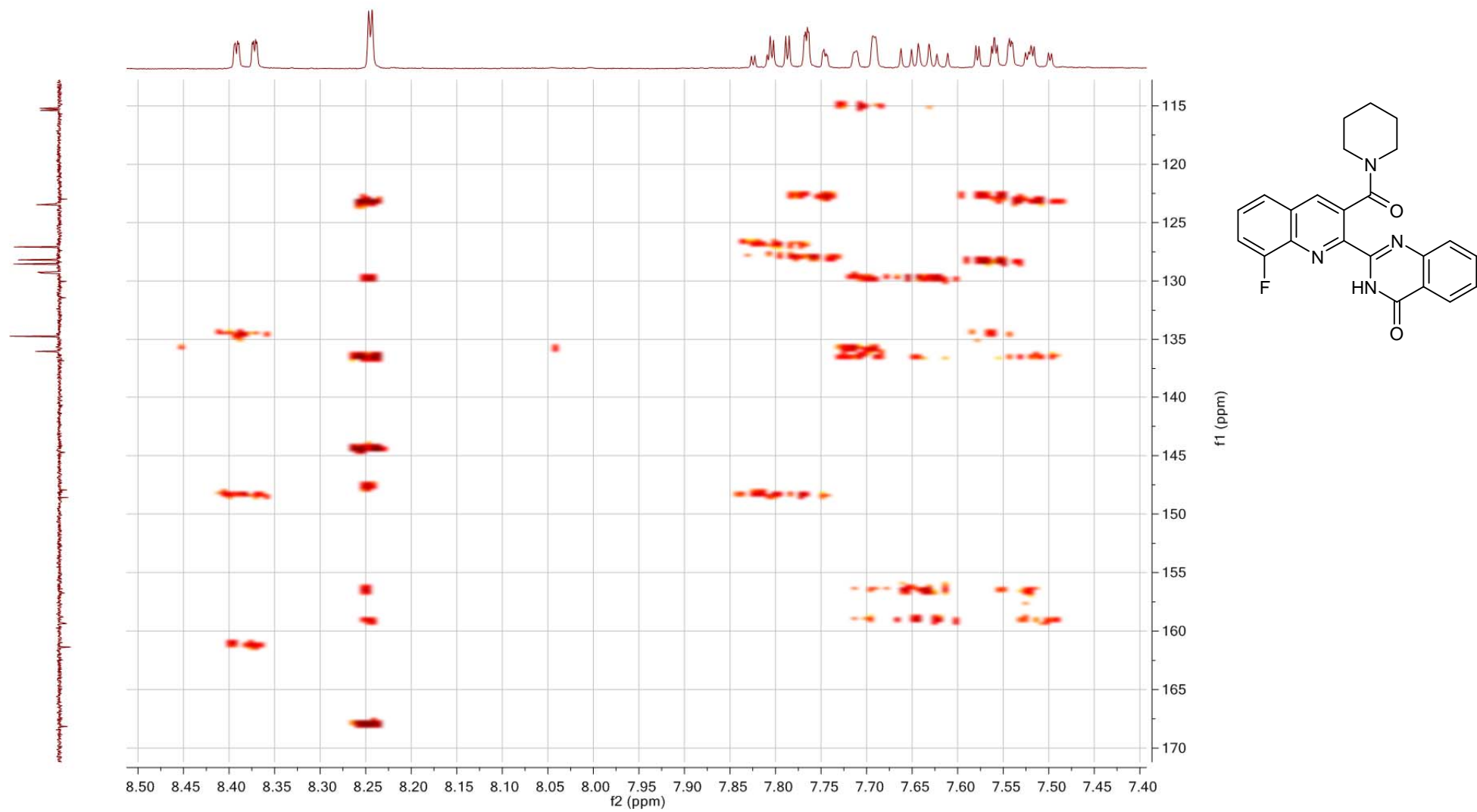
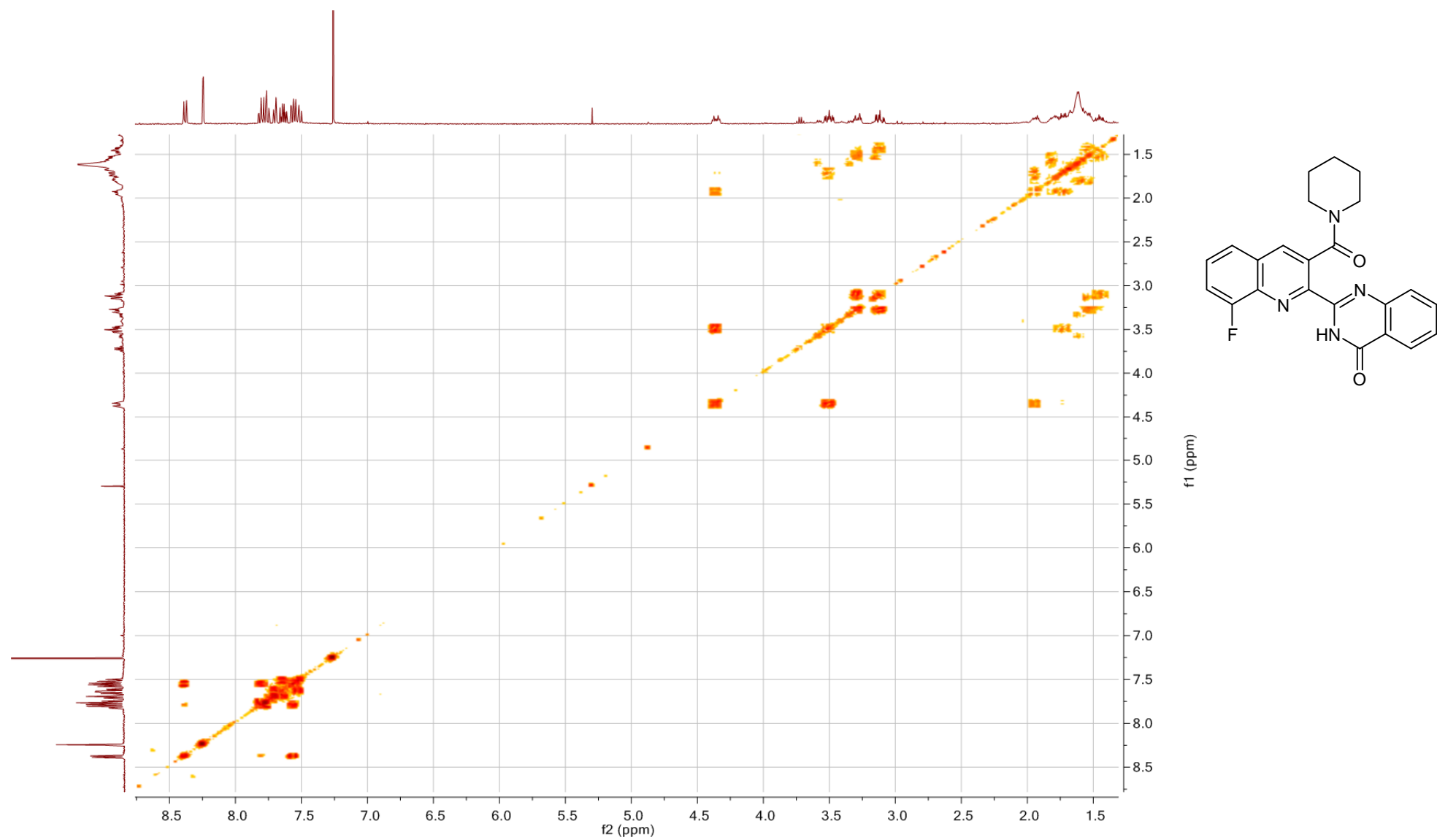


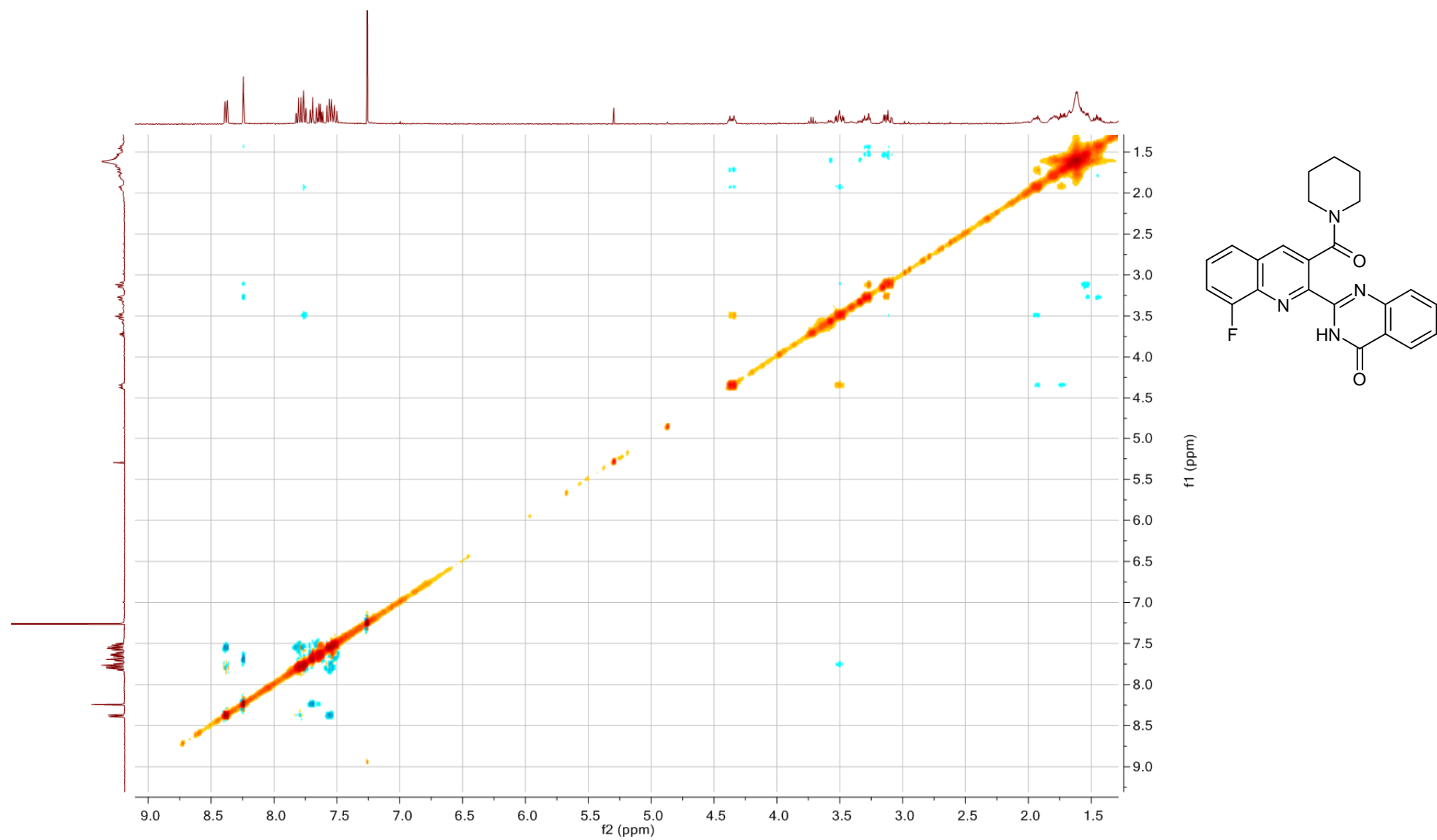
Figure S28. HSQC spectrum of 2-[8-fluoro-3-(piperidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (6)



