

## Supporting Information

### Design and synthesis of 7-azaindole derivatives as potent CDK8 inhibitors for the treatment of acute myeloid leukemia

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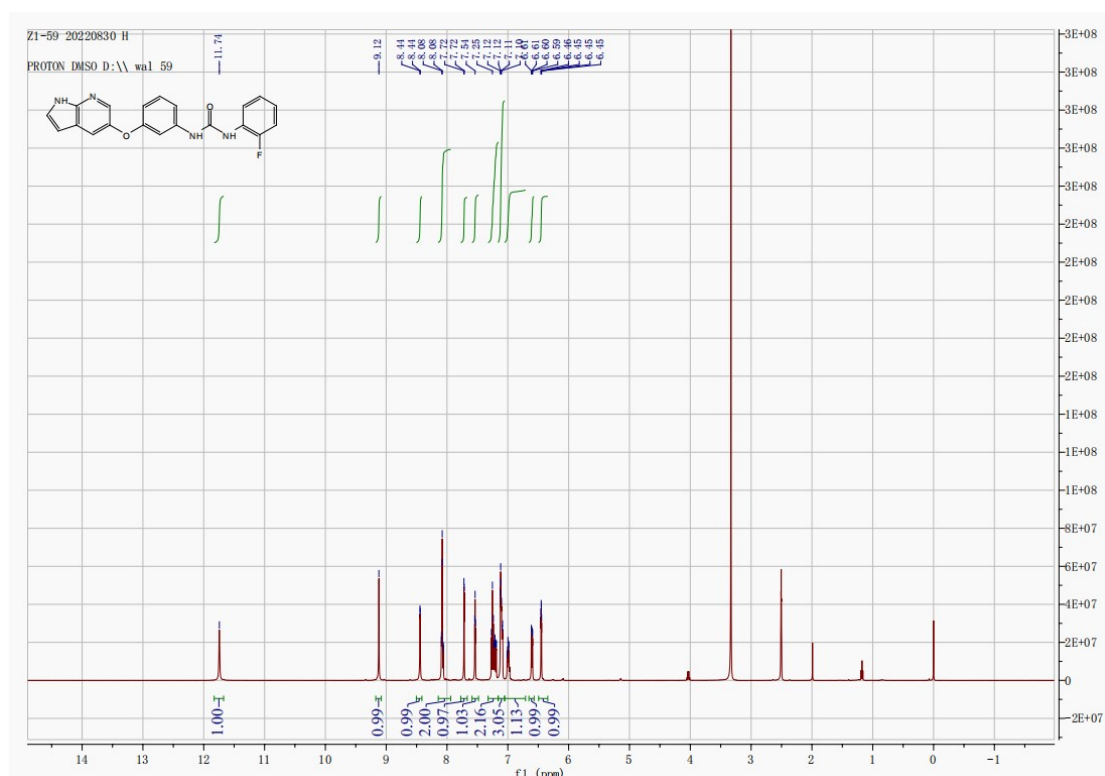
<sup>a</sup> School of Pharmacy, Inflammation and Immune Mediated Diseases Laboratory of Anhui Province, Anhui Medical University, Hefei, P. R. China

<sup>b</sup> School of Health Management, Anhui Medical University Hefei, 230032, PR China

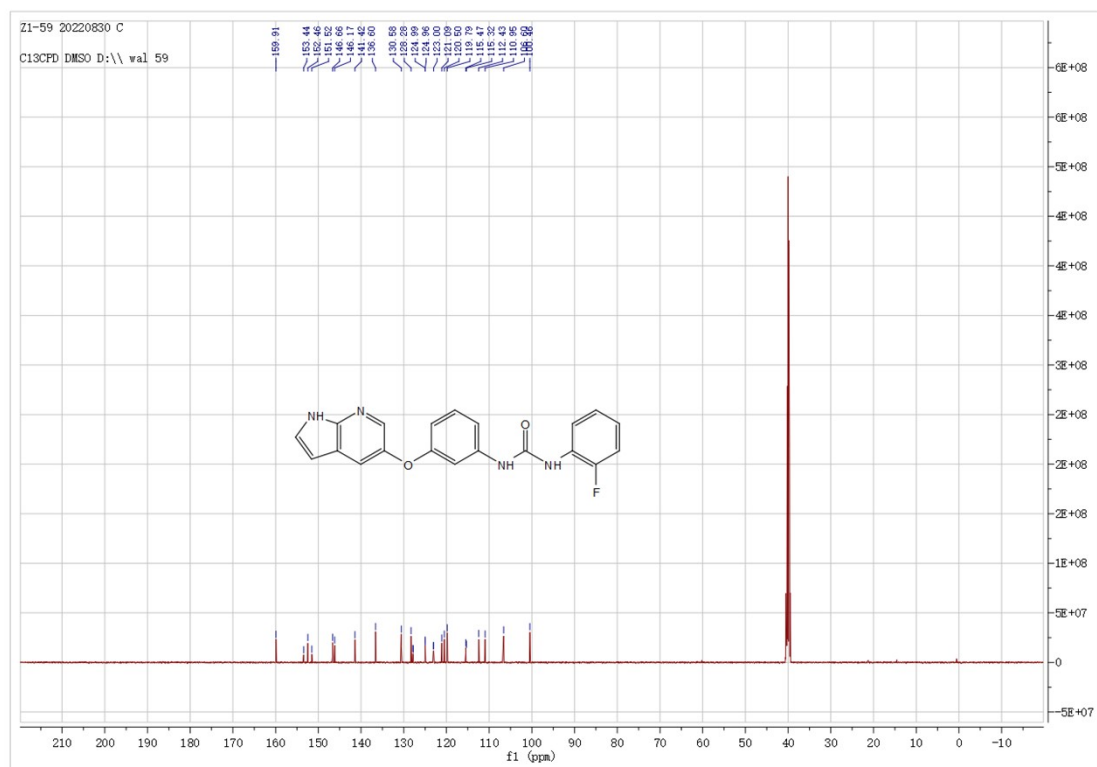
## Contents

1. <sup>1</sup> H NMR, <sup>13</sup> C NMR, HRMS.....	S2
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1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(2-fluorophenyl)urea (**1**)

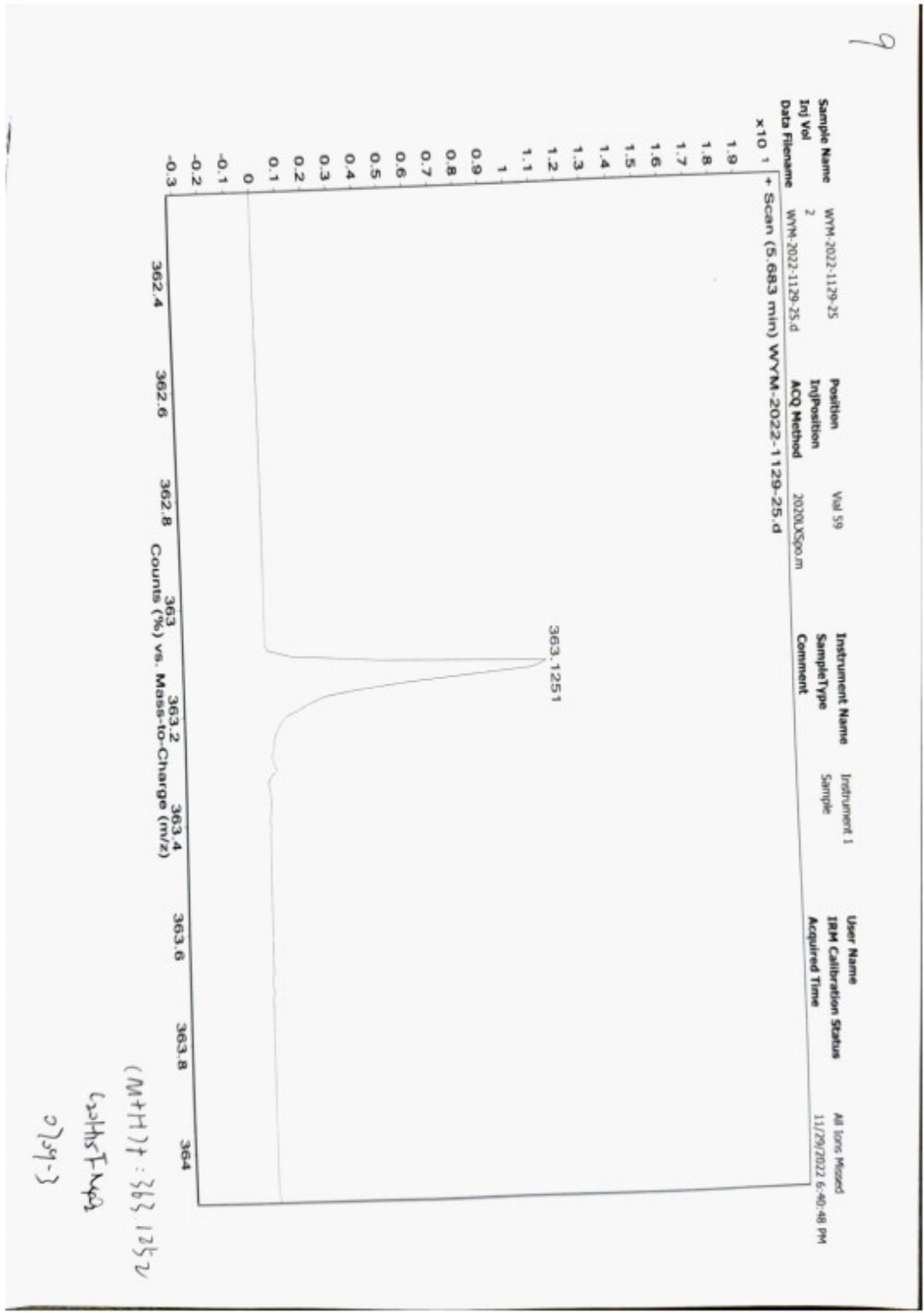


$^1\text{H}$  NMR spectrum of **1**



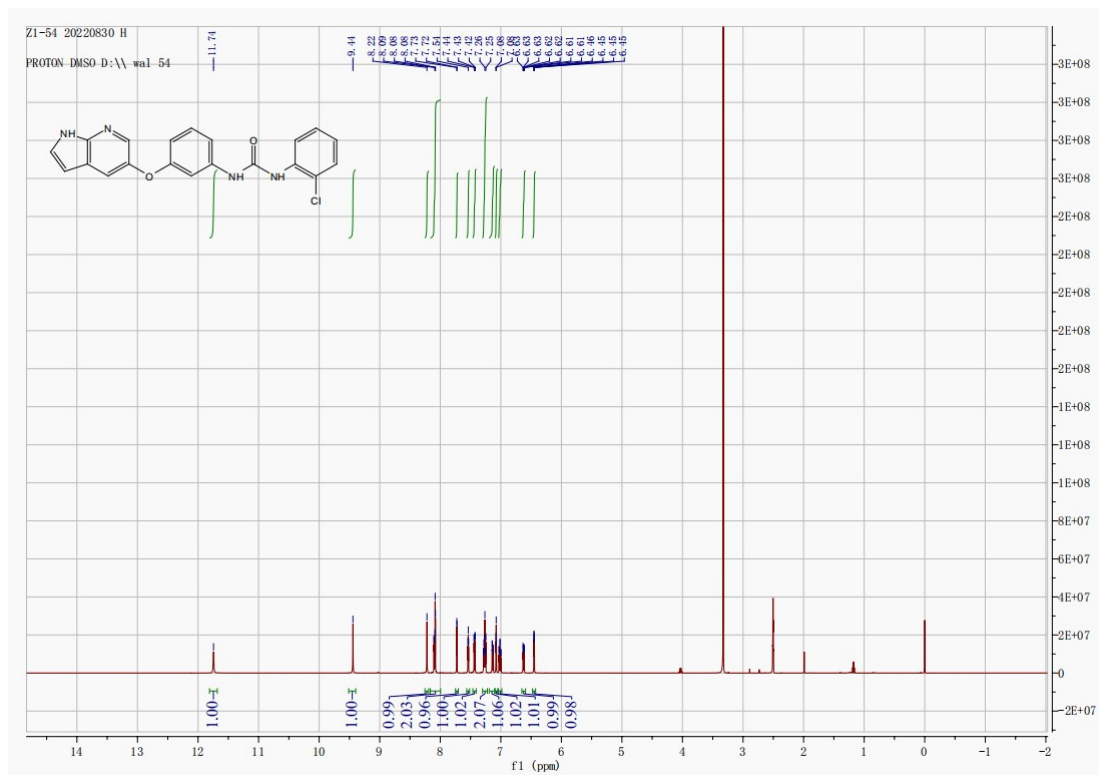
$^{13}\text{C}$  NMR spectrum of **1**

9

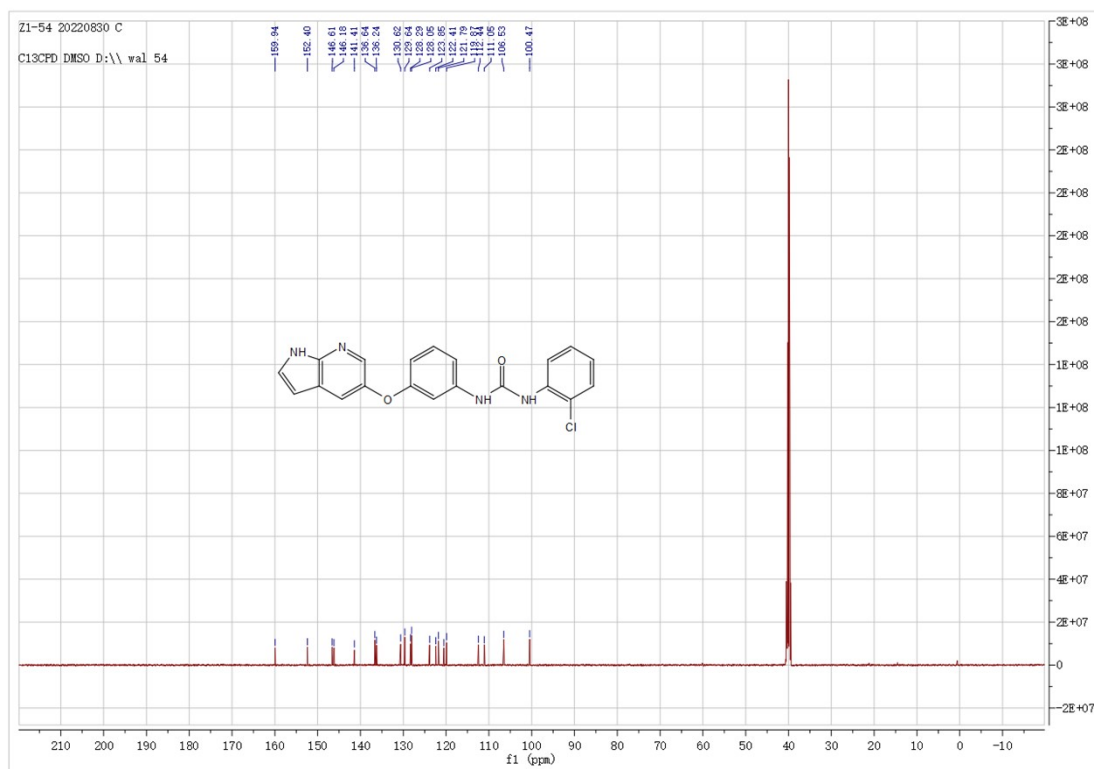


HRMS (ESI) spectrum of 1

*1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(2-chlorophenyl)urea (2)*

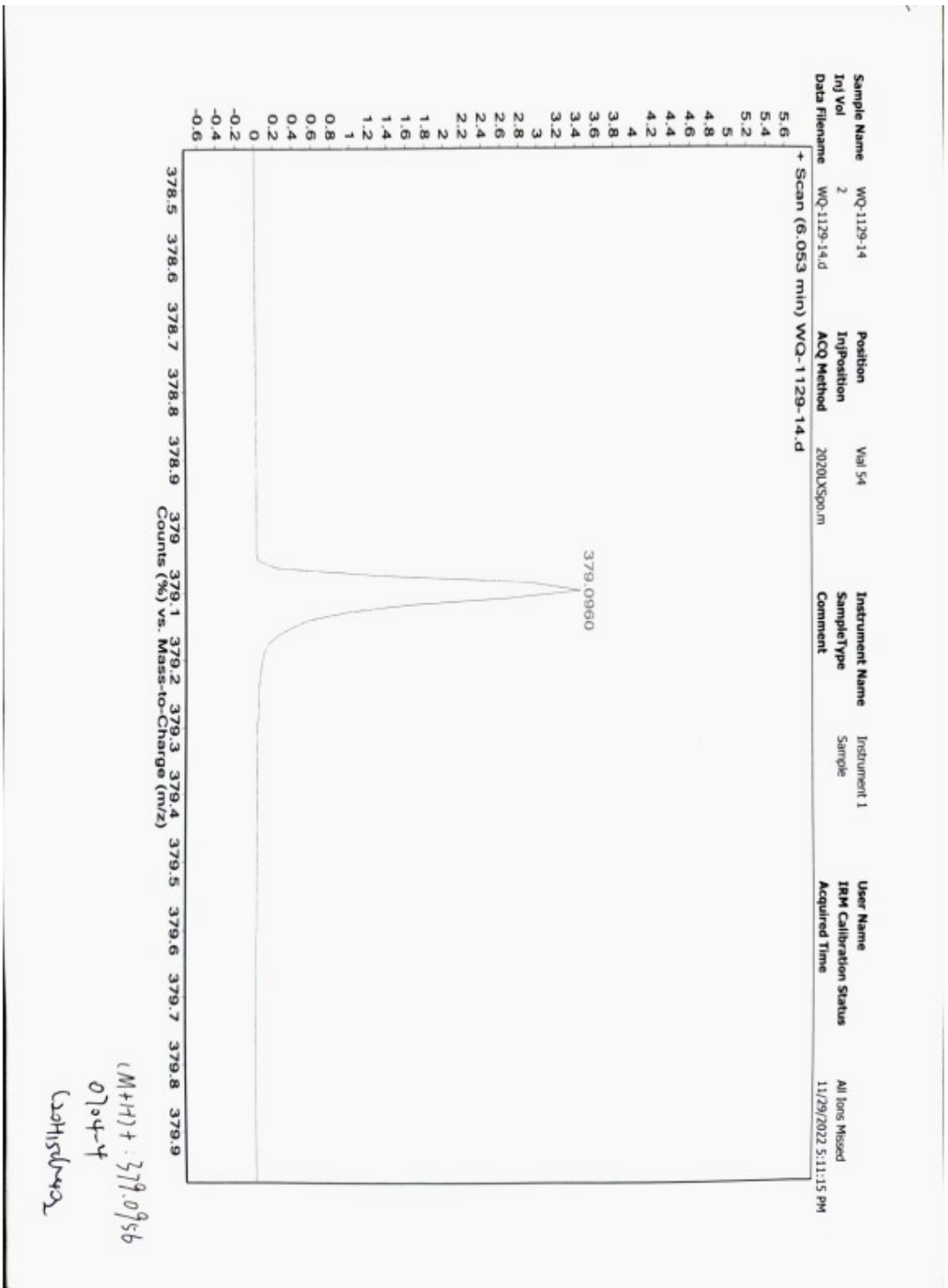


<sup>1</sup>H NMR spectrum of 2



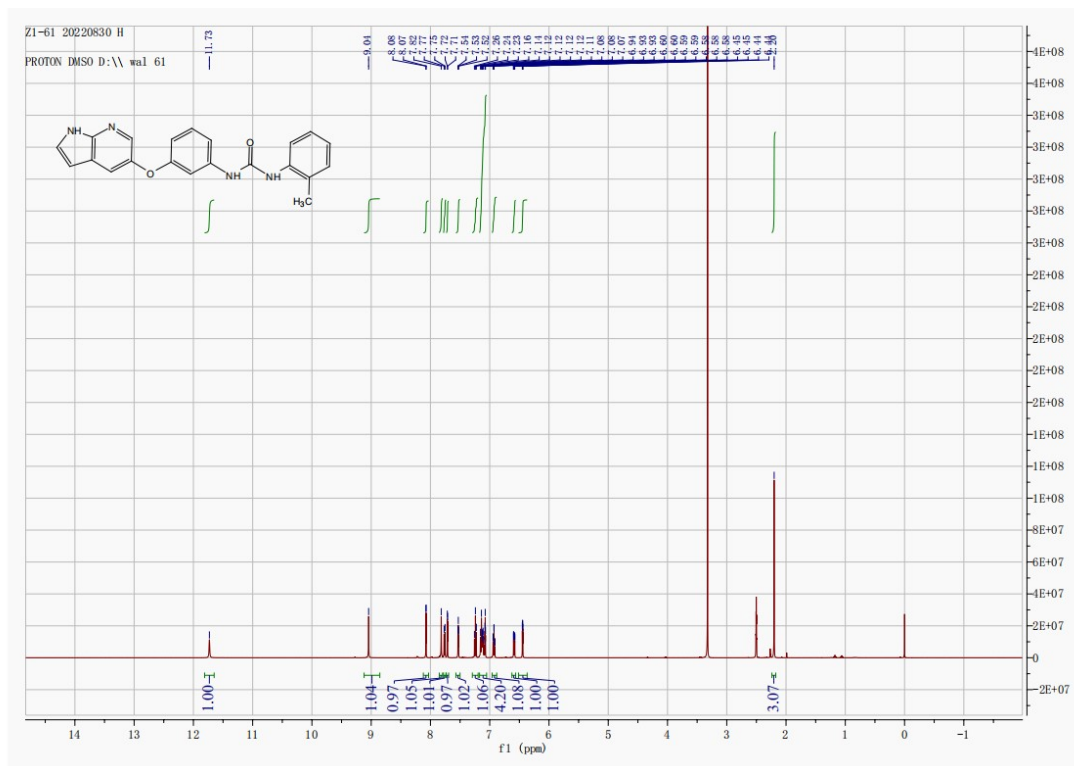
<sup>13</sup>C NMR spectrum of 2



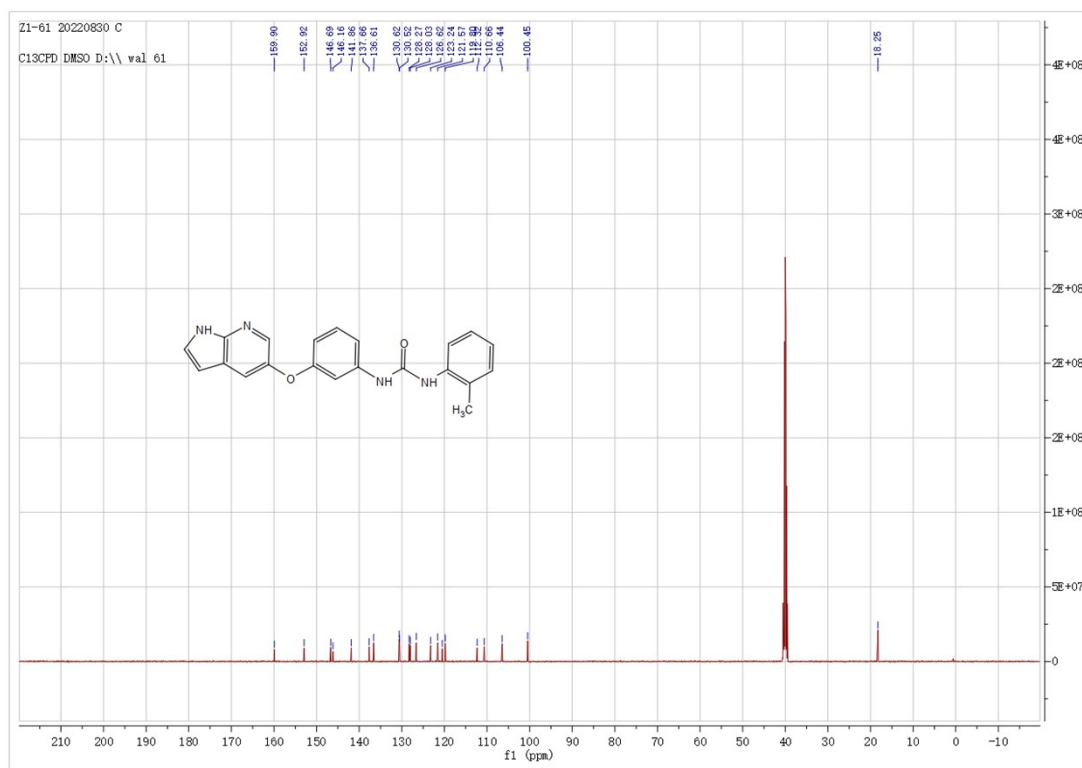


HRMS (ESI) spectrum of 2

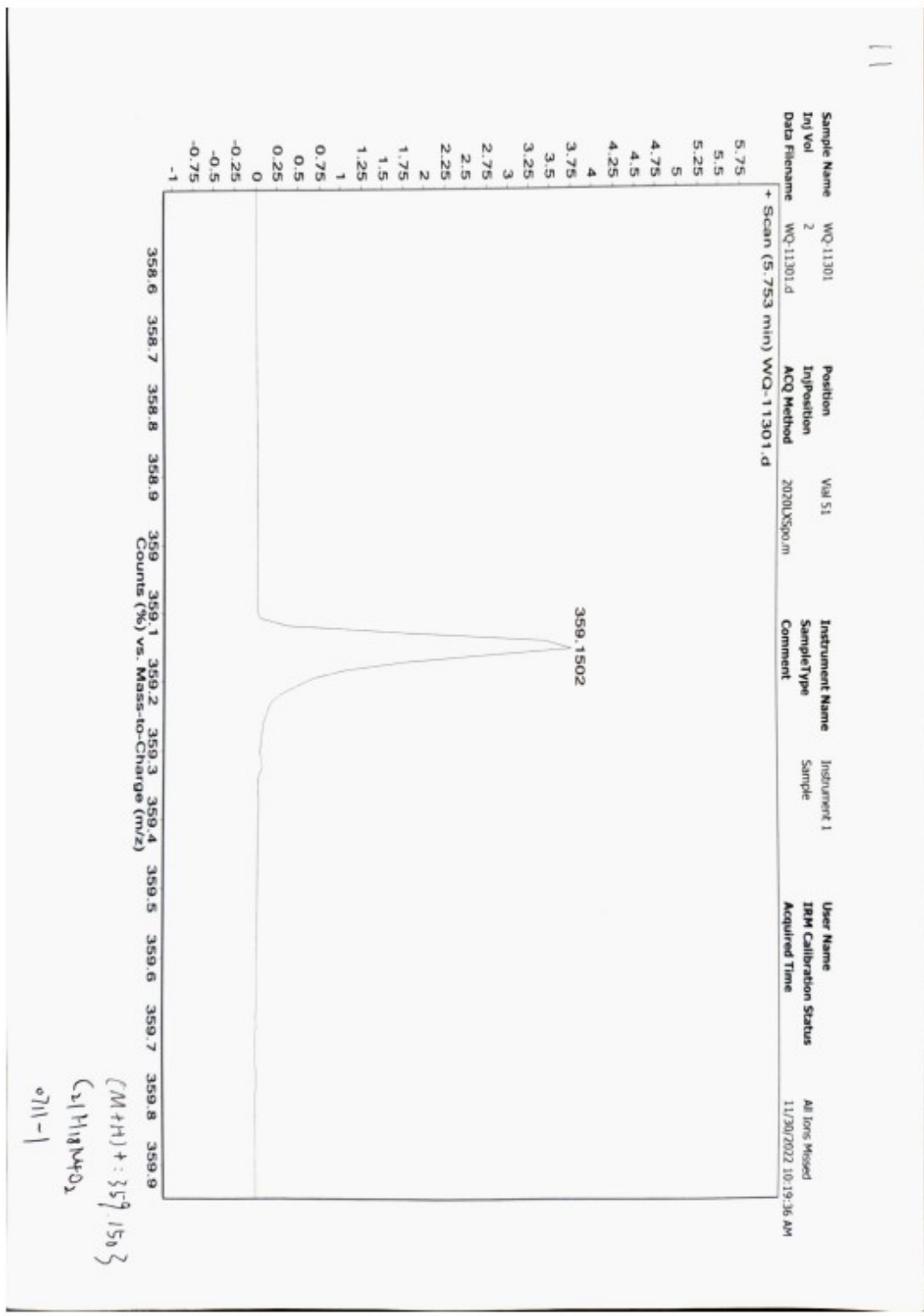
1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(2-methylphenyl)urea (**3**)