**Figure S29.** HMBC spectrum of 2-[8-fluoro-3-(piperidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (6)

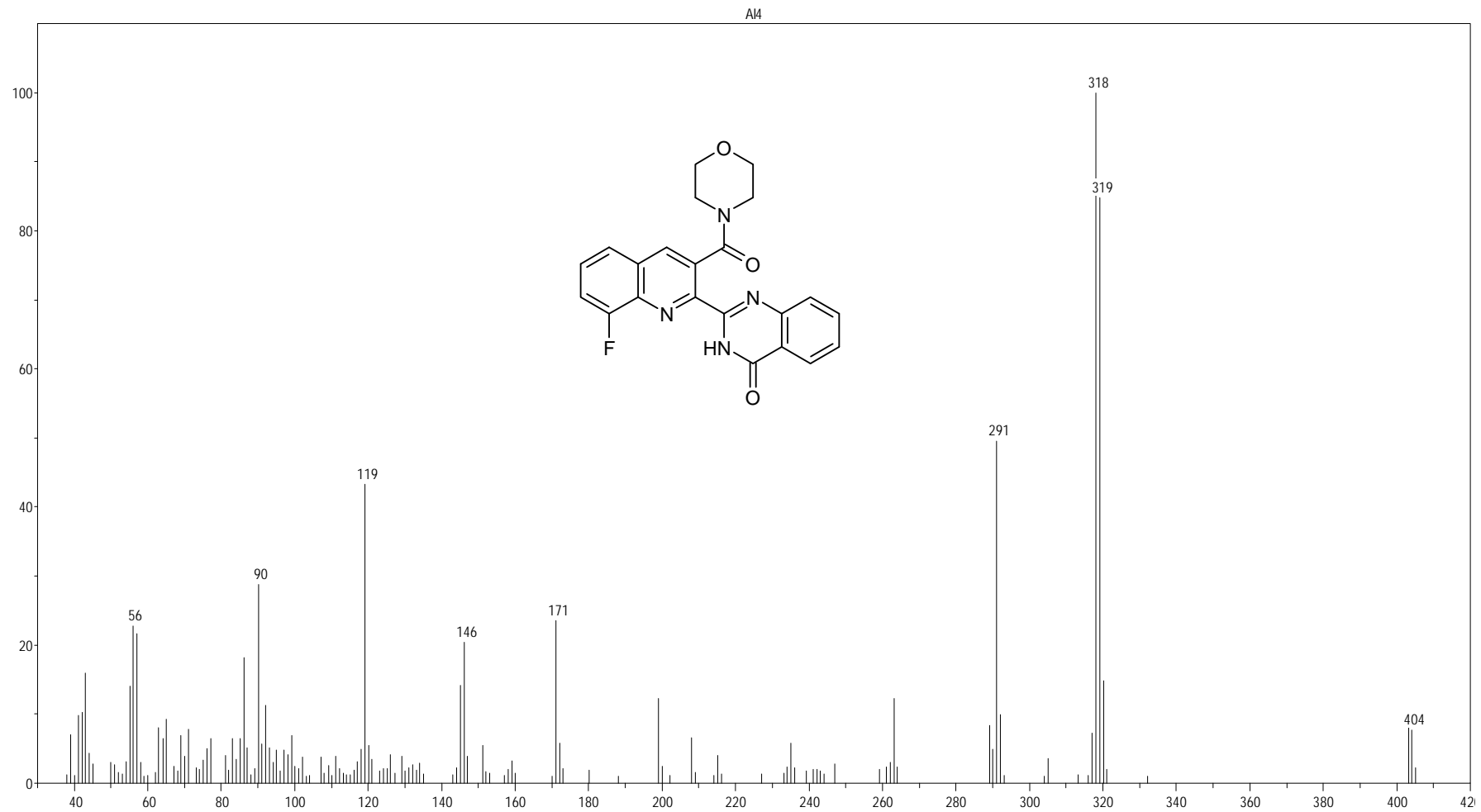


**Figure S30.** COSY spectrum of 2-[8-fluoro-3-(piperidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (6)

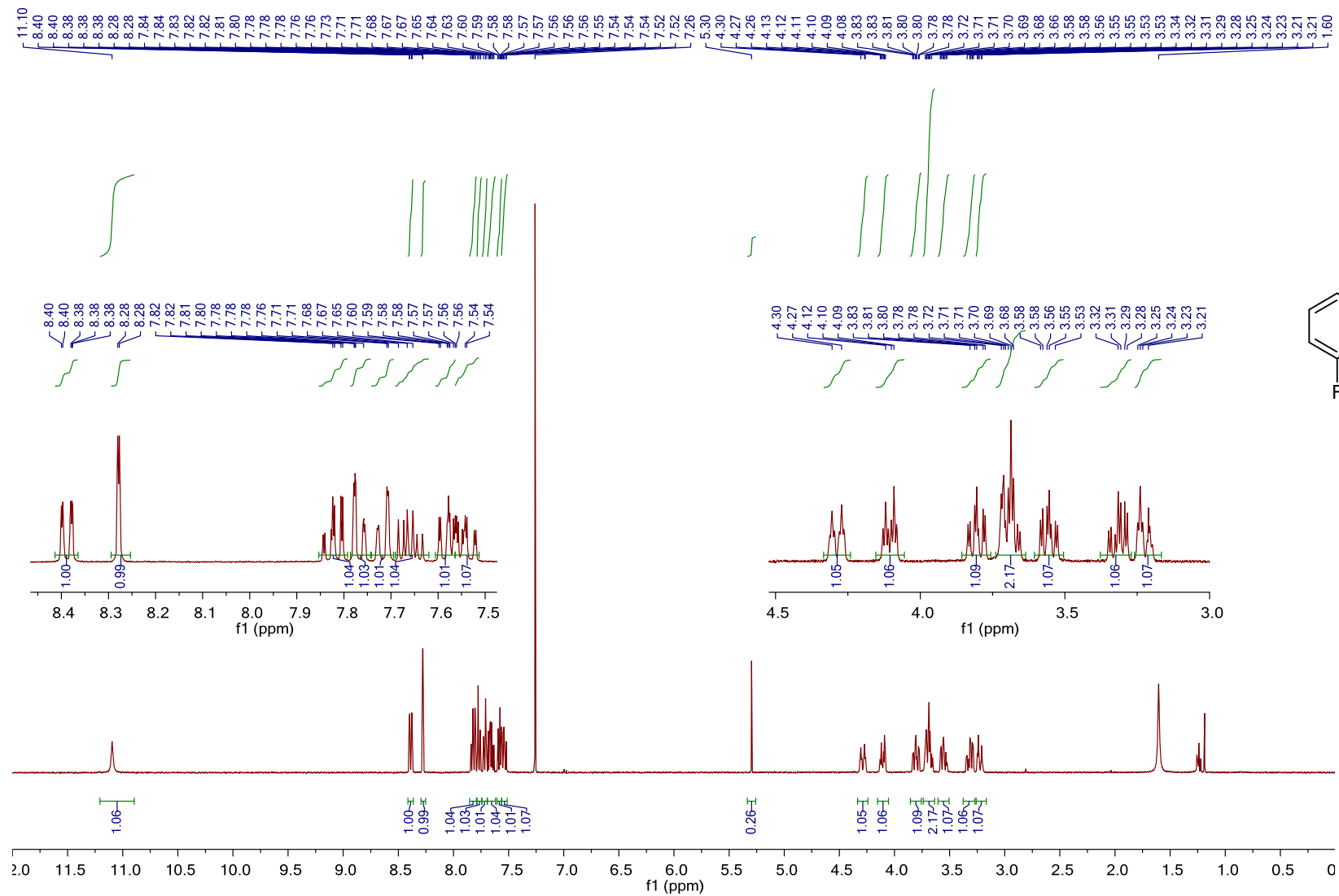


**Figure S31.** NOESY spectrum of 2-[8-fluoro-3-(piperidin-1-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (6)

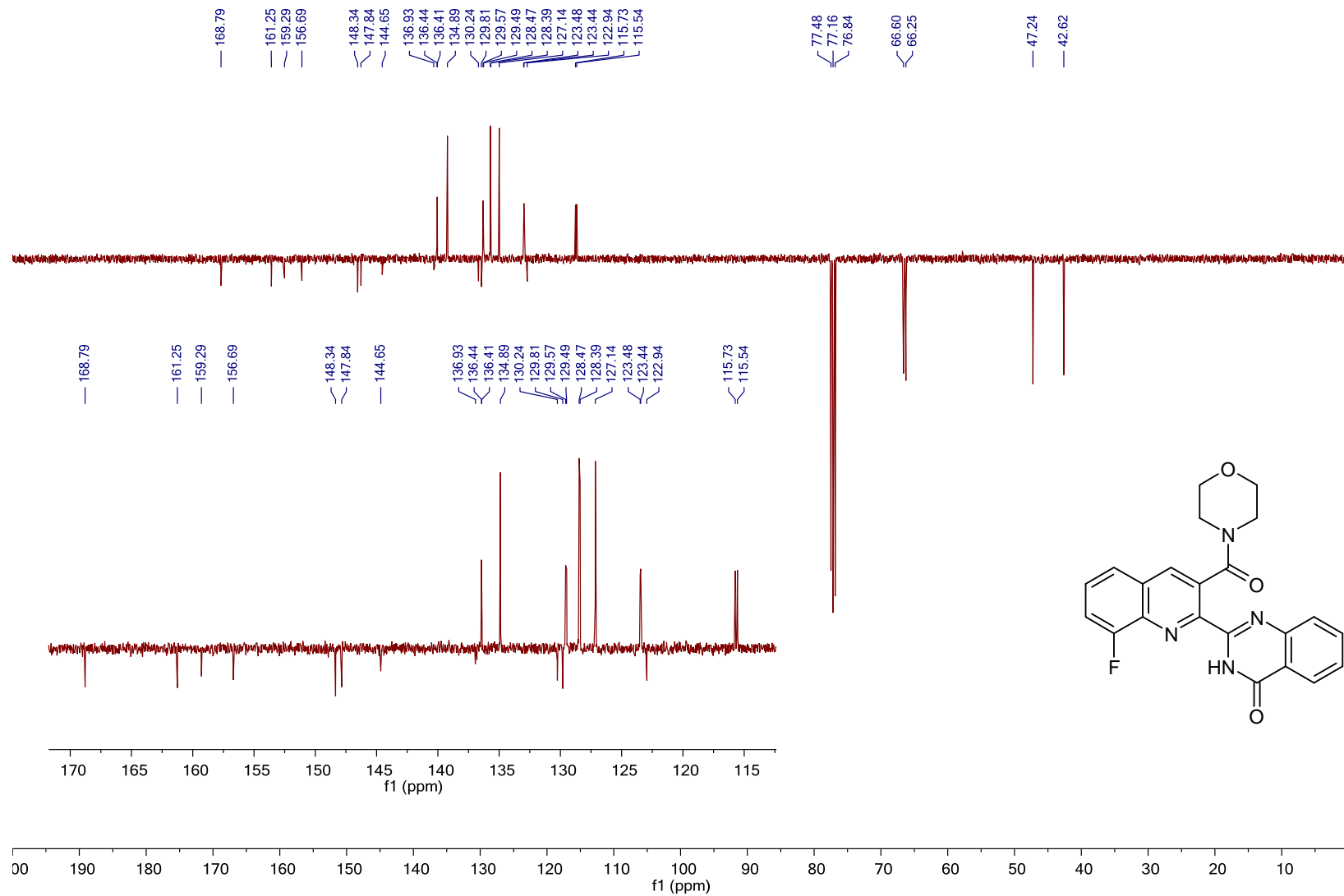




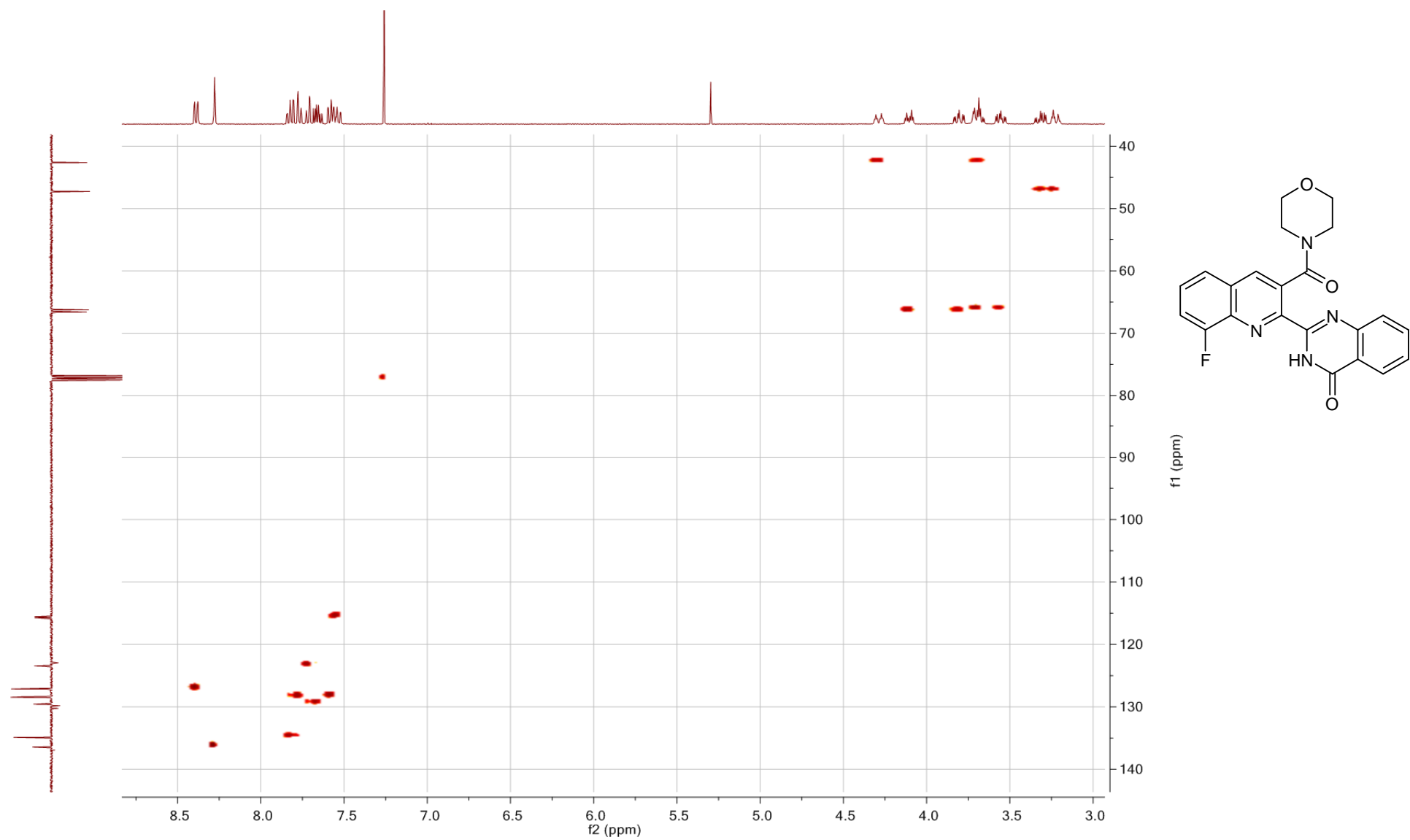
**Figure S32.** EI-MS of 2-[8-fluoro-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (7)



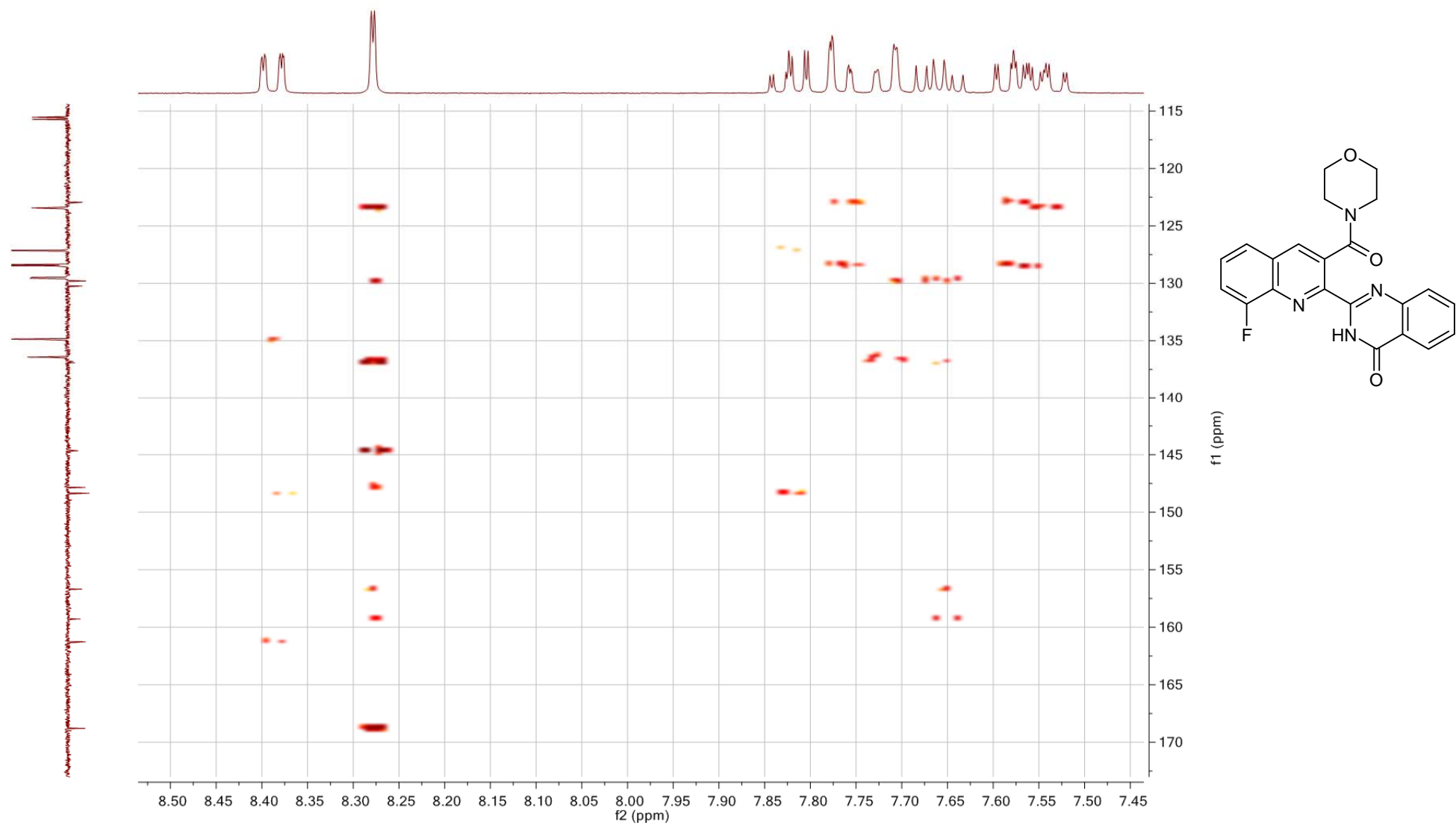
**Figure S33.** <sup>1</sup>H-NMR spectrum of 2-[8-fluoro-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (7)



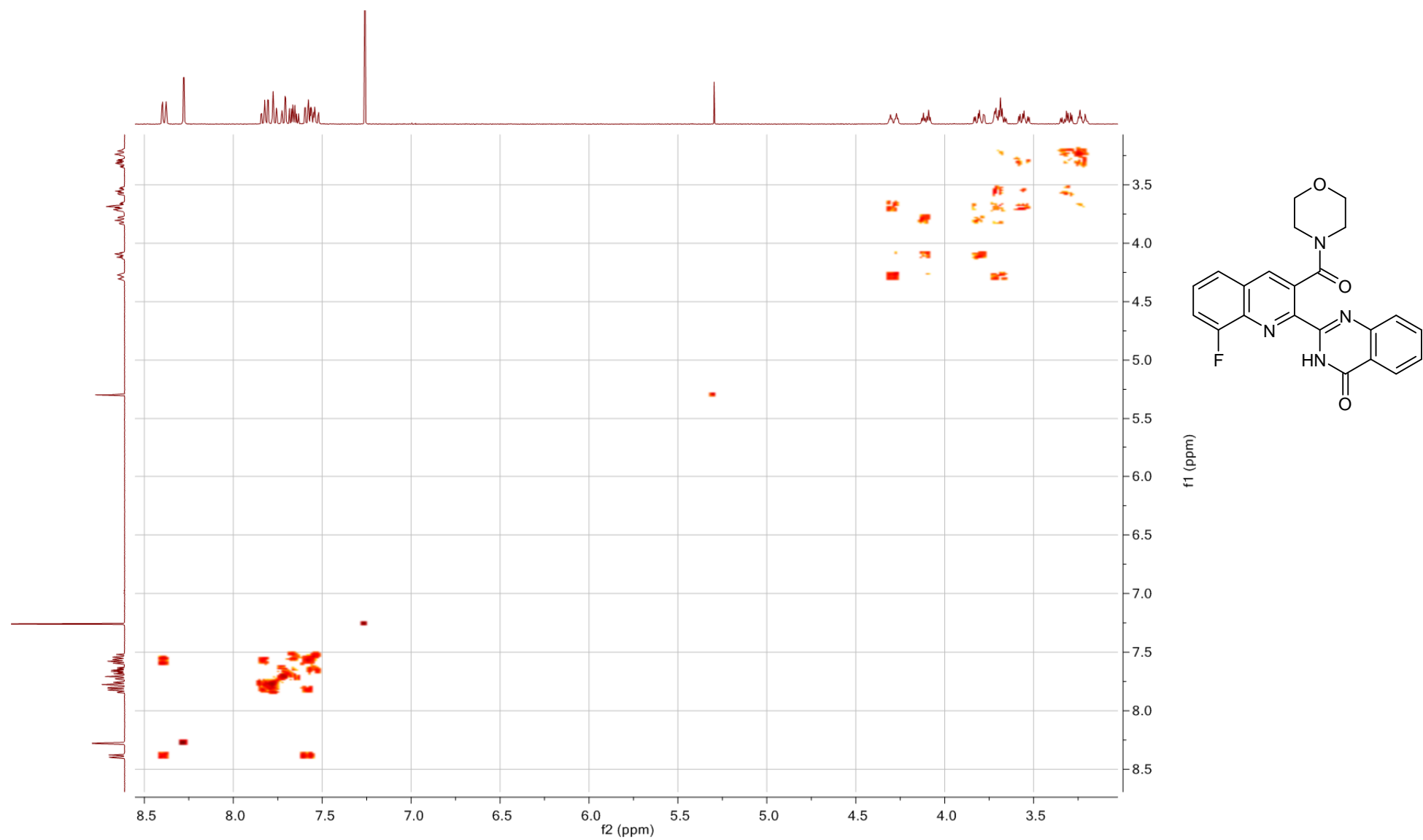
**Figure S34.**  $^{13}\text{C}$ -NMR spectrum of 2-[8-fluoro-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (7)



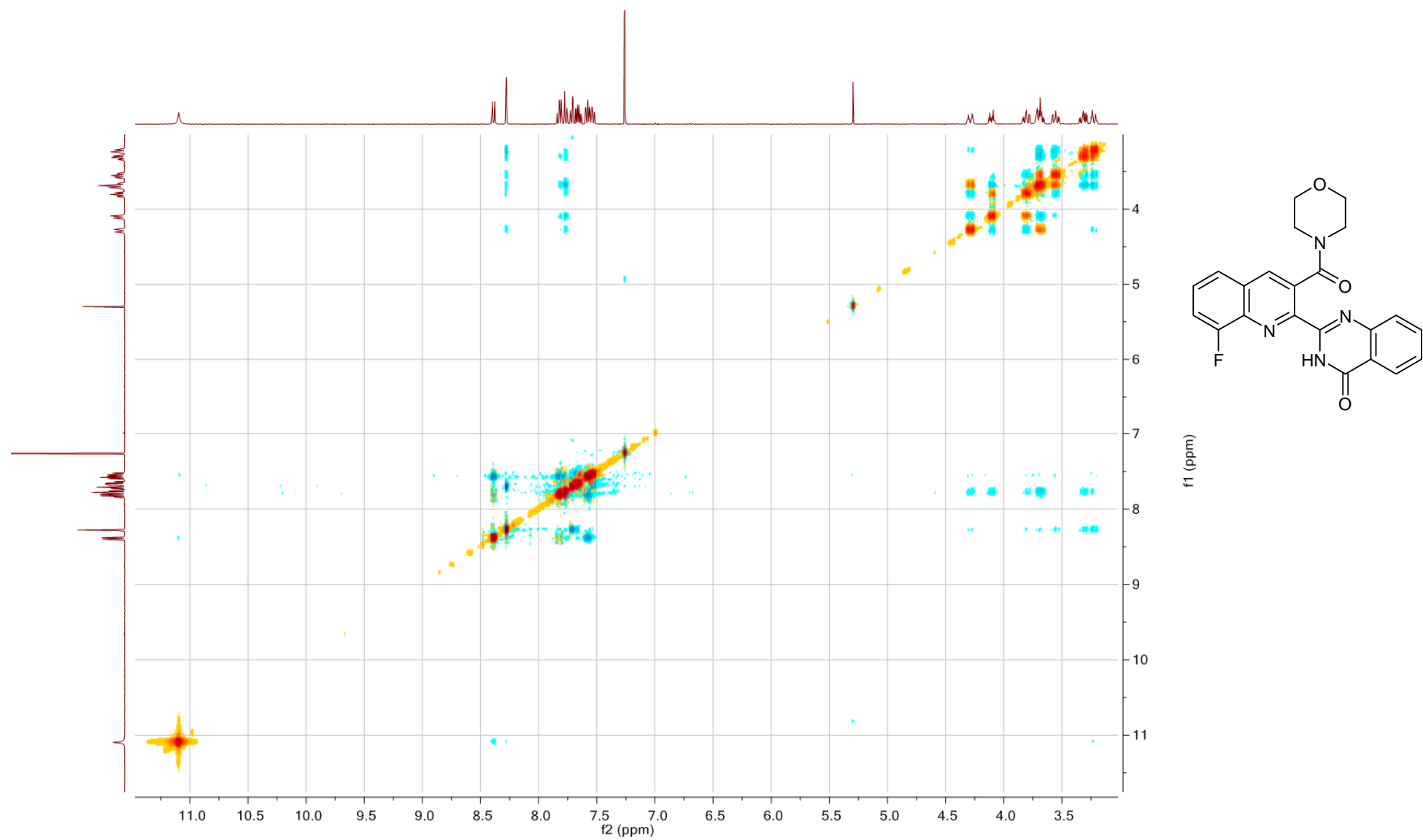
**Figure S35.** HSQC spectrum of 2-[8-fluoro-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (7)



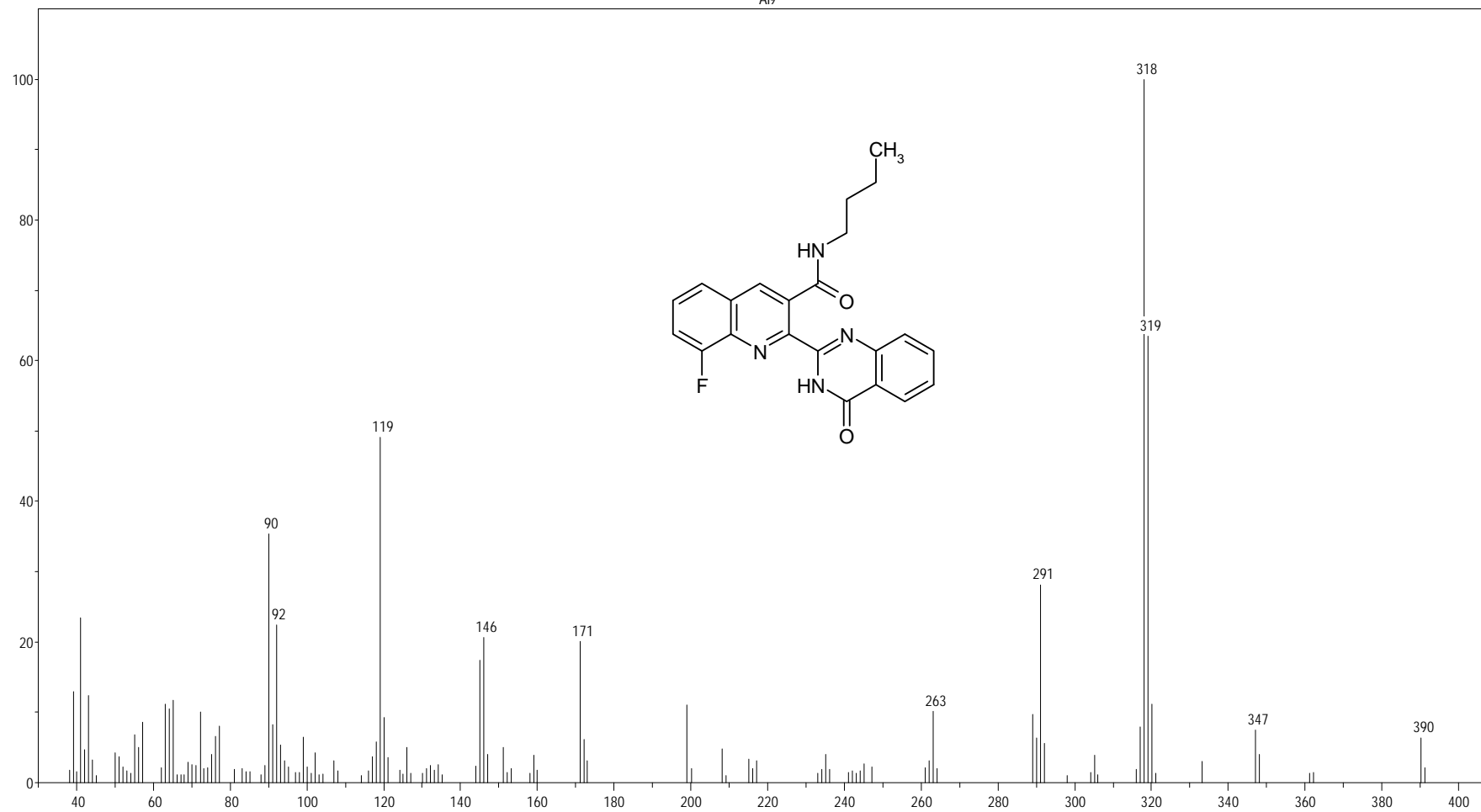
**Figure S36.** HMBC spectrum of 2-[8-fluoro-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (7)