<sup>1</sup>H NMR spectrum of **3**

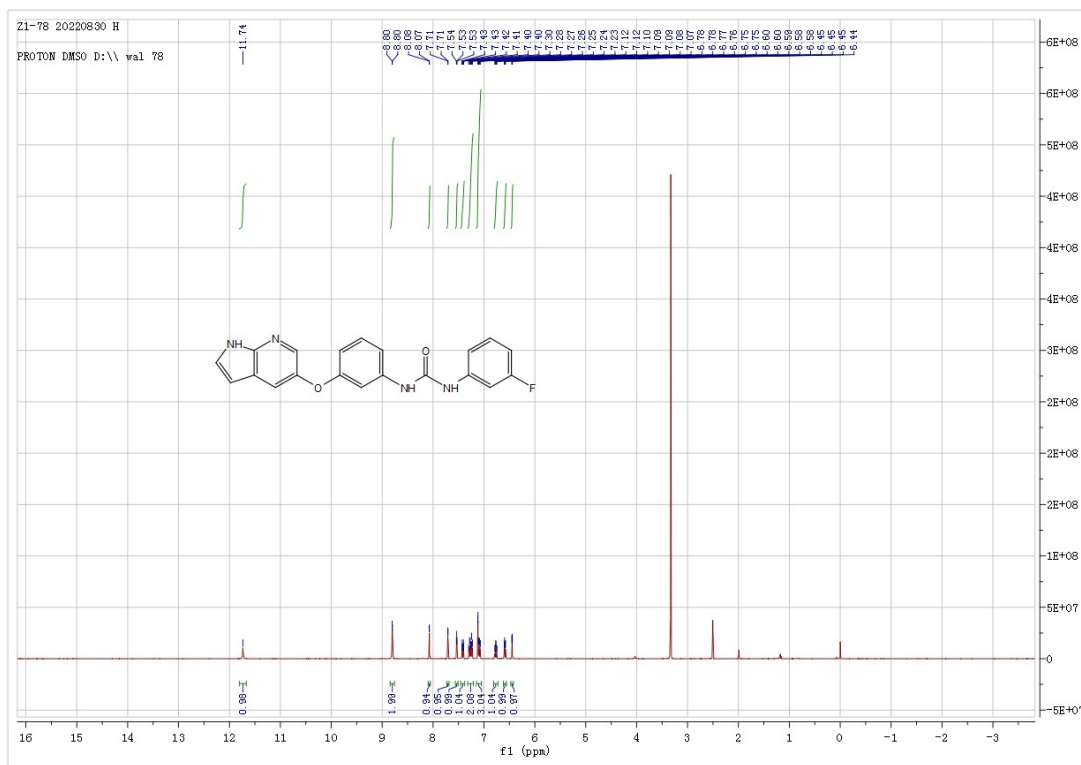


<sup>13</sup>C NMR spectrum of **3**

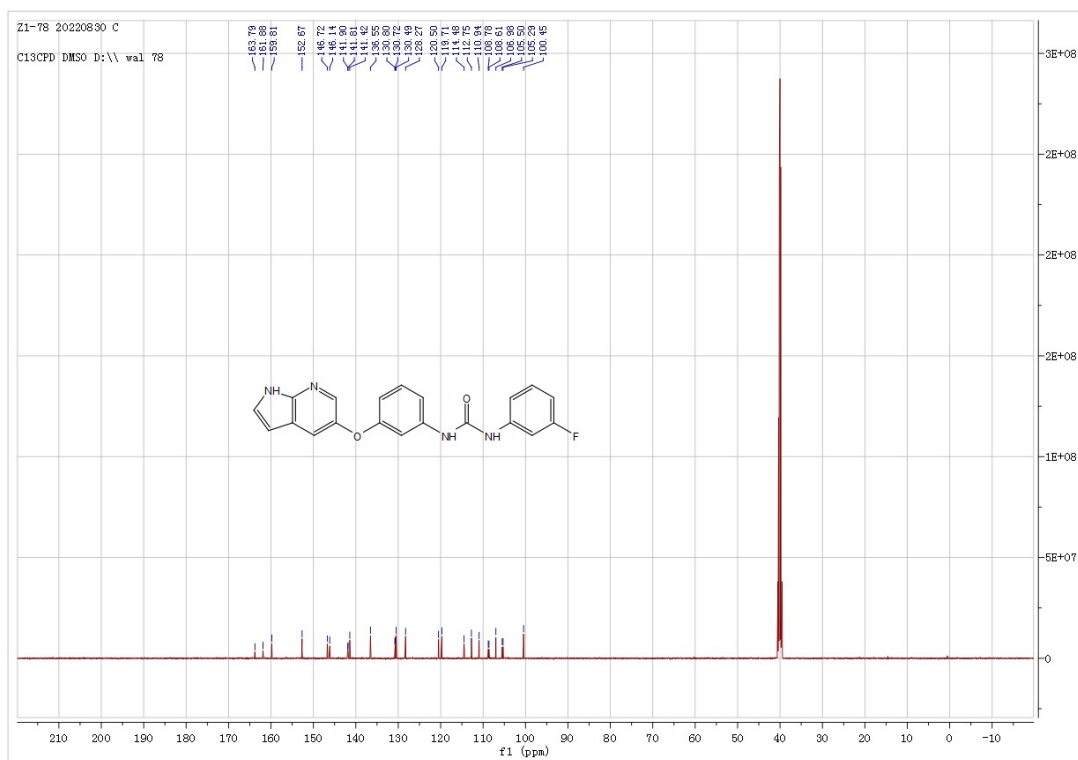


HRMS (ESI) spectrum of 3

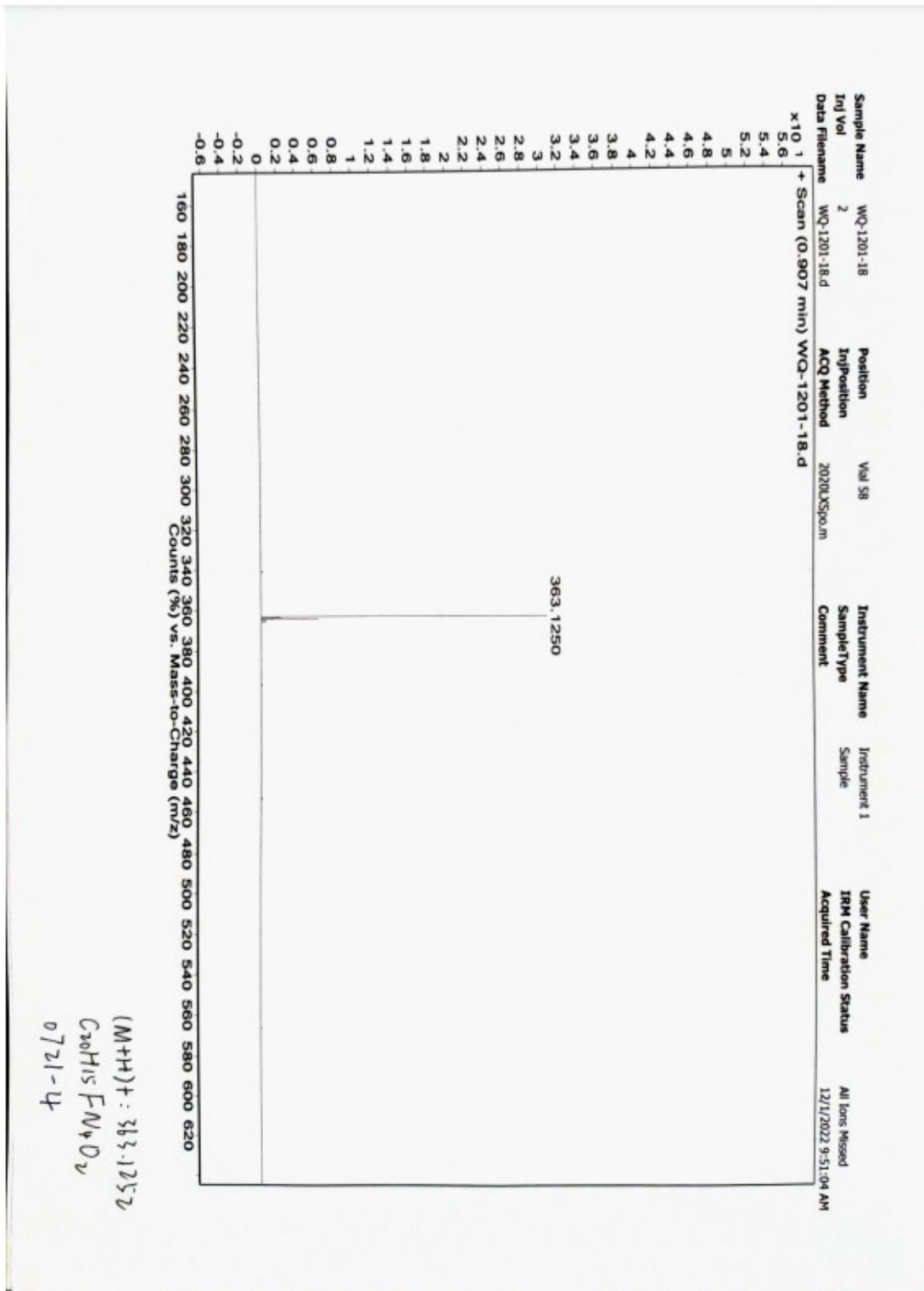
1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3-fluorophenyl)urea (4)



<sup>1</sup>H NMR spectrum of 4

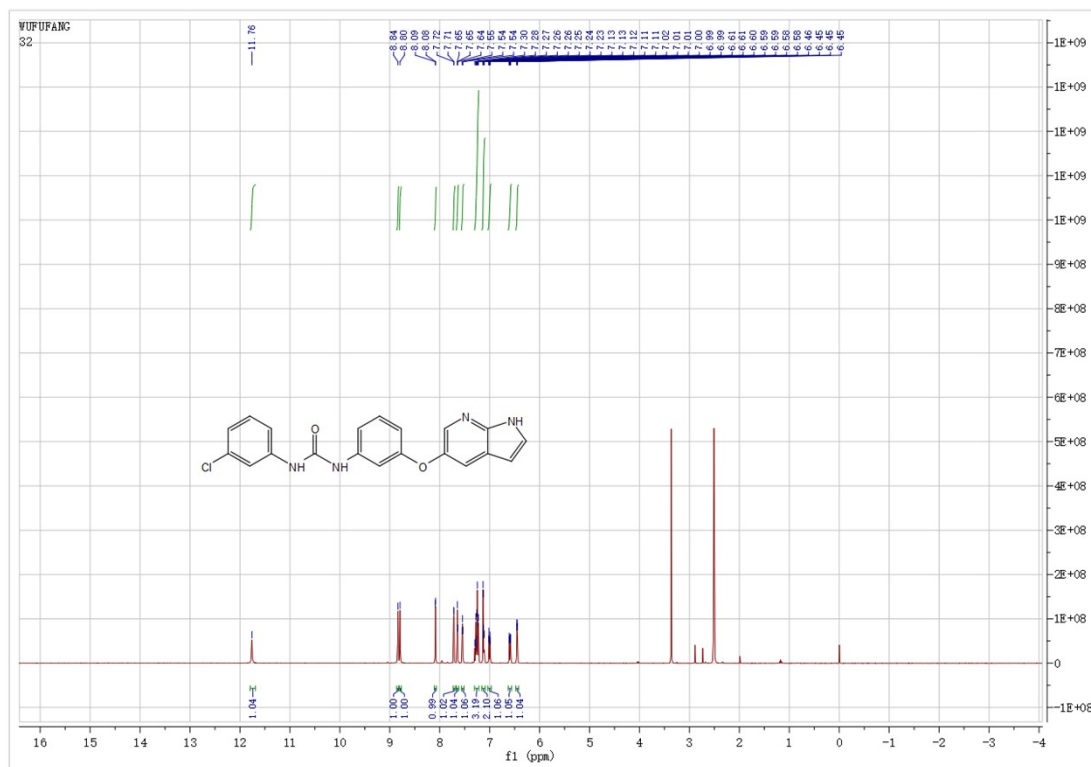


<sup>13</sup>C NMR spectrum of 4

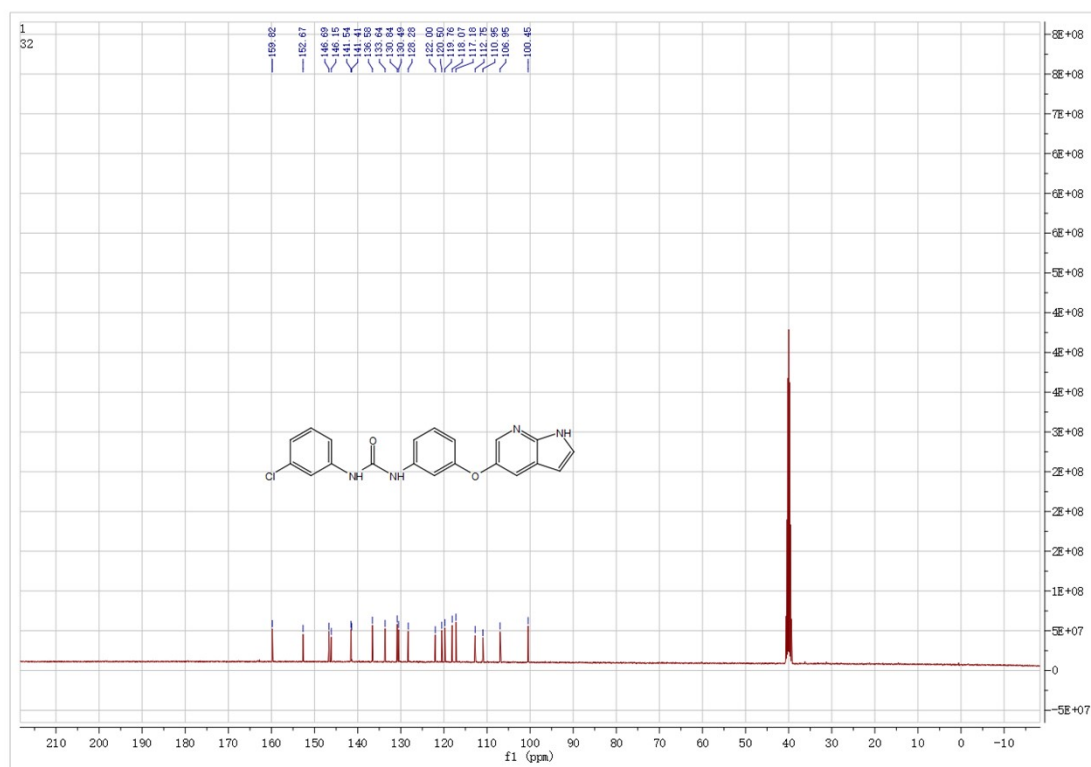


HRMS (ESI) spectrum of 4

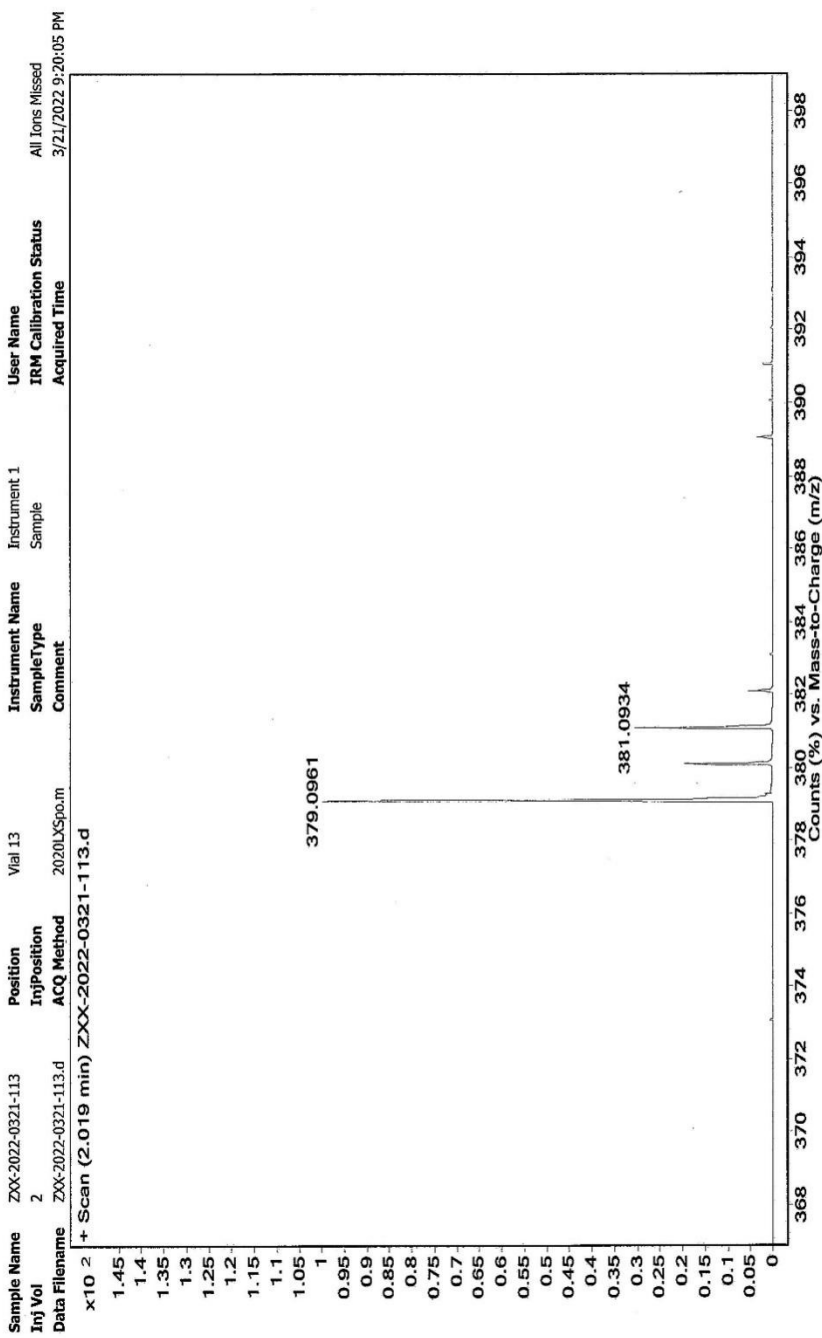
1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3-chlorophenyl)urea (5)



<sup>1</sup>H NMR spectrum of 5



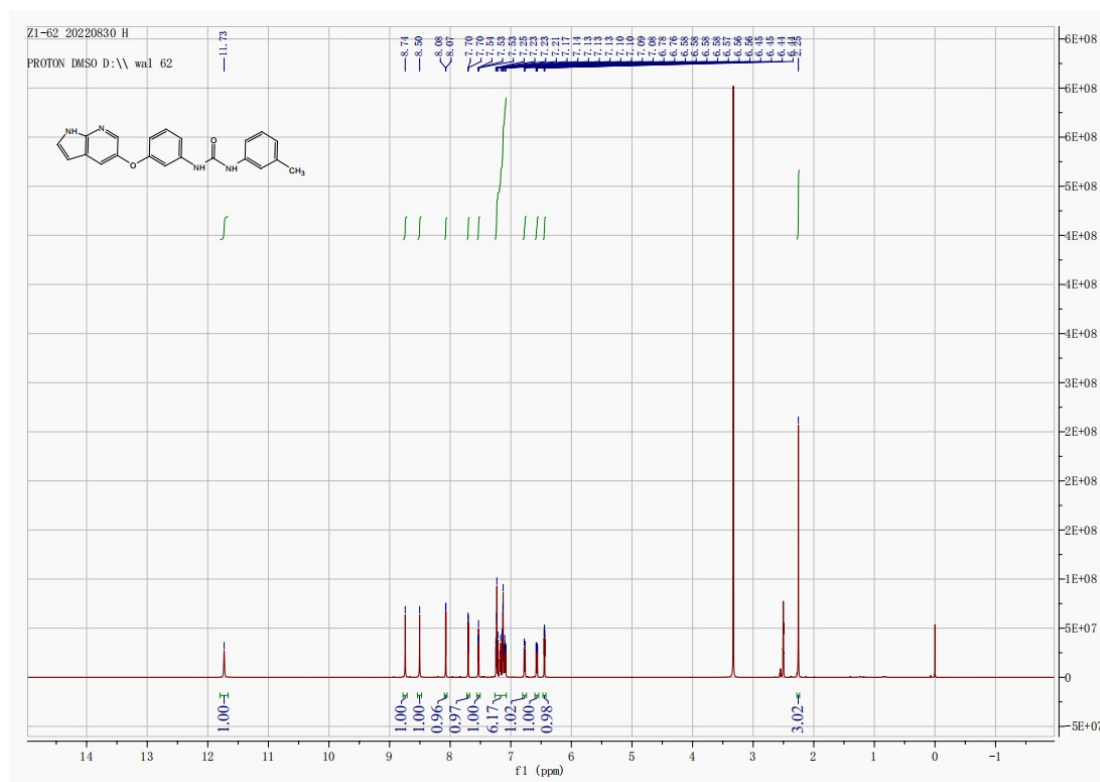
<sup>13</sup>C NMR spectrum of 5



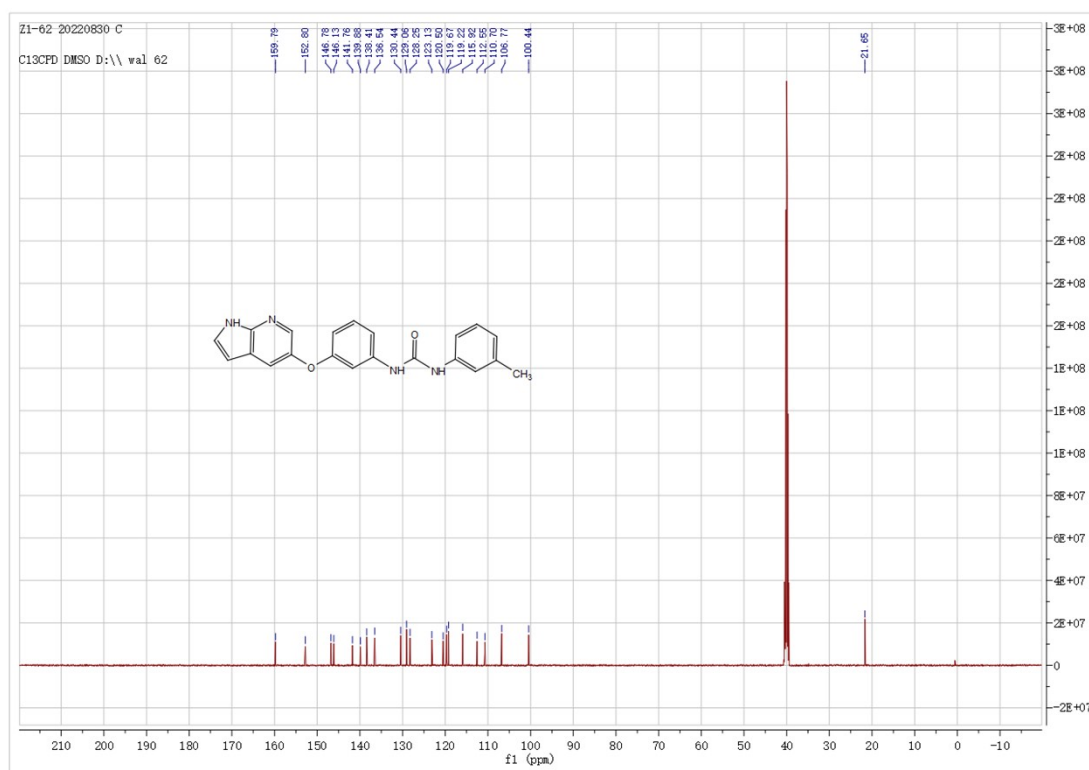
0321-1

HRMS (ESI) spectrum of 5

1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3-methylphenyl)urea (**6**)



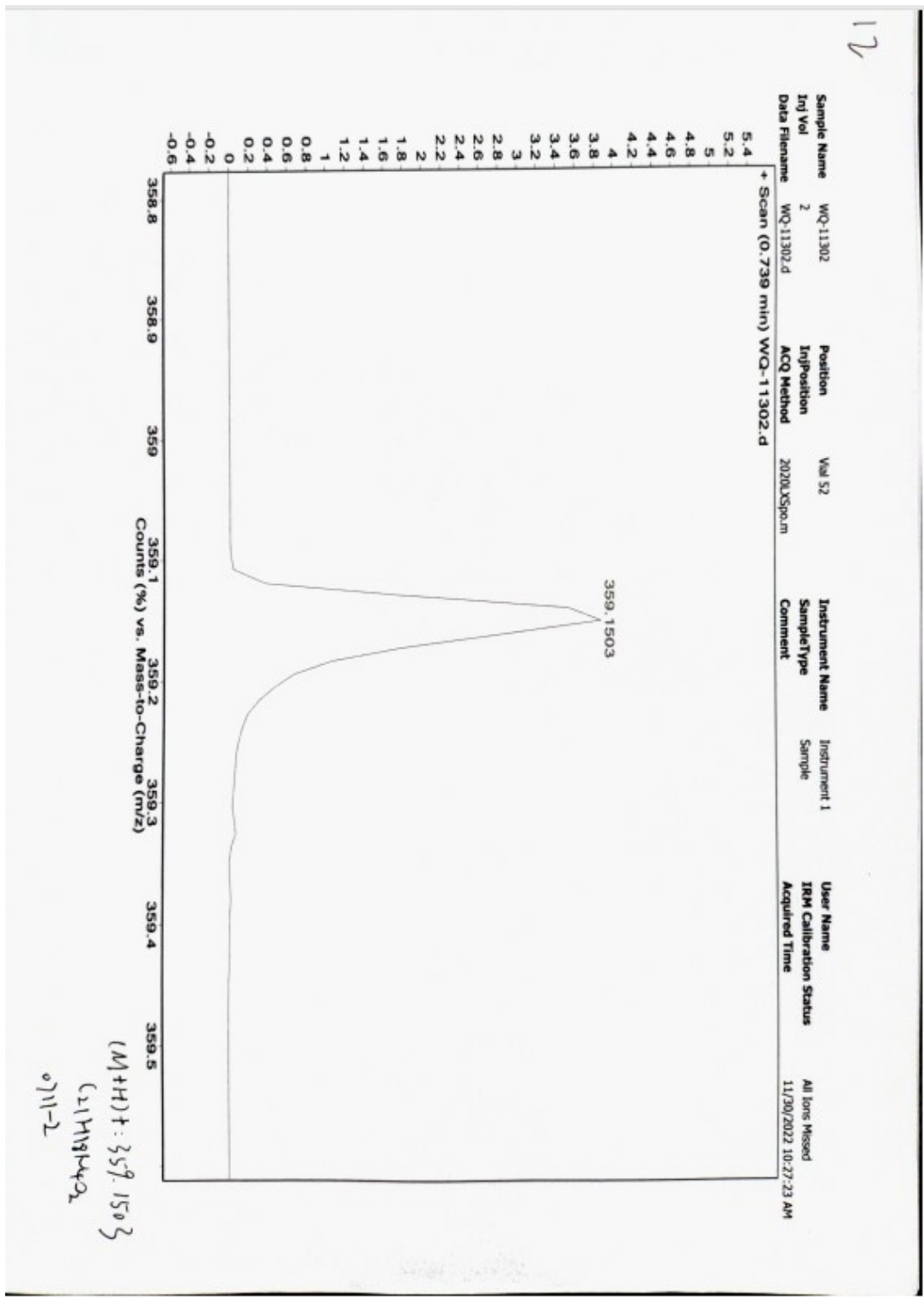
<sup>1</sup>H NMR spectrum of **6**



<sup>13</sup>C NMR spectrum of **6**



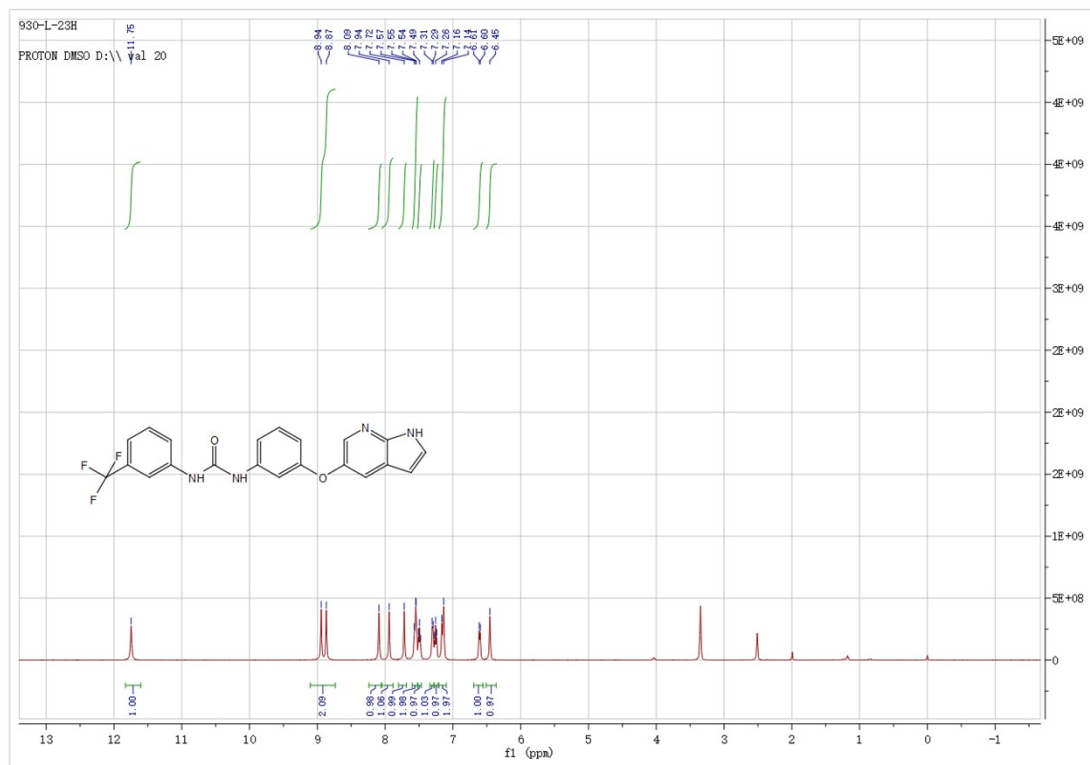
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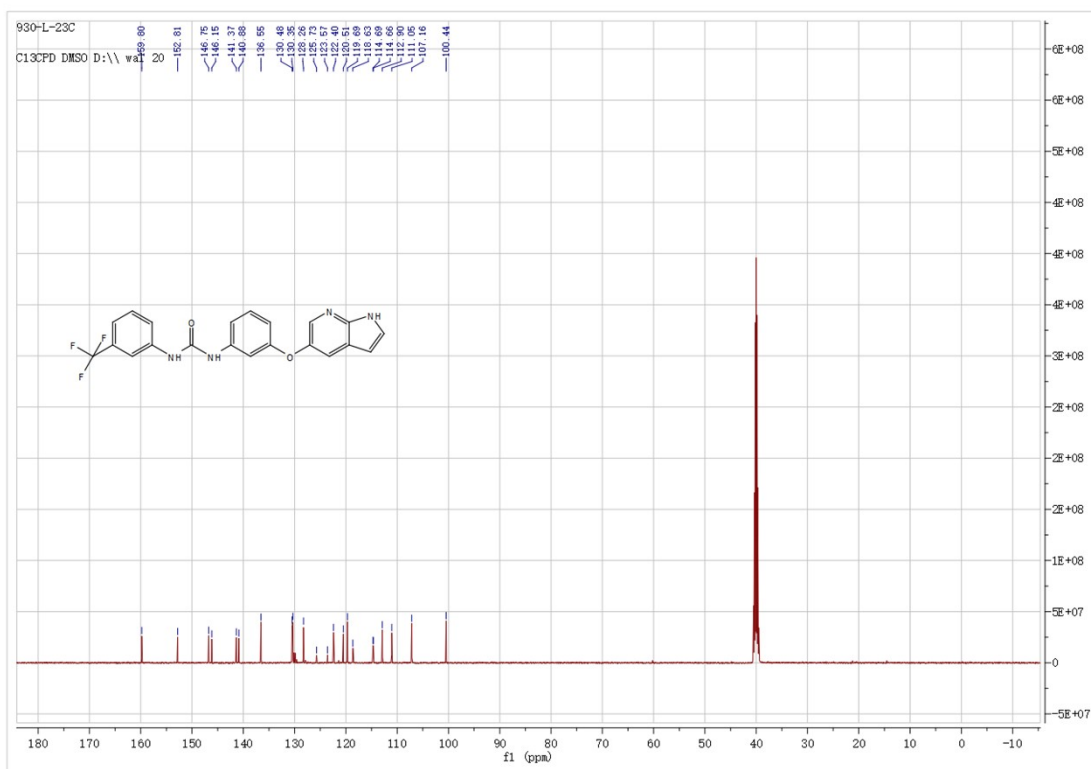
HRMS (ESI) spectrum of 6

1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3-(trifluoromethyl)phenyl)urea

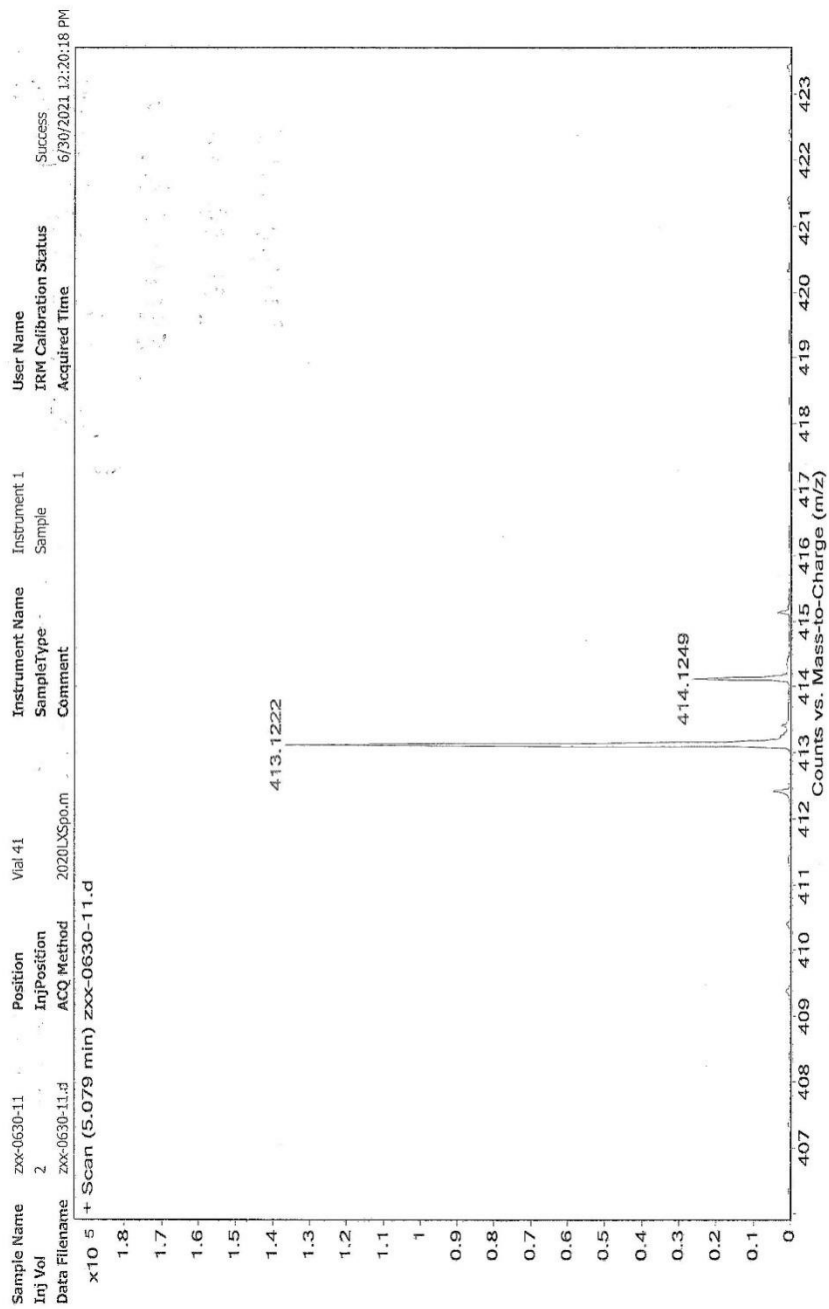
(7)



<sup>1</sup>H NMR spectrum of 7



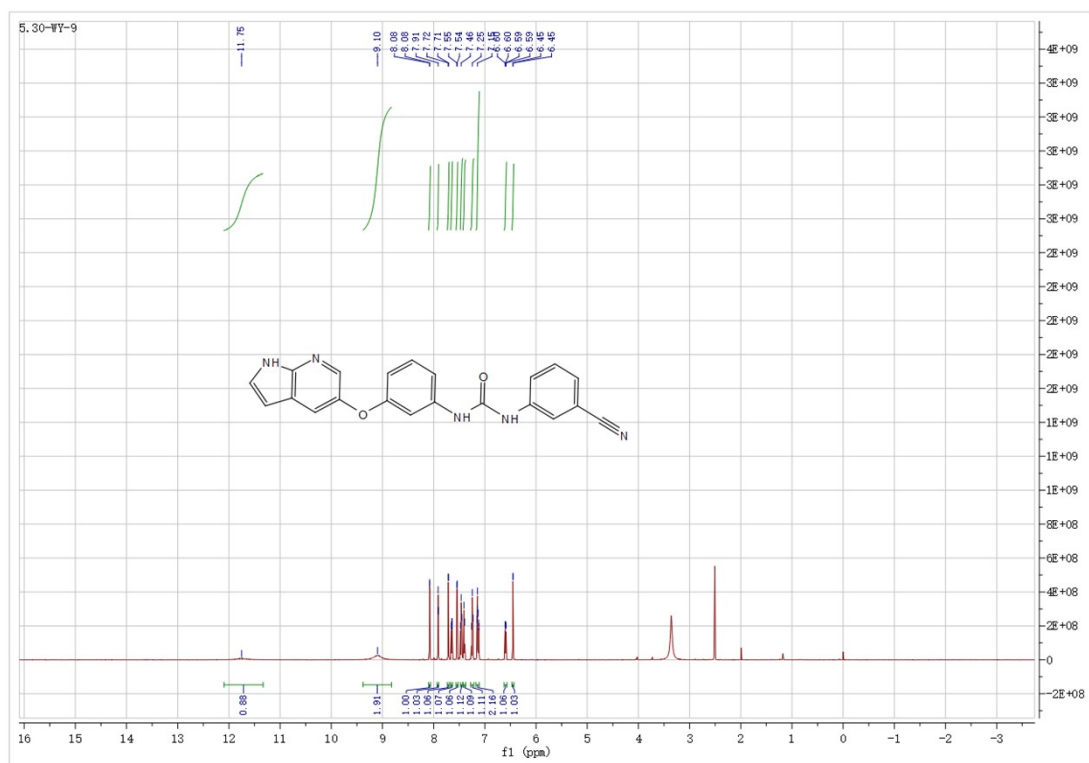
<sup>13</sup>C NMR spectrum of 7



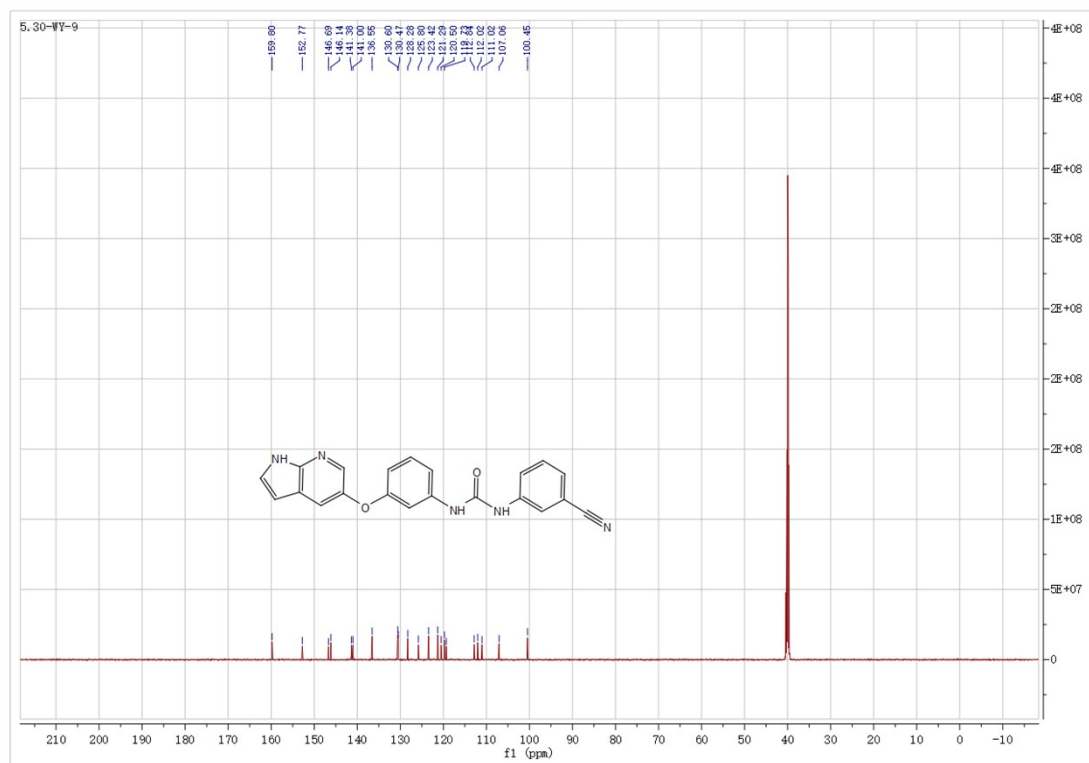
06/30/21

HRMS (ESI) spectrum of 7

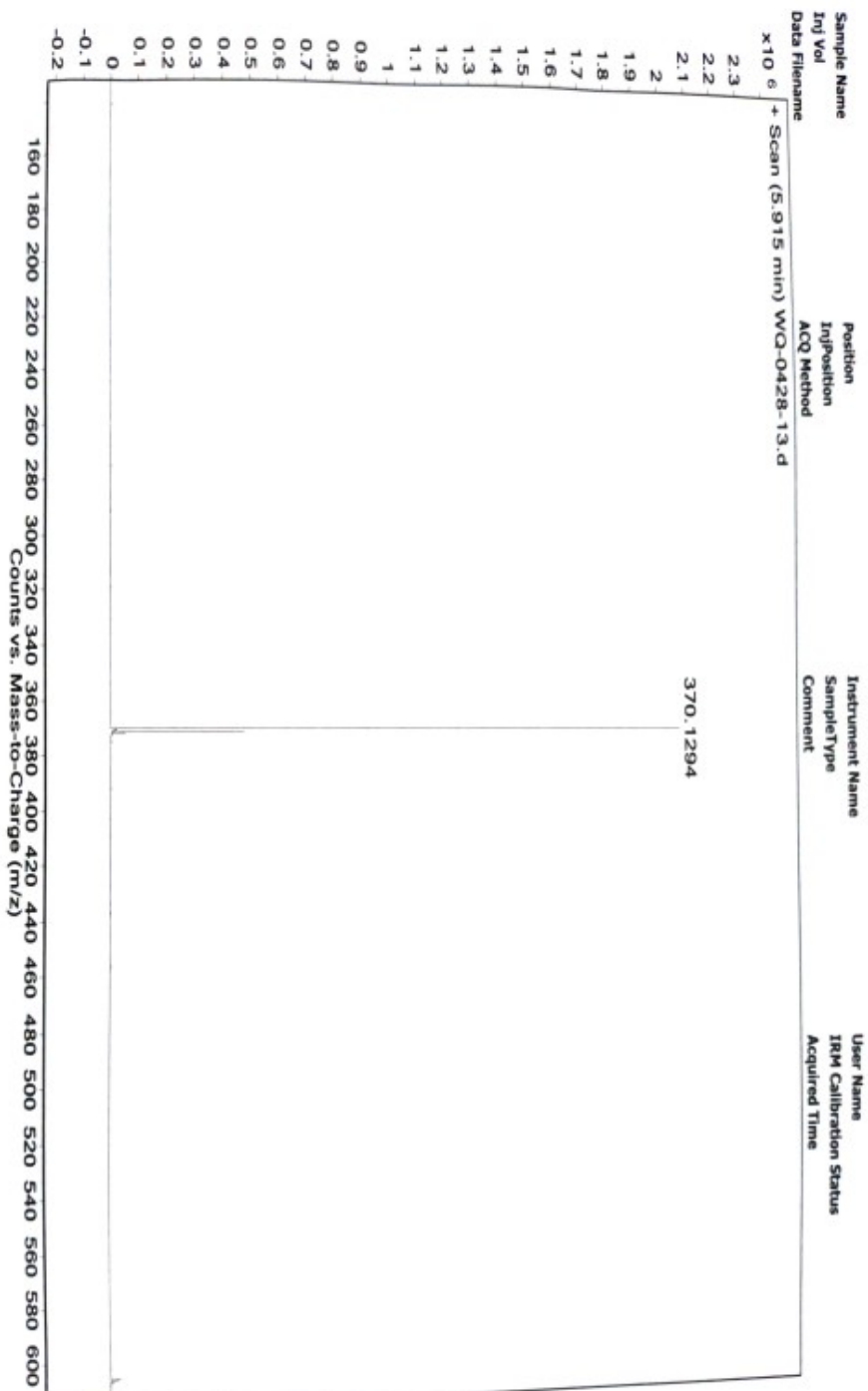
1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3-cyanophenyl)urea (**8**)



<sup>1</sup>H NMR spectrum of **8**



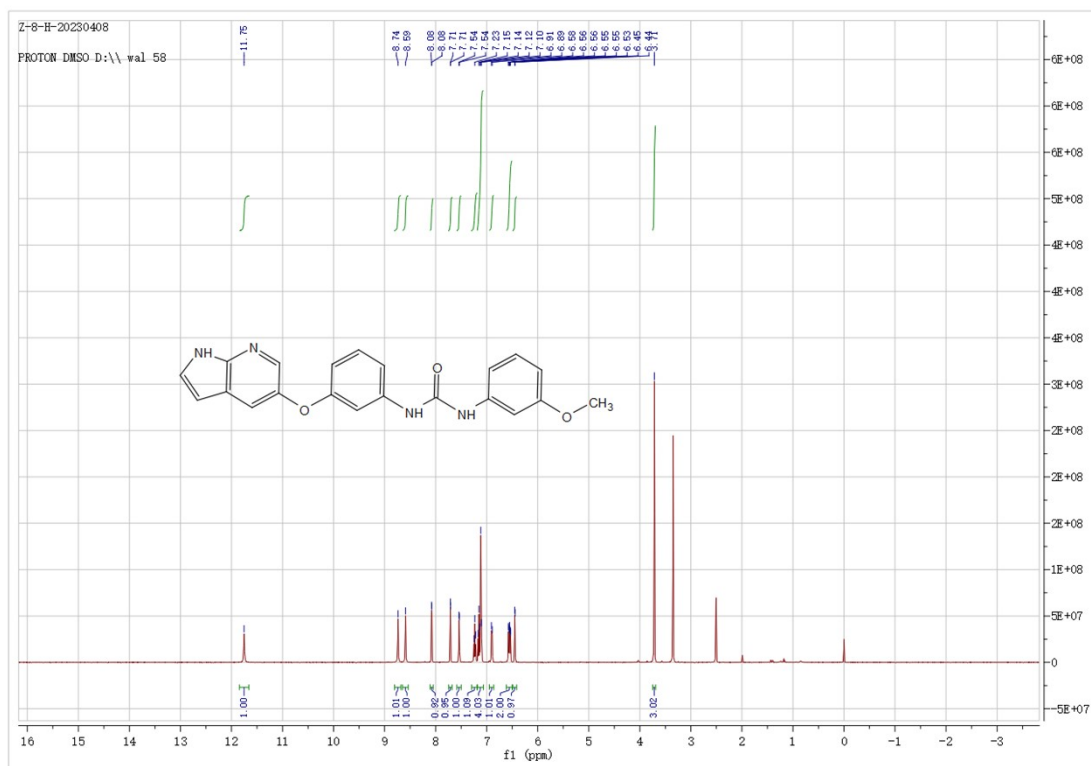
<sup>13</sup>C NMR spectrum of **8**



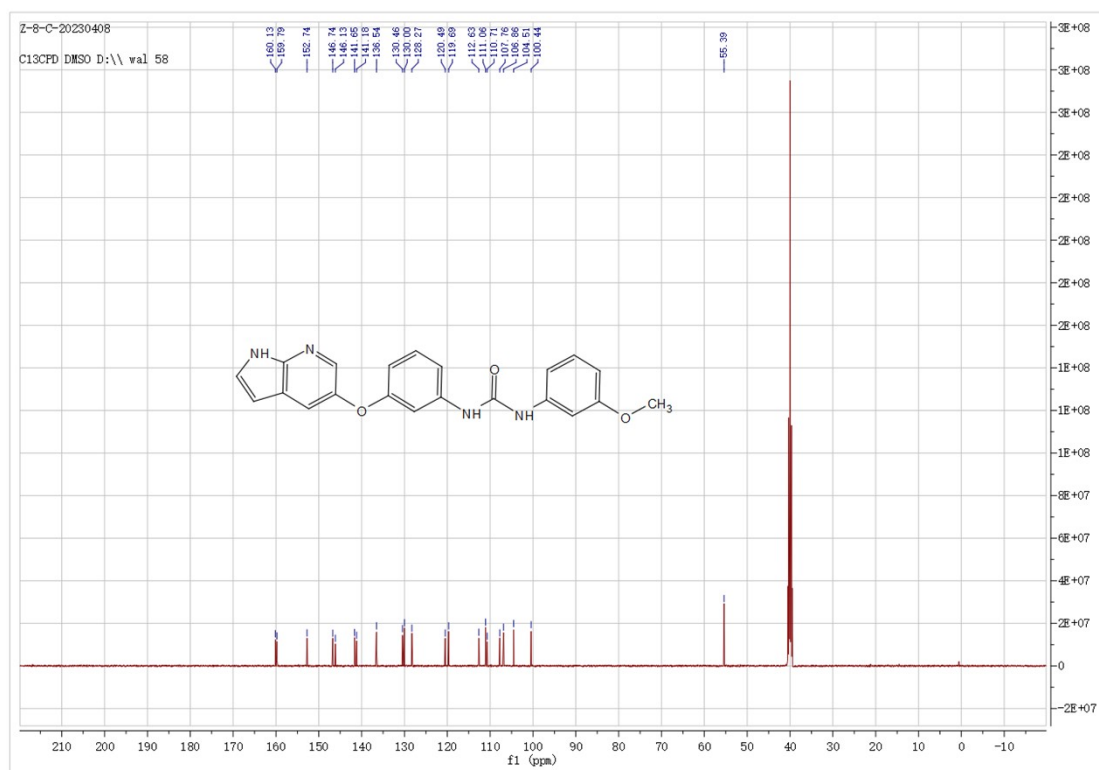
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 370.1294

HRMS (ESI) spectrum of 8

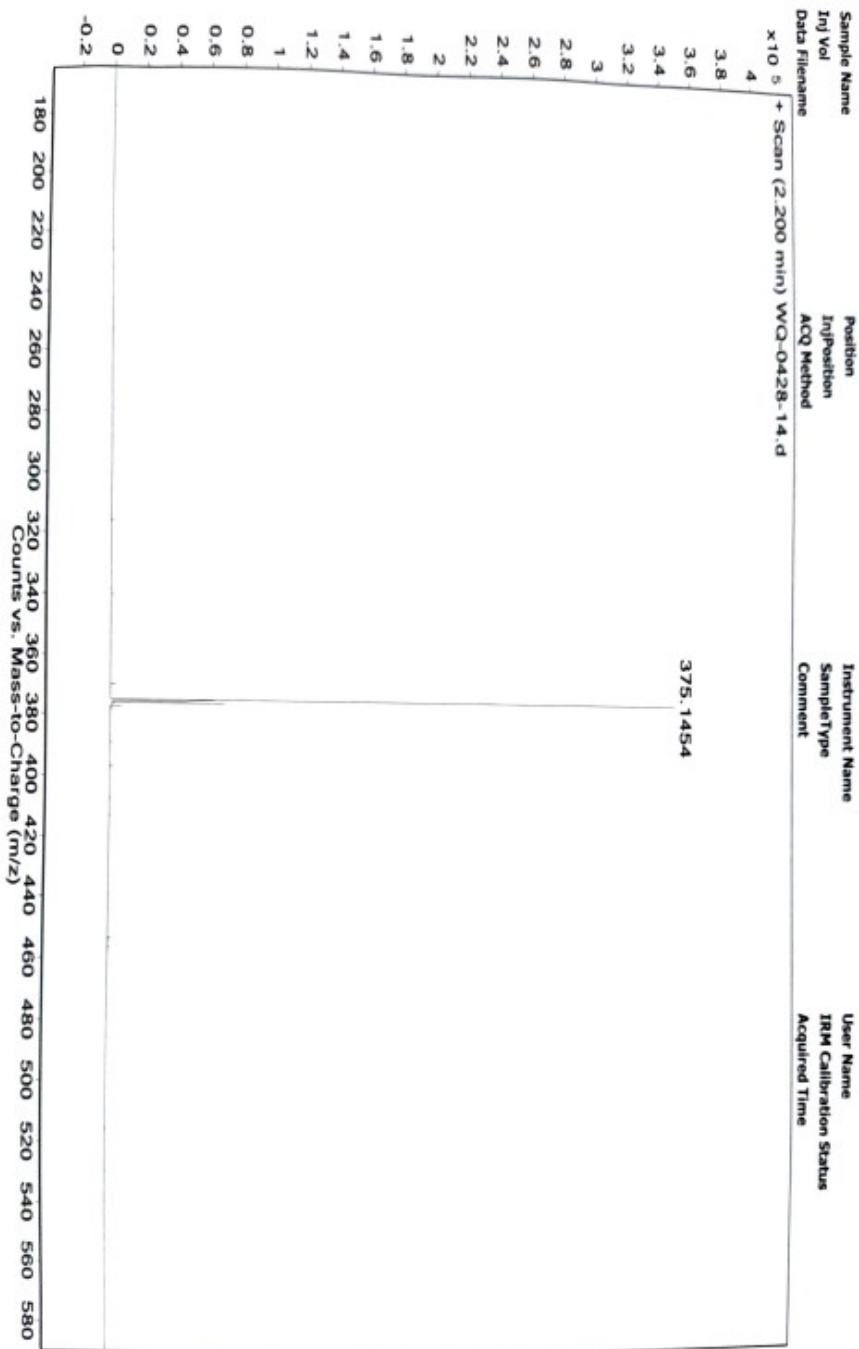
1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3-methoxyphenyl)urea (9)



$^1\text{H}$  NMR spectrum of 9



$^{13}\text{C}$  NMR spectrum of 9

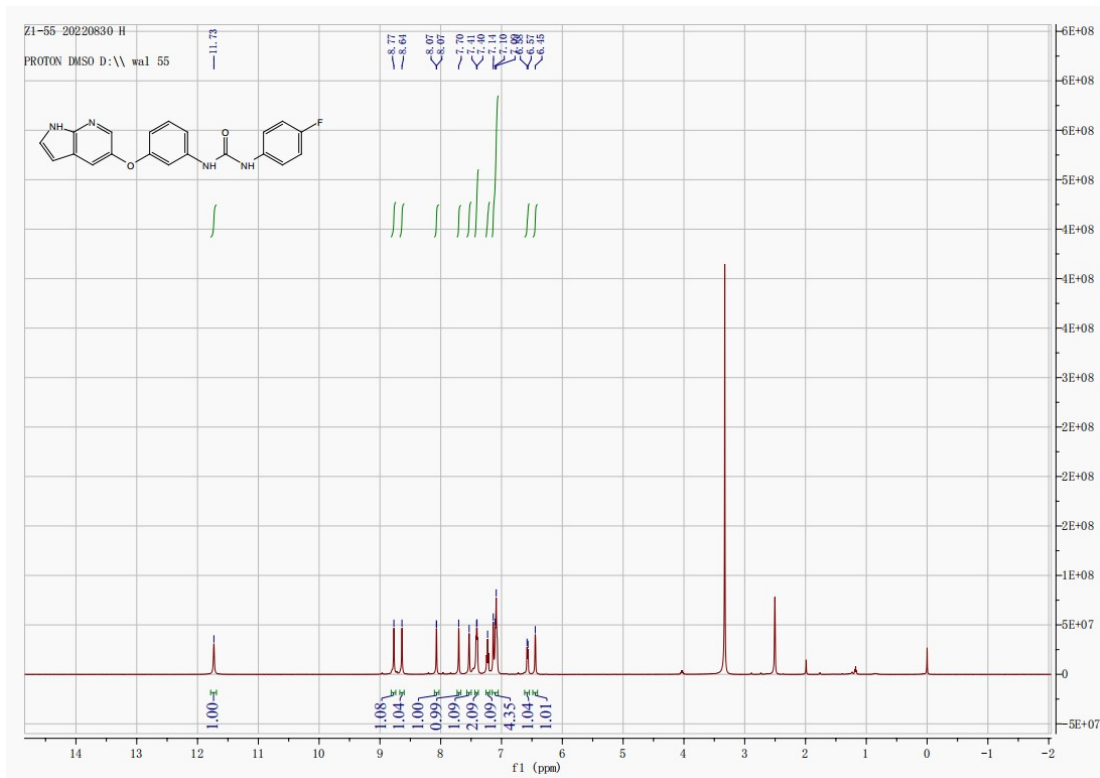


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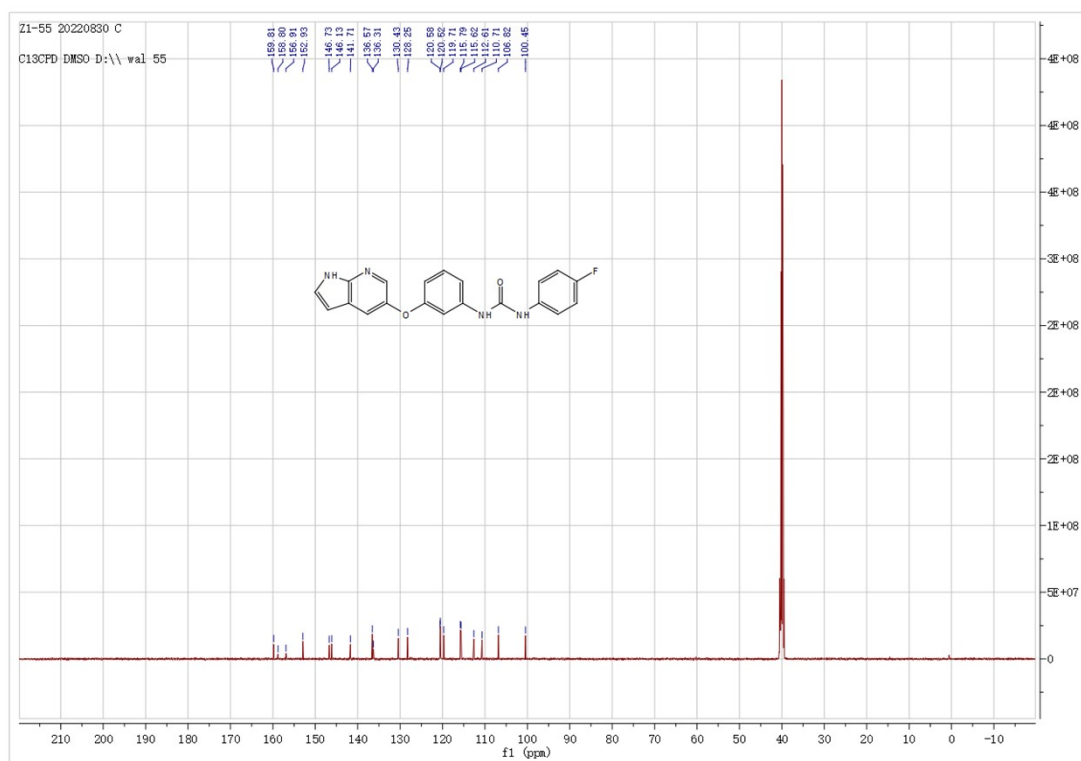
HRMS (ESI) spectrum of 9

1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(4-fluorophenyl)urea

(10)



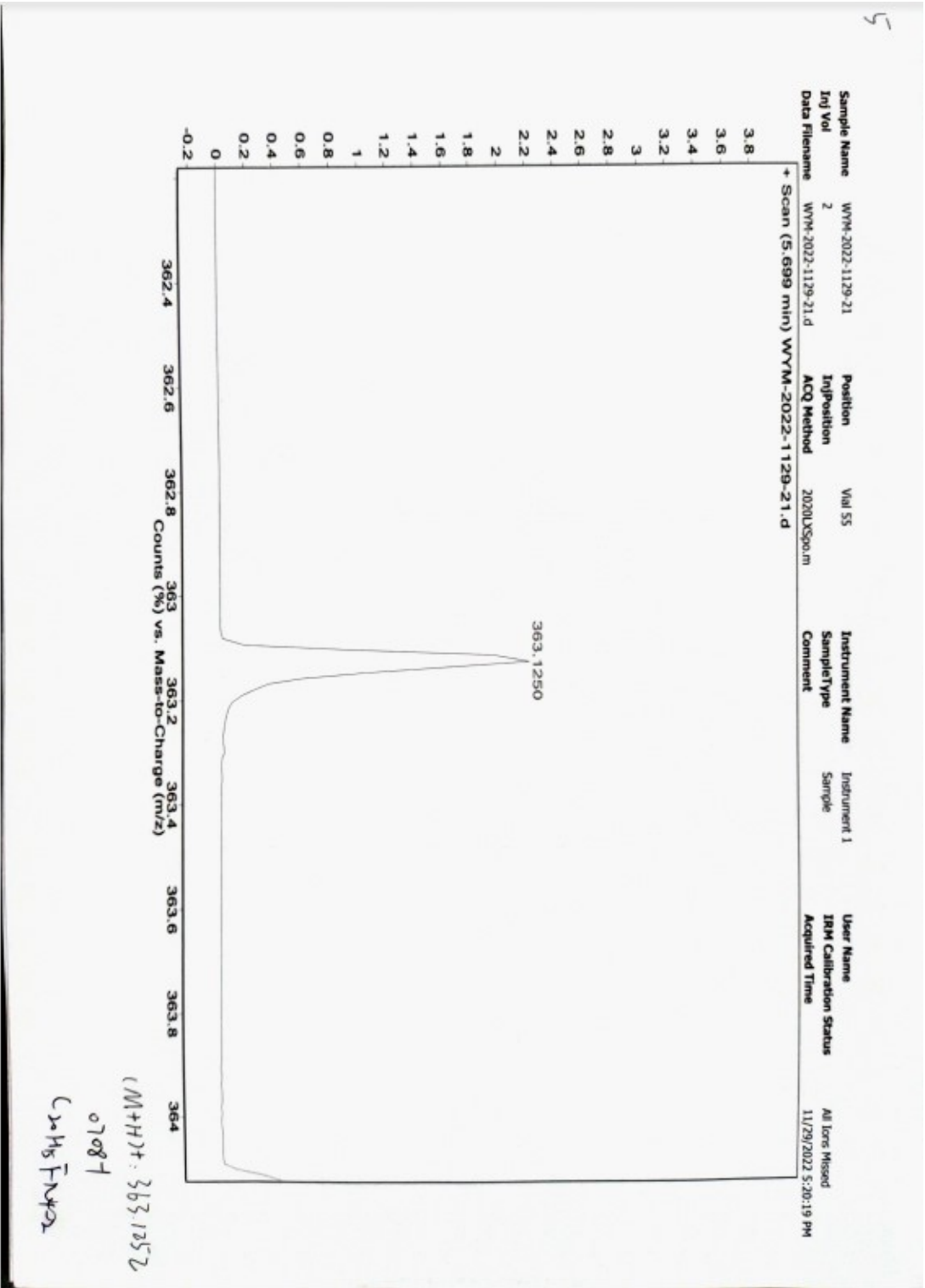
<sup>1</sup>H NMR spectrum of **10**



<sup>13</sup>C NMR spectrum of **10**

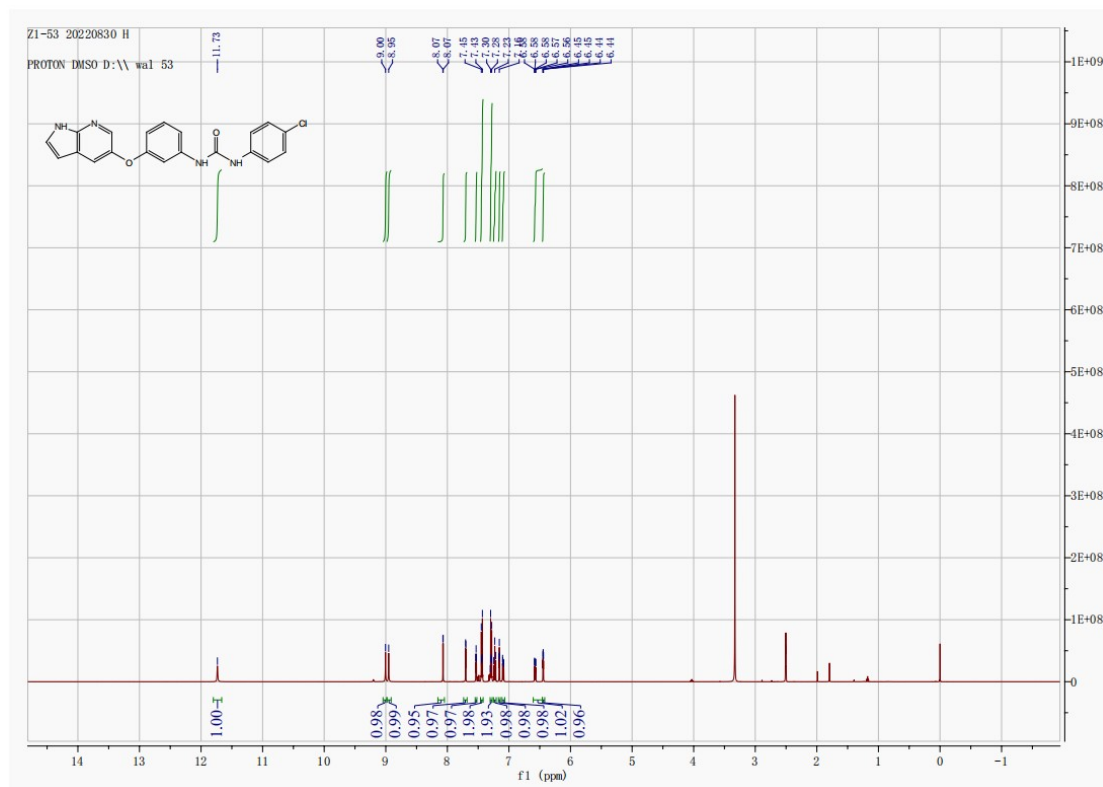


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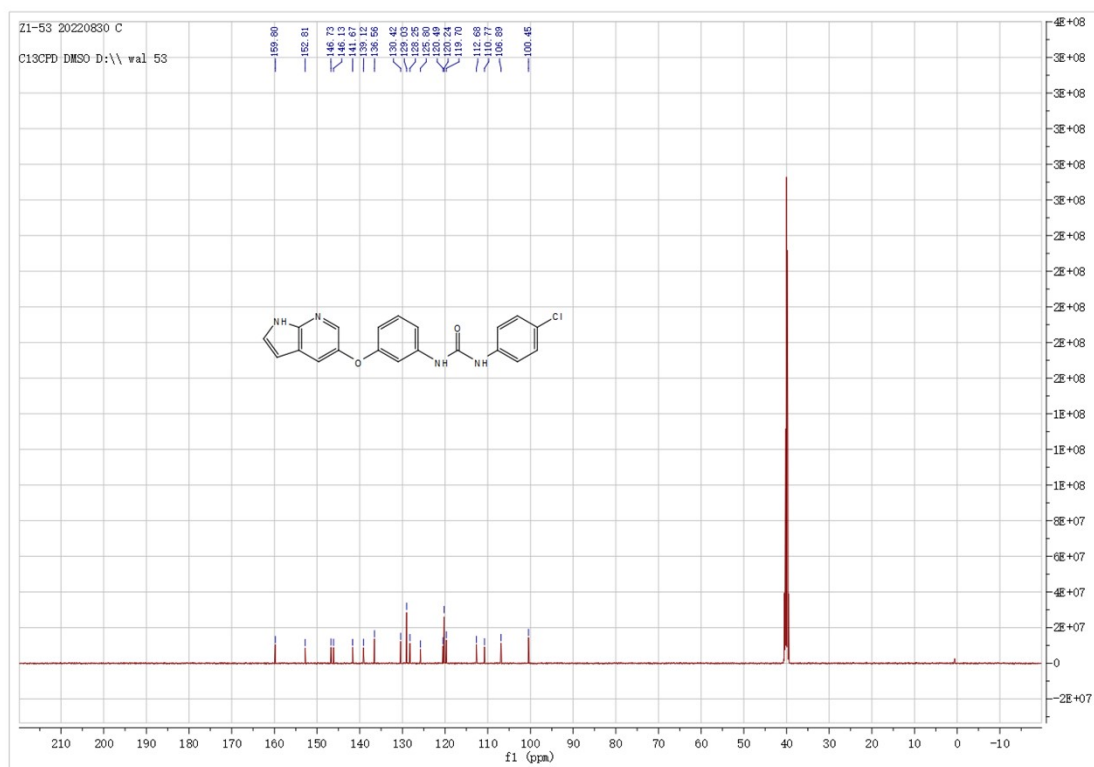