**Figure S37.** COSY spectrum of 2-[8-fluoro-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (7)

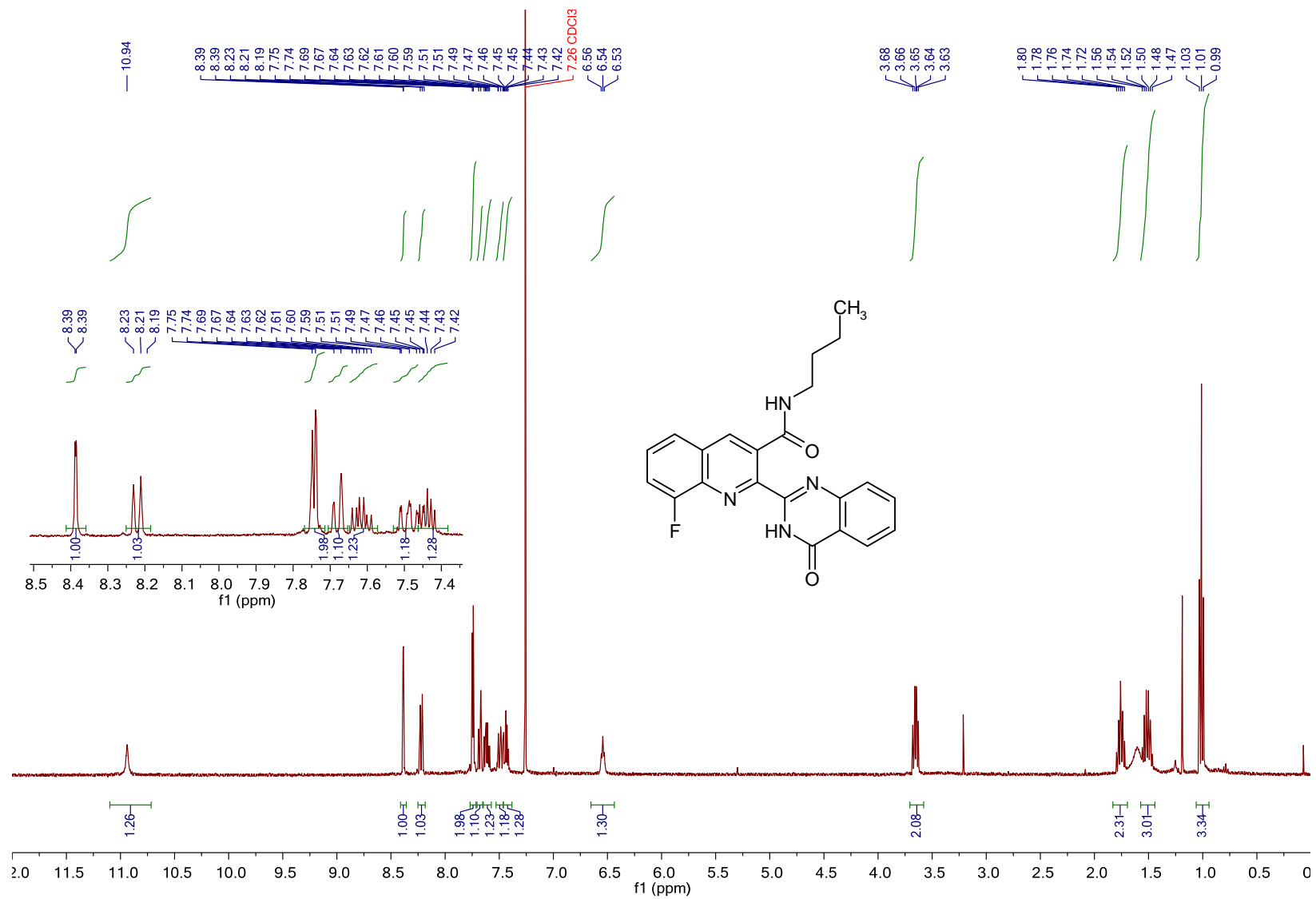


**Figure S38.** NOESY spectrum of 2-[8-fluoro-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (7)

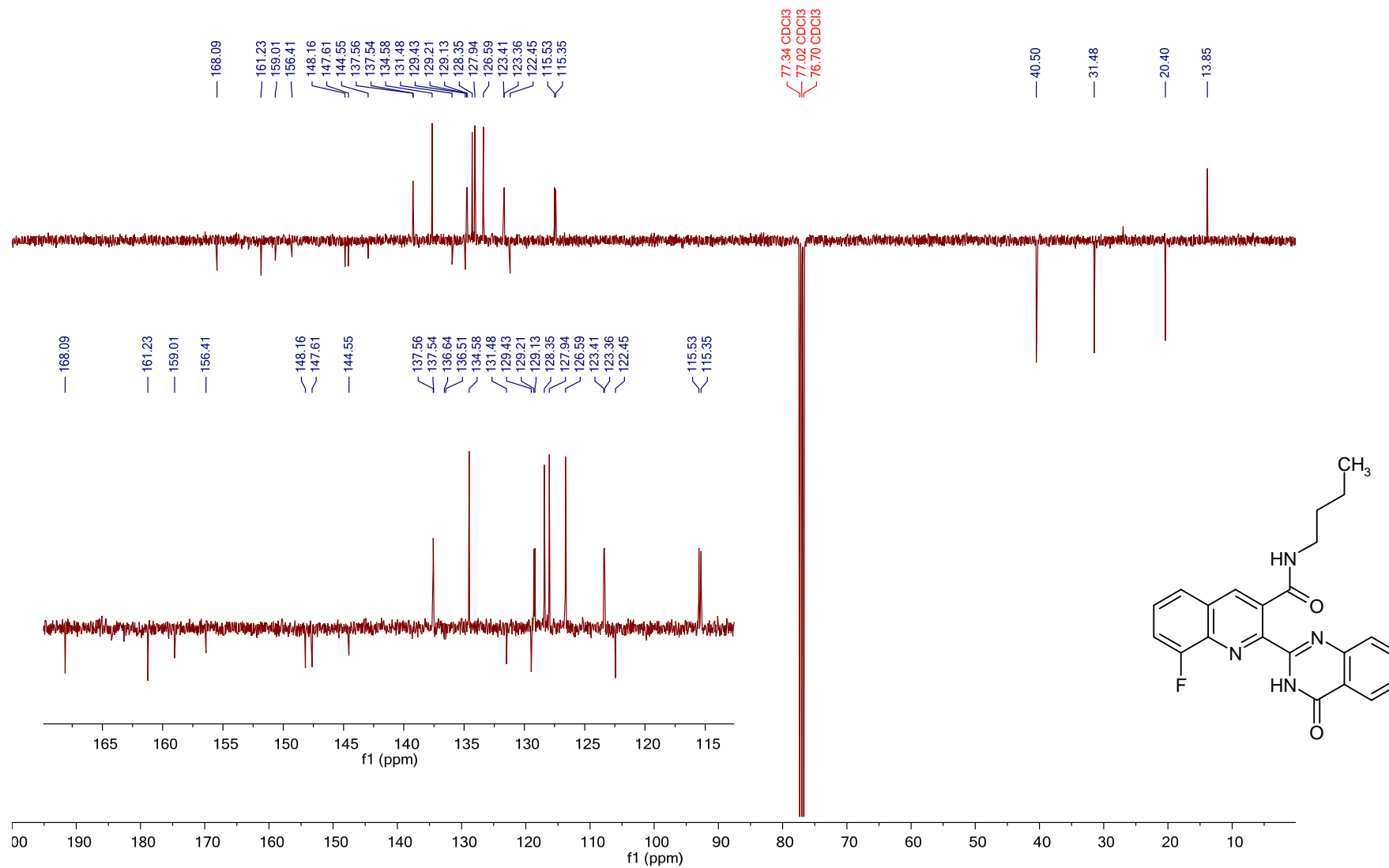


**Figure S39.** EI-MS of *N*-butyl-8-fluoro-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (**8**)

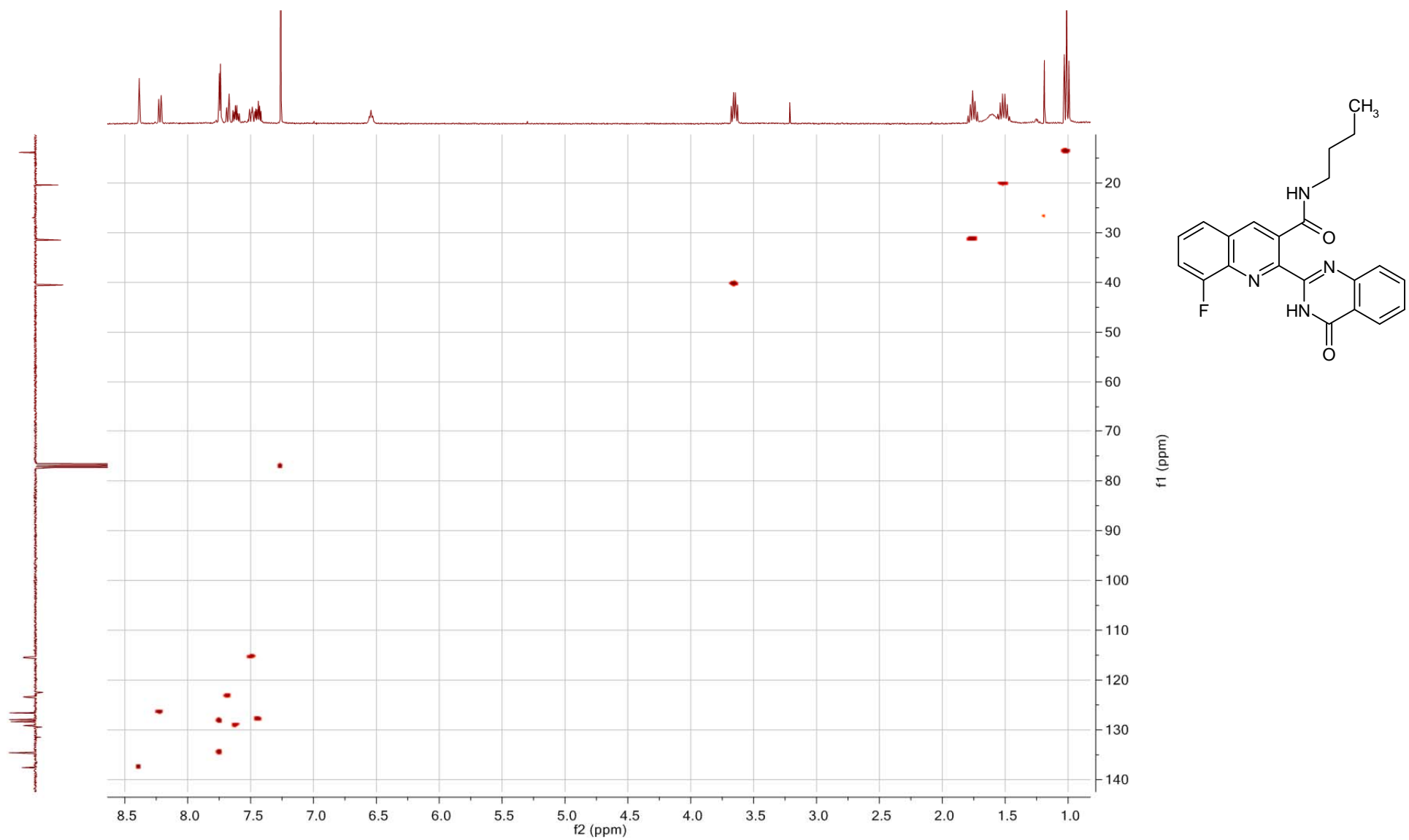




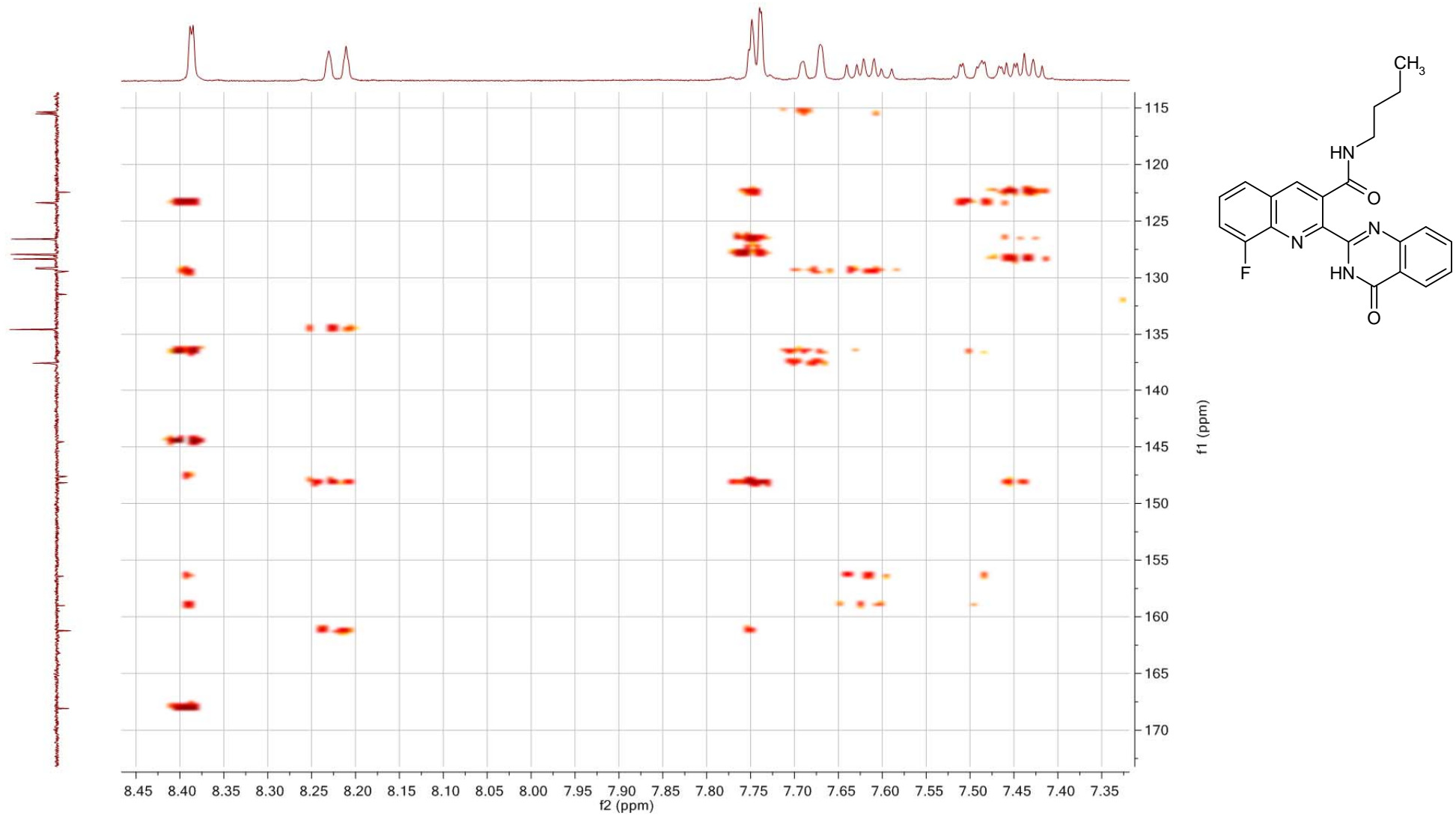
**Figure S40.** <sup>1</sup>H-NMR spectrum of *N*-butyl-8-fluoro-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (8)



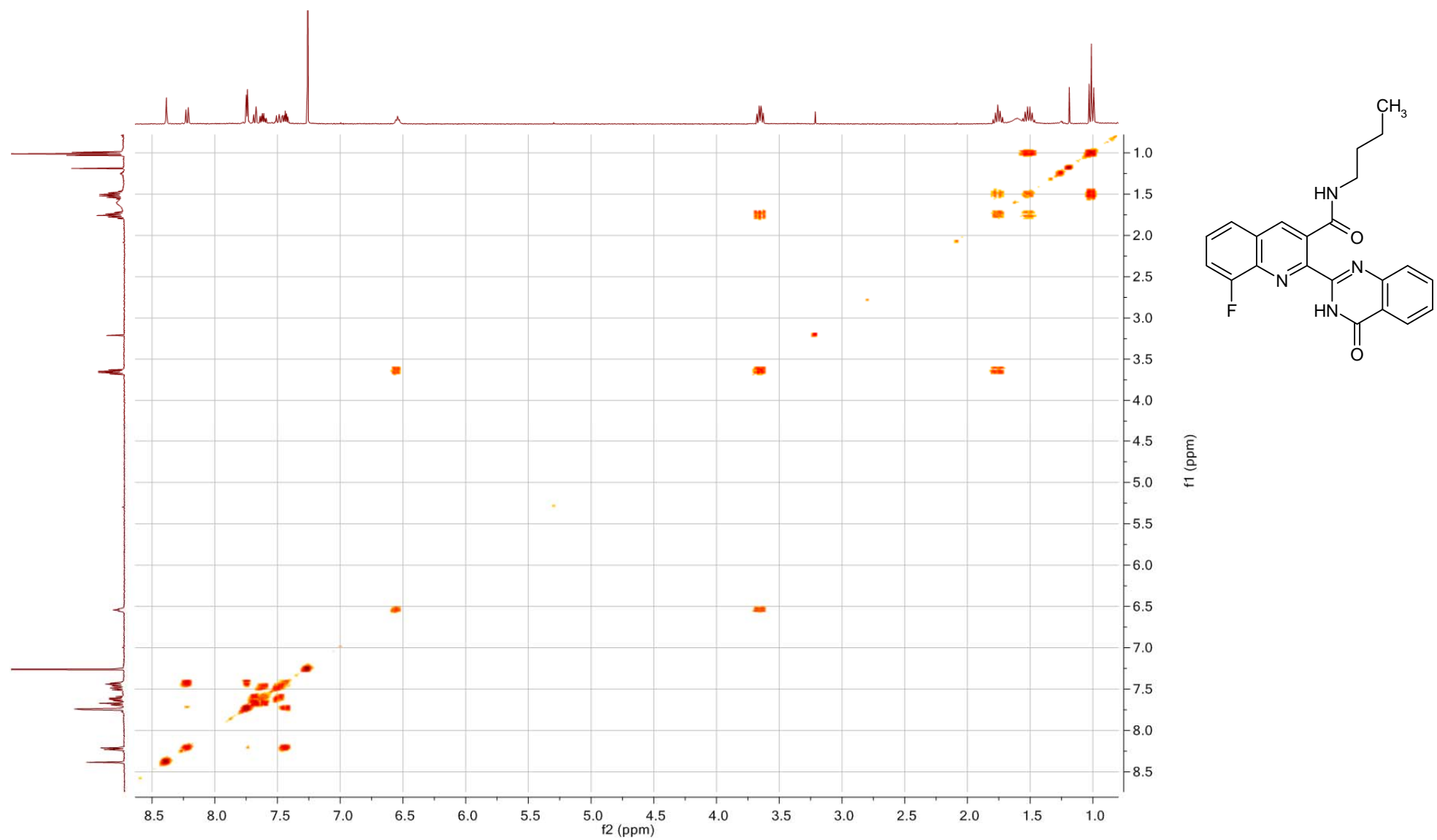
**Figure S41.** <sup>13</sup>C-NMR spectrum of *N*-butyl-8-fluoro-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (8)



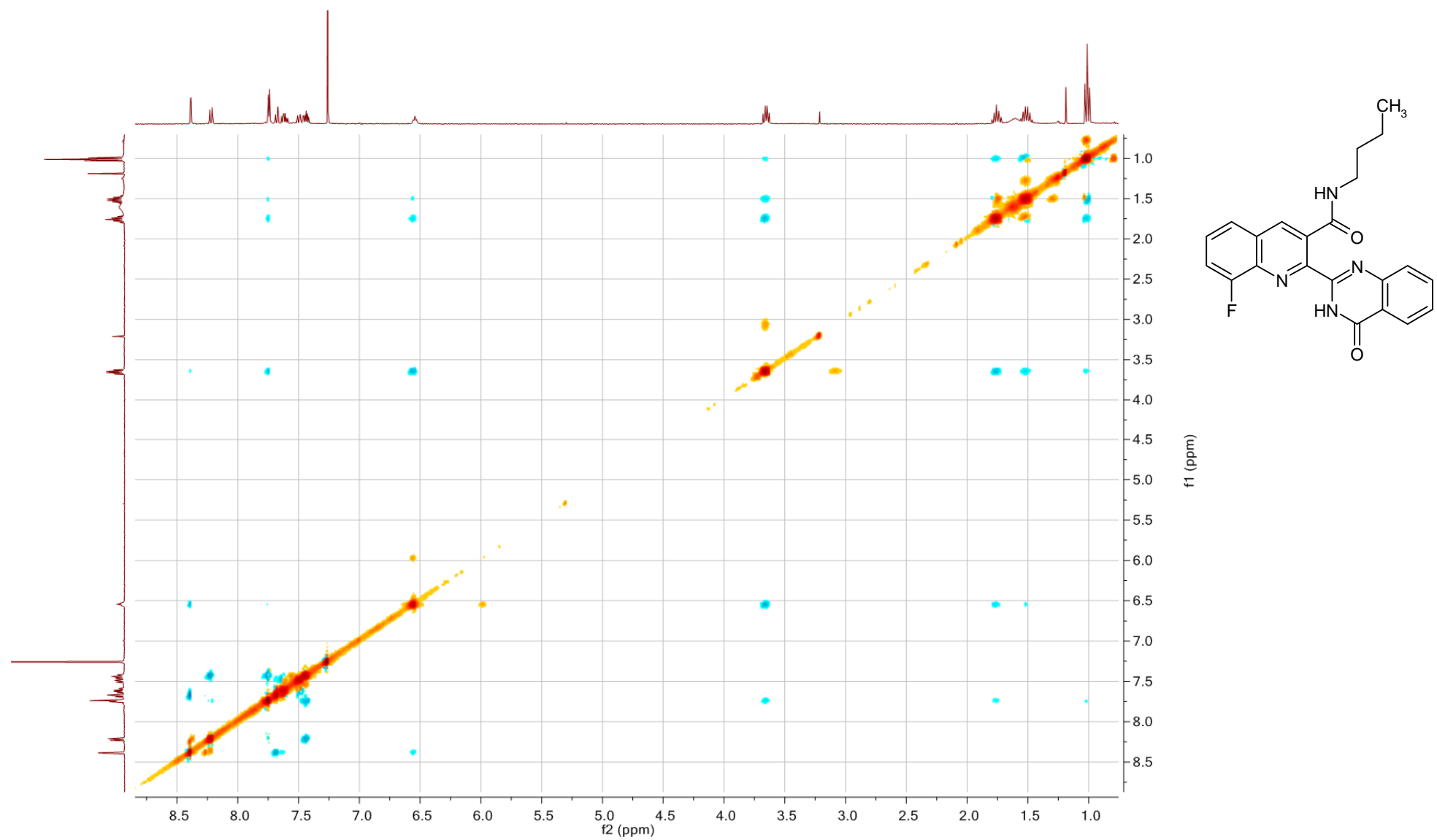
**Figure S42.** HSQC spectrum of *N*-butyl-8-fluoro-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (8)