HRMS (ESI) spectrum of 10

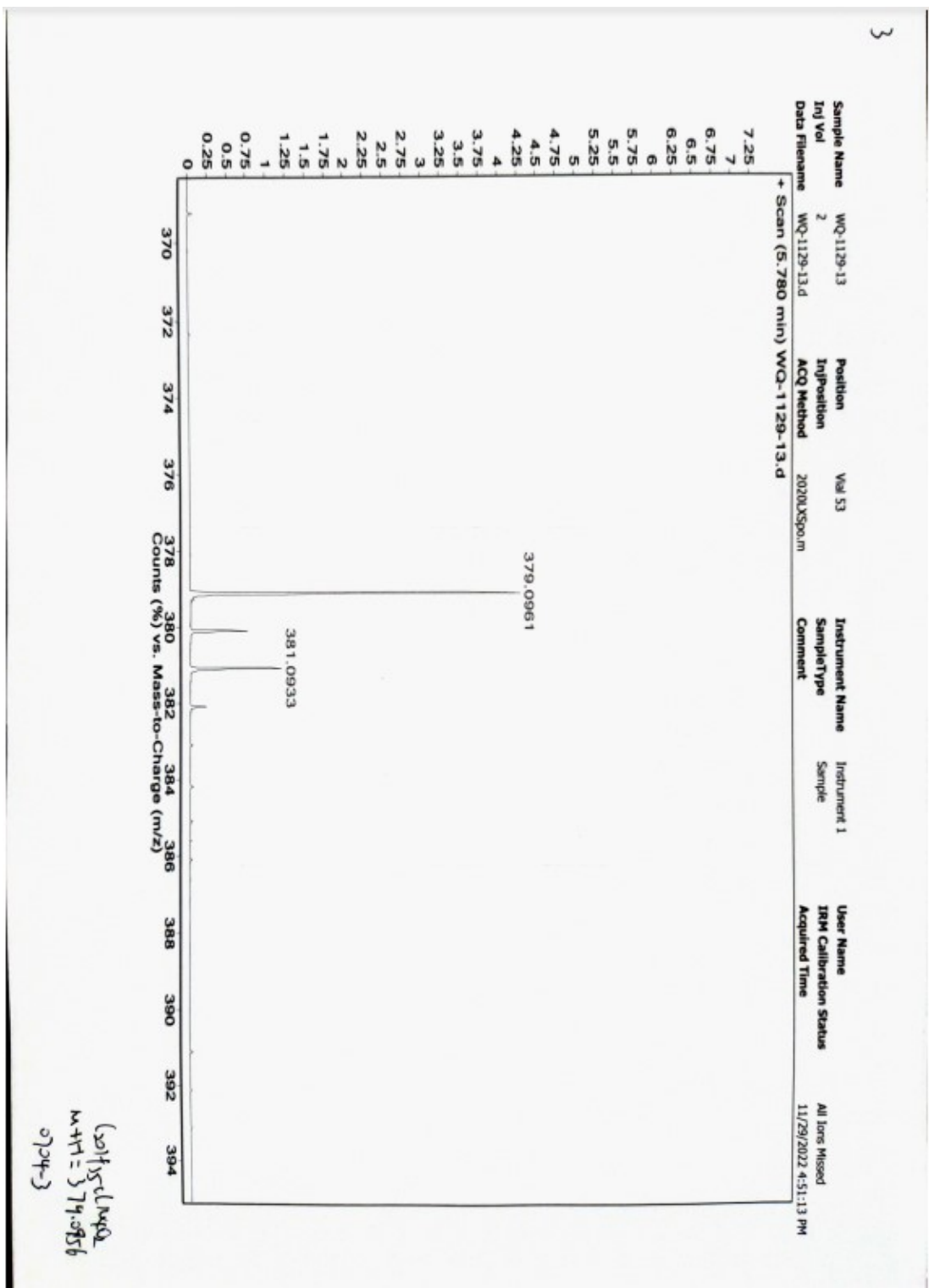
1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(4-chlorophenyl)urea (**11**)



<sup>1</sup>H NMR spectrum of **11**

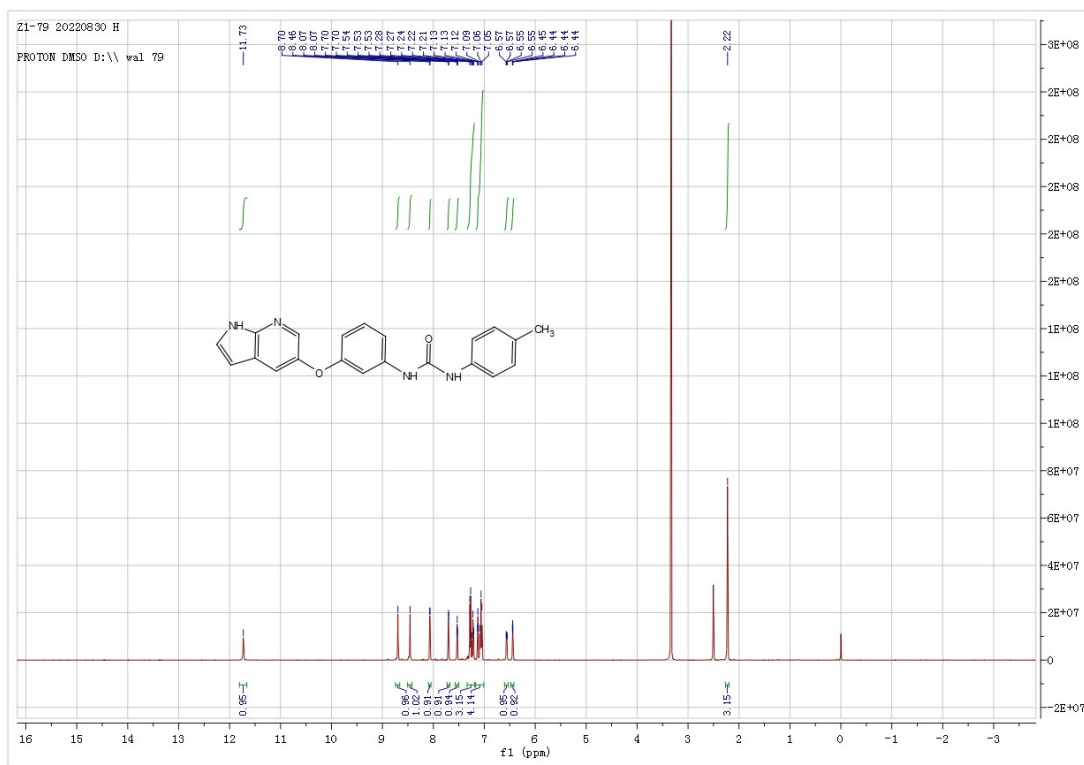


<sup>13</sup>C NMR spectrum of **11**

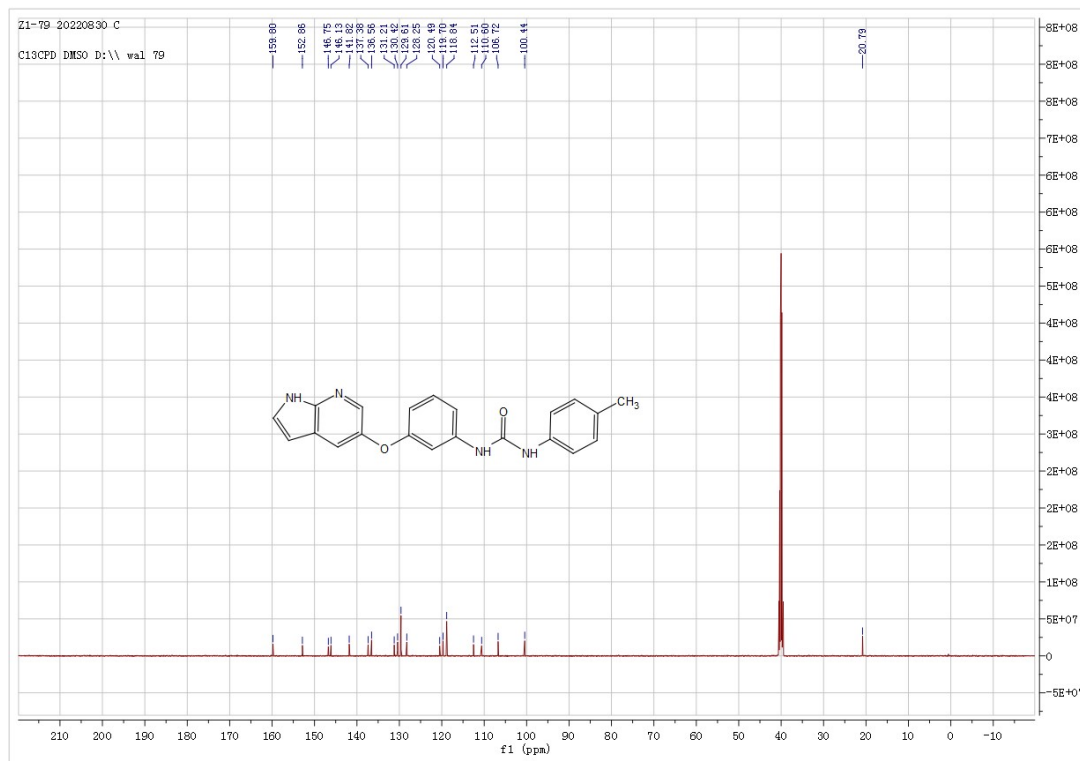


HRMS (ESI) spectrum of 11

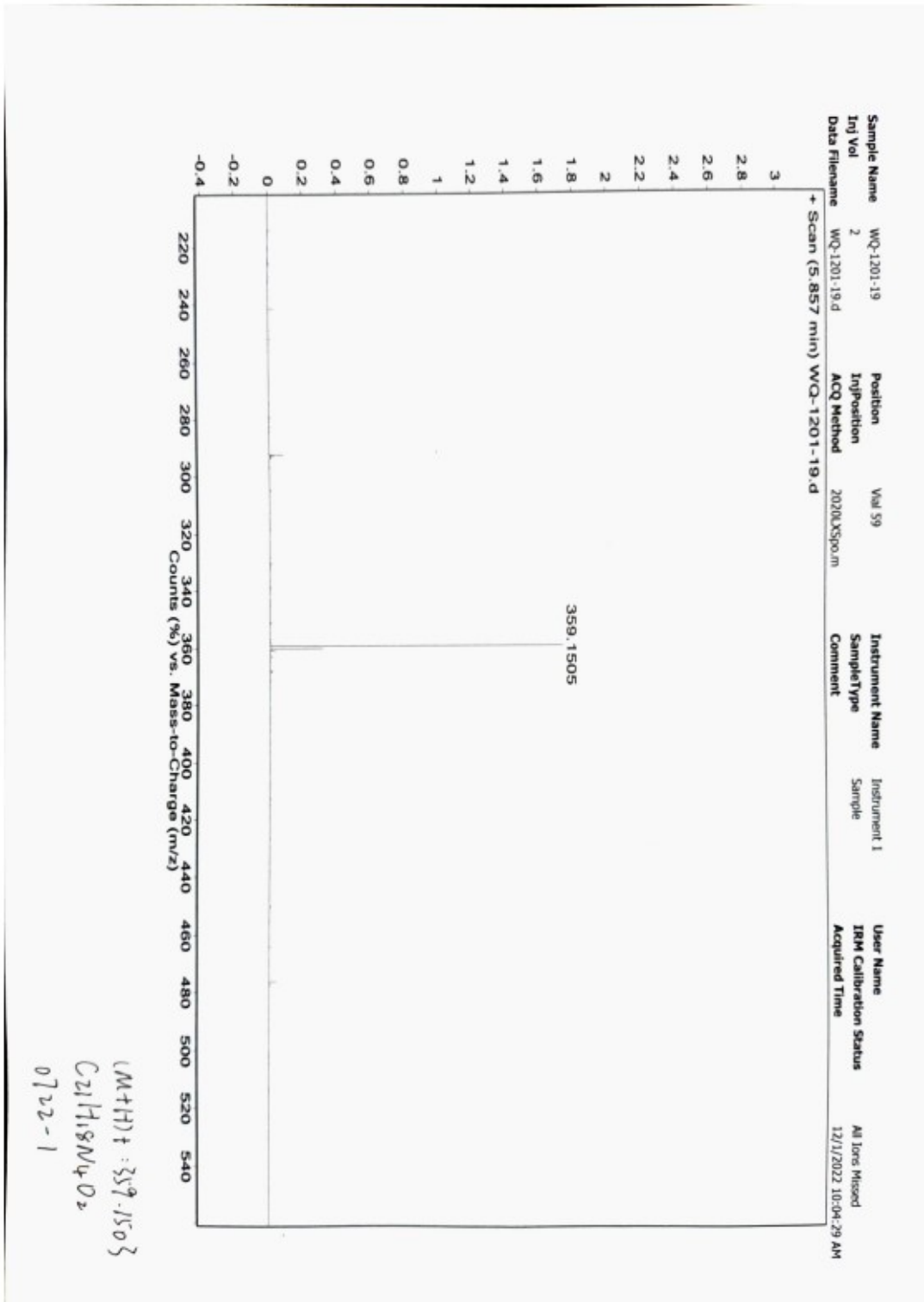
1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(4-methylphenyl)urea (**12**)



<sup>1</sup>H NMR spectrum of **12**



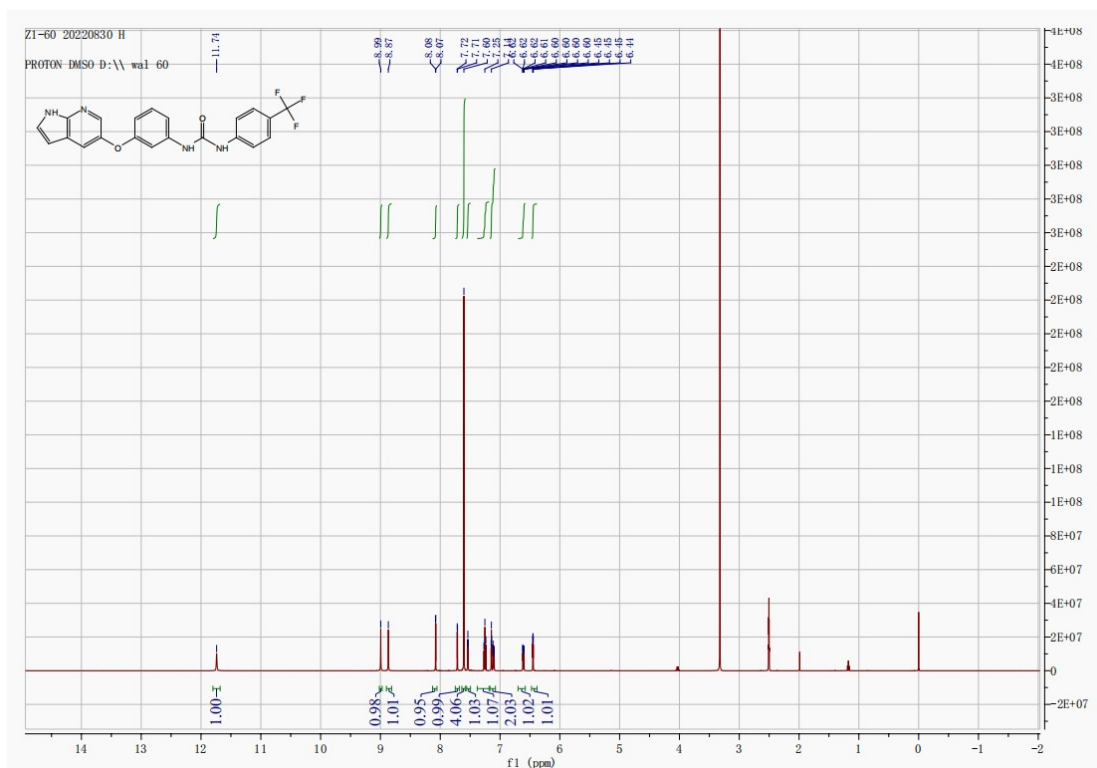
<sup>13</sup>C NMR spectrum of **12**



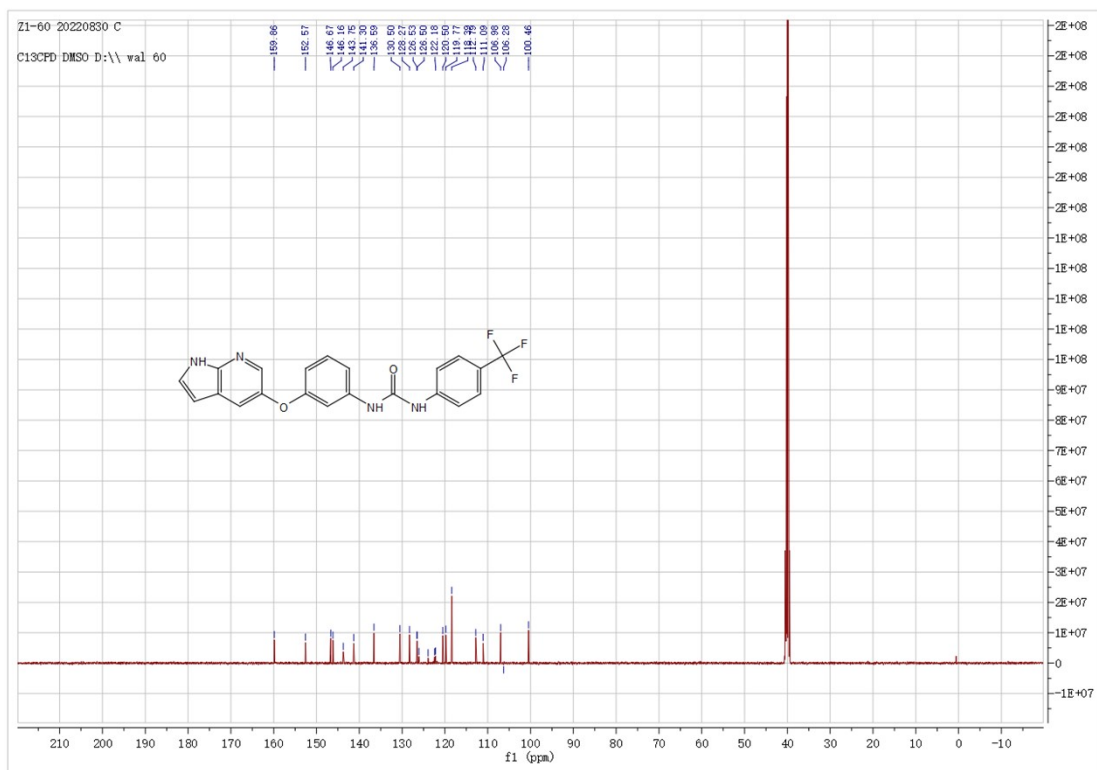
HRMS (ESI) spectrum of 12

1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(4-(trifluoromethyl)phenyl)urea

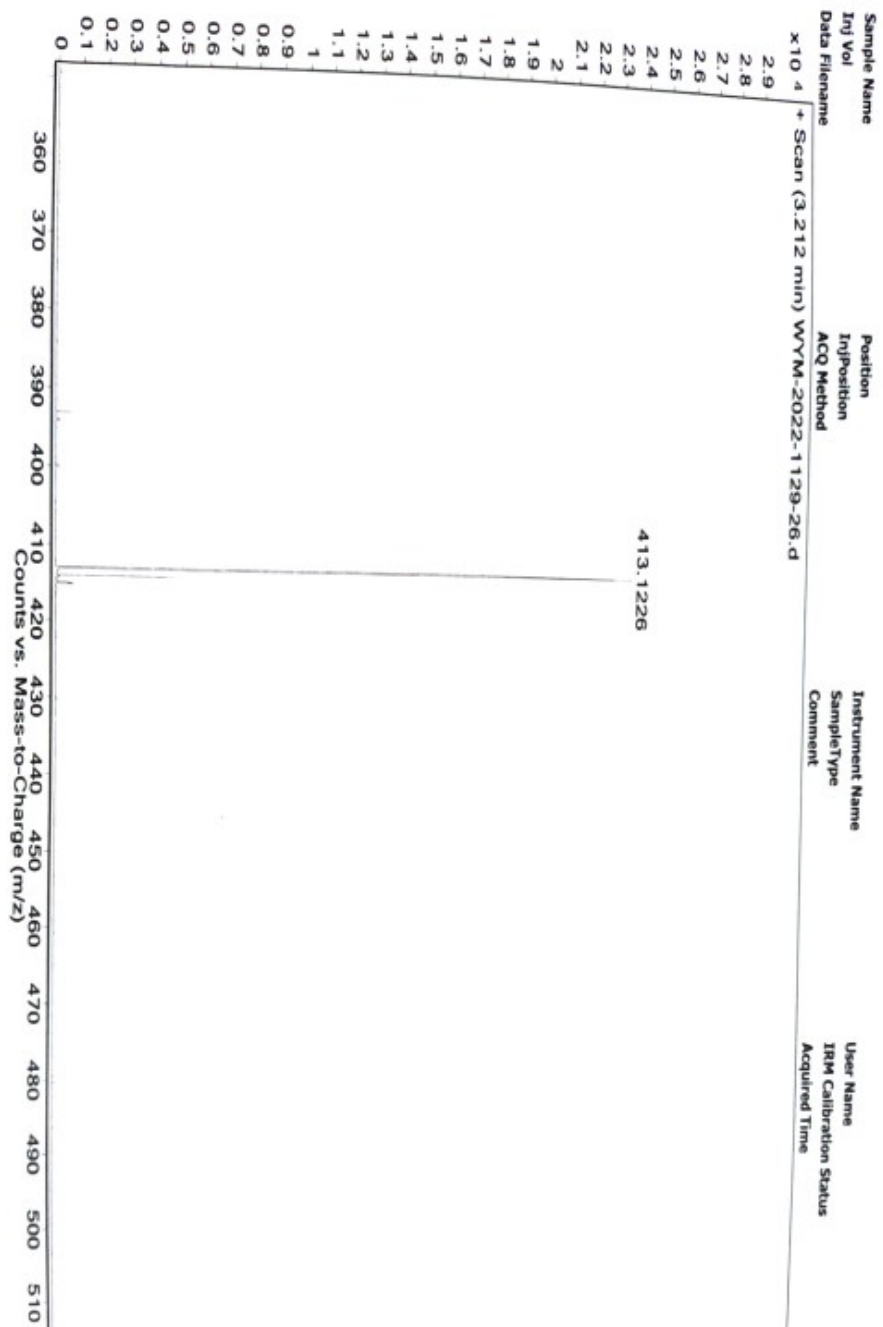
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<sup>1</sup>H NMR spectrum of 13



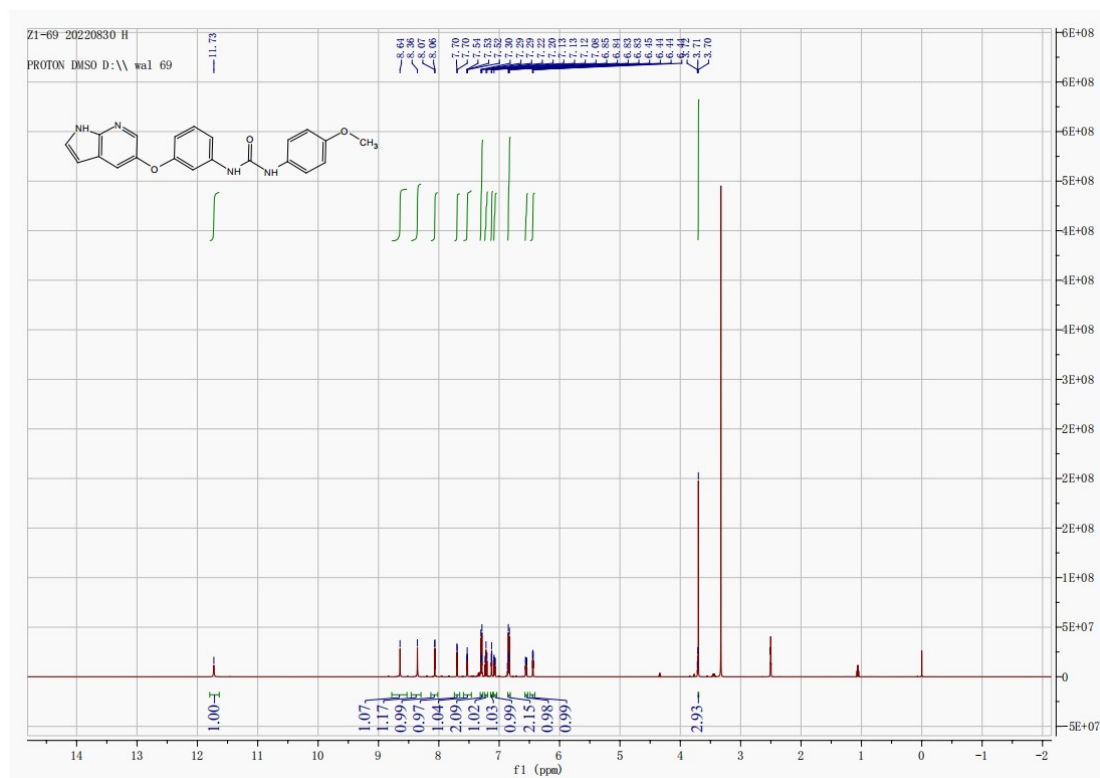
<sup>13</sup>C NMR spectrum of 13



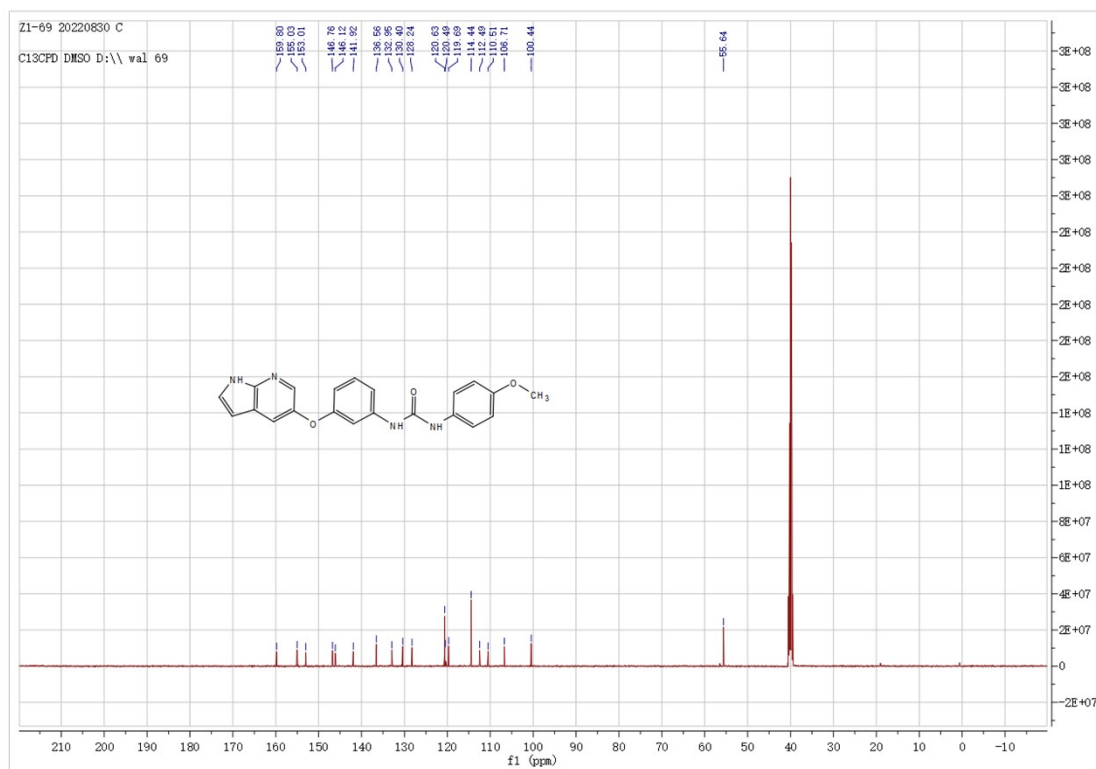
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HRMS (ESI) spectrum of 13

*1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(4-methoxyphenyl)urea (14)*