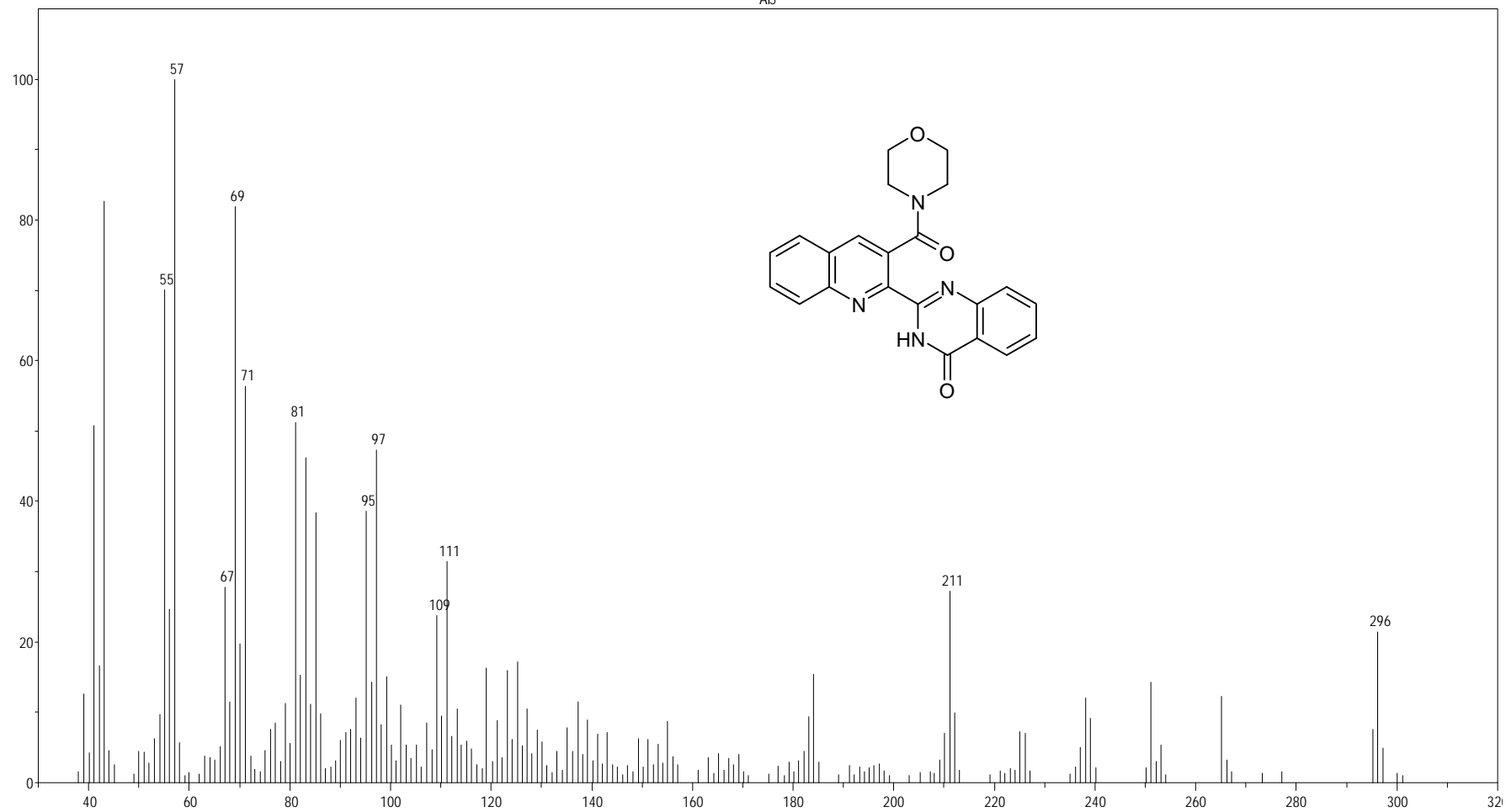
**Figure S43.** HMBC spectrum of *N*-butyl-8-fluoro-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (**8**)



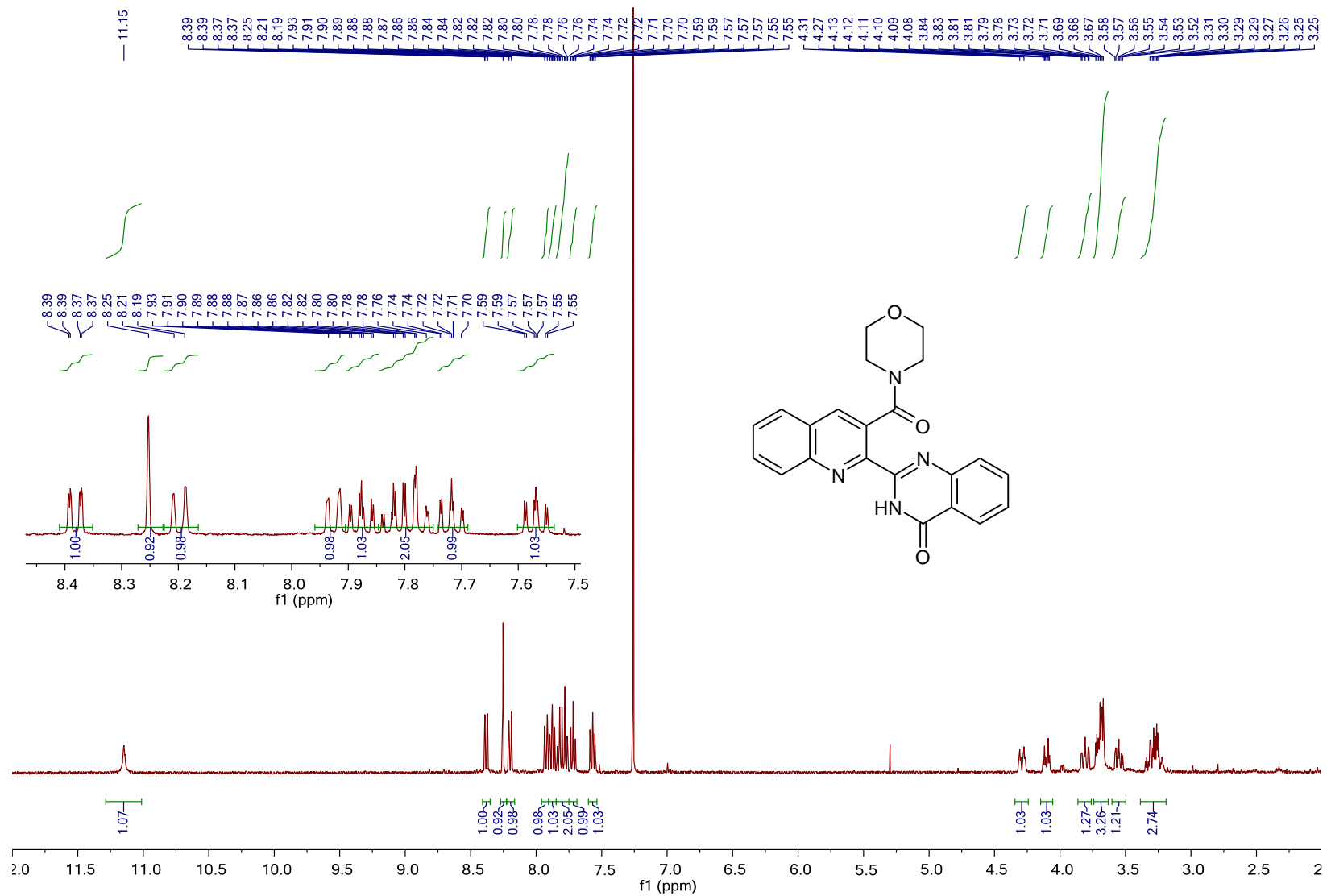
**Figure S44.** COSY spectrum of *N*-butyl-8-fluoro-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (8)



**Figure S45.** NOESY spectrum of *N*-butyl-8-fluoro-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (8)

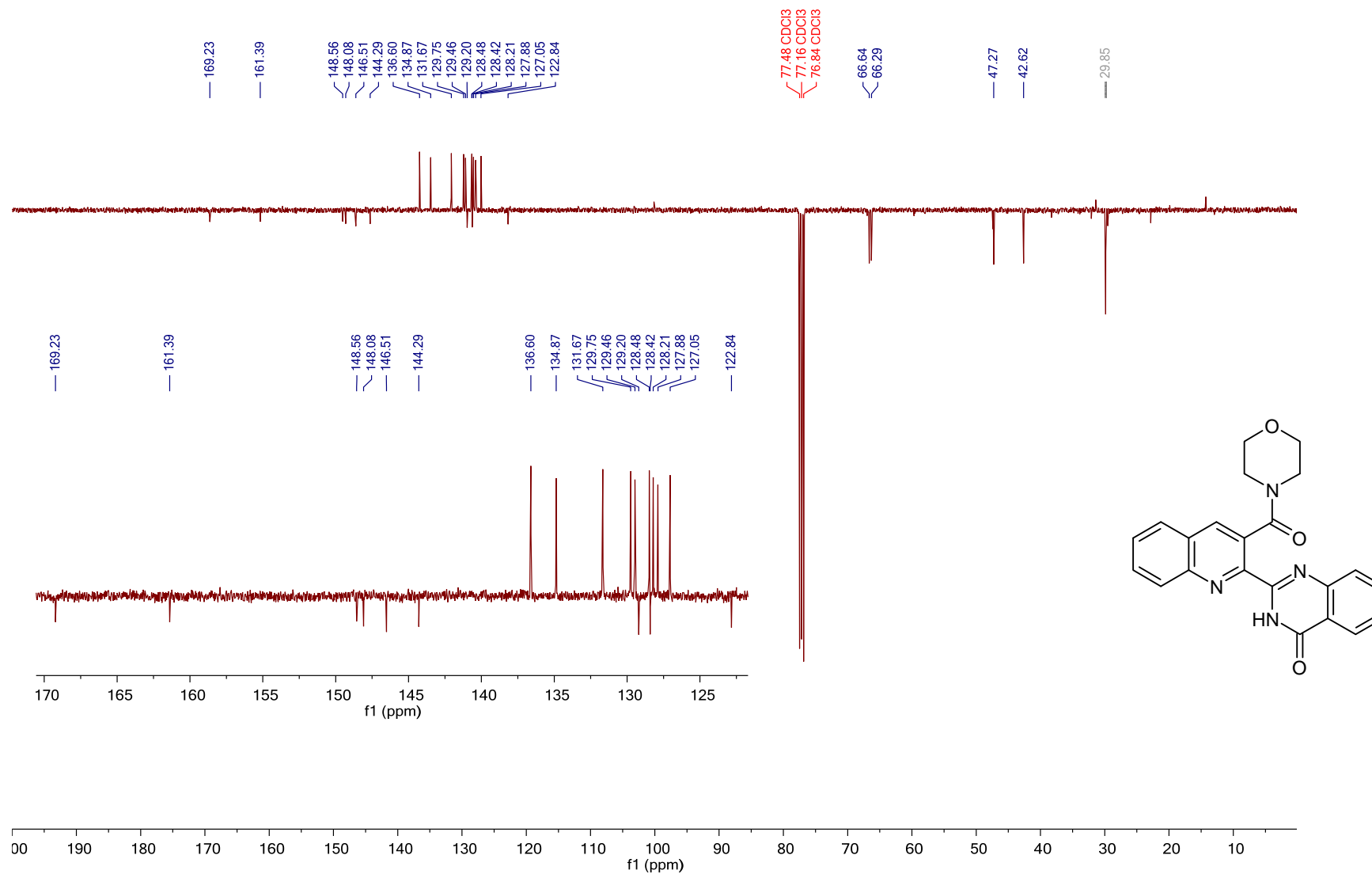


**Figure S46.** EI-MS of 2-[3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (**10**)

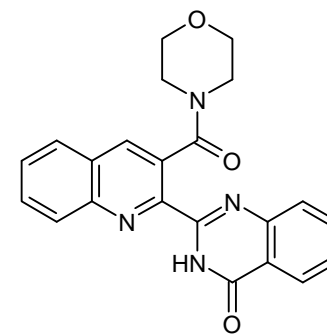
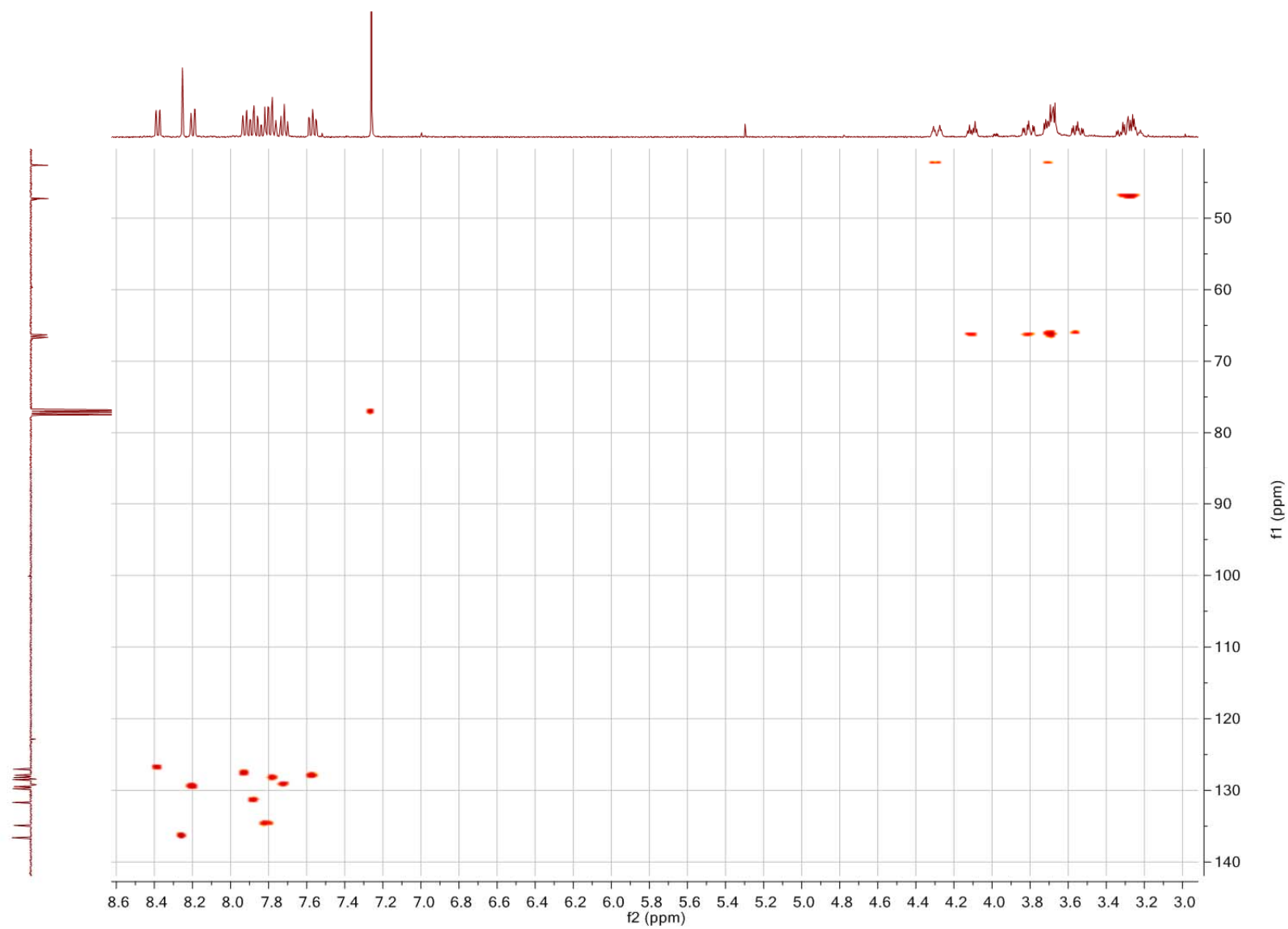


**Figure S47.** <sup>1</sup>H-NMR spectrum of 2-[3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (10)





**Figure S48.**  $^{13}\text{C}$ -NMR spectrum of 2-[3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (10)



**Figure S49.** HSQC spectrum of 2-[3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (**10**)

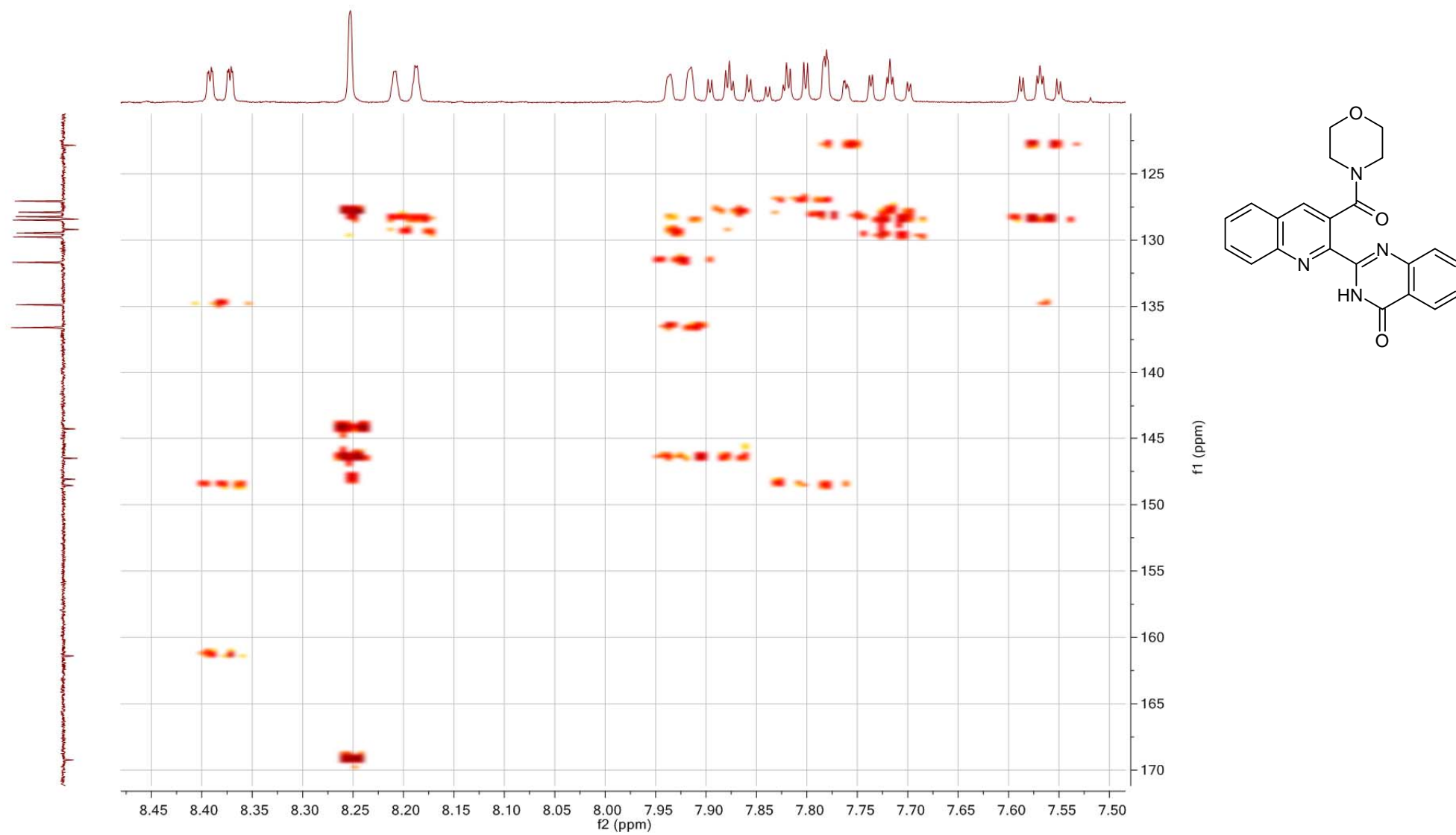
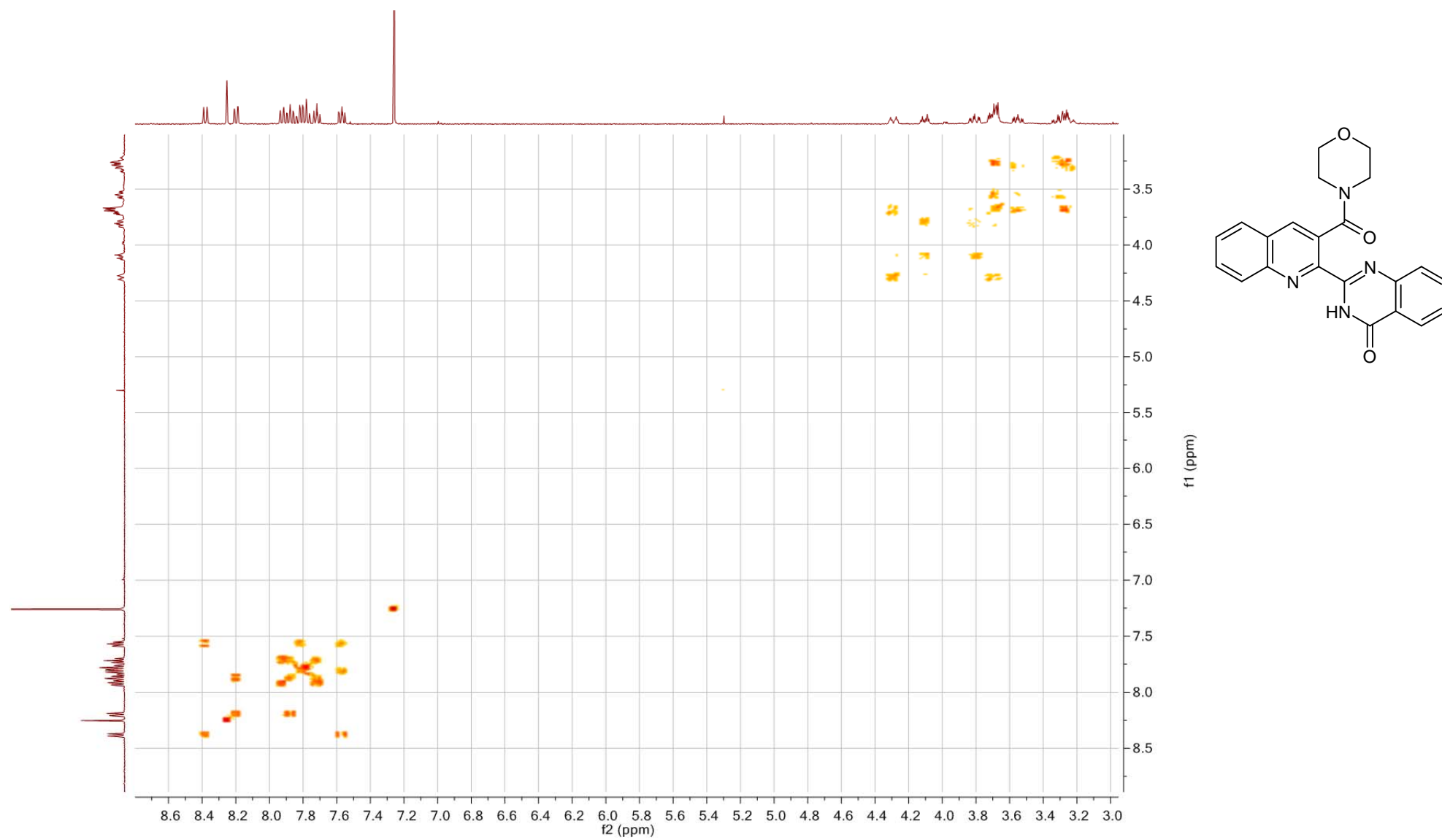
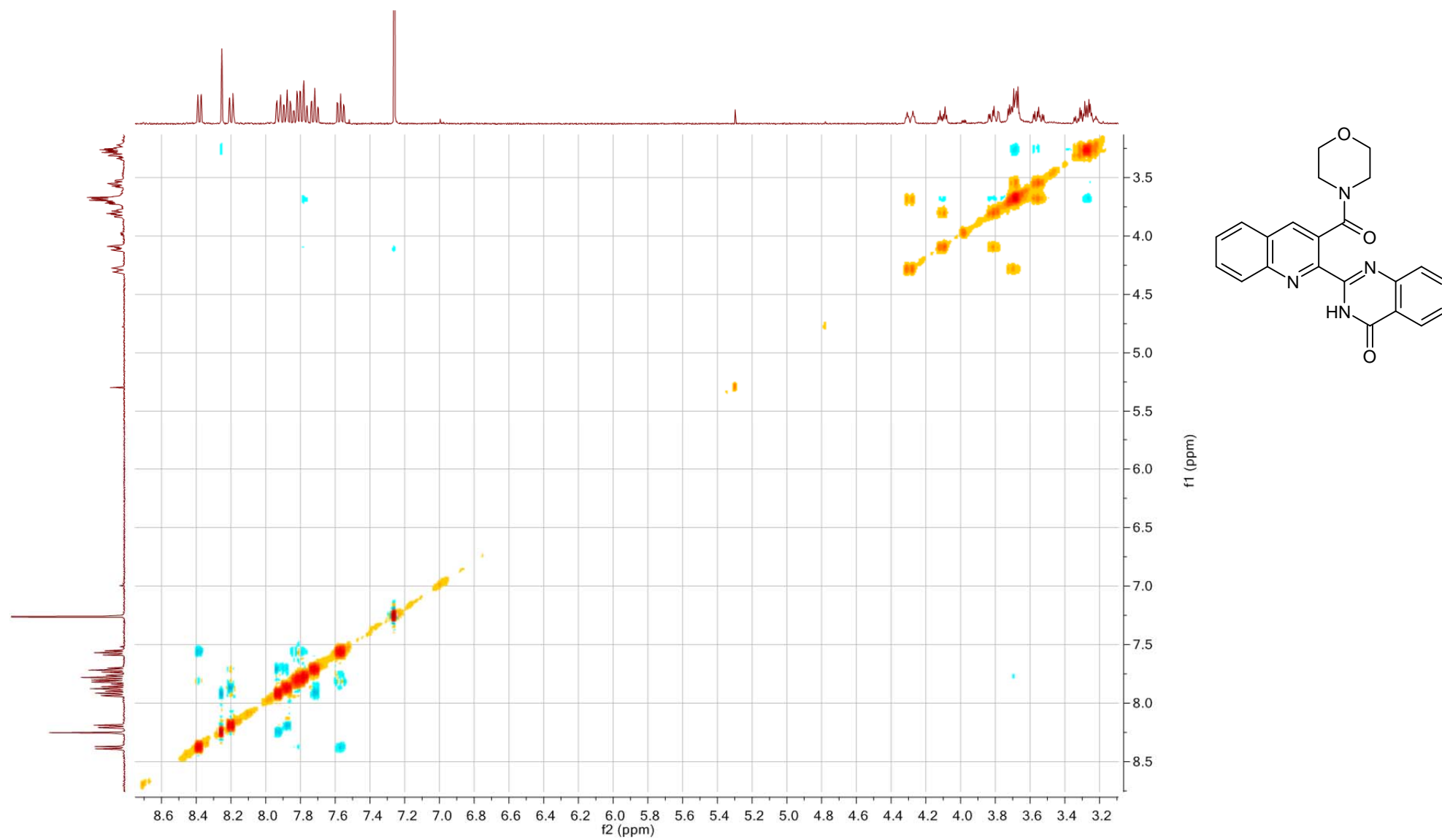