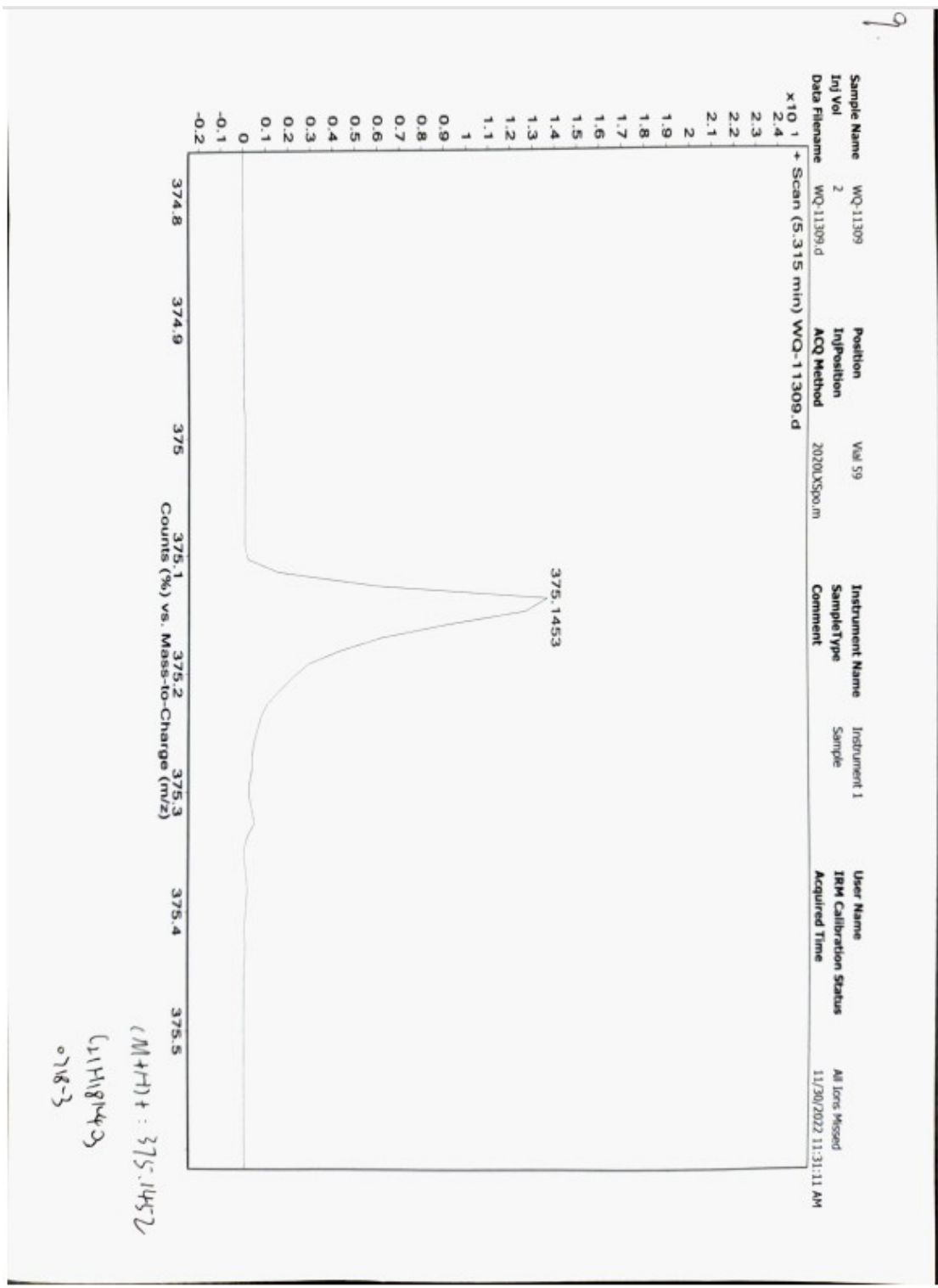


<sup>1</sup>H NMR spectrum of 14



<sup>13</sup>C NMR spectrum of 14

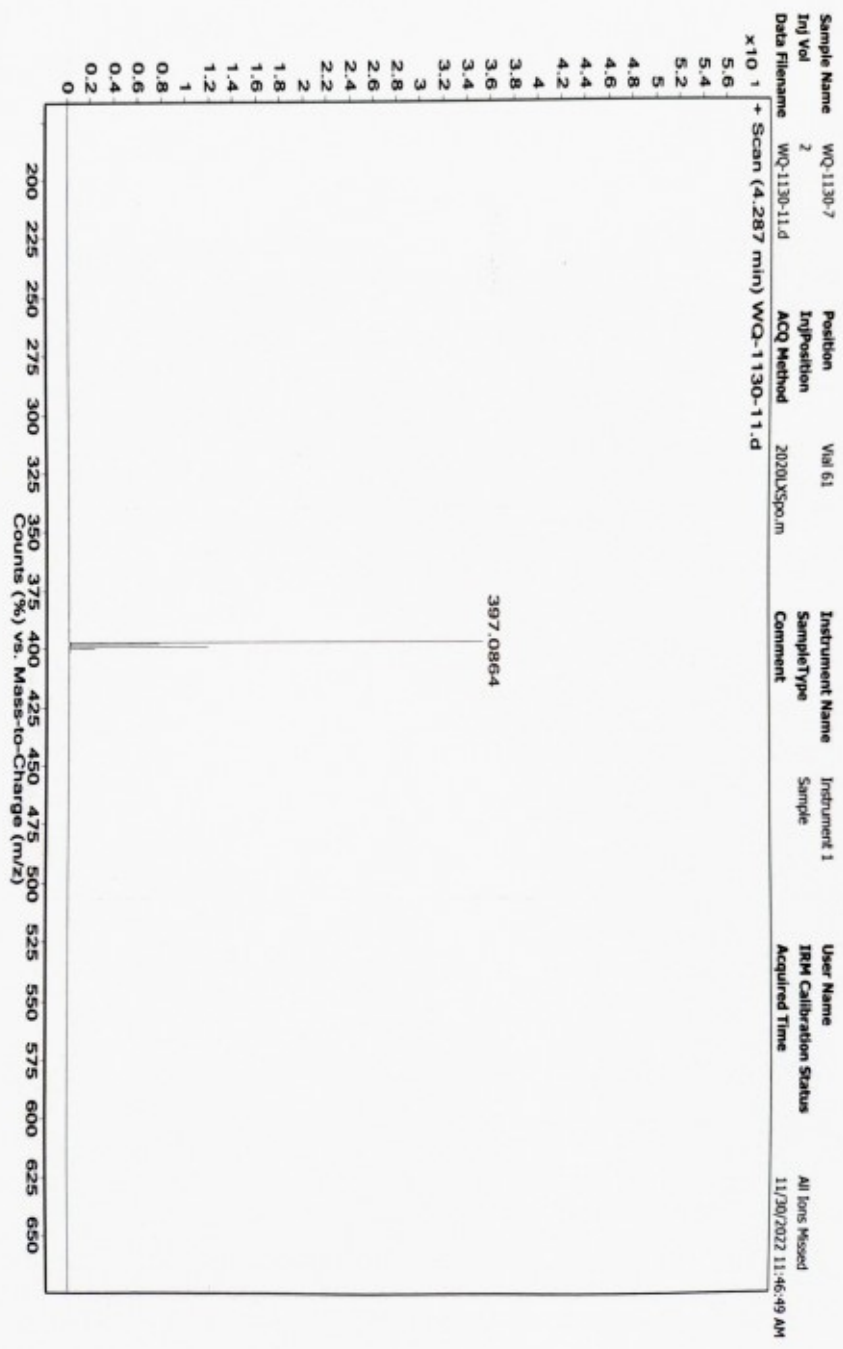




HRMS (ESI) spectrum of 14



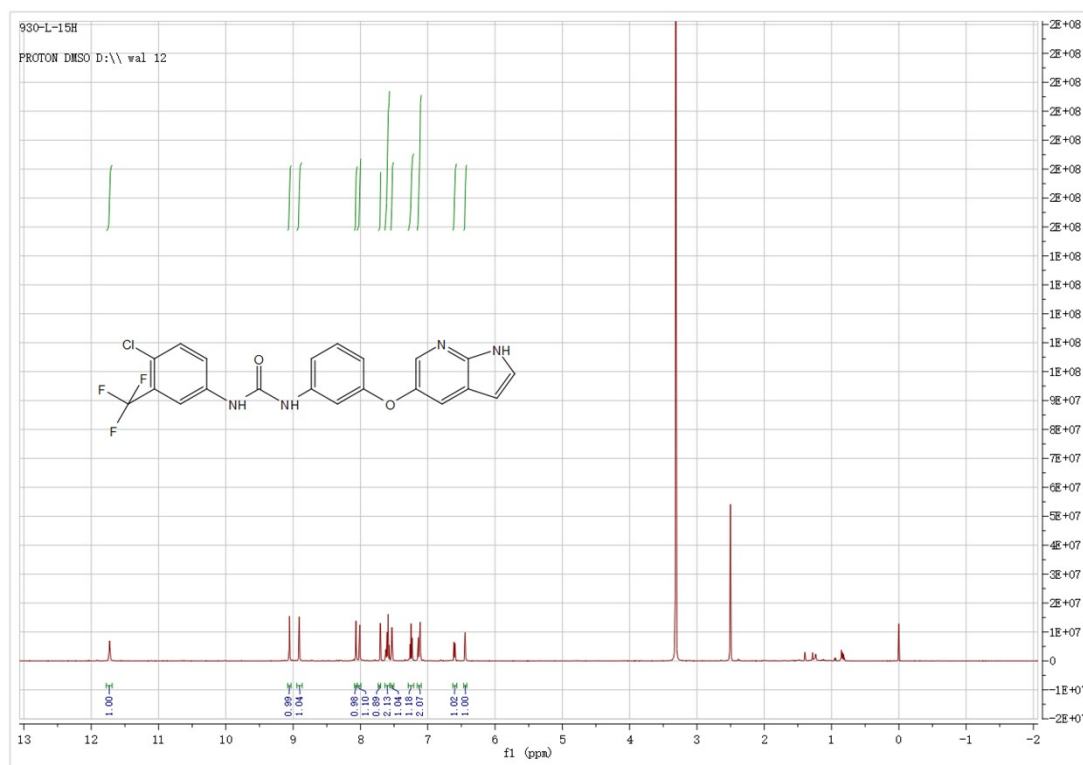
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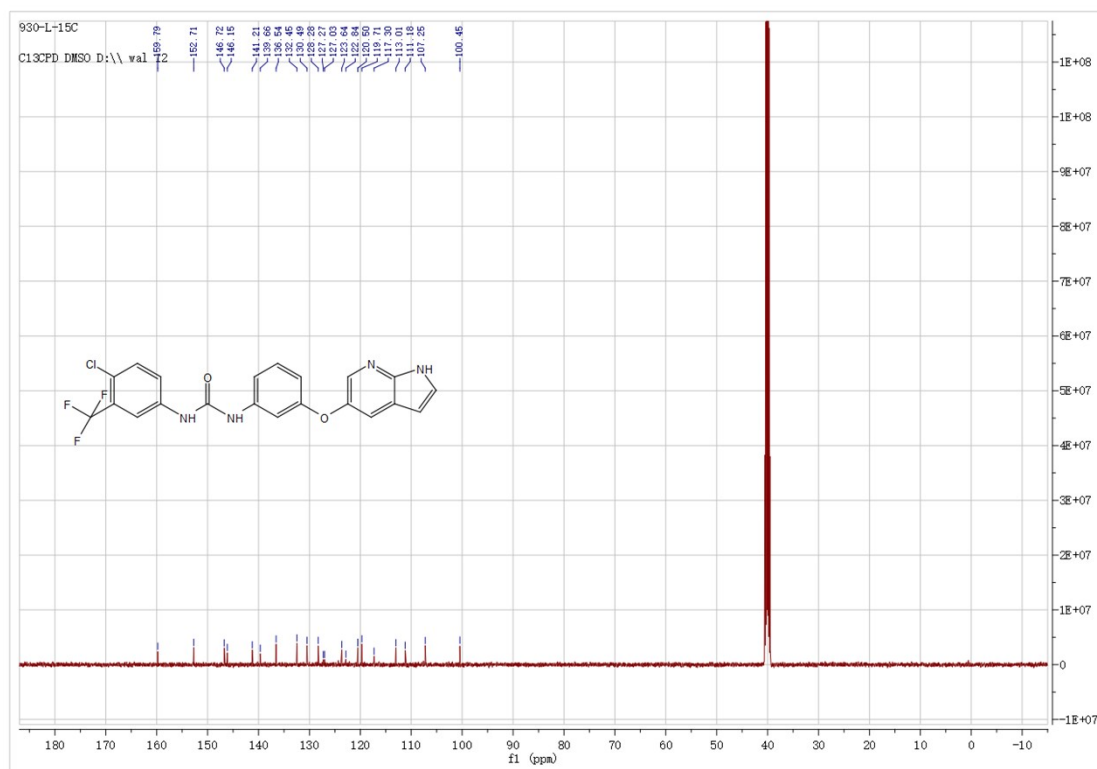
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HRMS (ESI) spectrum of 15

1-(3-((1*H*-pyrrolo[2,3-*b*]pyridin-5-yl)oxy)phenyl)-3-(4-chloro-3-(trifluoromethyl)phenyl)urea (**16**)



<sup>1</sup>H NMR spectrum of **16**



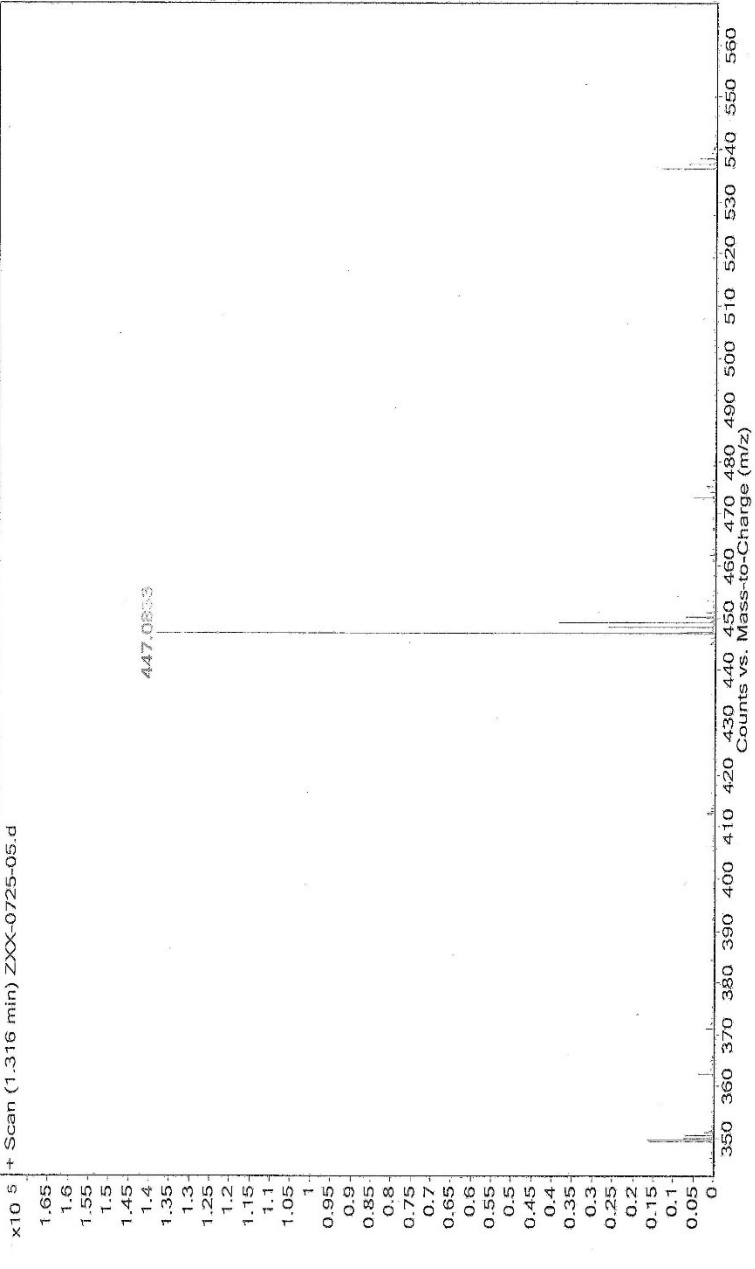
<sup>13</sup>C NMR spectrum of **16**

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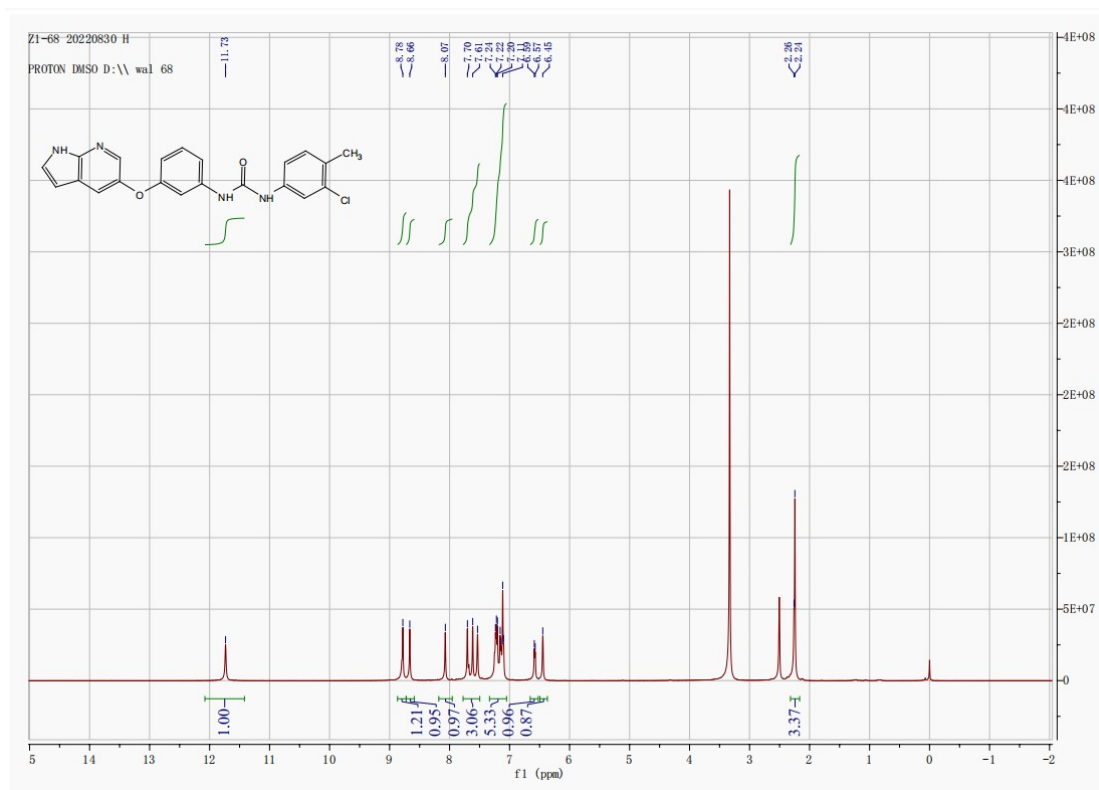


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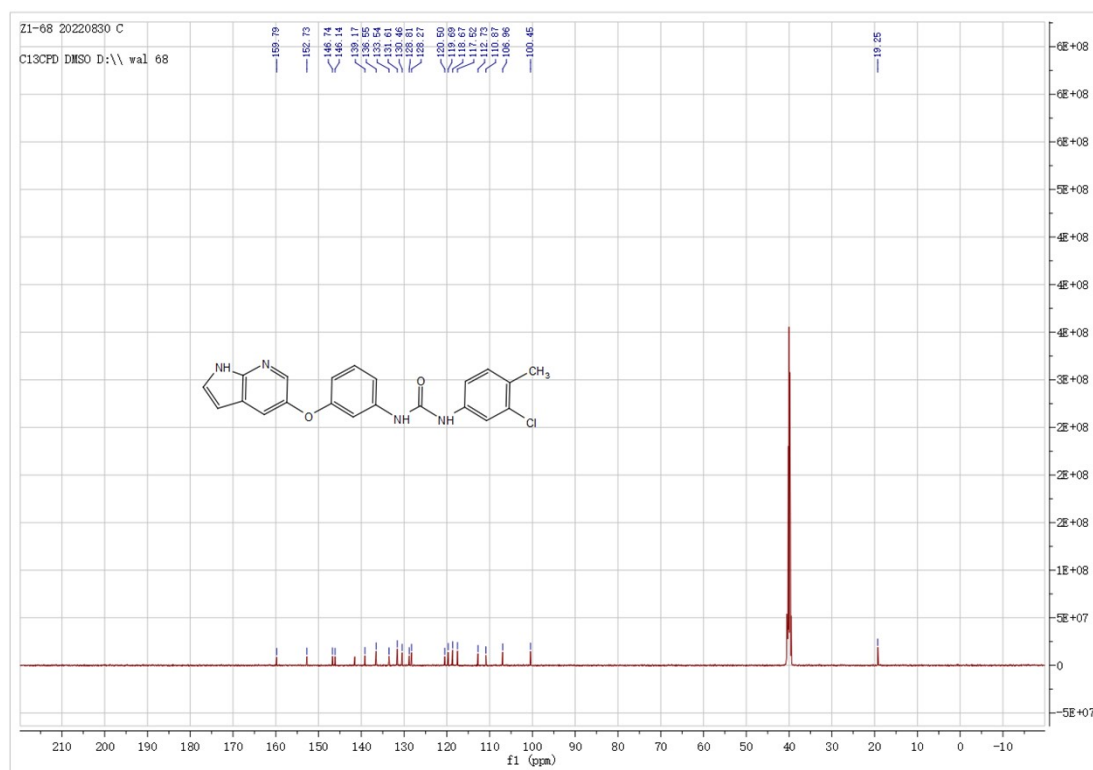
HRMS (ESI) spectrum of 16

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(17)

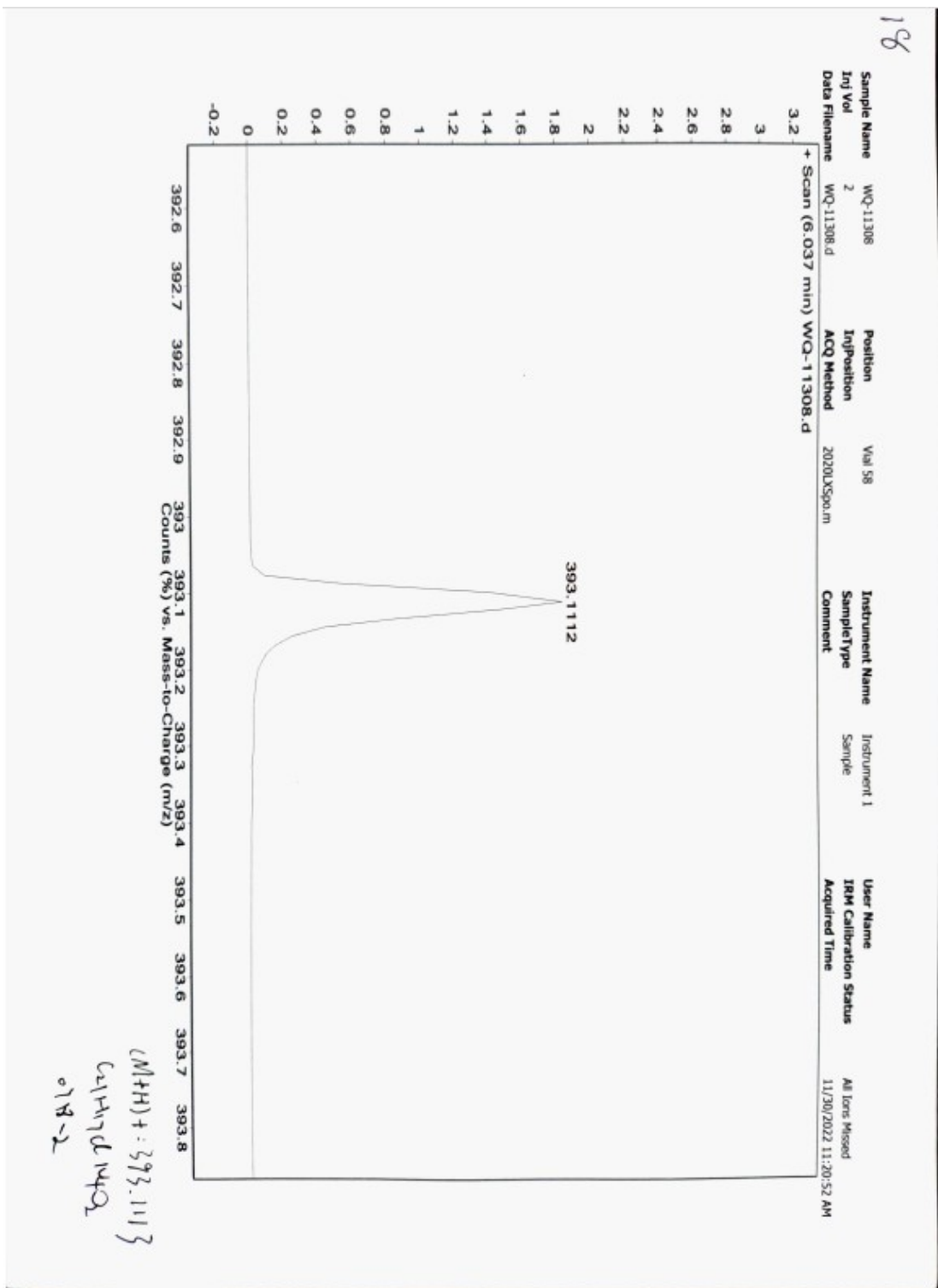


<sup>1</sup>H NMR spectrum of 17



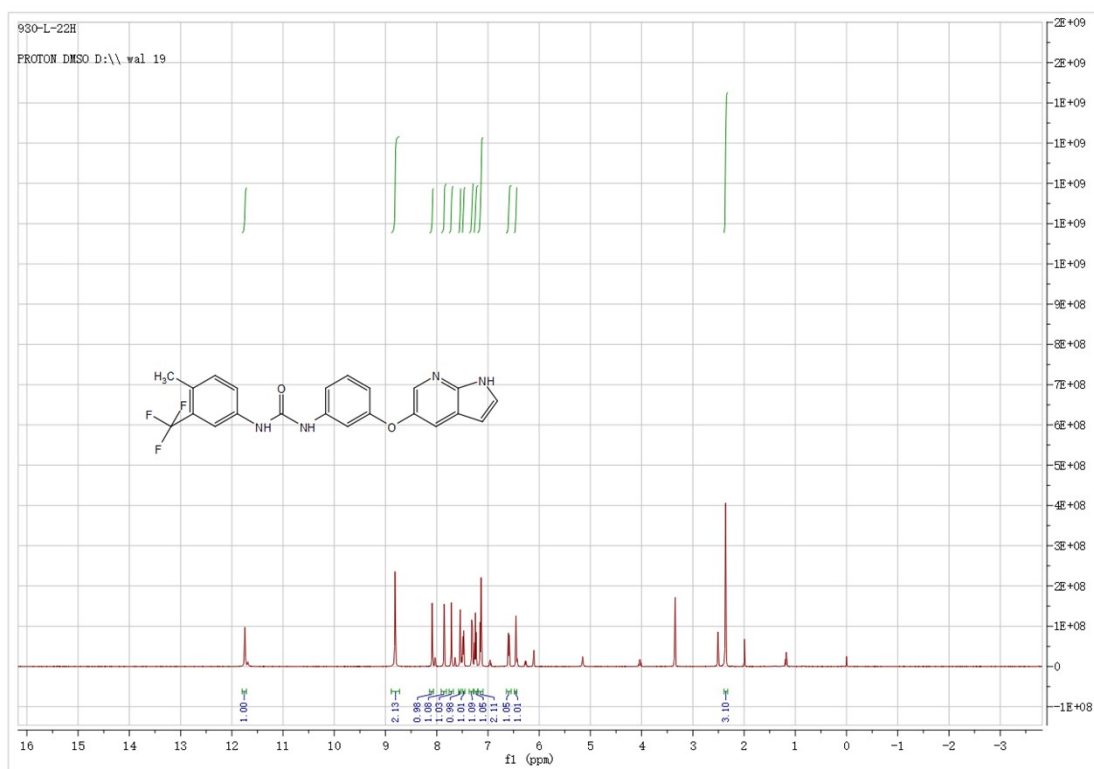
<sup>13</sup>C NMR spectrum of 17

18

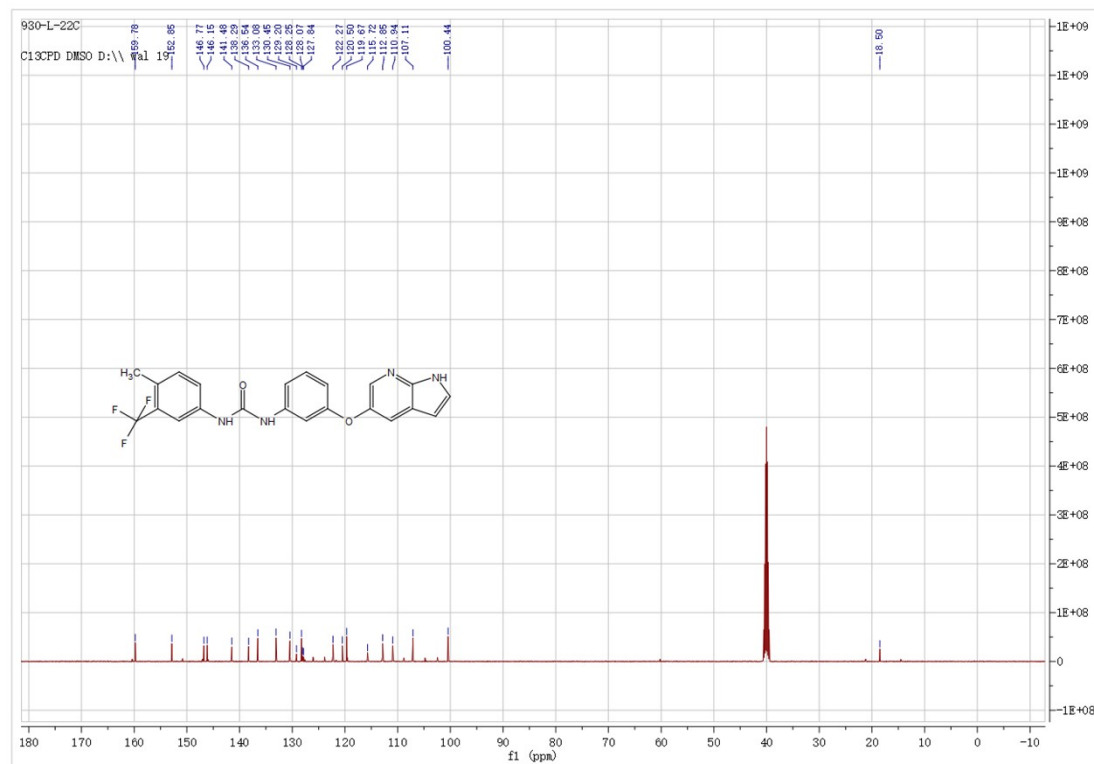


HRMS (ESI) spectrum of 17

*1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(4-methyl-3-(trifluoromethyl)phenyl)urea (18)*