Figure S50. HMBC spectrum of 2-[3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (10)

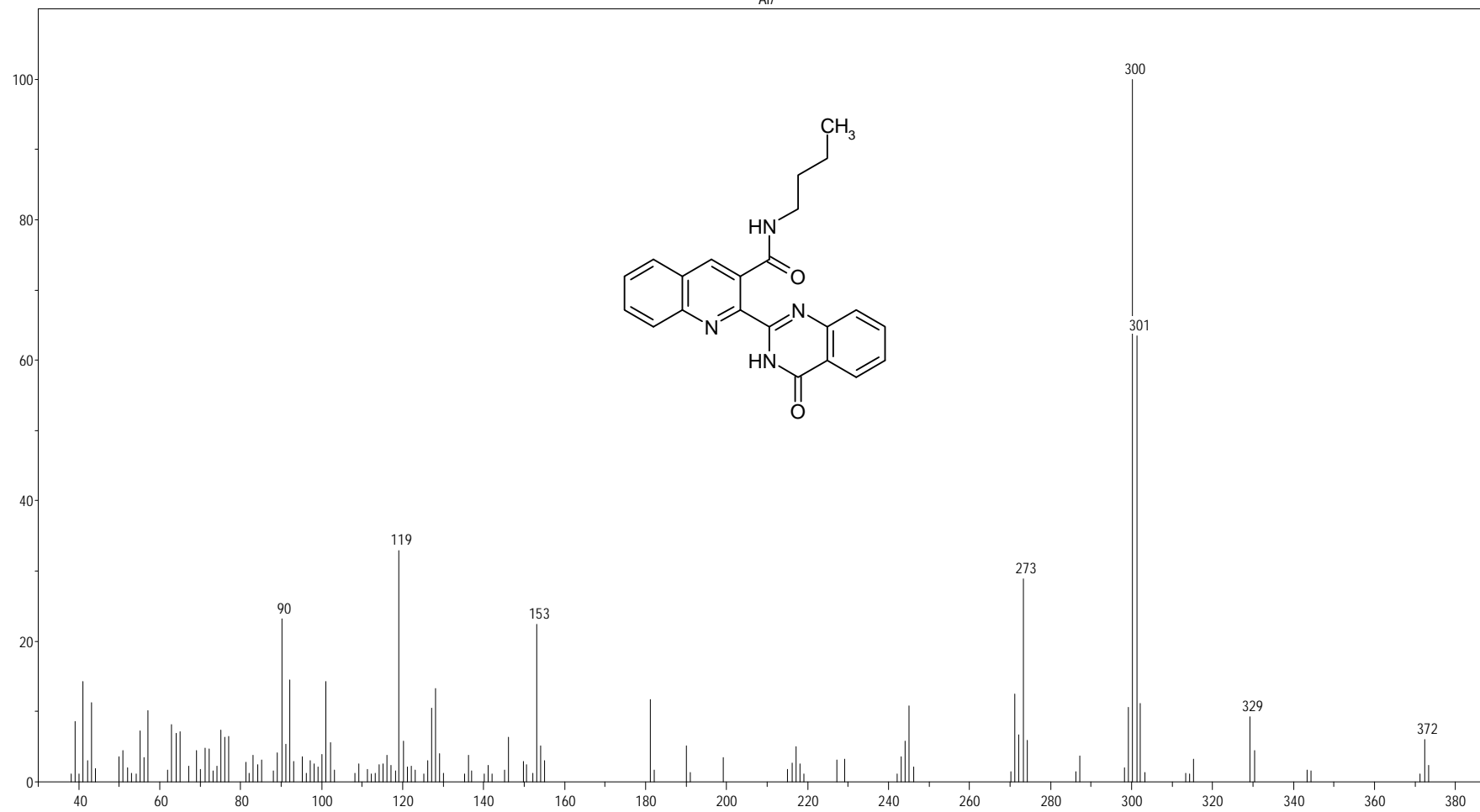


**Figure S51.** COSY spectrum of 2-[3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (10)

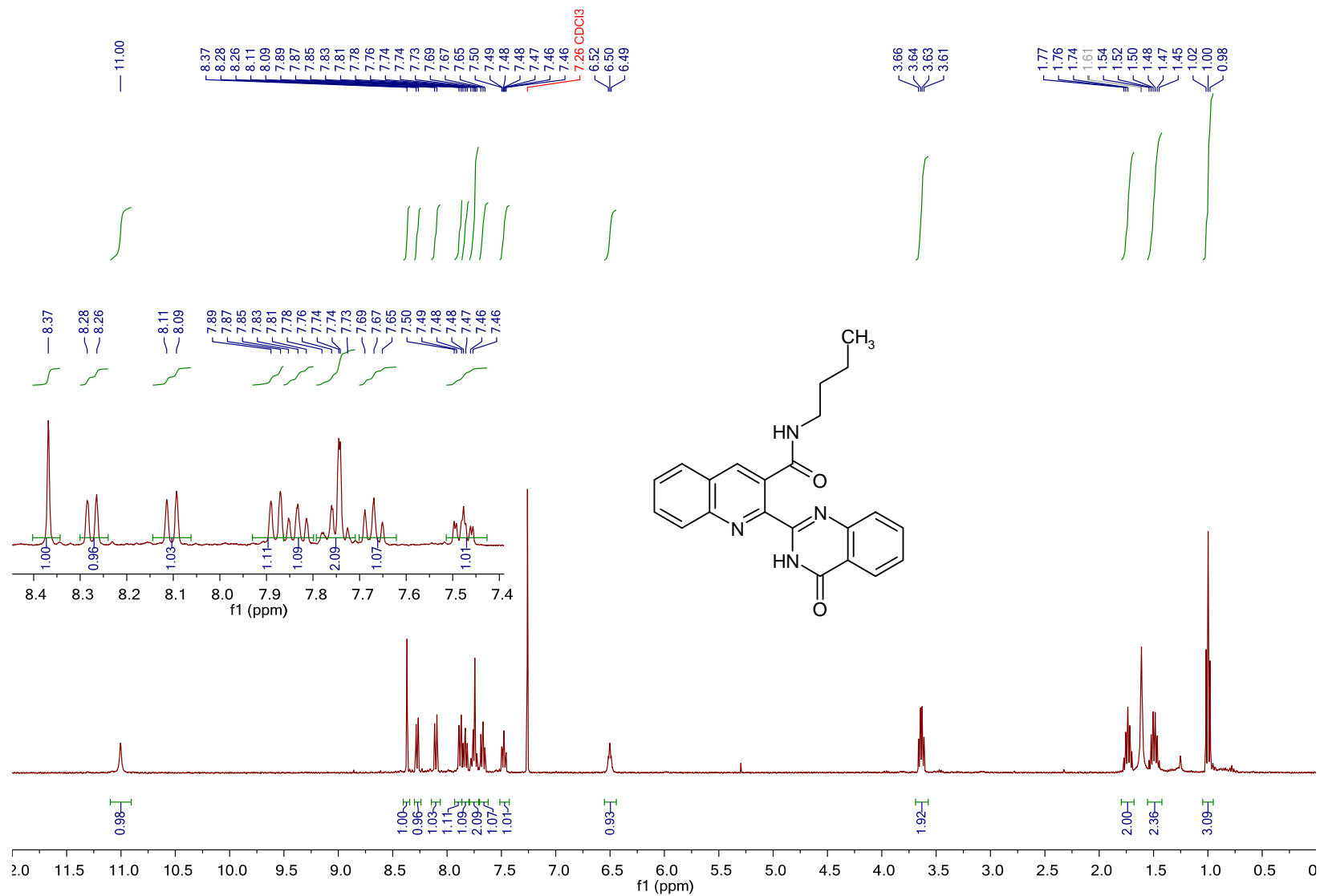


**Figure S52.** NOESY spectrum of 2-[3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (**10**)

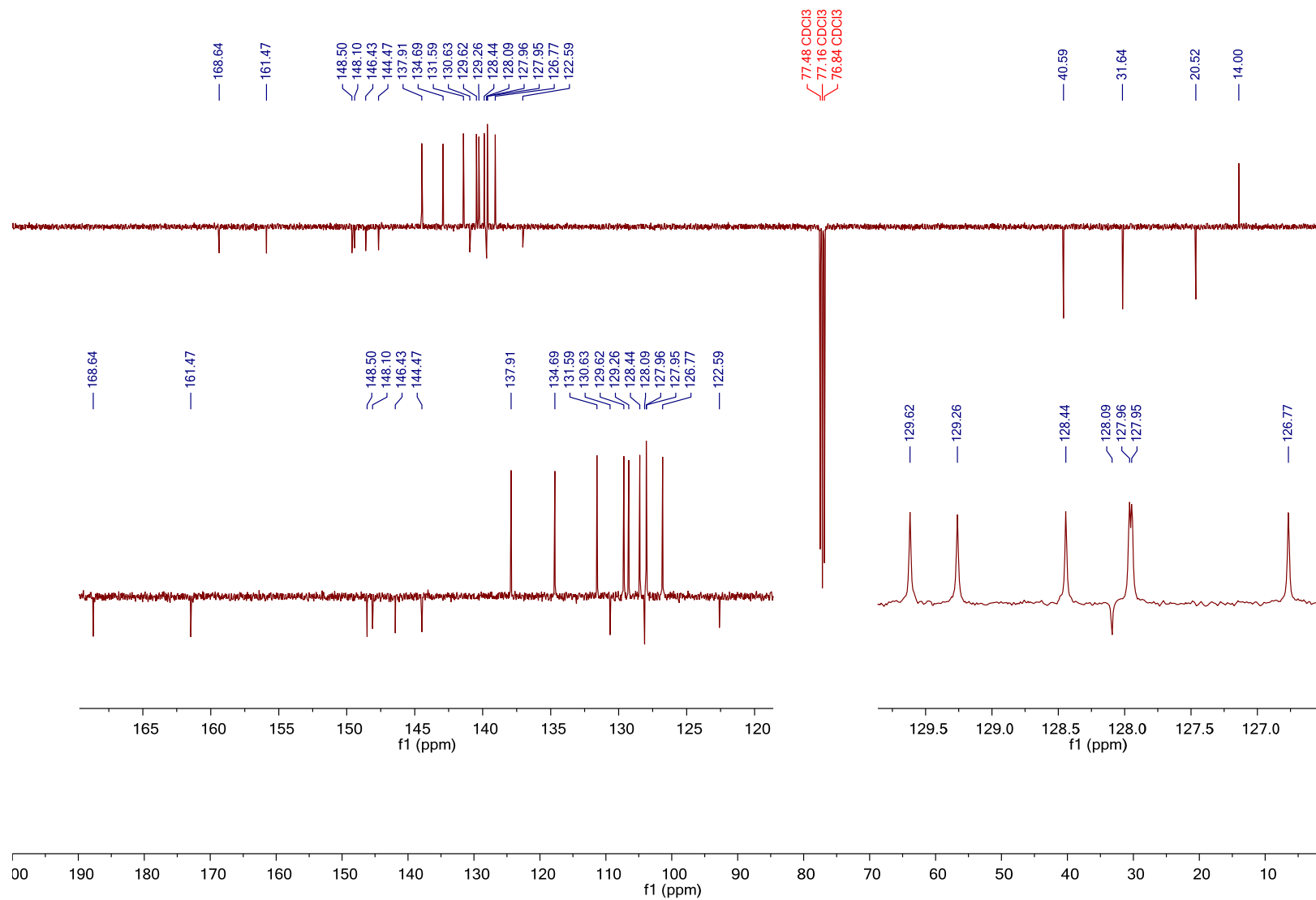
A17



**Figure S53.** EI-MS of *N*-butyl-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (11)



**Figure S54.**  $^1\text{H-NMR}$  spectrum of *N*-butyl-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (11)



**Figure S55.**  $^{13}\text{C}$ -NMR spectrum of *N*-butyl-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (11)



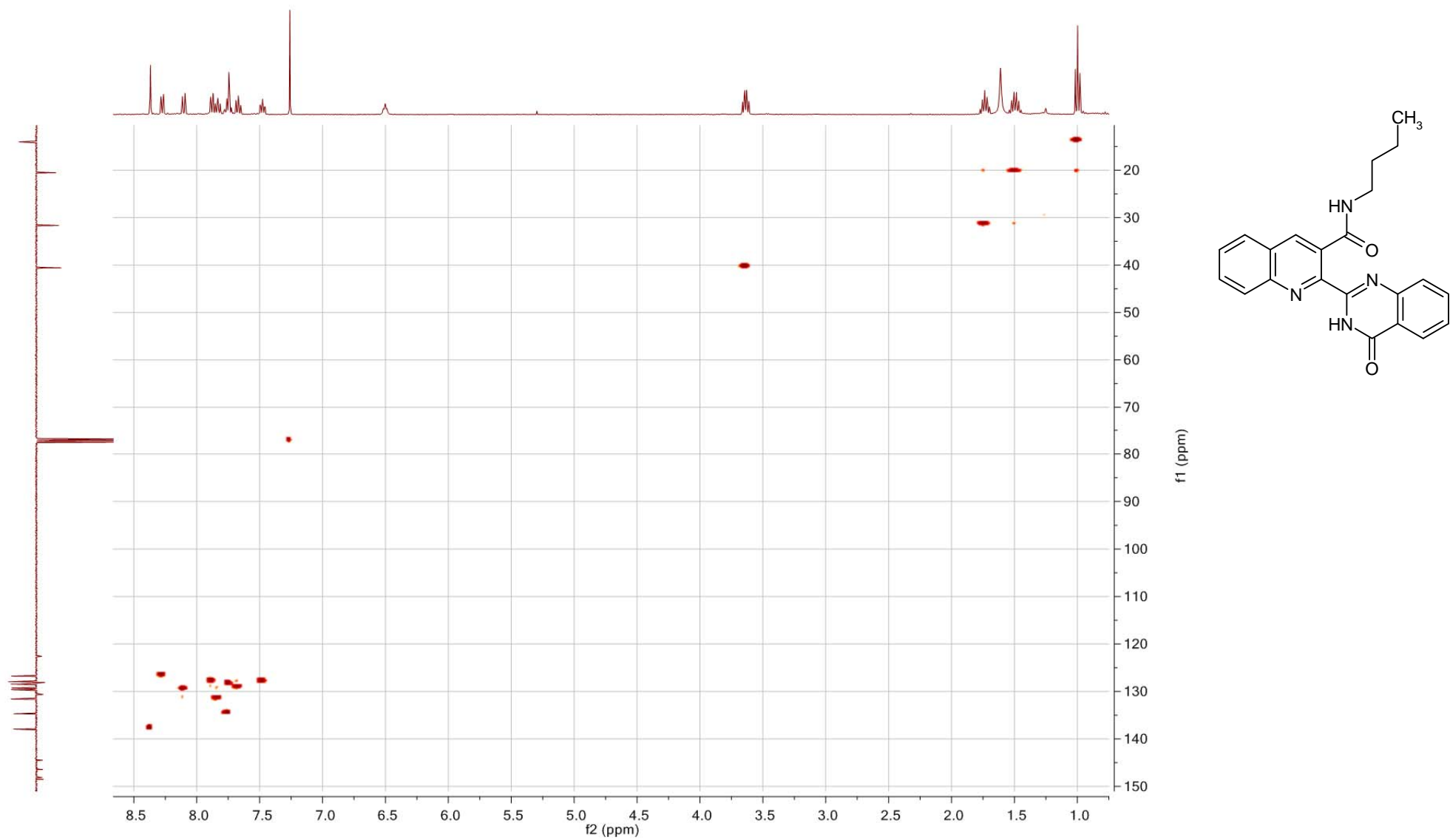


Figure S56. HSQC spectrum of *N*-butyl-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (11)