<sup>1</sup>H NMR spectrum of **18**



<sup>13</sup>C NMR spectrum of **18**





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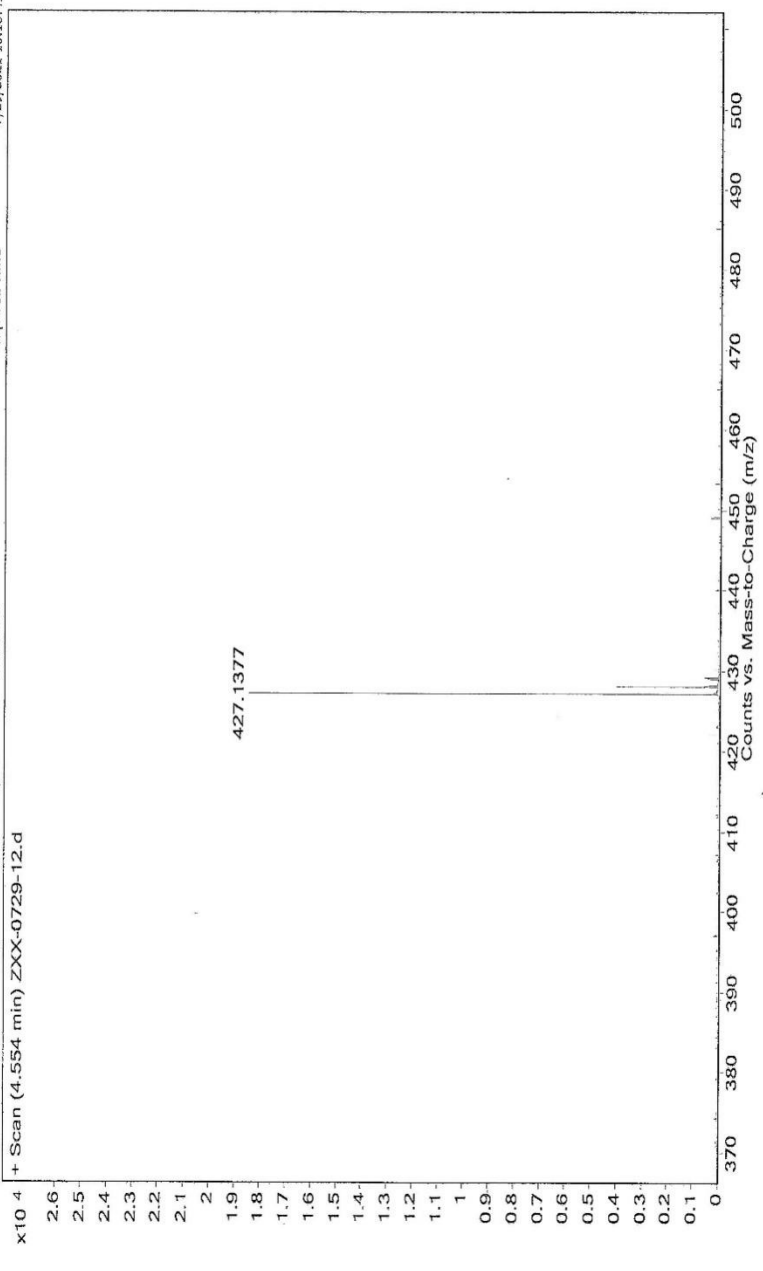
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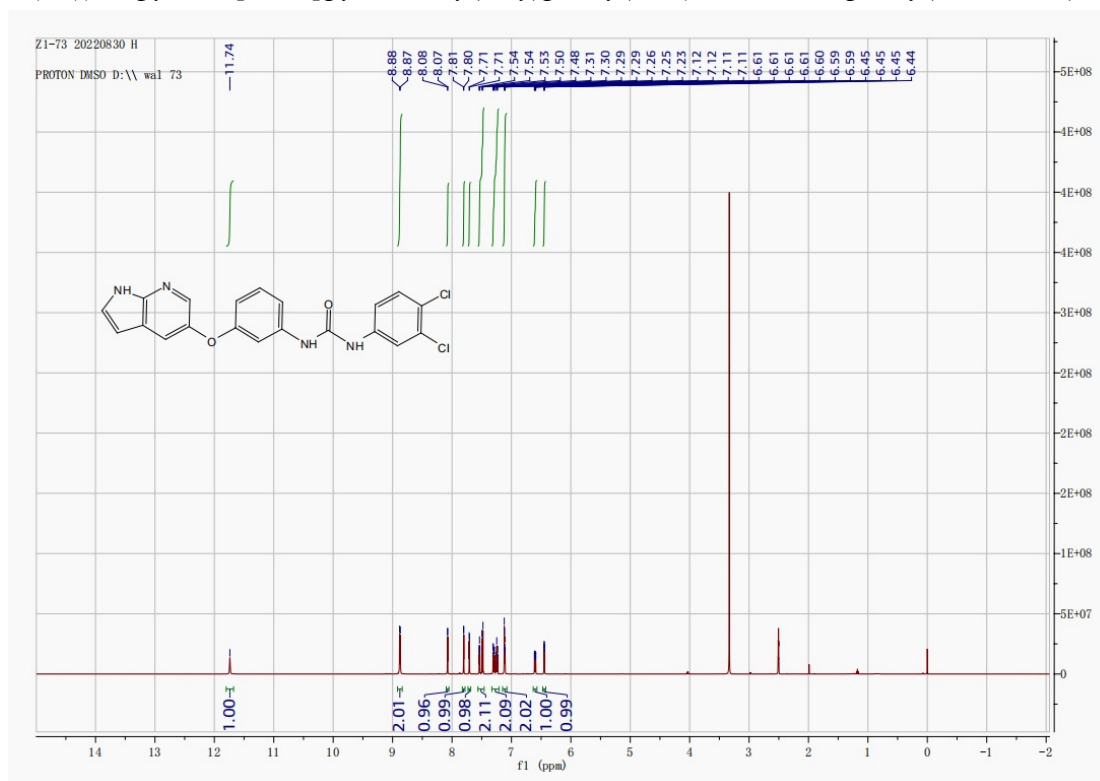
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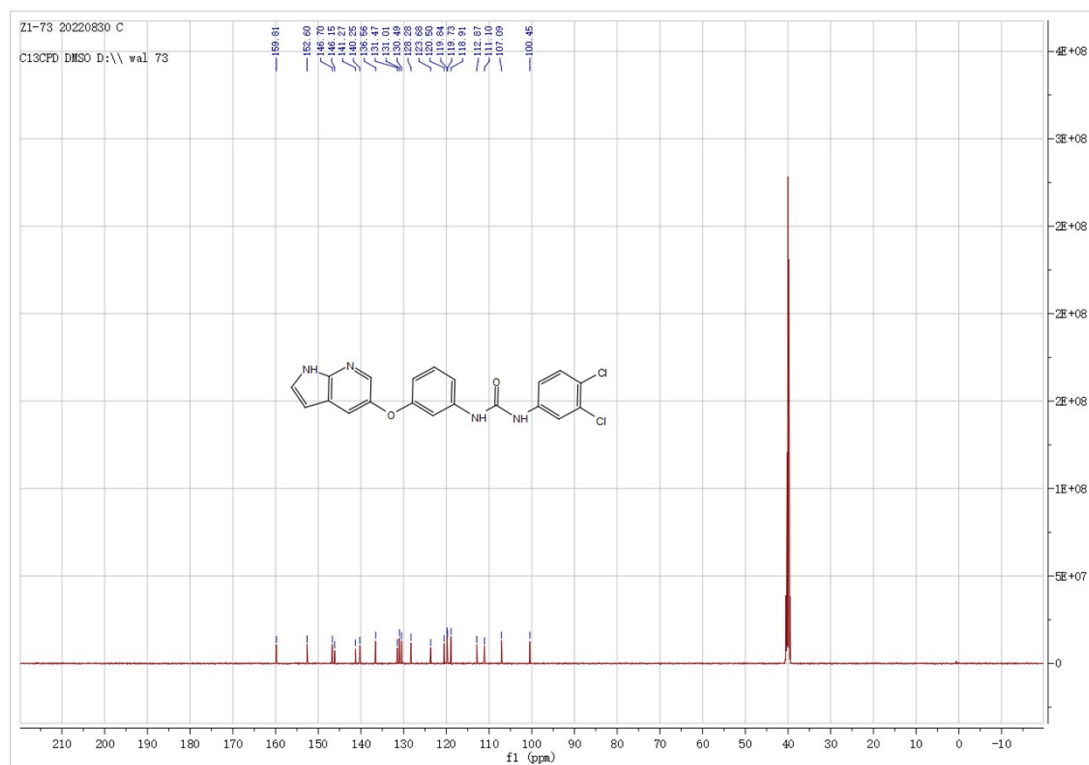
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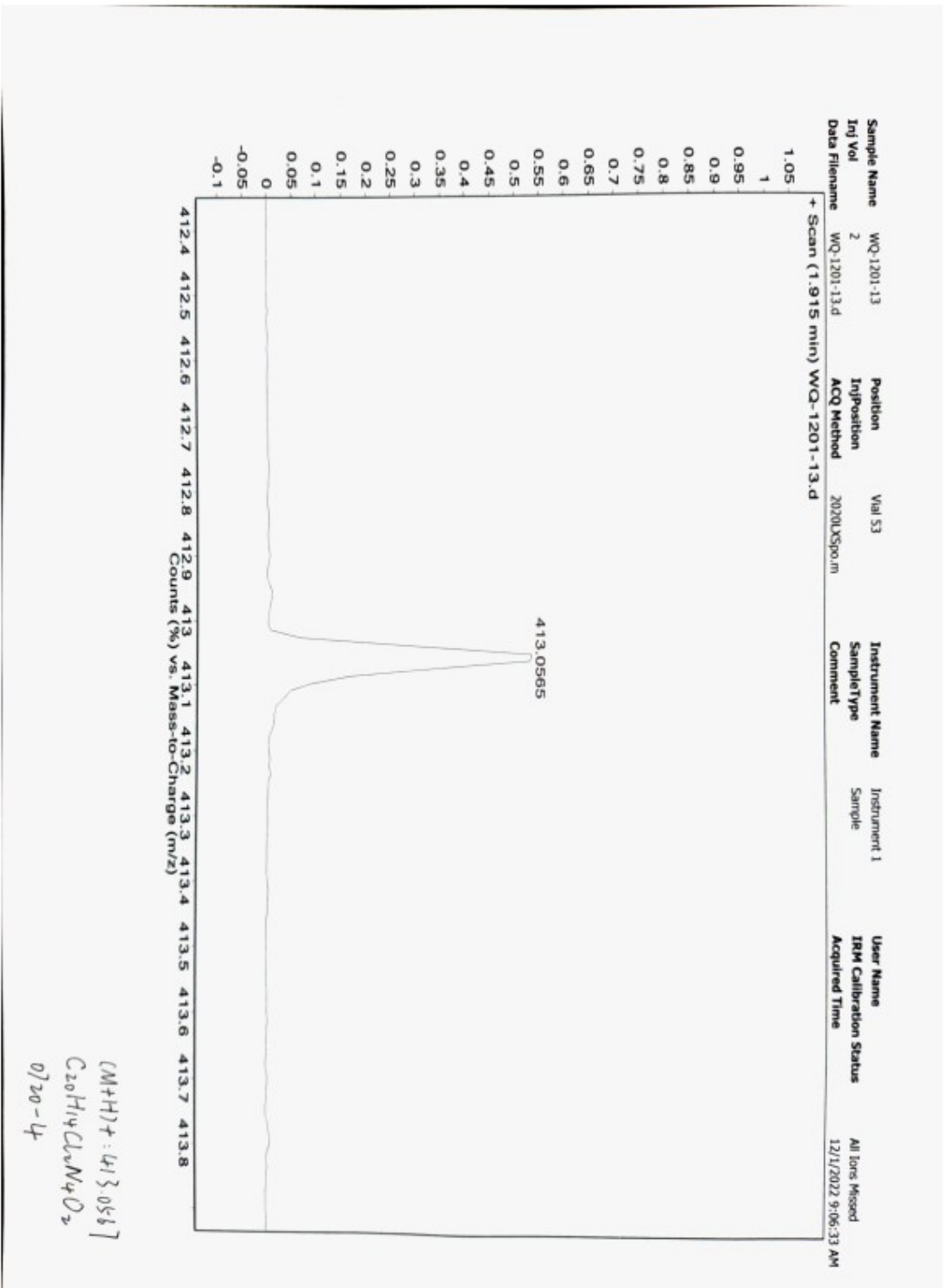
1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3,4-dichlorophenyl)urea (19)



<sup>1</sup>H NMR spectrum of 19

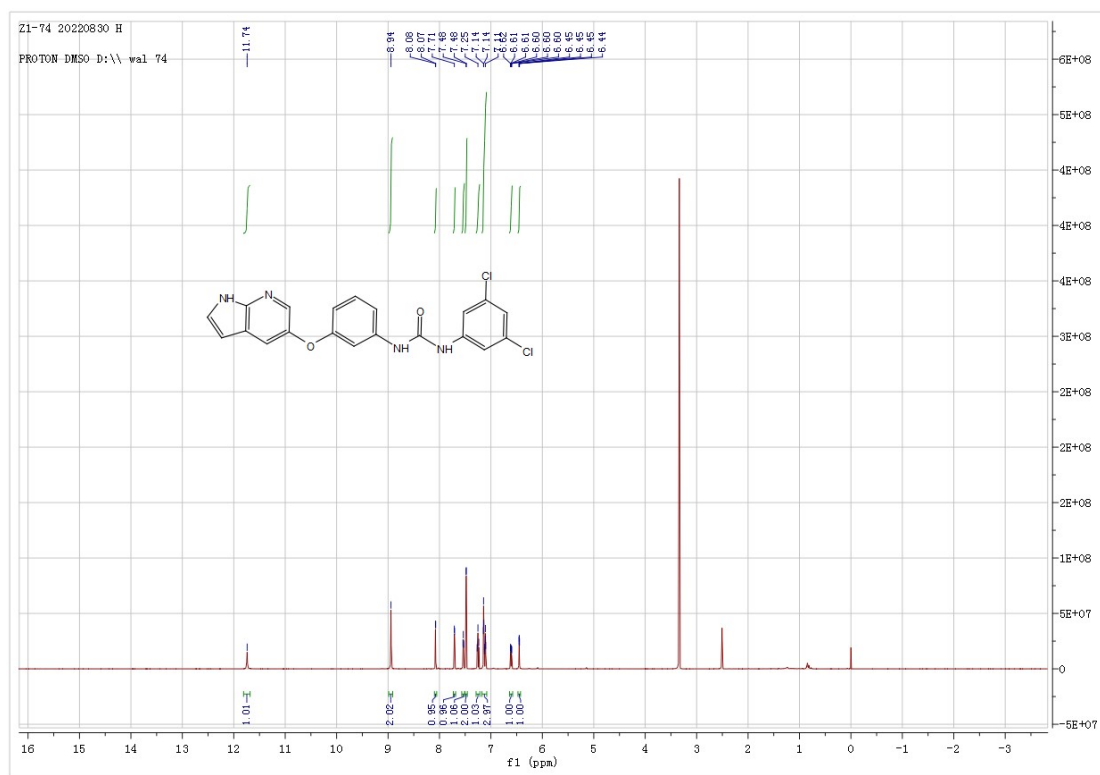


<sup>13</sup>C NMR spectrum of 19

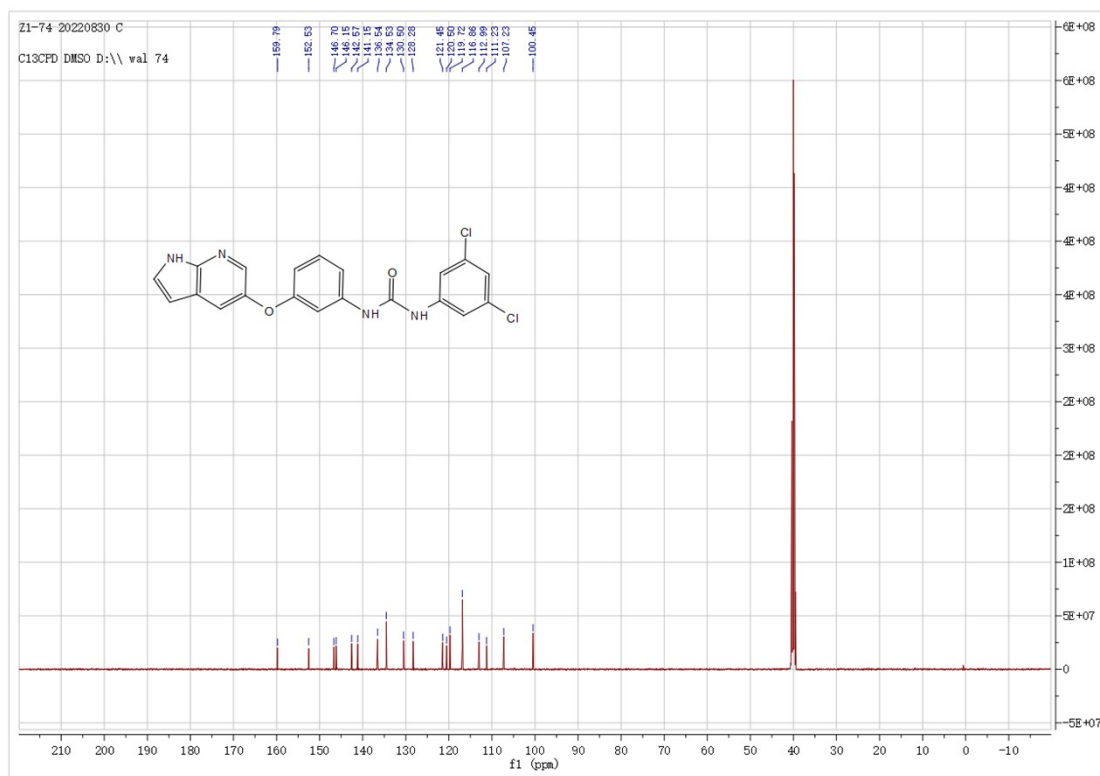


HRMS (ESI) spectrum of 19

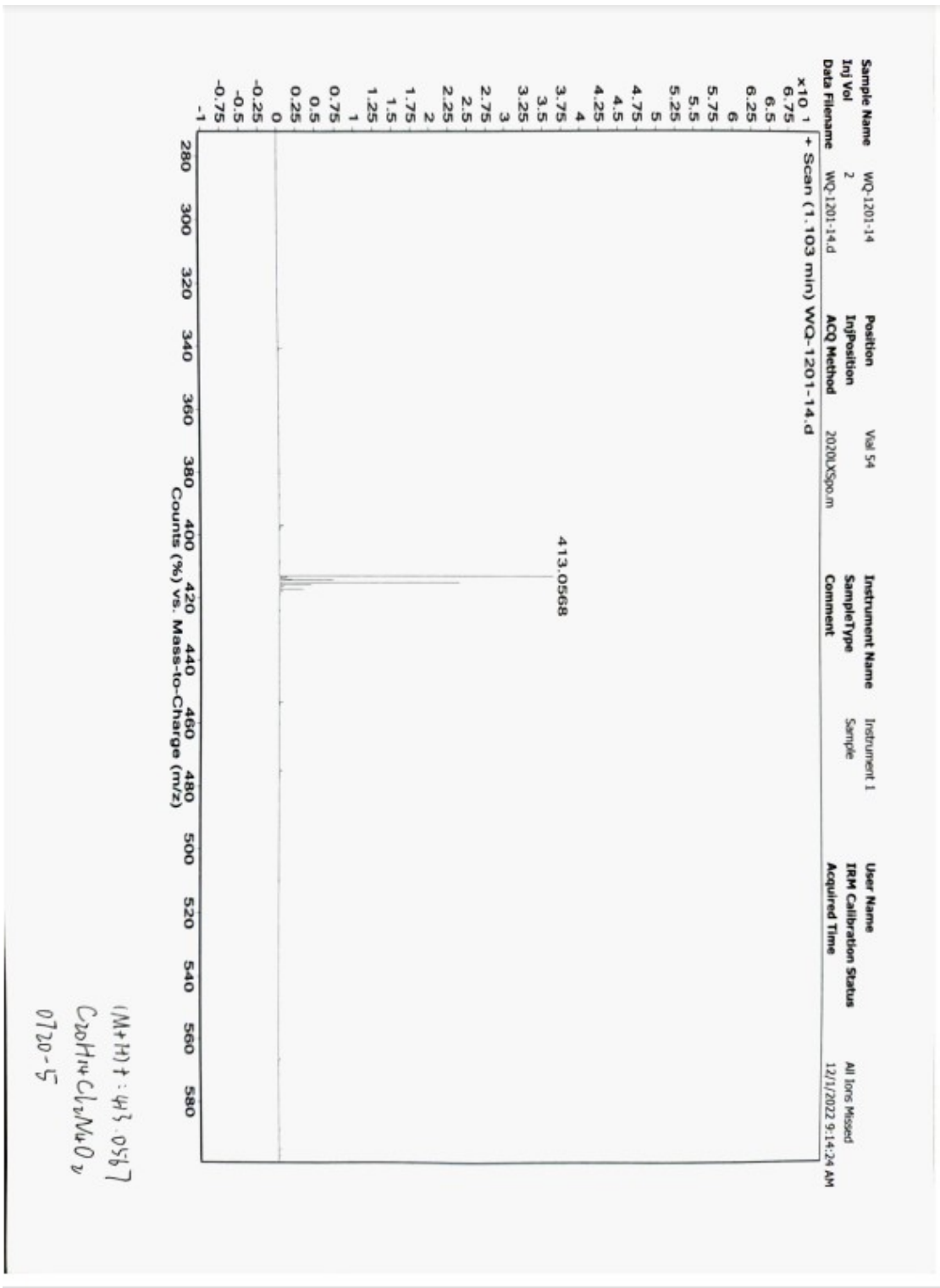
*1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3,5-dichlorophenyl)urea (20)*



<sup>1</sup>H NMR spectrum of **20**

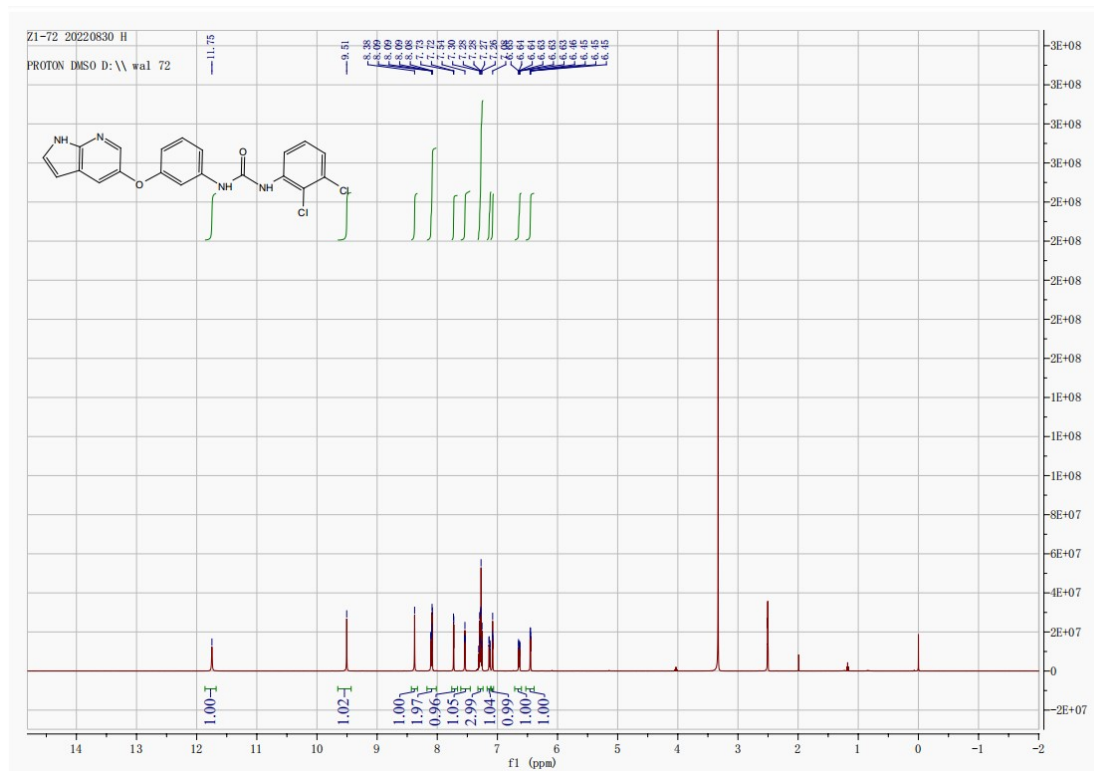


<sup>13</sup>C NMR spectrum of **20**

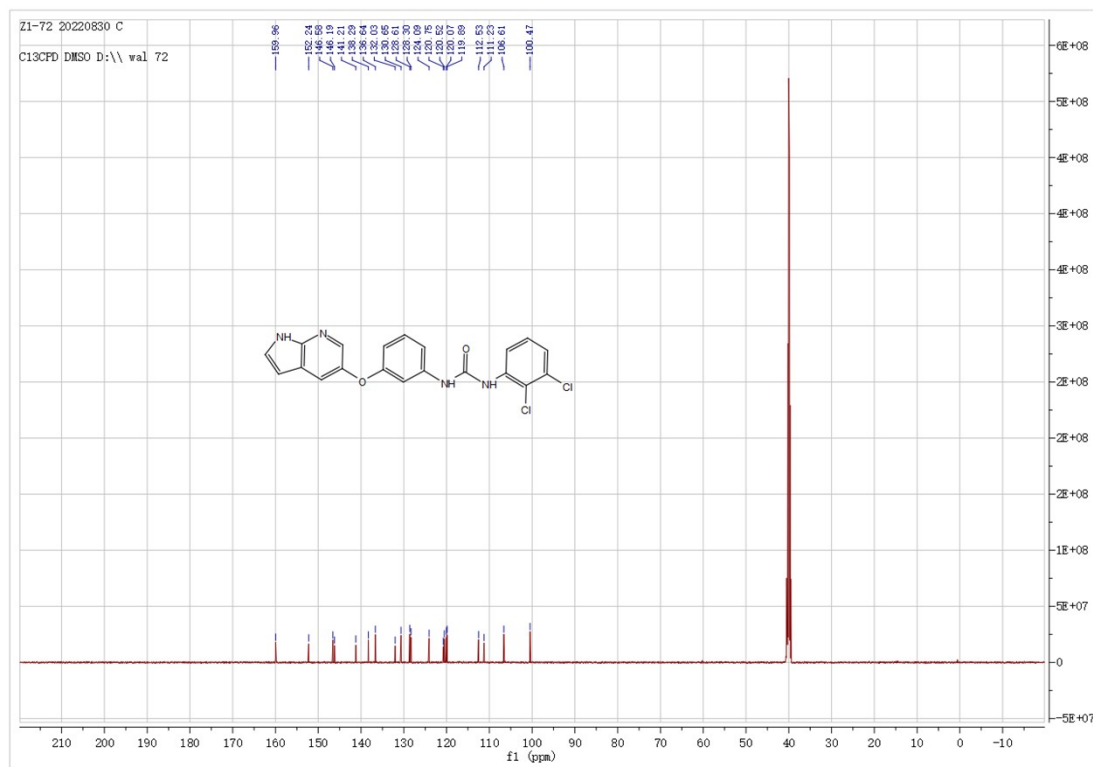


HRMS (ESI) spectrum of 20

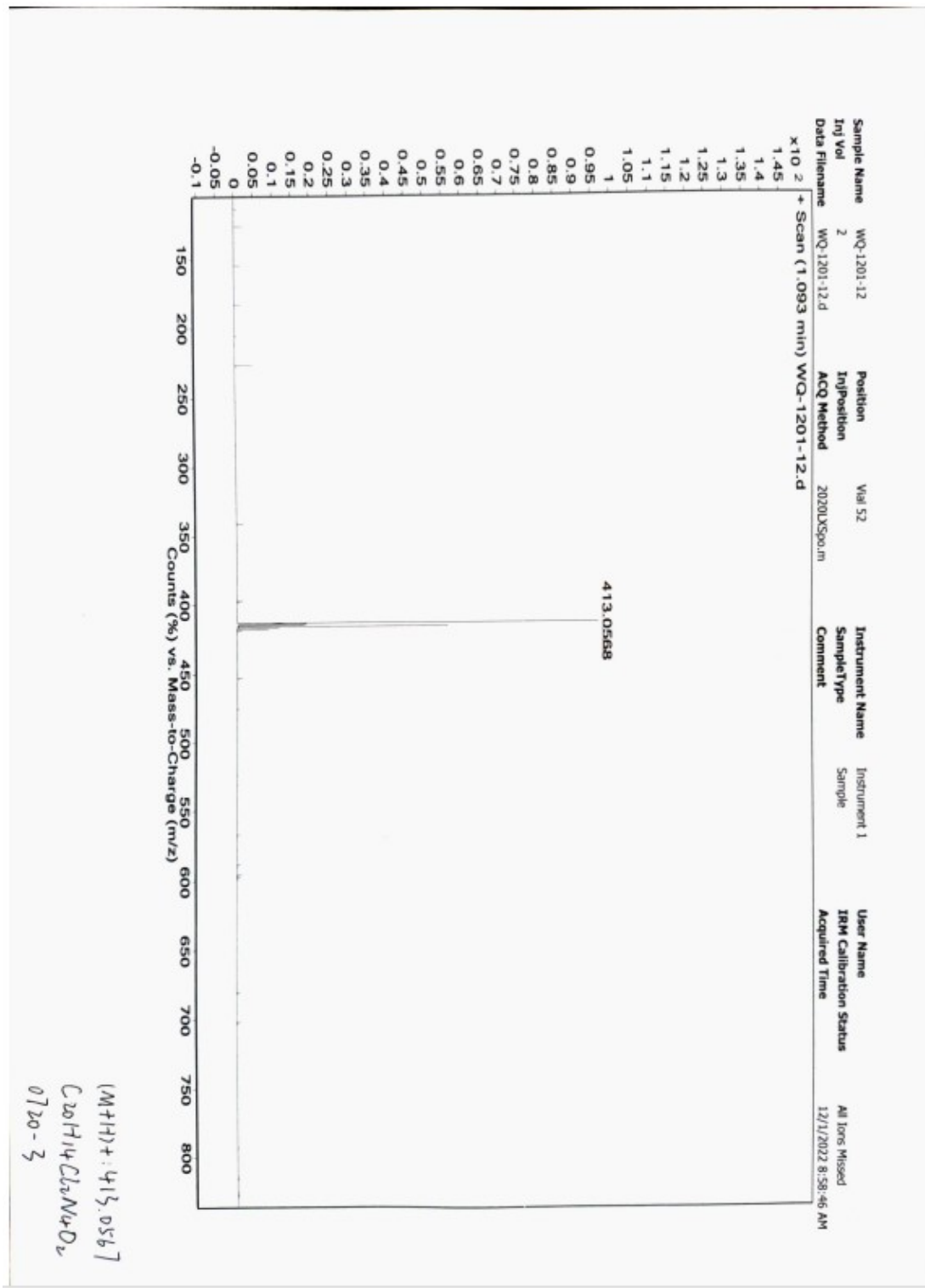
*1-(3-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(2,3-dichlorophenyl)urea (21)*



$^1\text{H}$  NMR spectrum of **21**



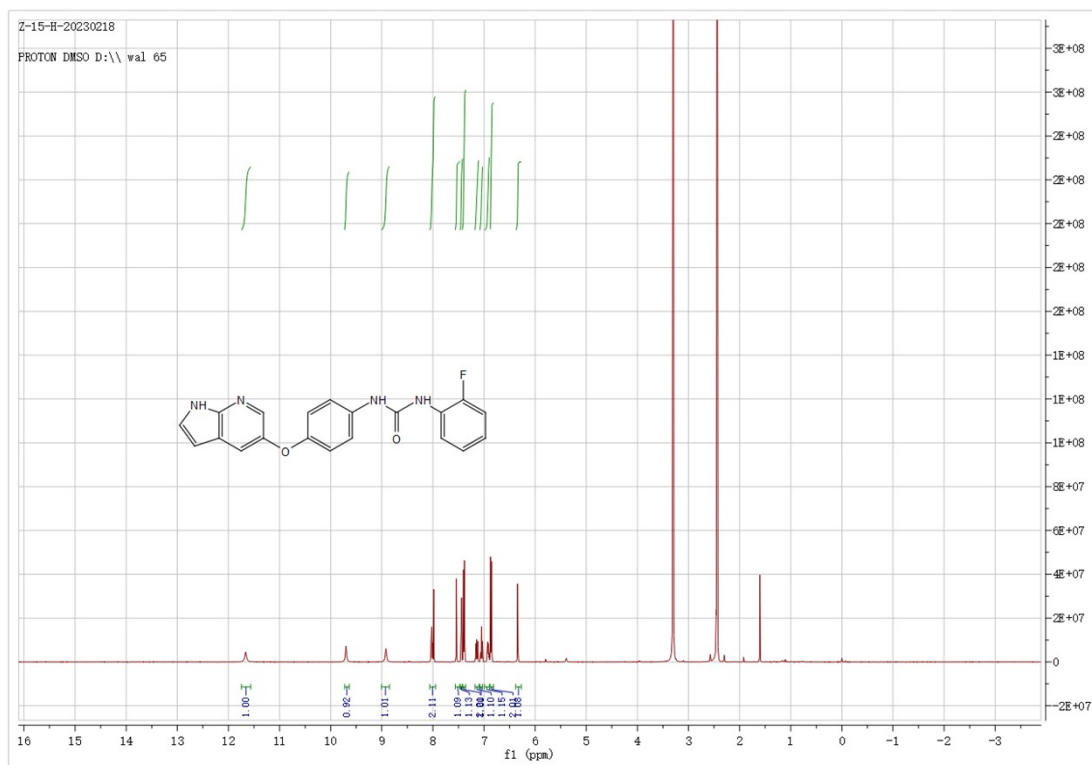
$^{13}\text{C}$  NMR spectrum of **21**



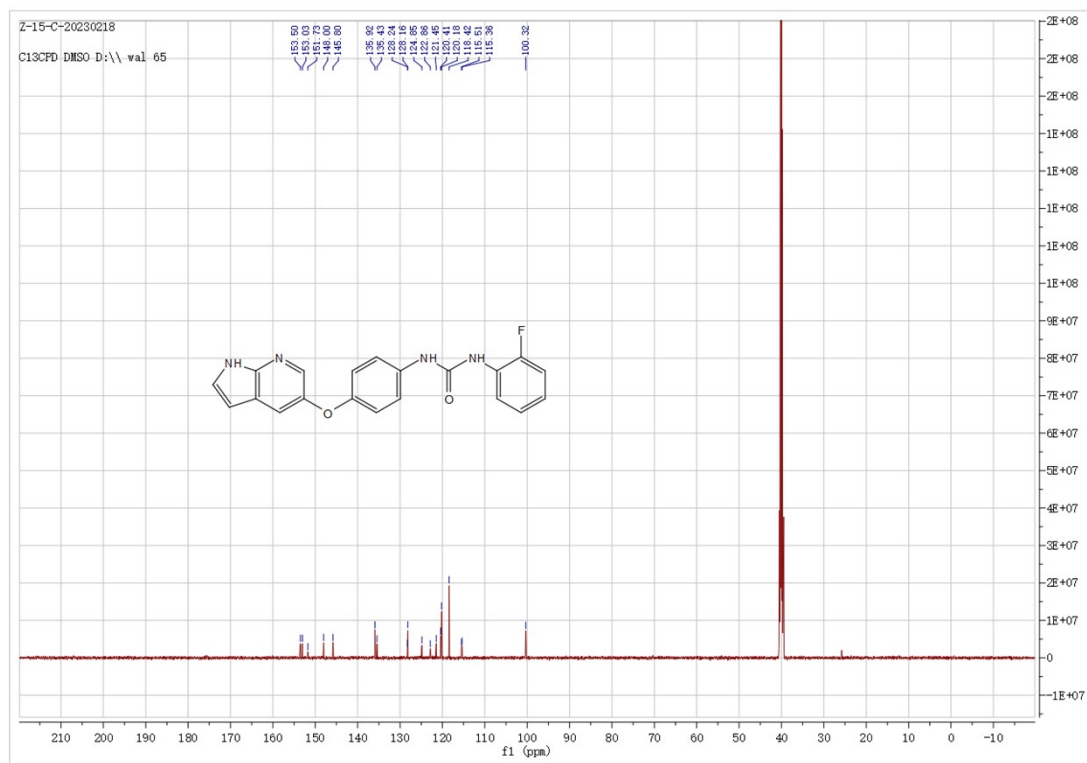
HRMS (ESI) spectrum of 21



*1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(2-fluorophenyl)urea (22)*

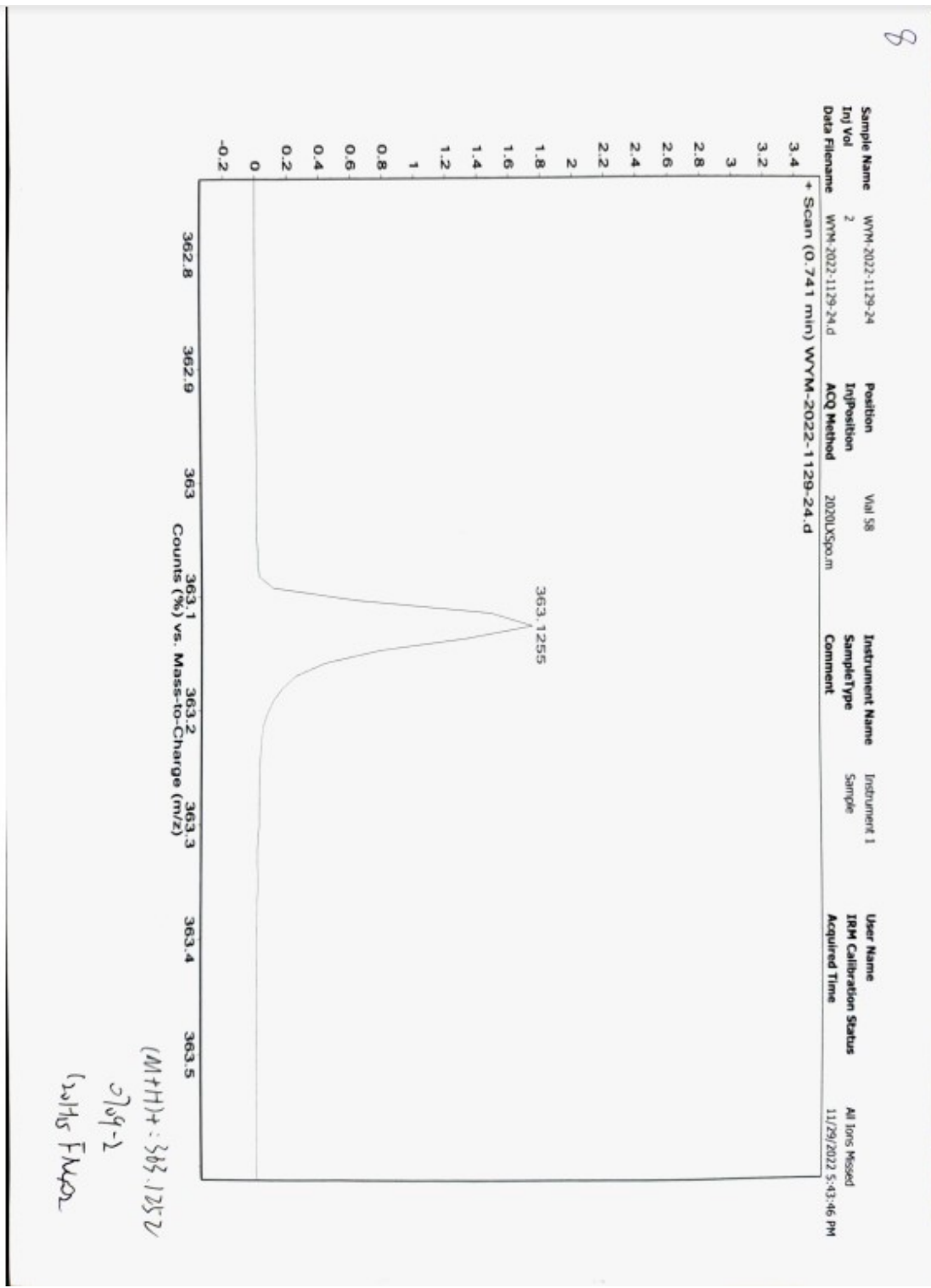


<sup>1</sup>H NMR spectrum of **22**



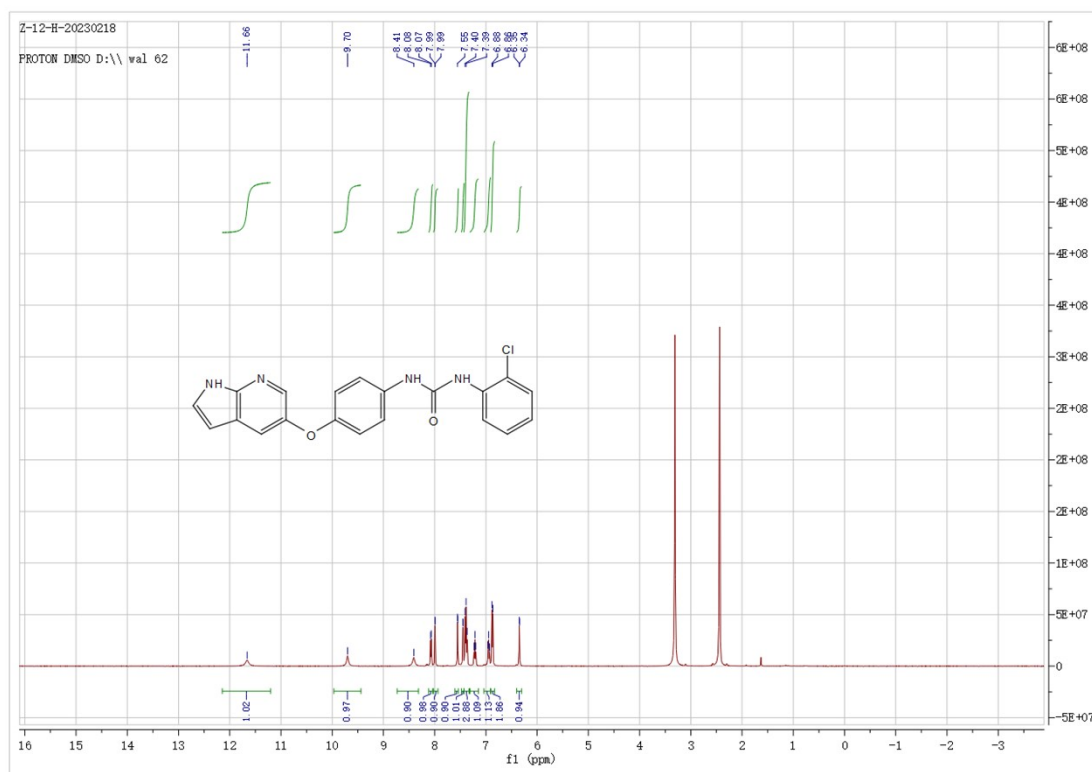
<sup>13</sup>C NMR spectrum of **22**

8

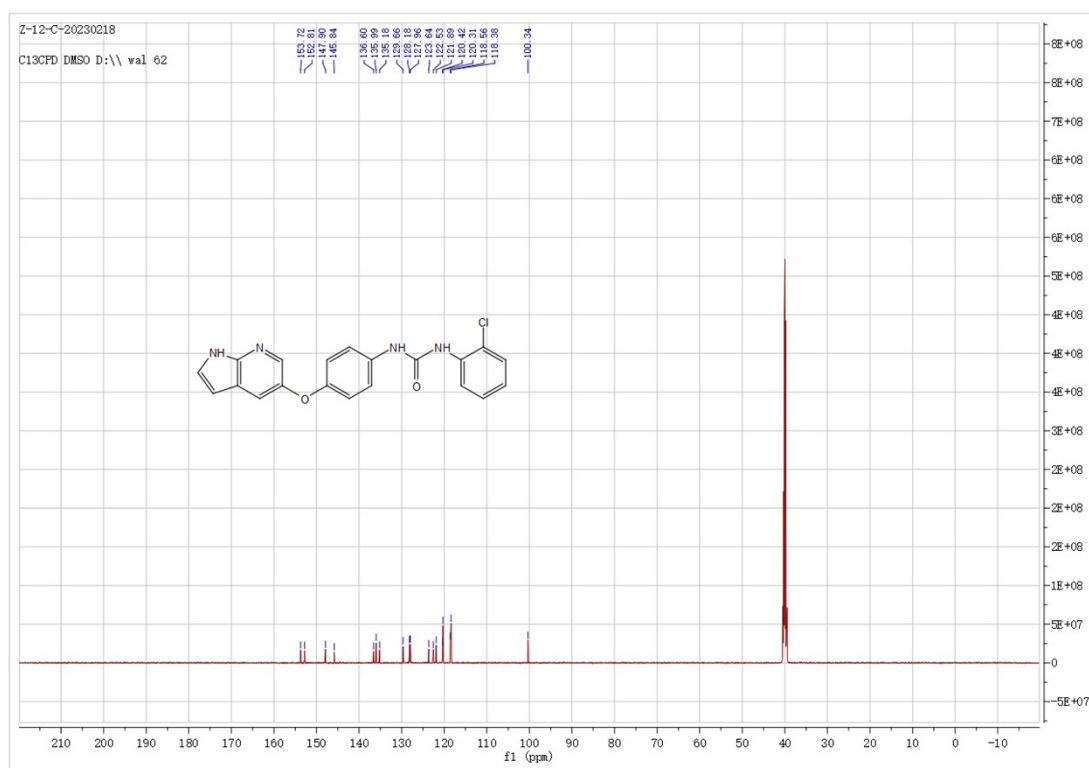


HRMS (ESI) spectrum of 22

1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(2-chlorophenyl)urea (**23**)

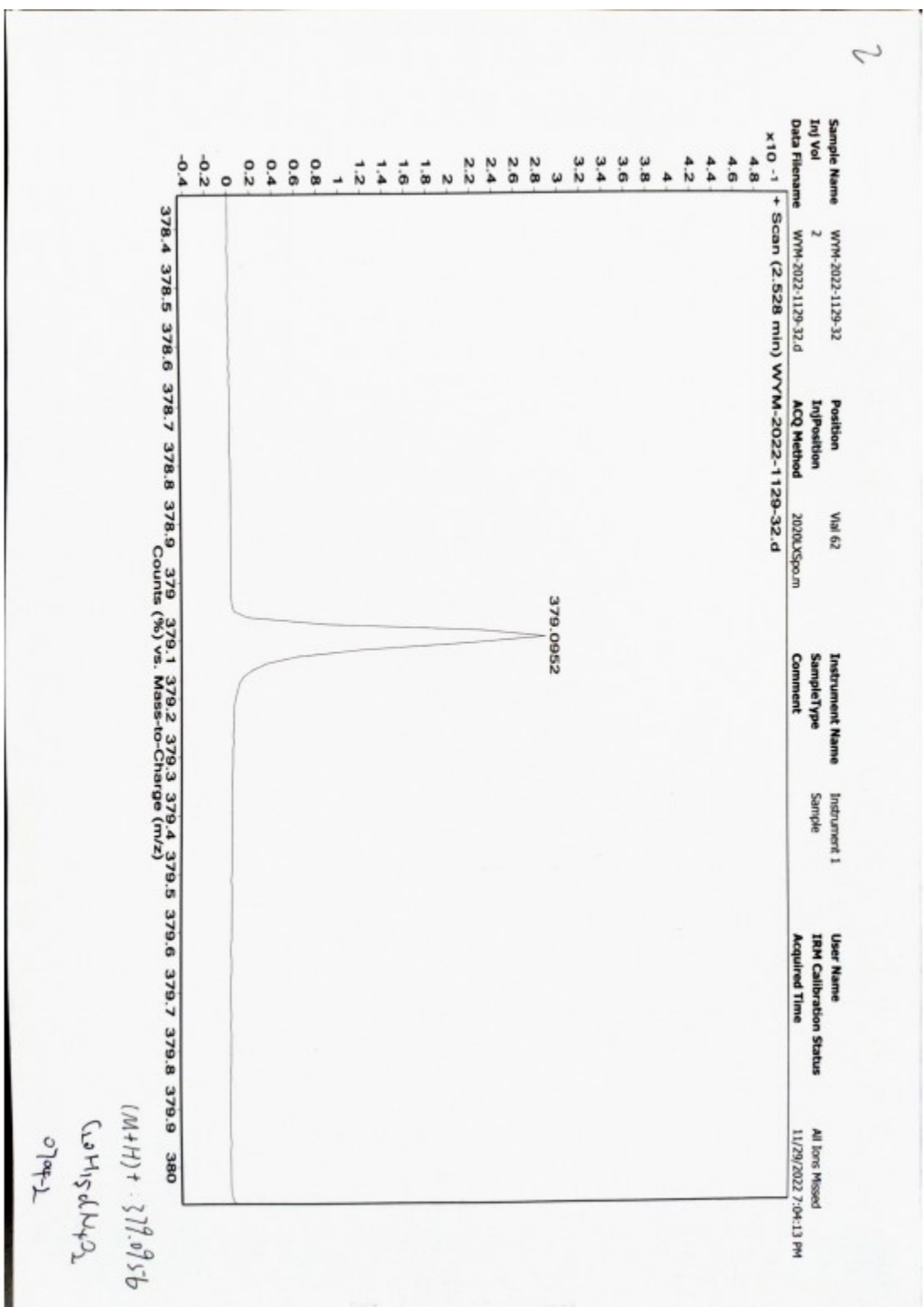


$^1\text{H}$  NMR spectrum of **23**



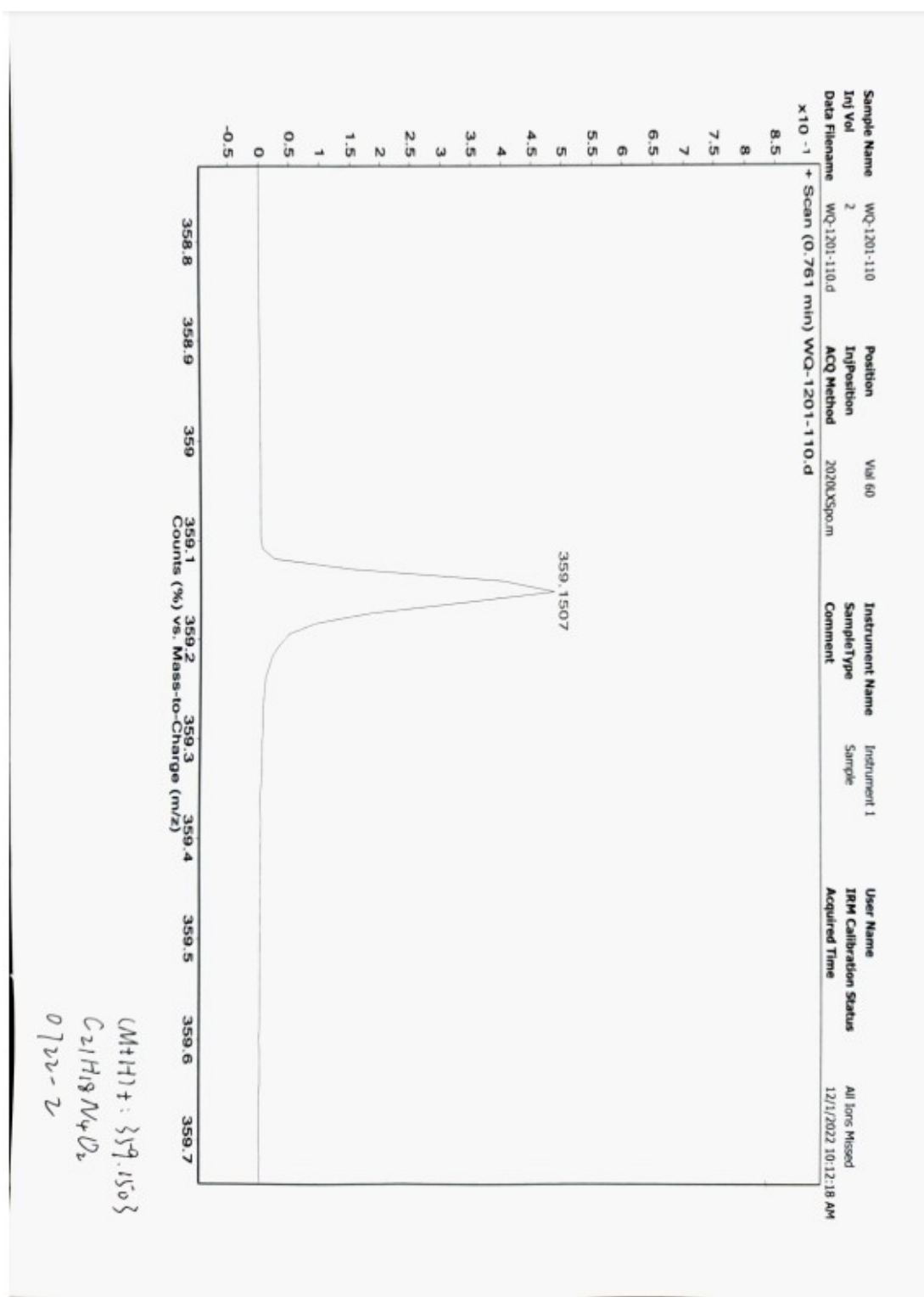
$^{13}\text{C}$  NMR spectrum of **23**

2



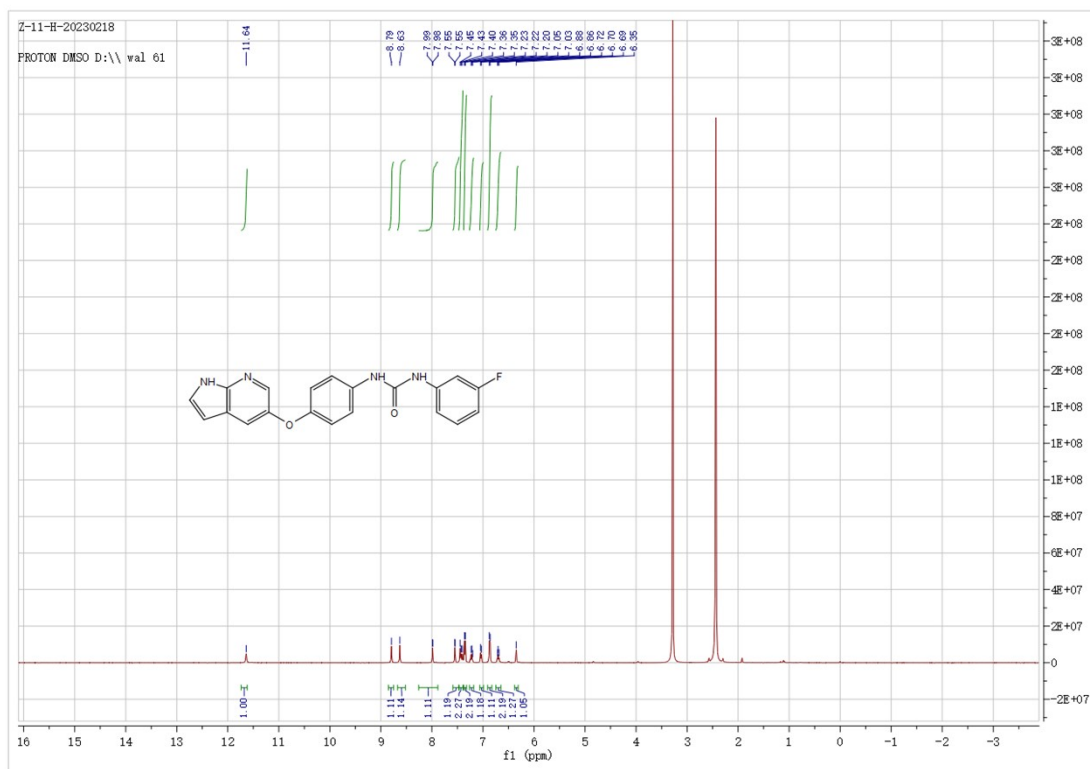
HRMS (ESI) spectrum of 23



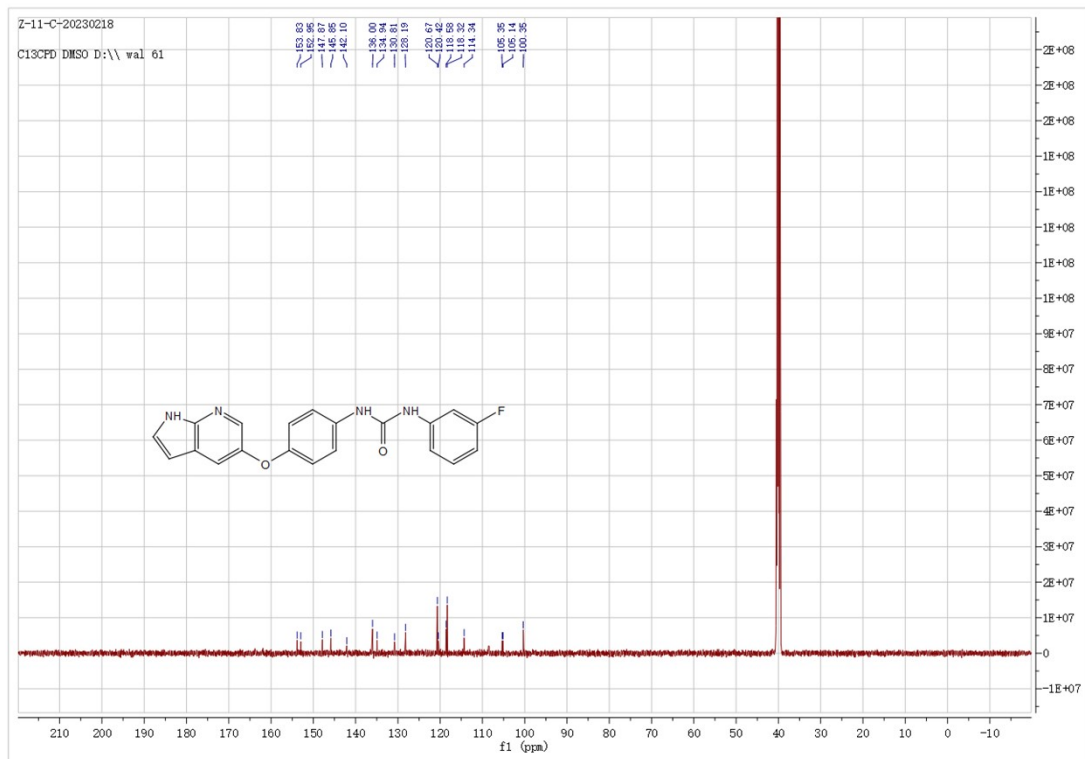


HRMS (ESI) spectrum of 24

1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3-fluorophenyl)urea (**25**)

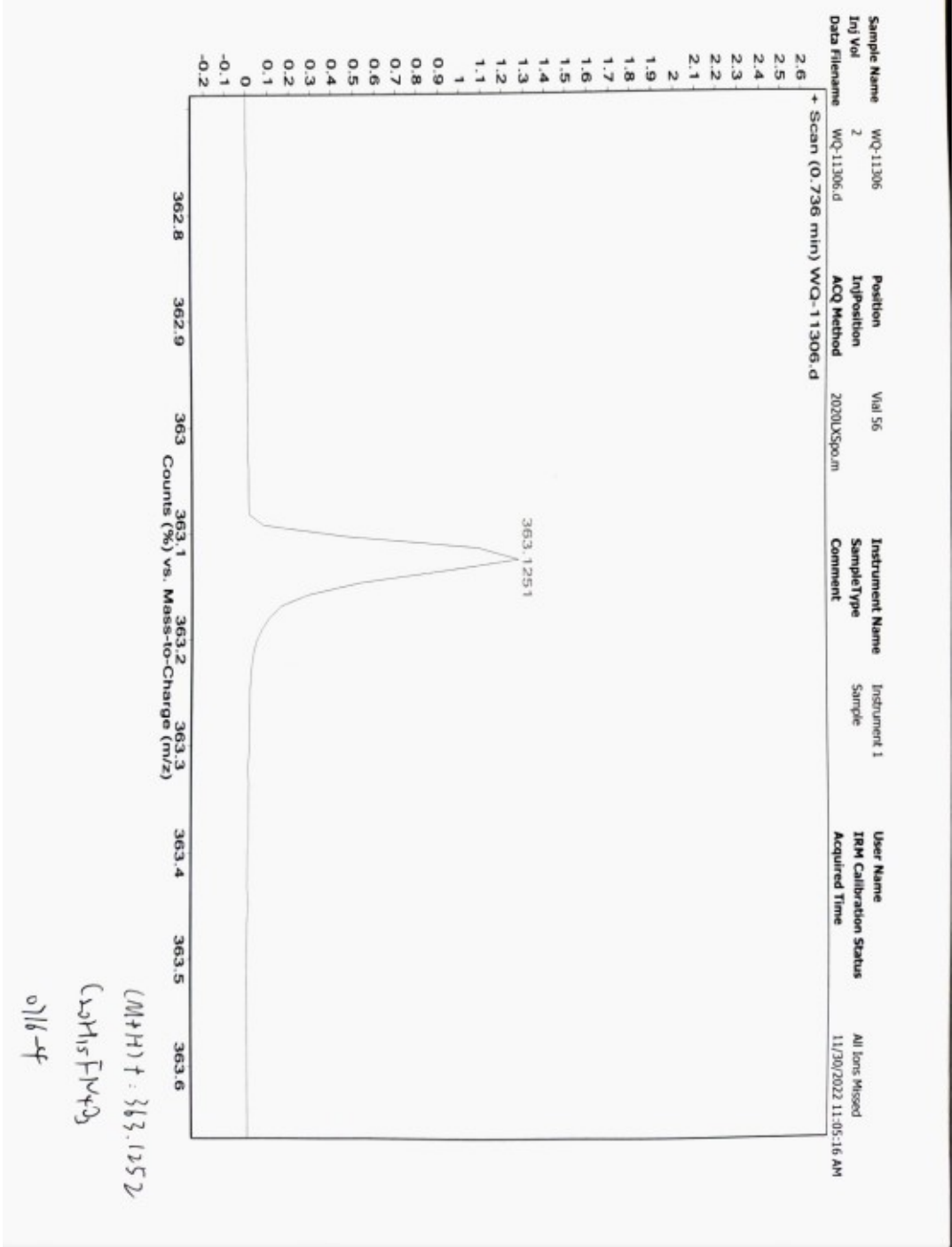


<sup>1</sup>H NMR spectrum of **25**



<sup>13</sup>C NMR spectrum of **25**

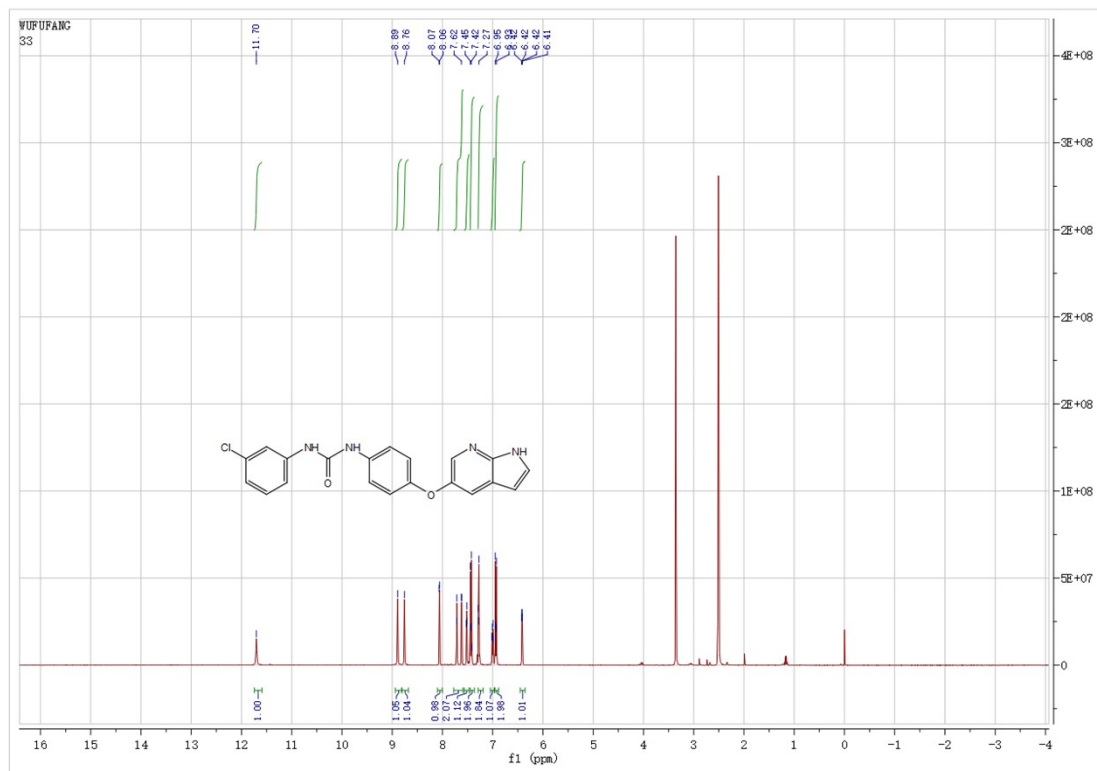
16



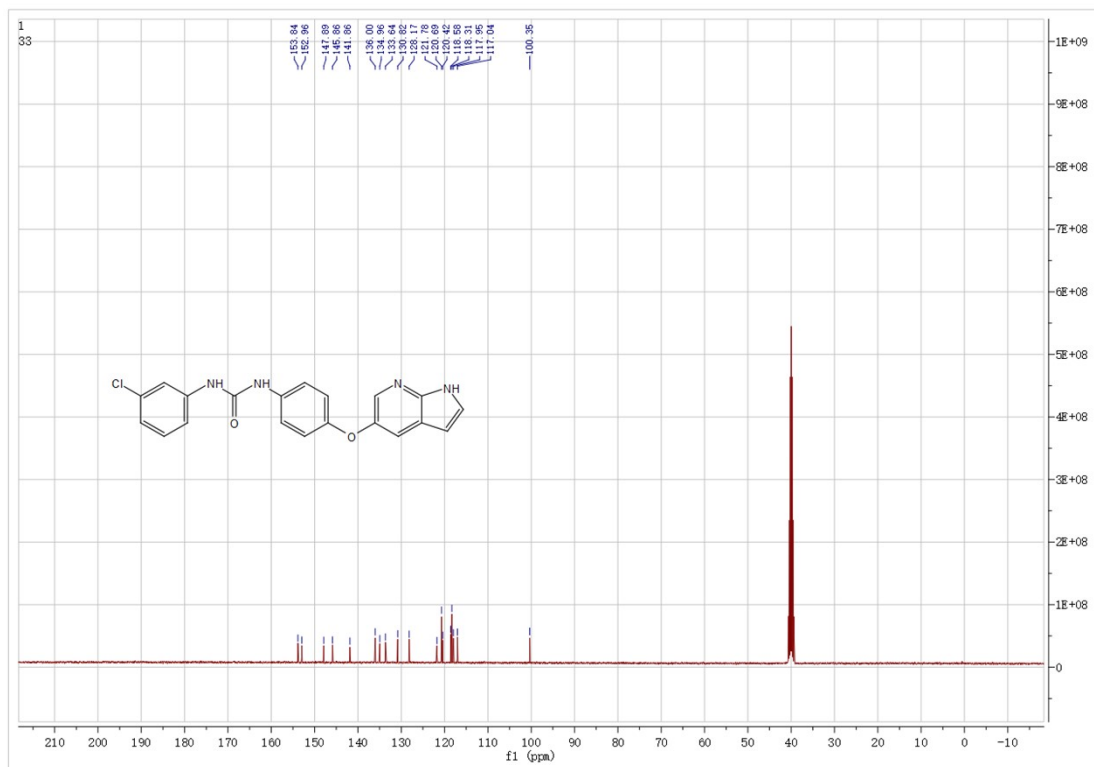
HRMS (ESI) spectrum of 25



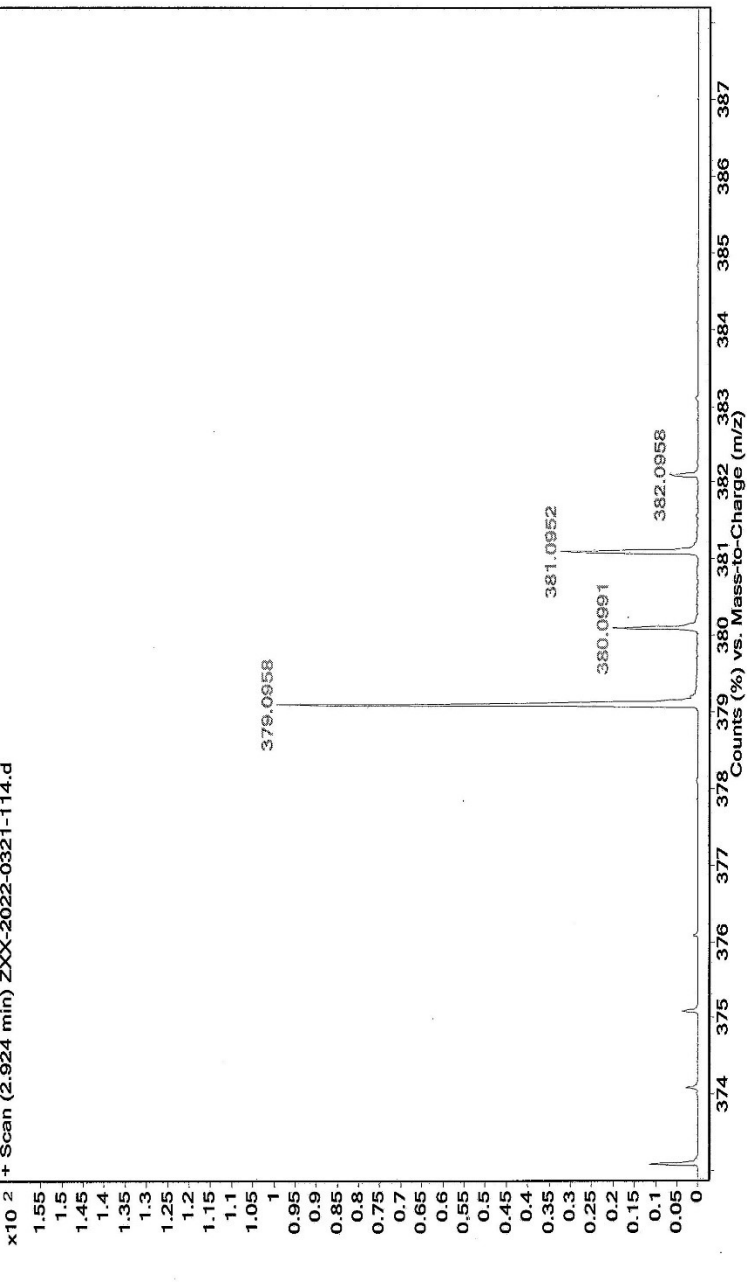
1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3-chlorophenyl)urea (**26**)