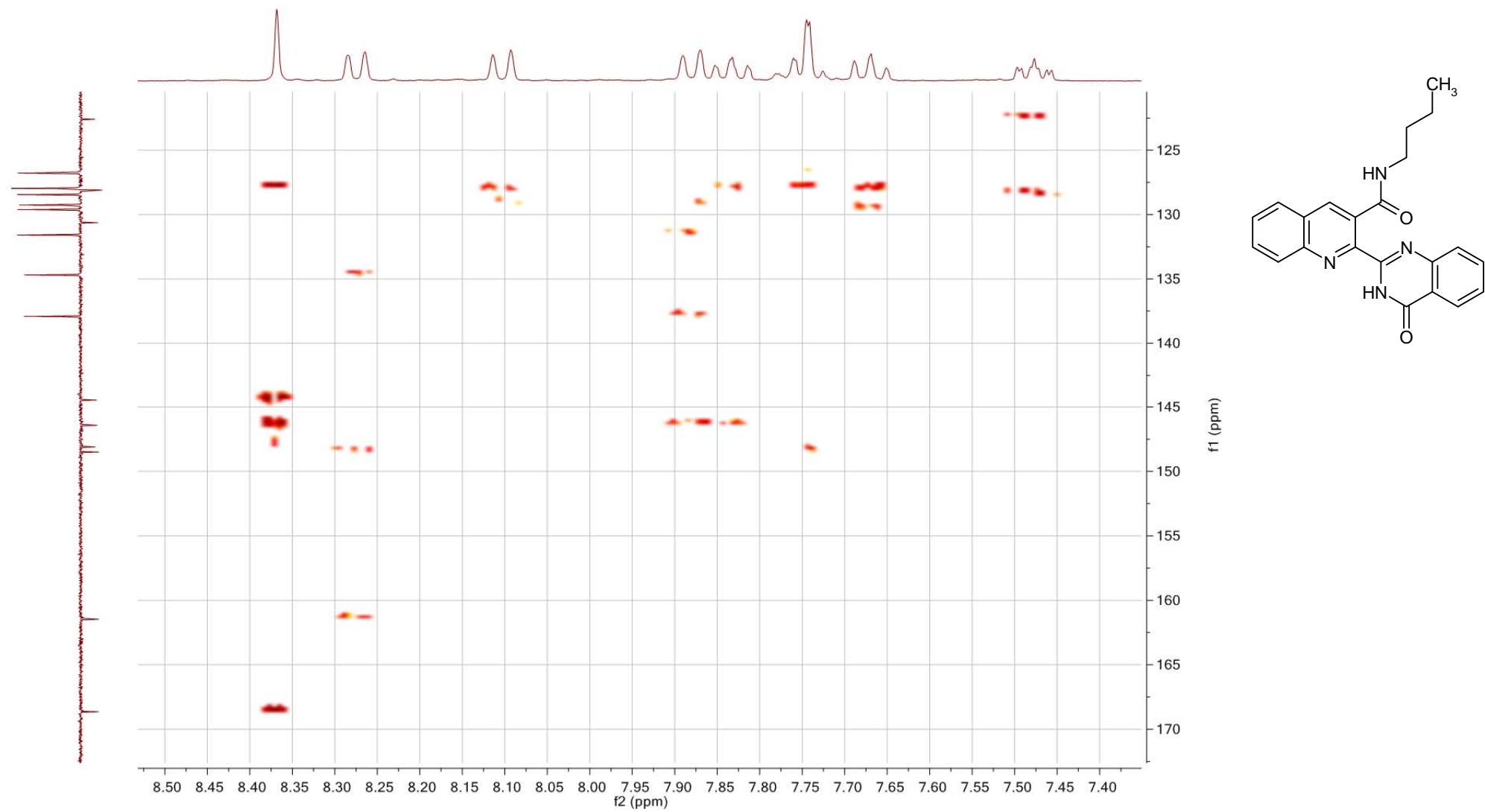
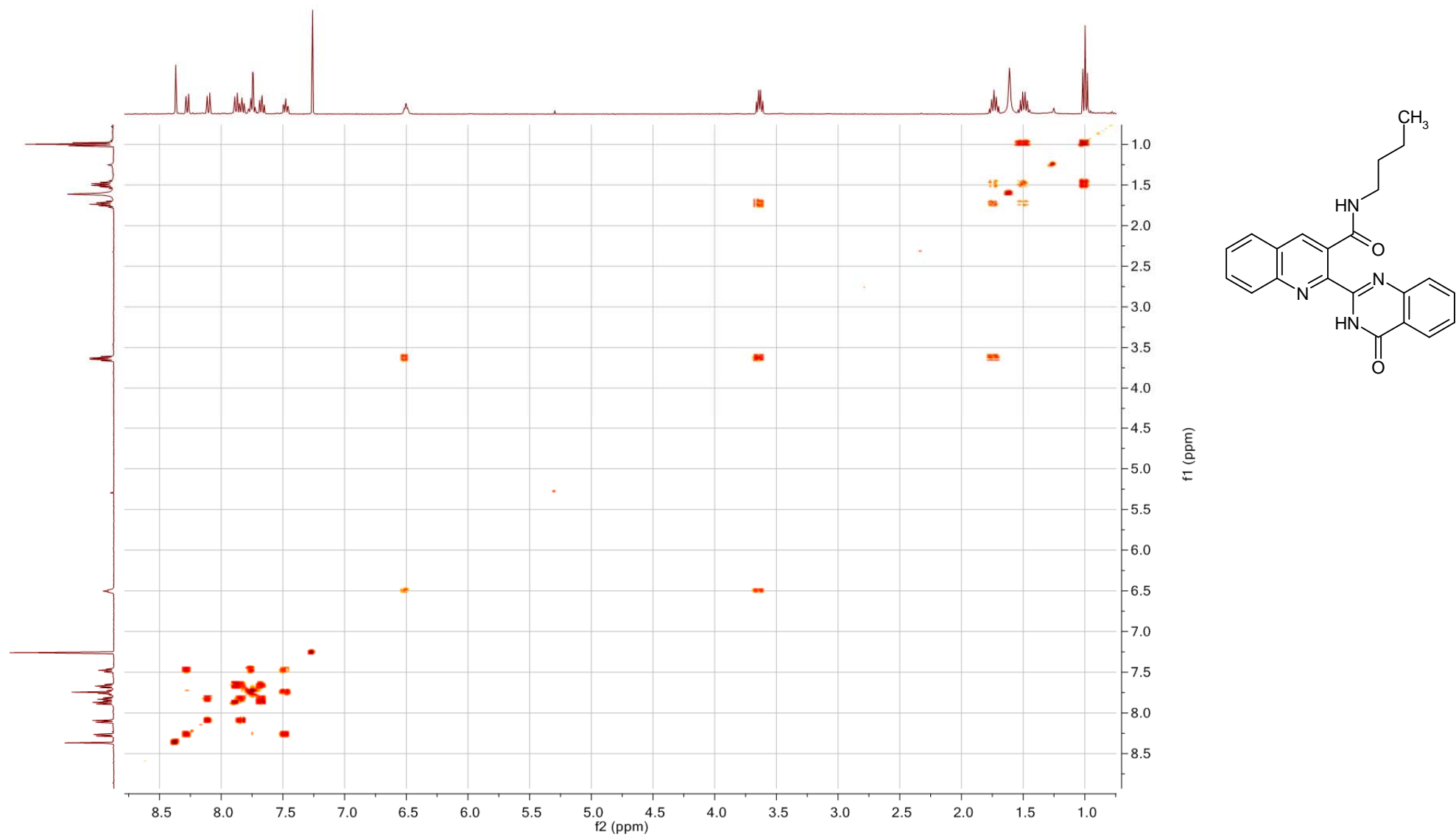
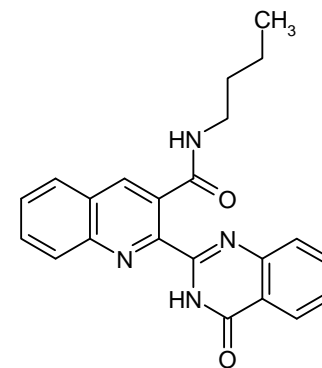
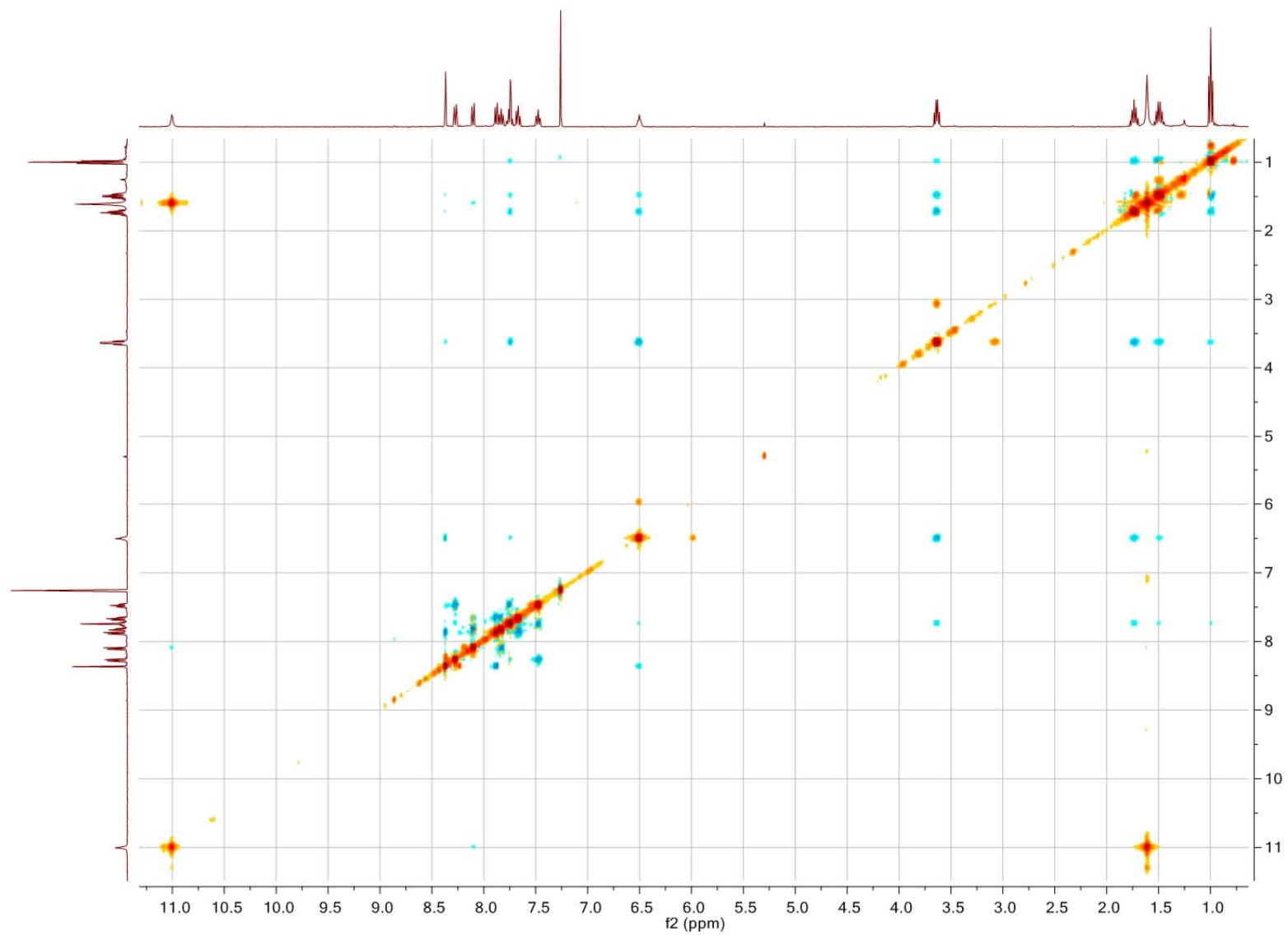


Figure S57. HMBC spectrum of *N*-butyl-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (**11**)



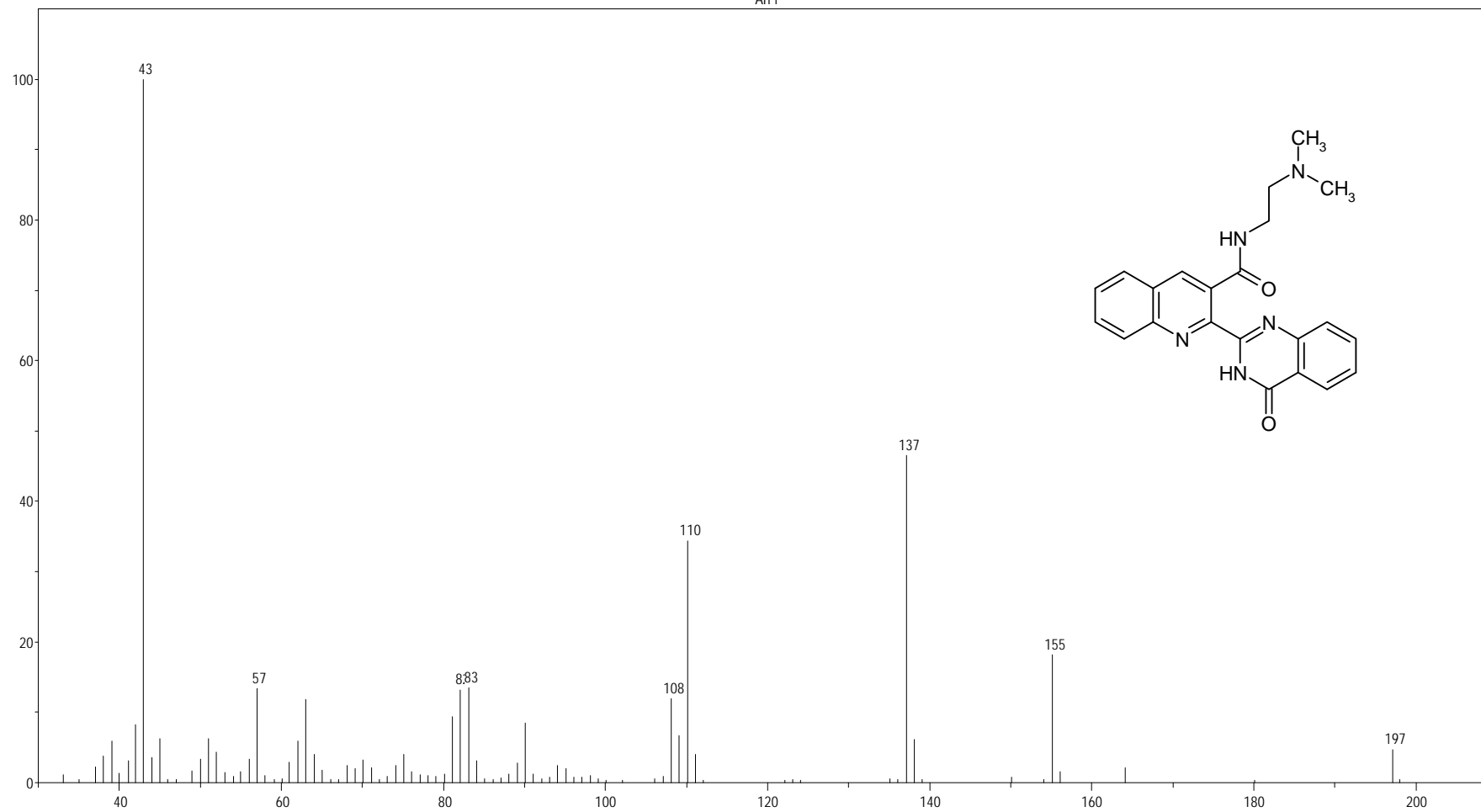
**Figure S58.** COSY spectrum of *N*-butyl-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (**11**)



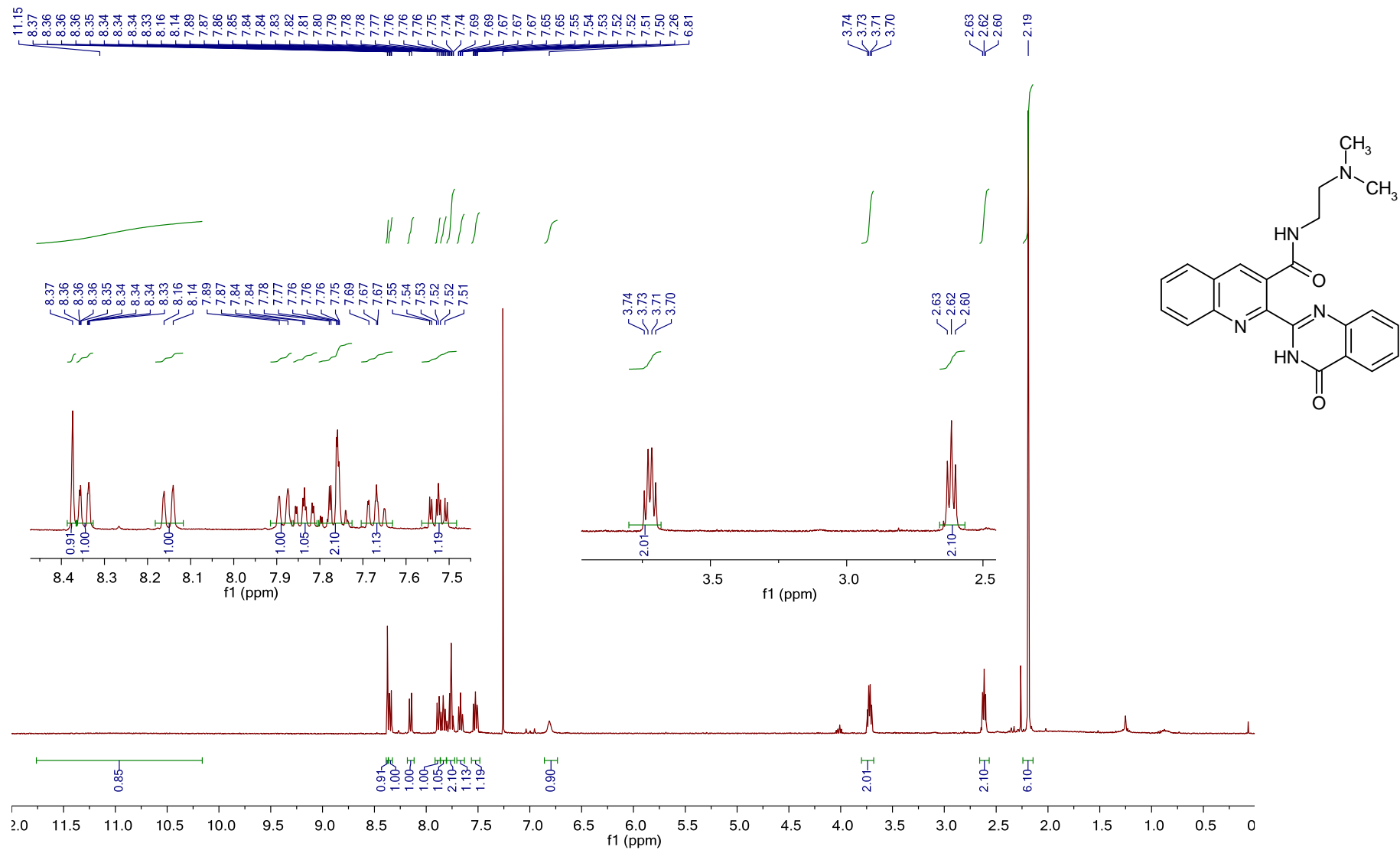
f1 (ppm)

**Figure S59.** NOESY spectrum of *N*-butyl-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (**11**)

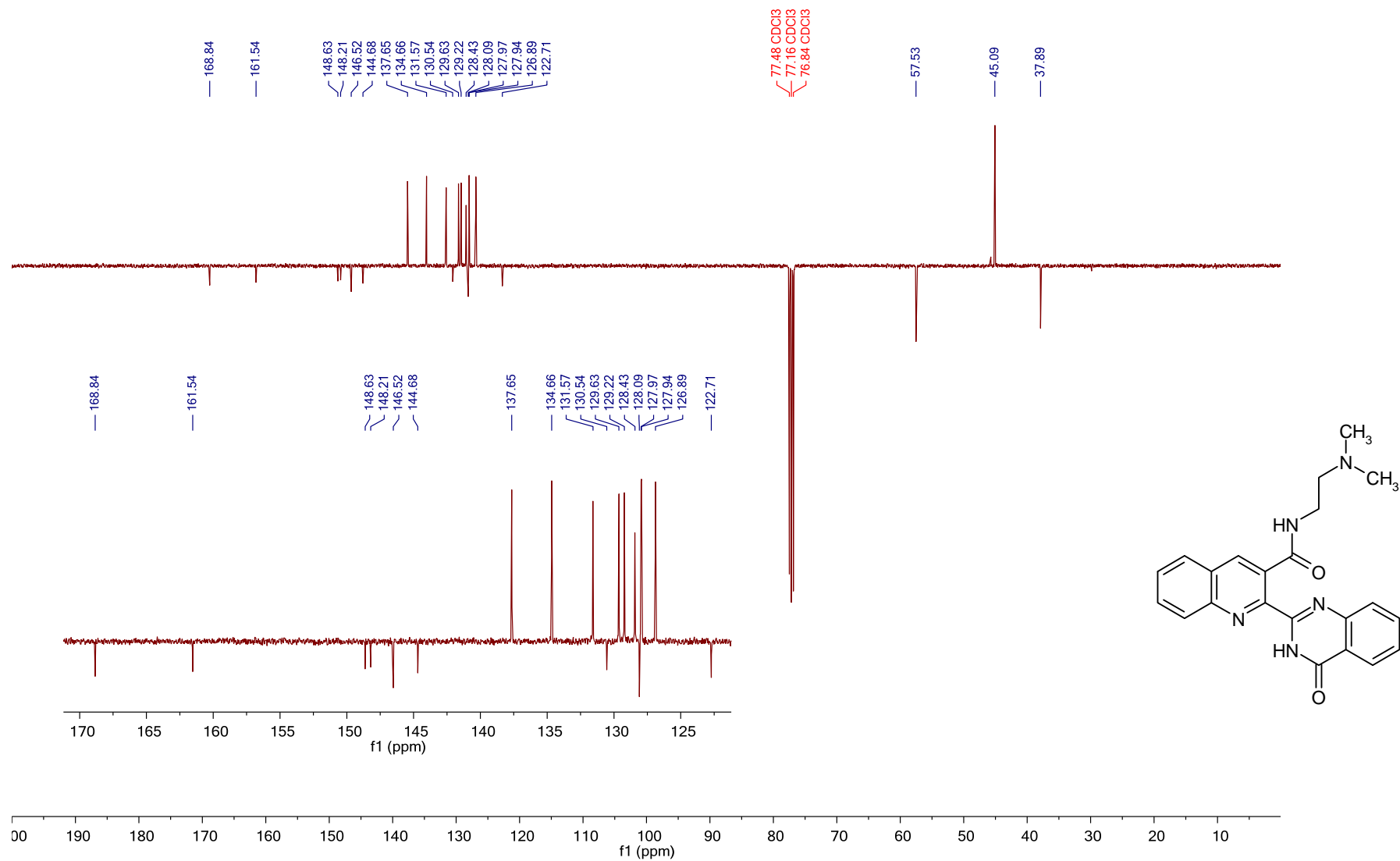
All 1



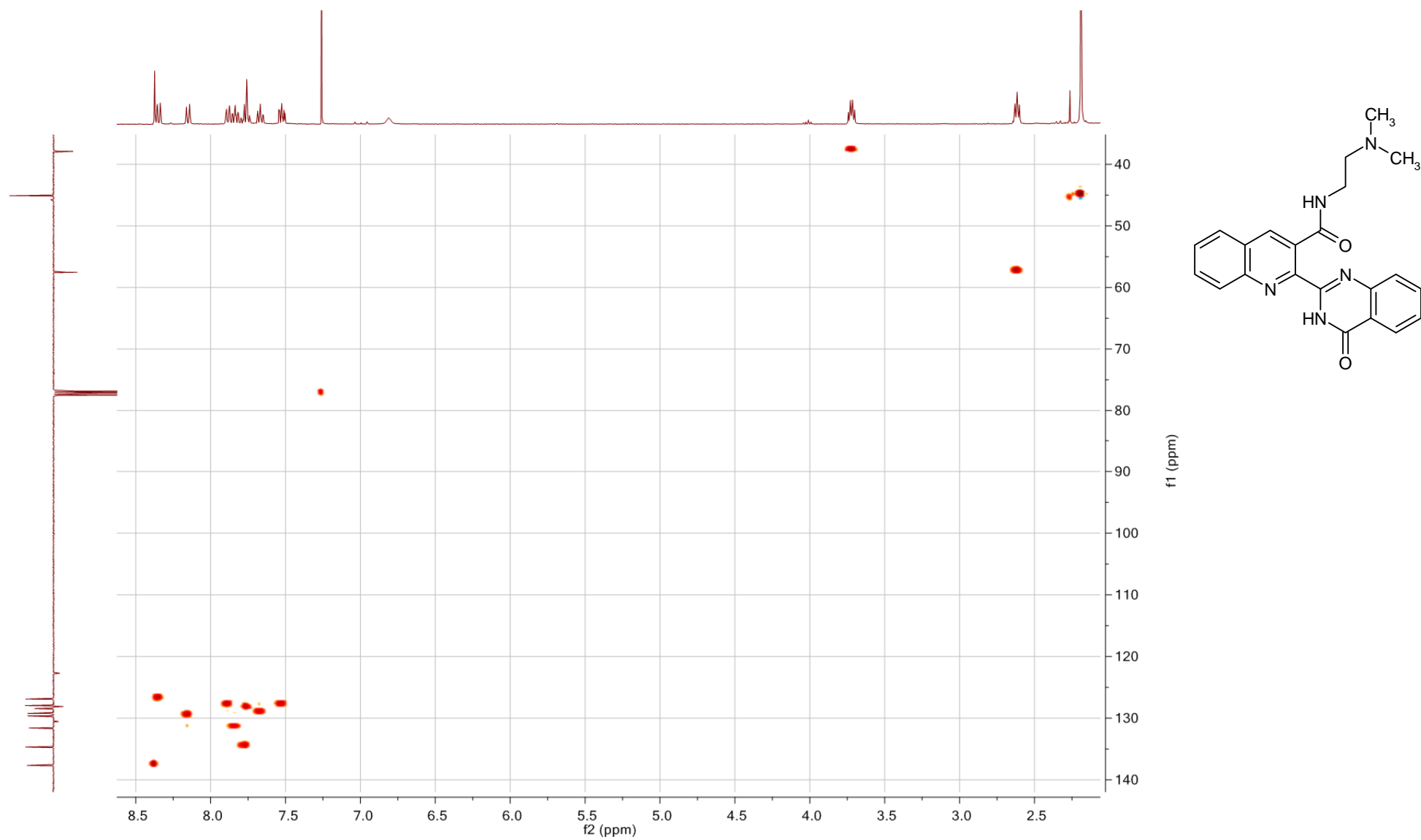
**Figure S60.** EI-MS of *N*-[2-(dimethylamino)ethyl]-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (**12**)



**Figure S61.** <sup>1</sup>H-NMR spectrum of *N*-[2-(dimethylamino)ethyl]-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (12)

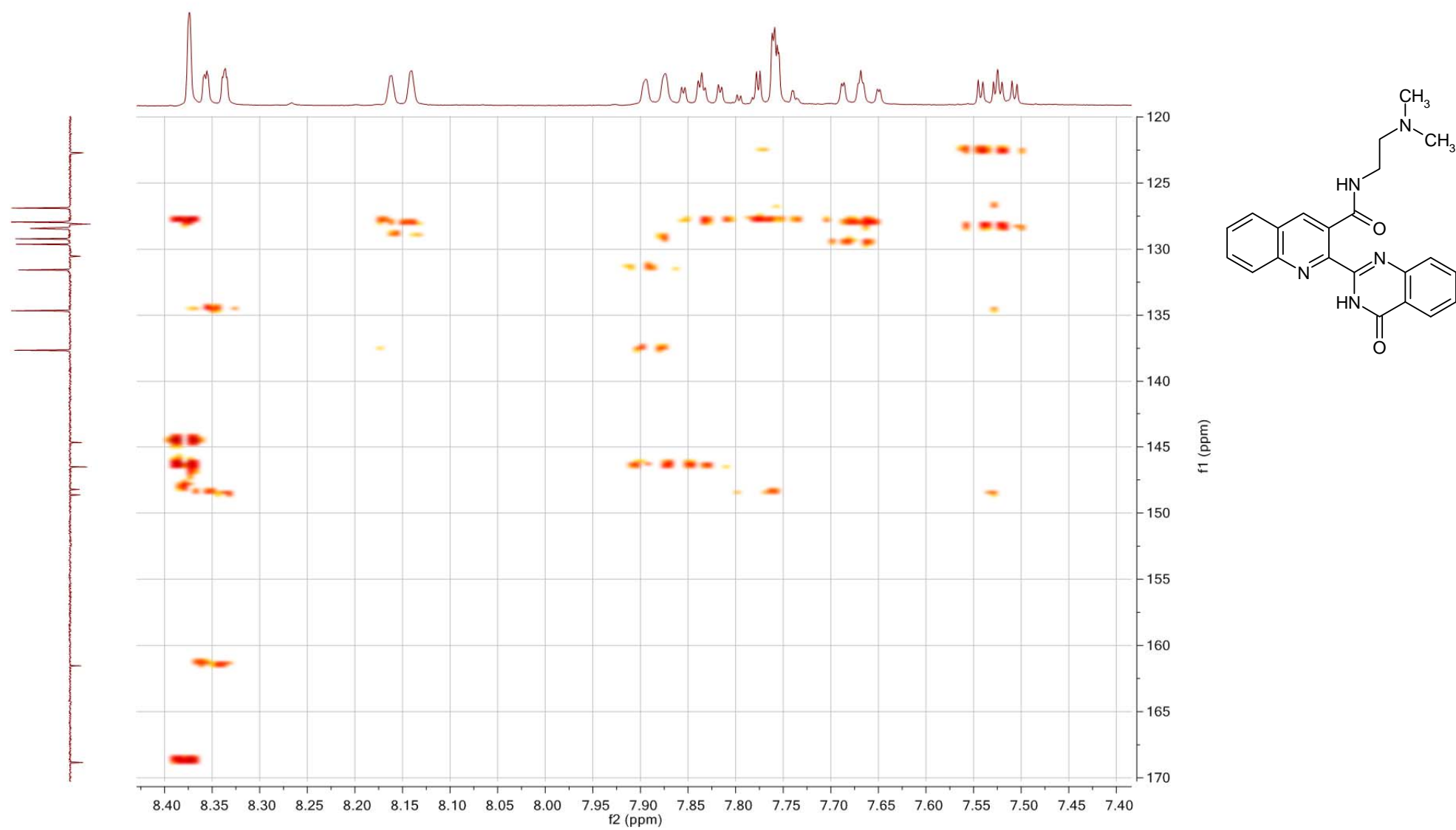


**Figure S62.** <sup>13</sup>C-NMR spectrum of *N*-[2-(dimethylamino)ethyl]-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (**12**)

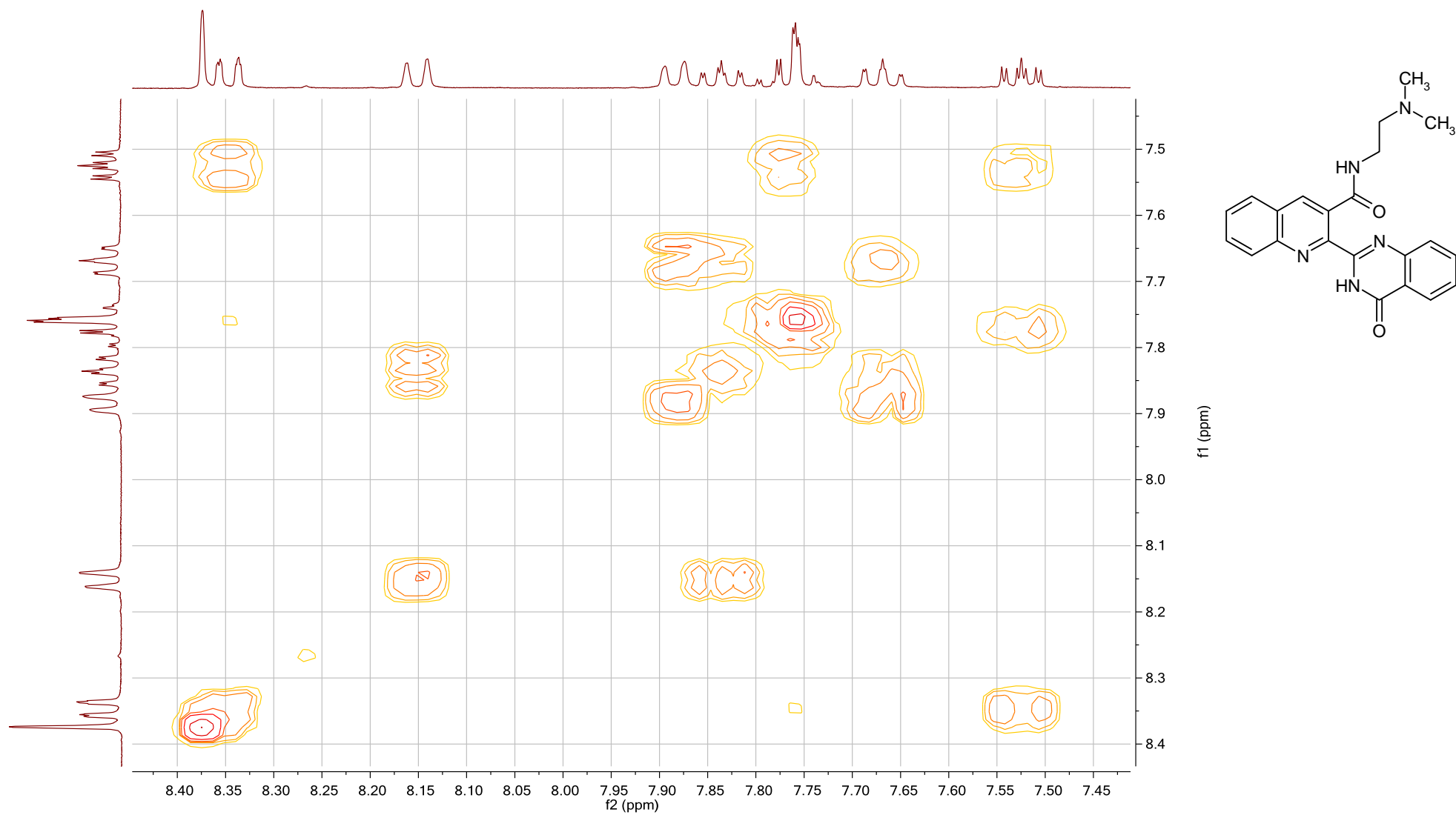


**Figure S63.** HSQC spectrum of *N*-[2-(dimethylamino)ethyl]-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (**12**)

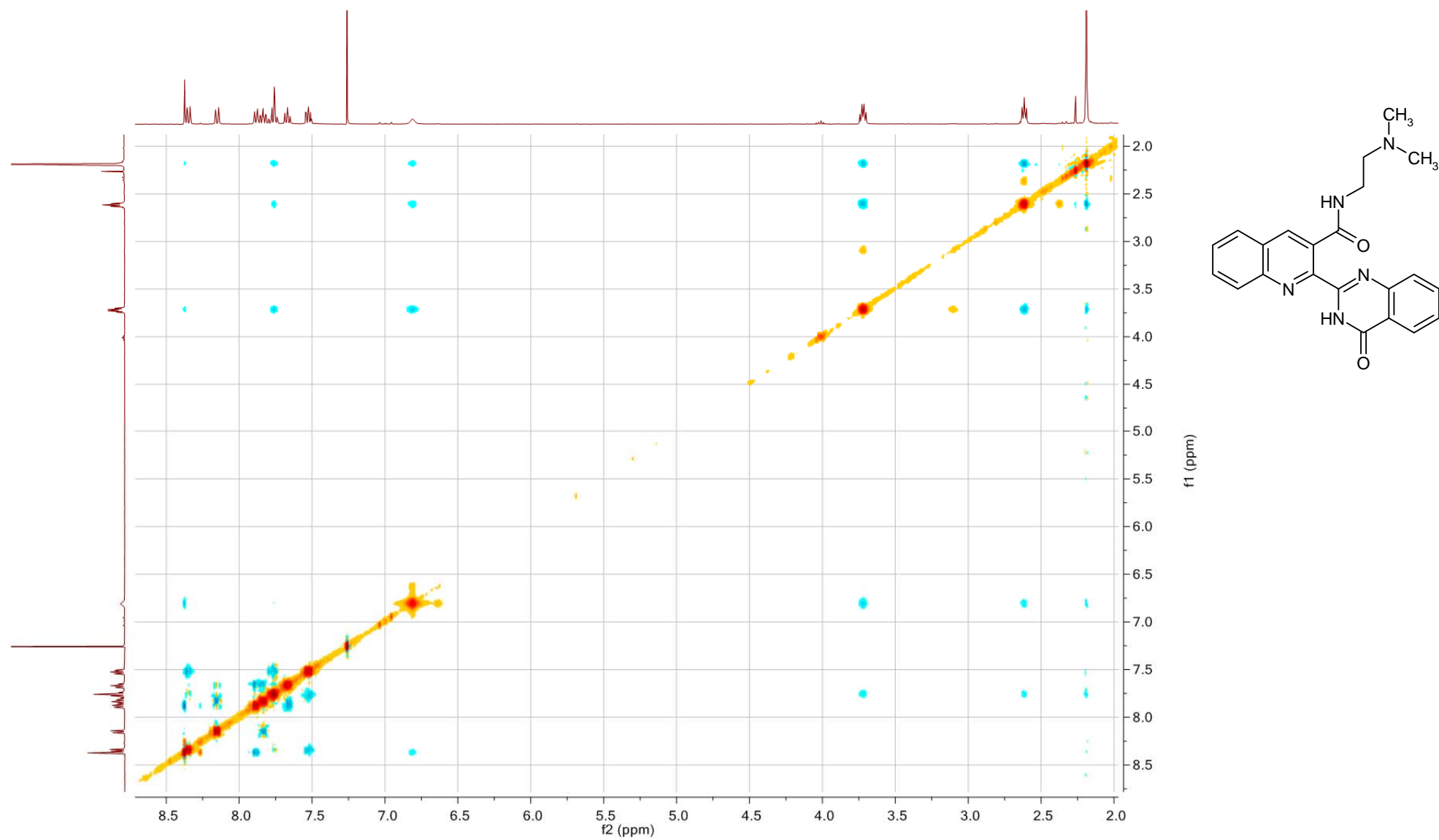




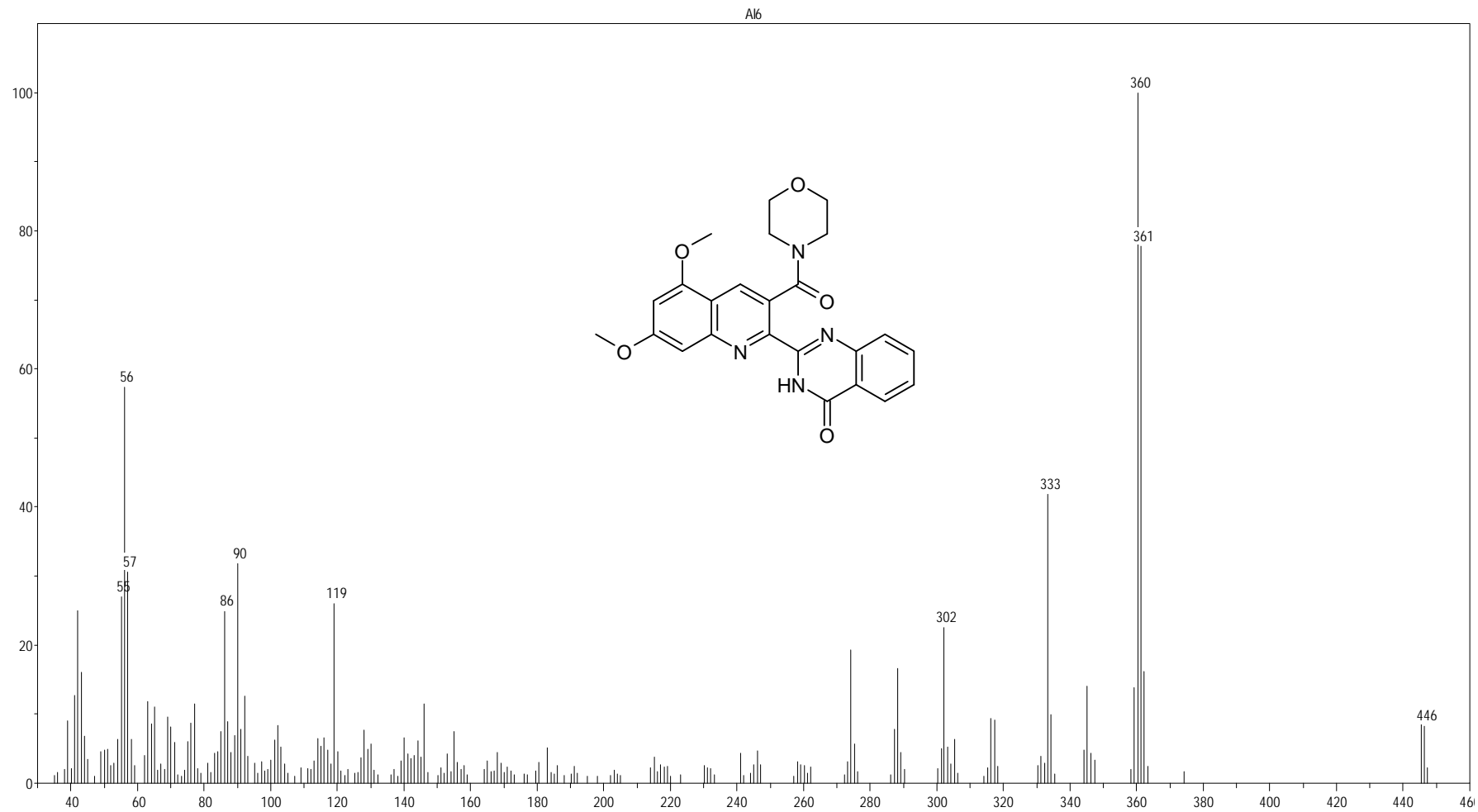
**Figure S64.** HMBC spectrum of *N*-[2-(dimethylamino)ethyl]-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (**12**)



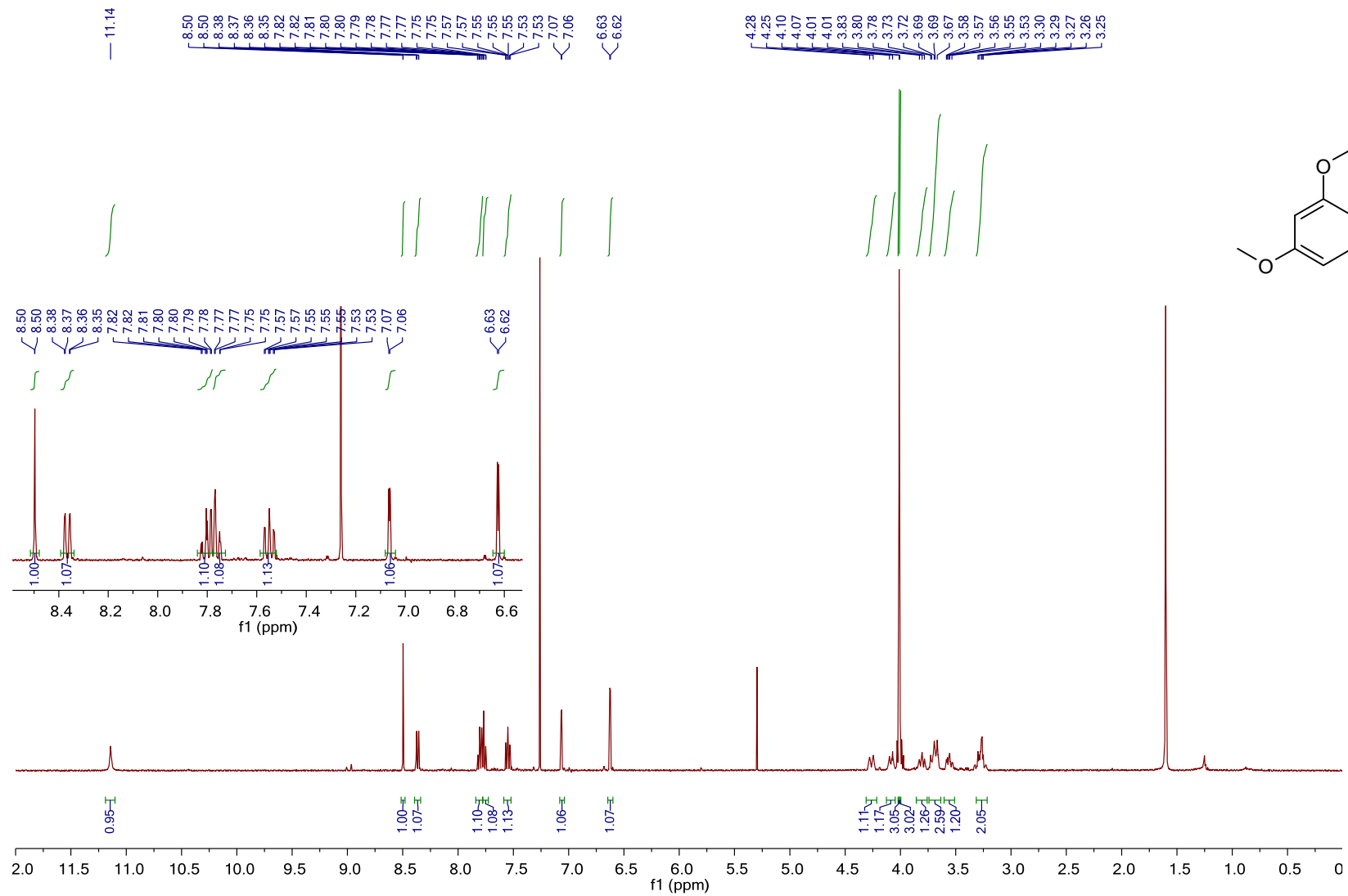
**Figure S65.** COSY spectrum of *N*-[2-(dimethylamino)ethyl]-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (**12**)



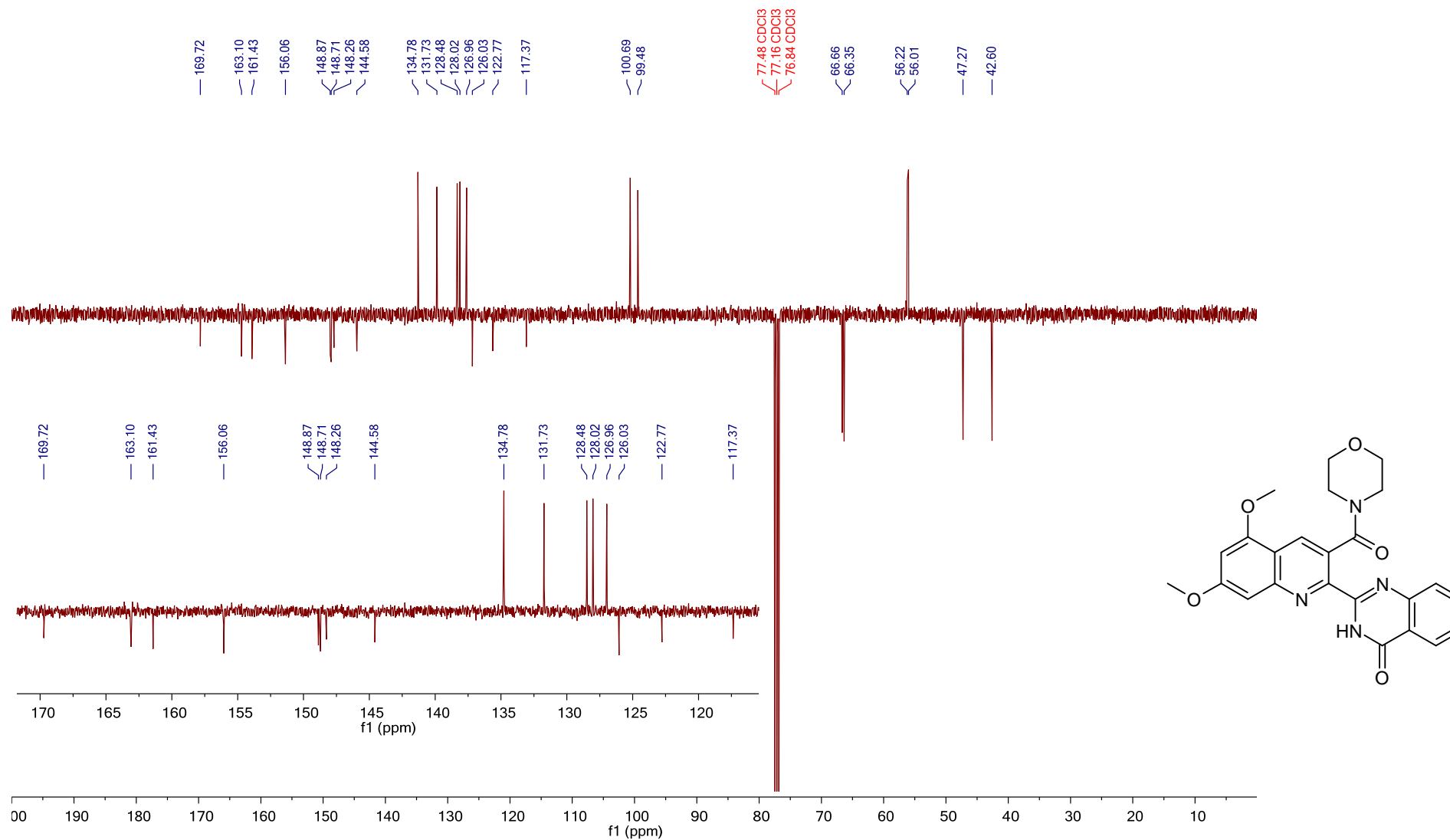
**Figure S66.** NOESY spectrum of *N*-[2-(dimethylamino)ethyl]-2-(4-oxo-3,4-dihydroquinazolin-2-yl)quinoline-3-carboxamide (**12**)



**Figure S67.** EI-MS of 2-[5,7-dimethoxy-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (**14**)



**Figure S68.**  $^1\text{H-NMR}$  spectrum of 2-[5,7-dimethoxy-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (**14**)



**Figure S69.** <sup>13</sup>C-NMR spectrum of 2-[5,7-dimethoxy-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (**14**)

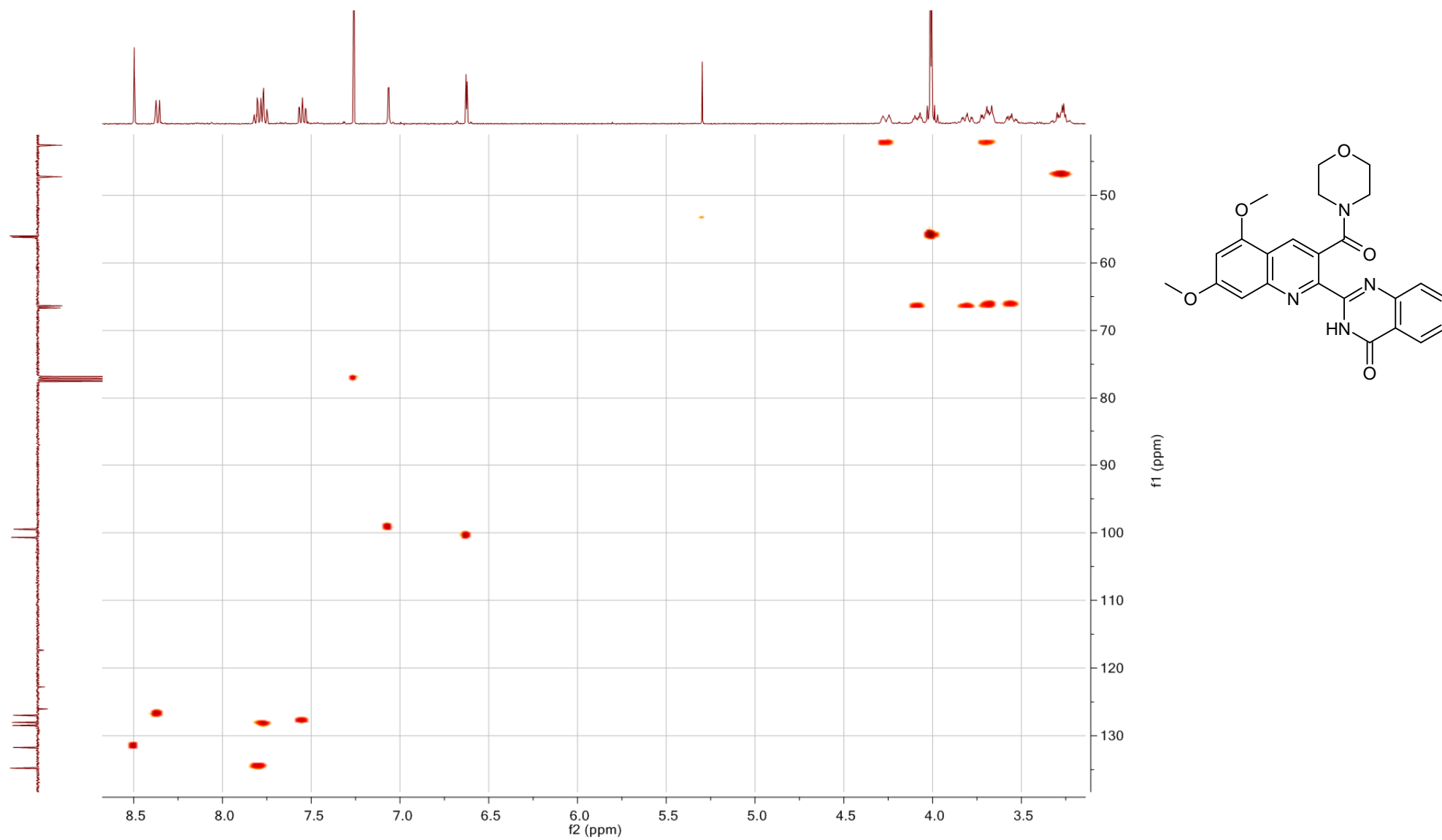


Figure S70. HSQC spectrum of 2-[5,7-dimethoxy-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (14)

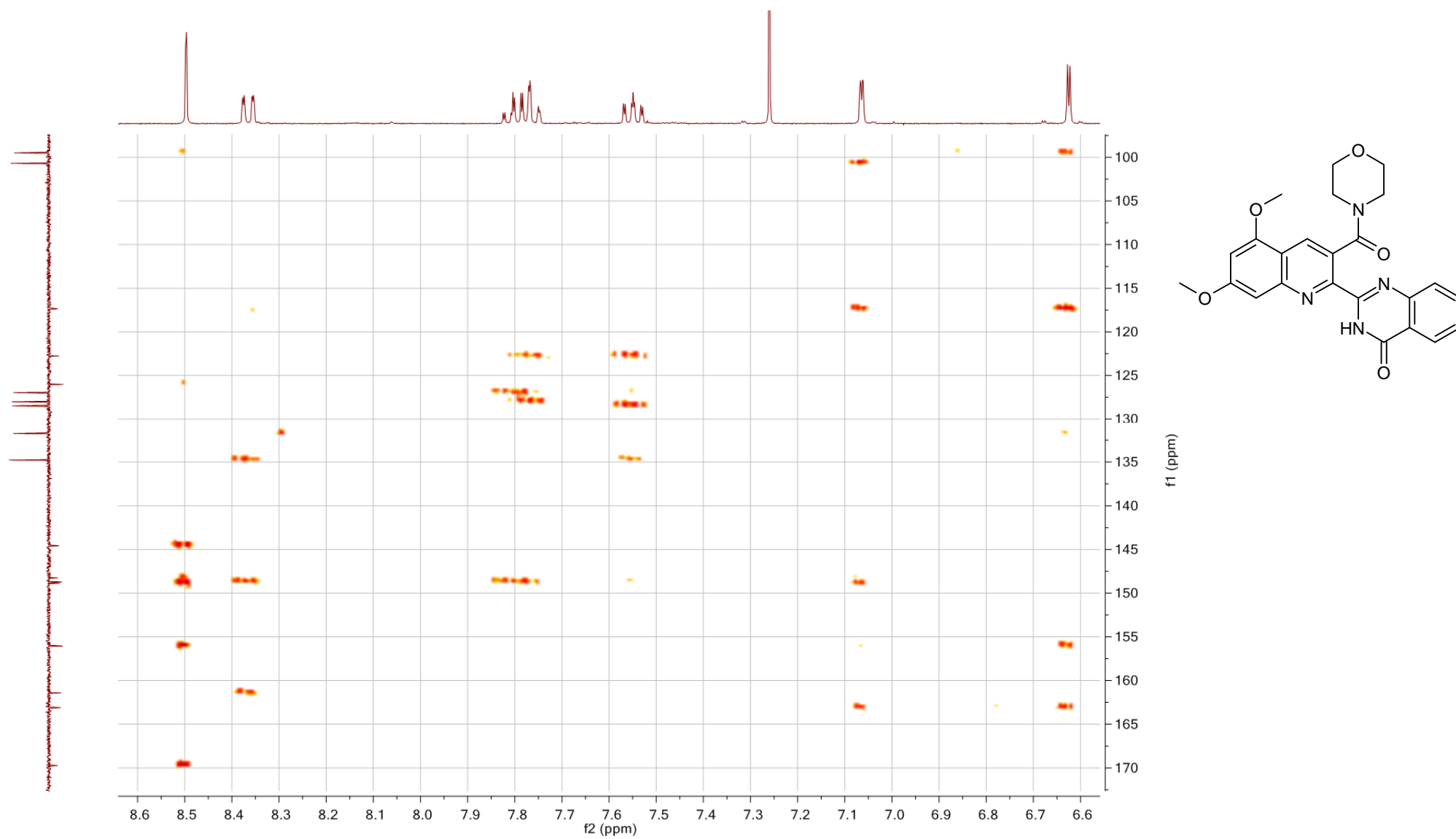
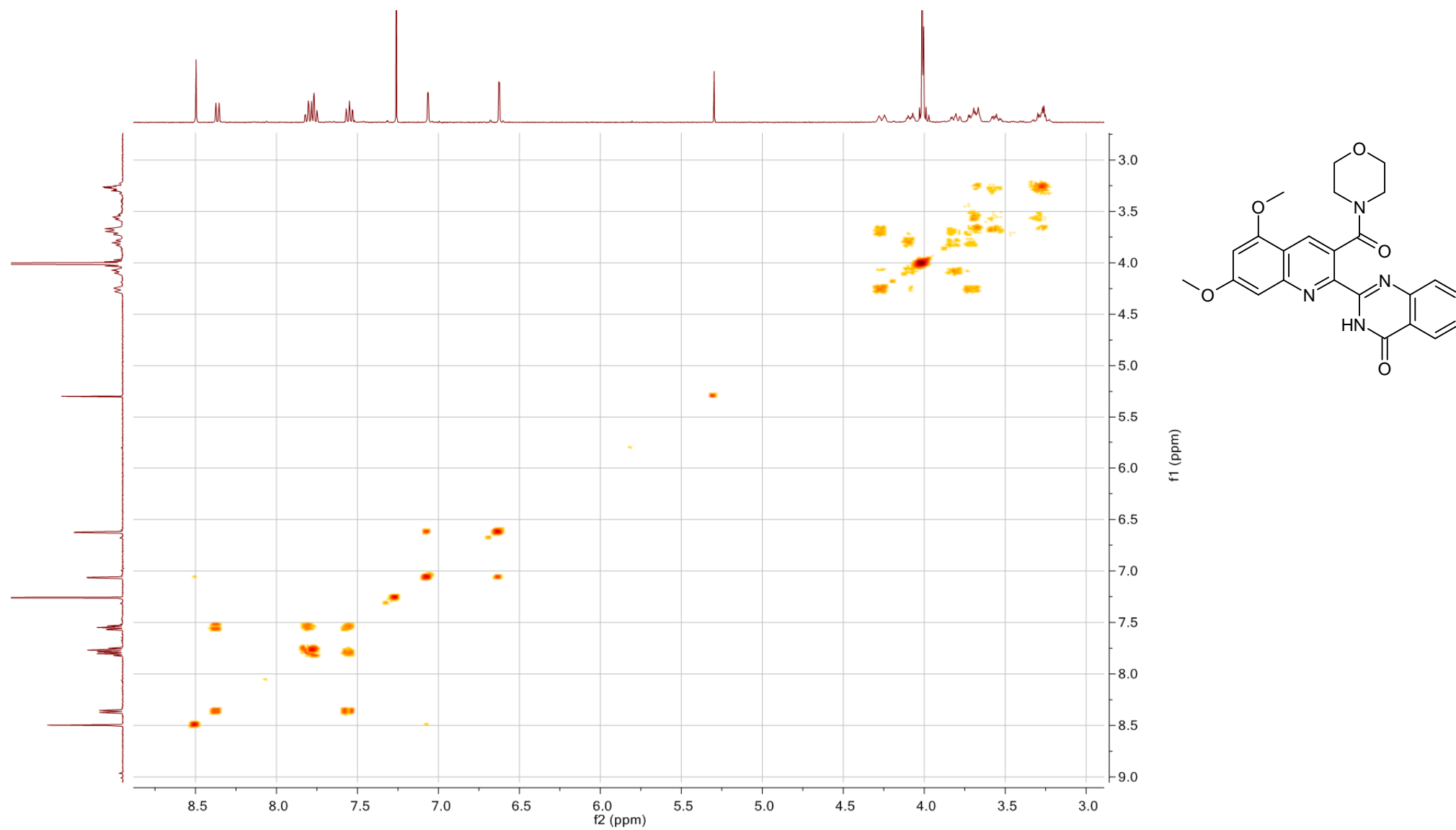
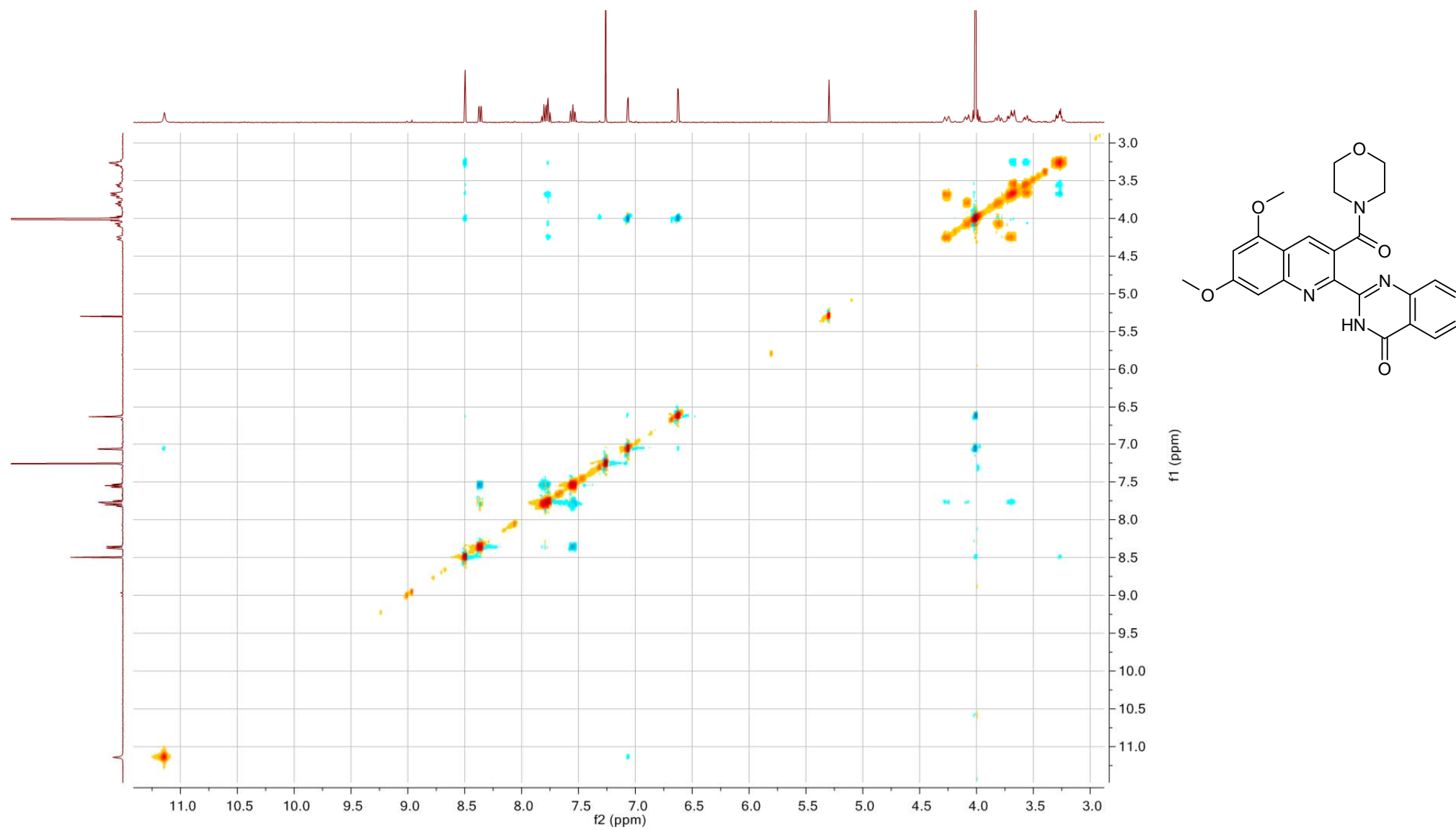


Figure S71. HMBC spectrum of 2-[5,7-dimethoxy-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (**14**)





**Figure S72.** COSY spectrum of 2-[5,7-dimethoxy-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (**14**)



**Figure S73.** NOESY spectrum of 2-[5,7-dimethoxy-3-(morpholin-4-ylcarbonyl)quinolin-2-yl]quinazolin-4(3H)-one (**14**)