<sup>1</sup>H NMR spectrum of **26**



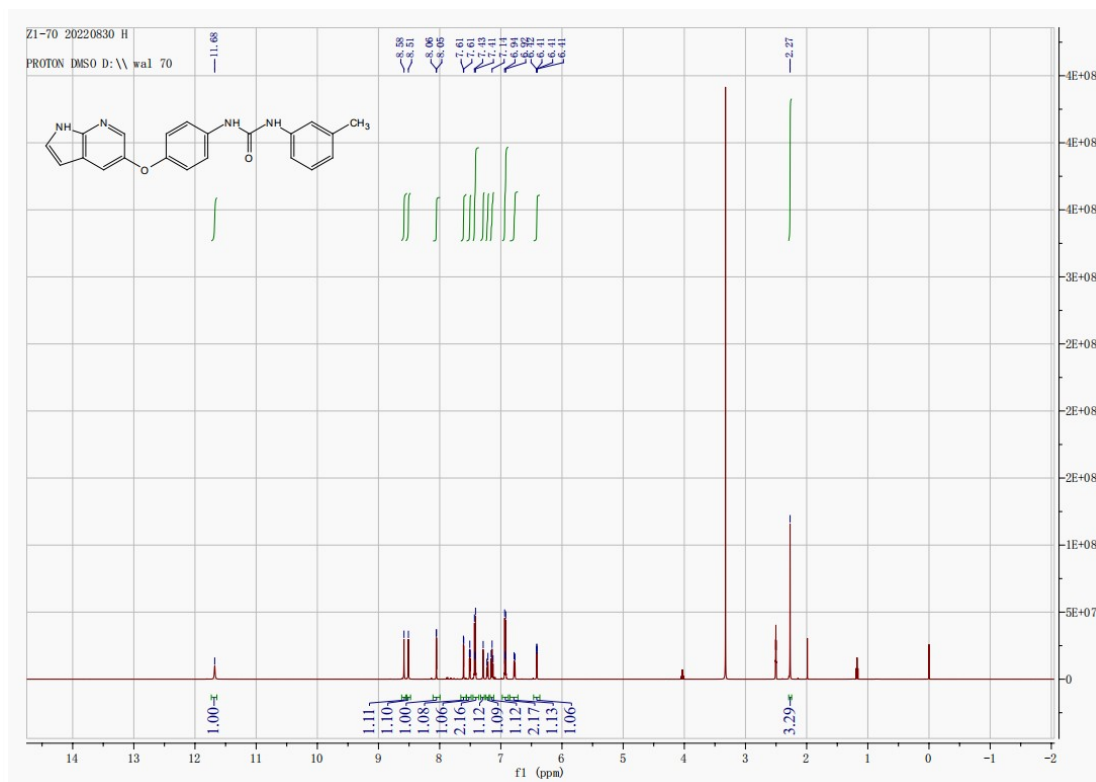
Sample Name ZXX-2022-0321-114 Vial 14 Instrument Name Instrument 1 User Name  
 Inj Vol 2 Inj Position Inj Position Sample Sample  
 Data Filename ZXX-2022-0321-114.d ACQ Method 2020\Xspo.m Comment All Ions Missed  
 x10 2 + Scan (2.924 min) ZXX-2022-0321-114.d Acquired Time 3/21/2022 9:26:52 PM



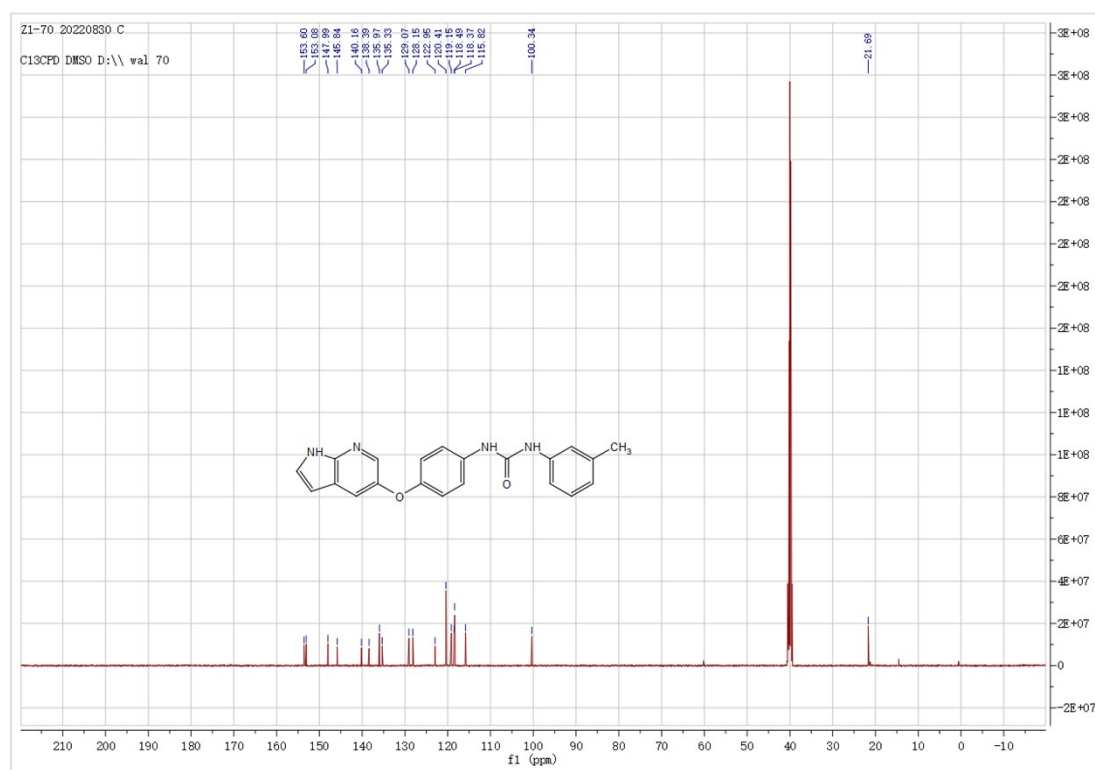
0321-2

HRMS (ESI) spectrum of 26

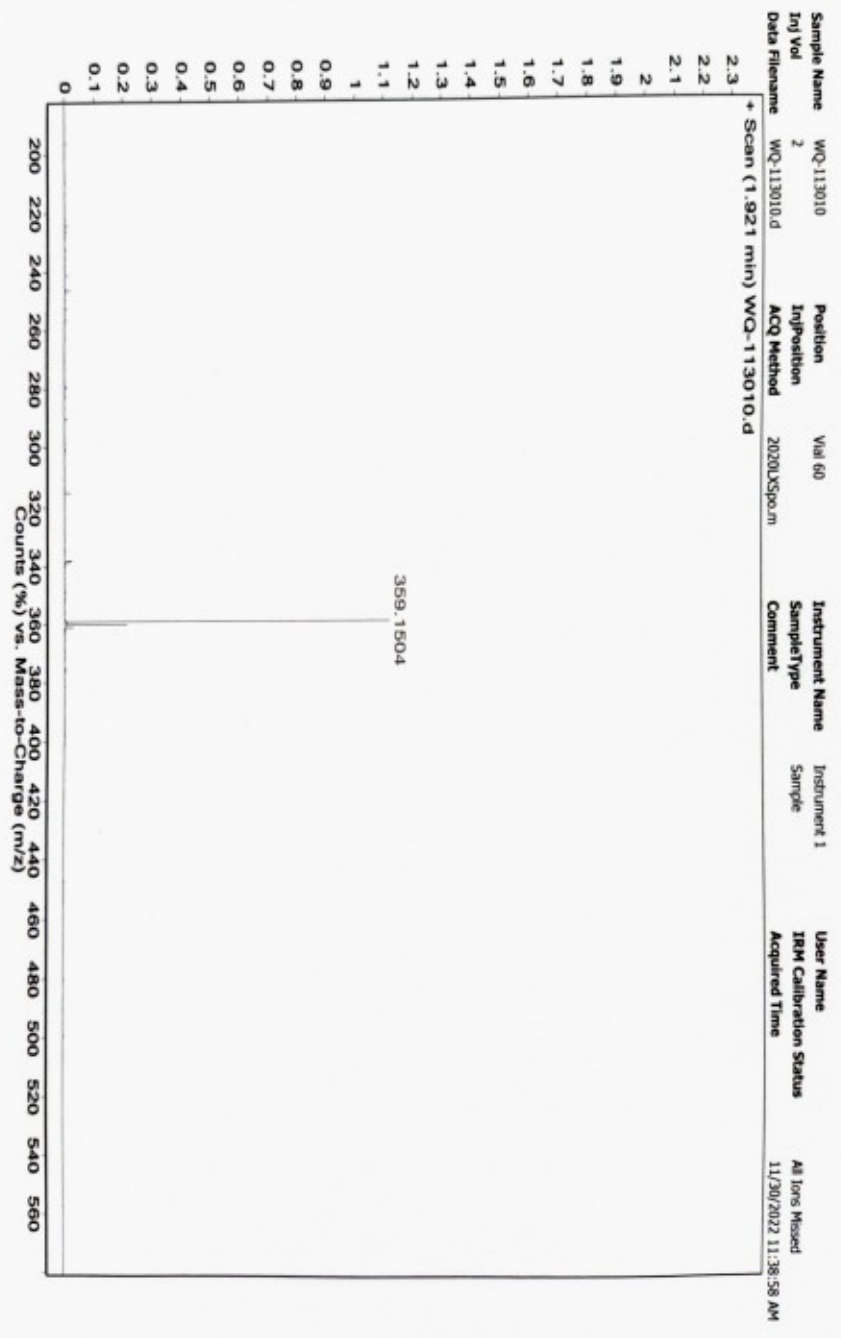
1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3-methylphenyl)urea (**27**)



<sup>1</sup>H NMR spectrum of **27**



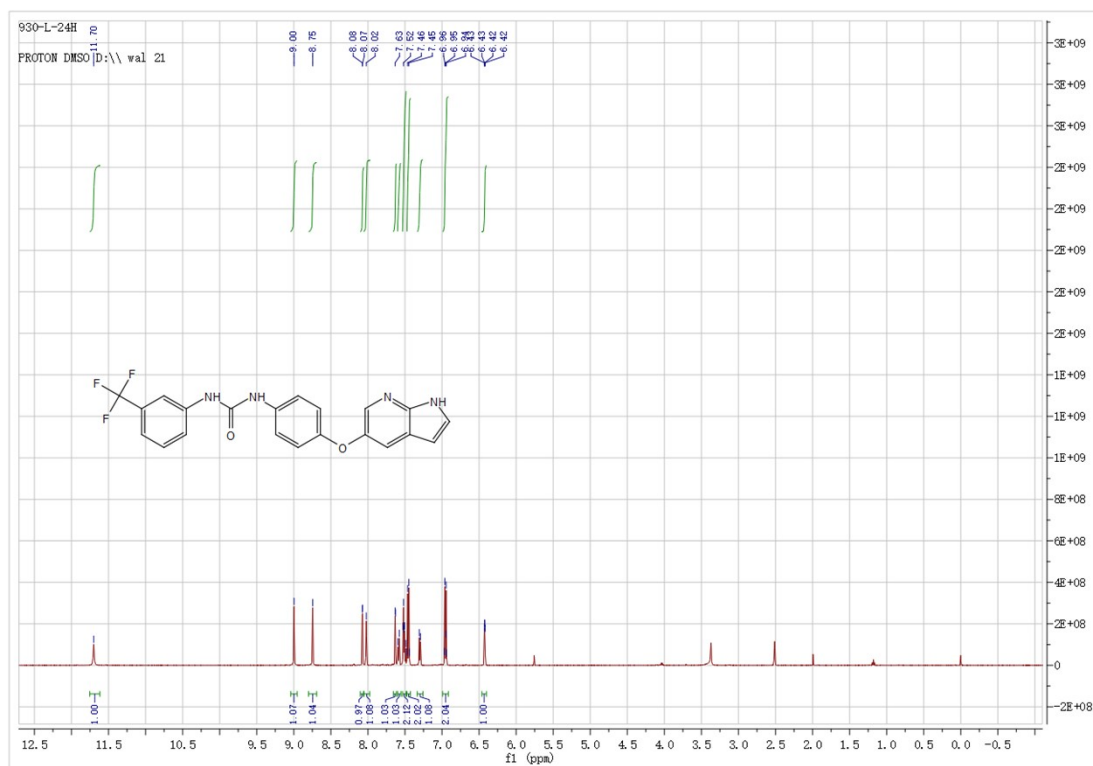
<sup>13</sup>C NMR spectrum of **27**



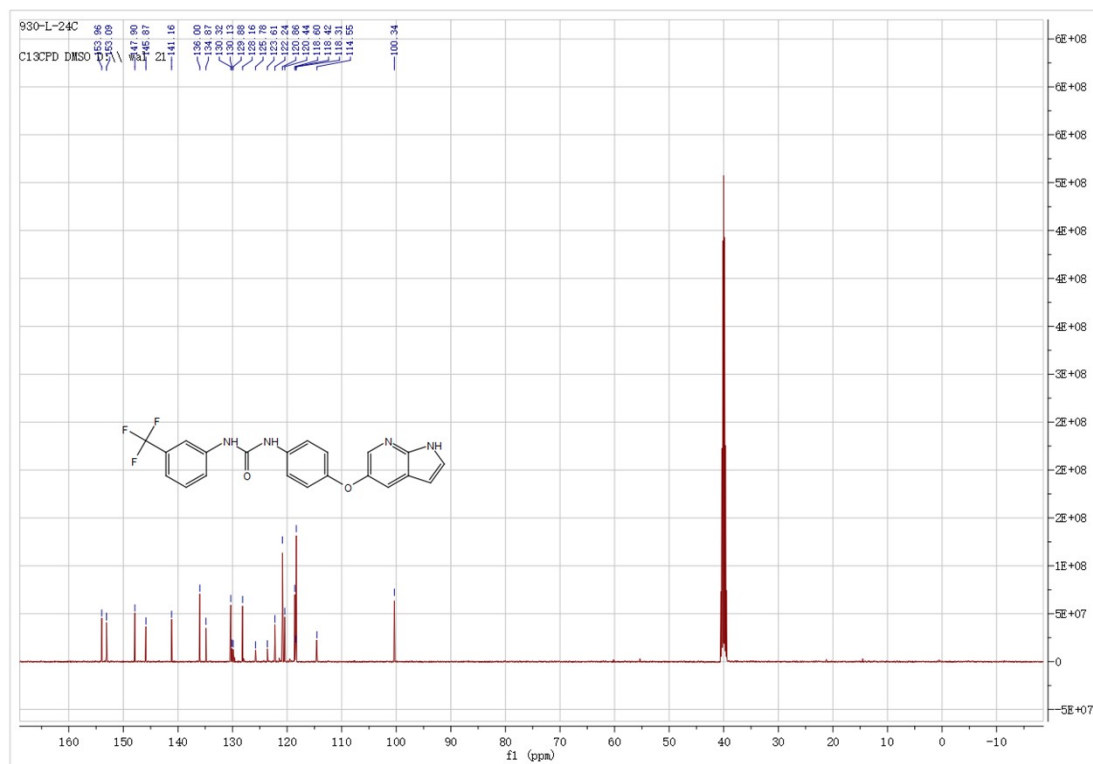
$m+1 = 359.1503$   
C<sub>21</sub>H<sub>18</sub>N<sub>4</sub>O<sub>2</sub>  
0720-1

HRMS (ESI) spectrum of 27

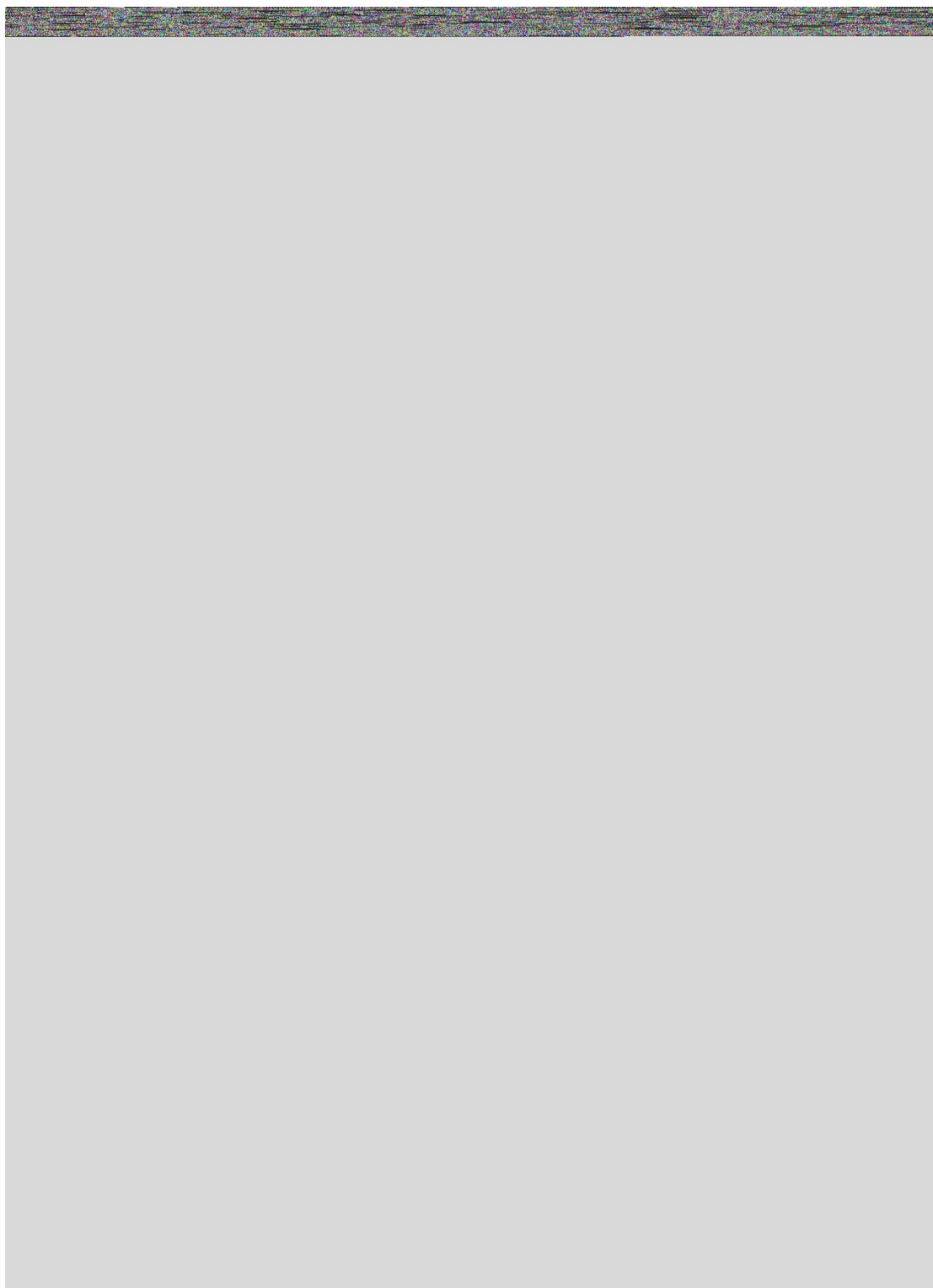
*1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3-(trifluoromethyl)phenyl)urea*  
**(28)**



<sup>1</sup>H NMR spectrum of **28**



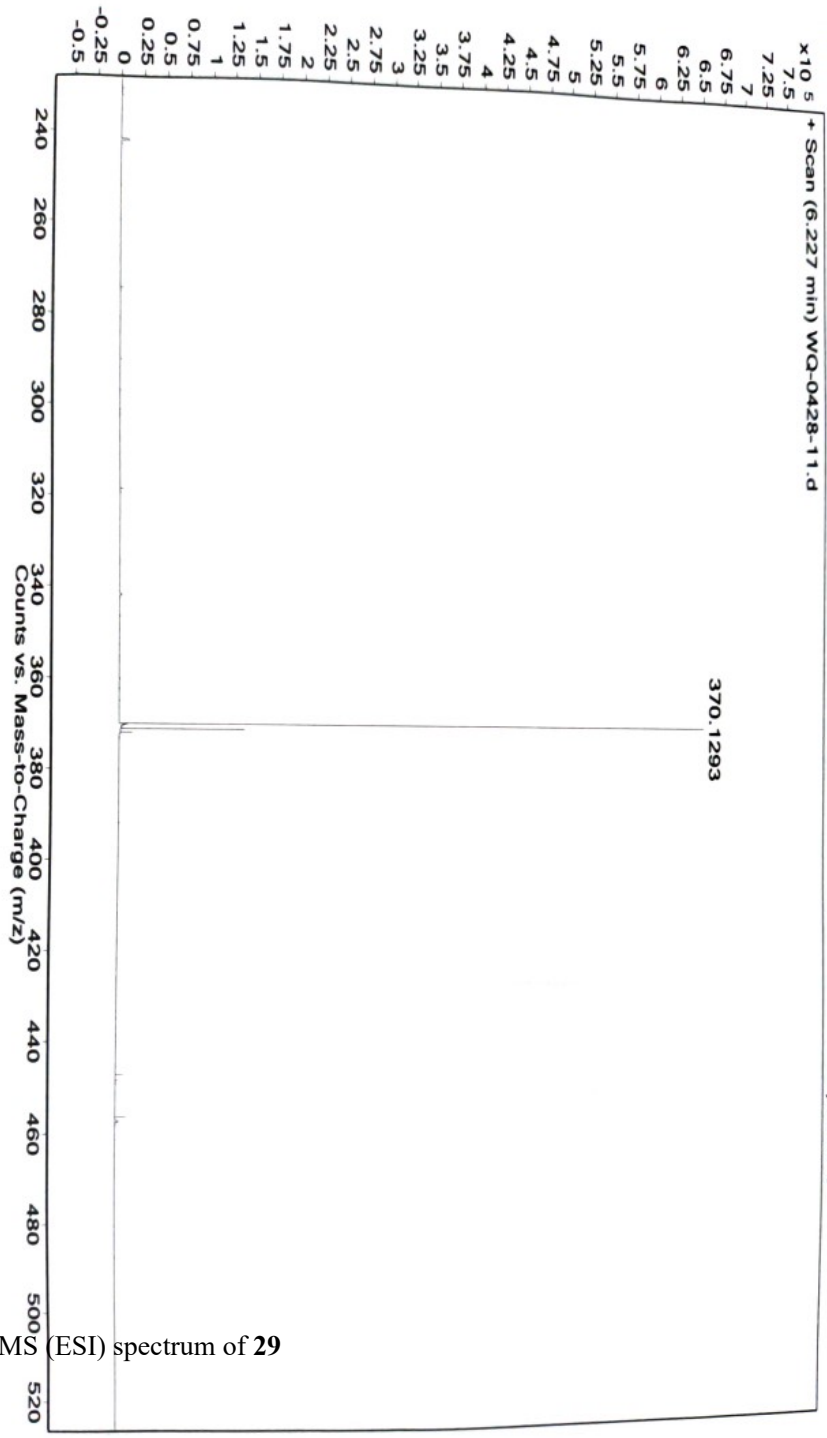
<sup>13</sup>C NMR spectrum of **28**



HRMS (ESI) spectrum of **28**



Sample Name  
Inj Vol  
Data Filename  
Position  
InjPosition  
ACQ Method  
Instrument Name  
SampleType  
Comment  
User Name  
IRM Calibration Status  
Acquired Time

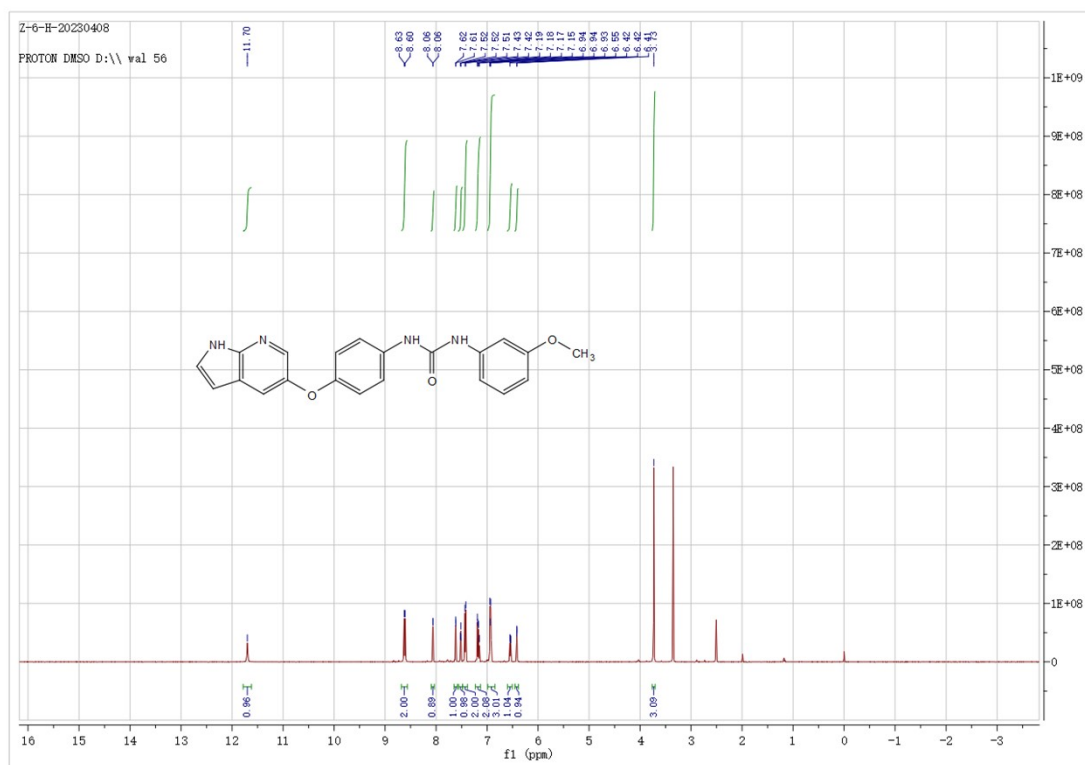


HRMS (ESI) spectrum of 29

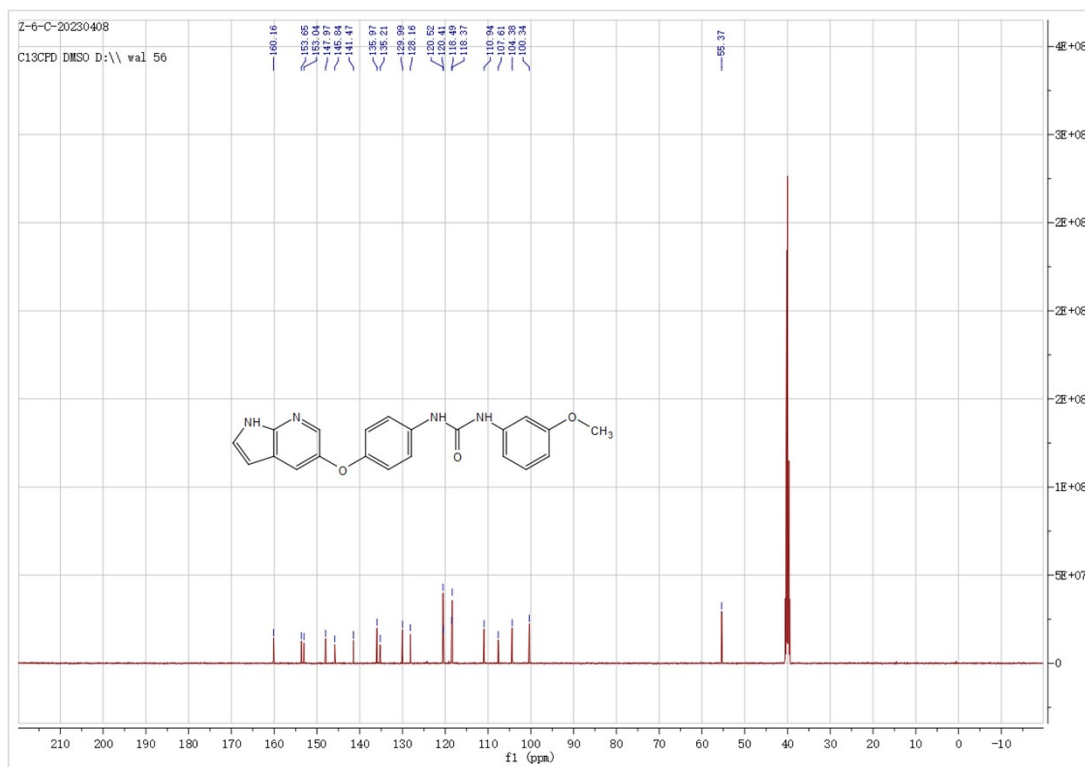
370.1293  
1734: C<sub>14</sub>H<sub>15</sub>O<sub>2</sub>N<sub>5</sub>  
1734: 370.1299



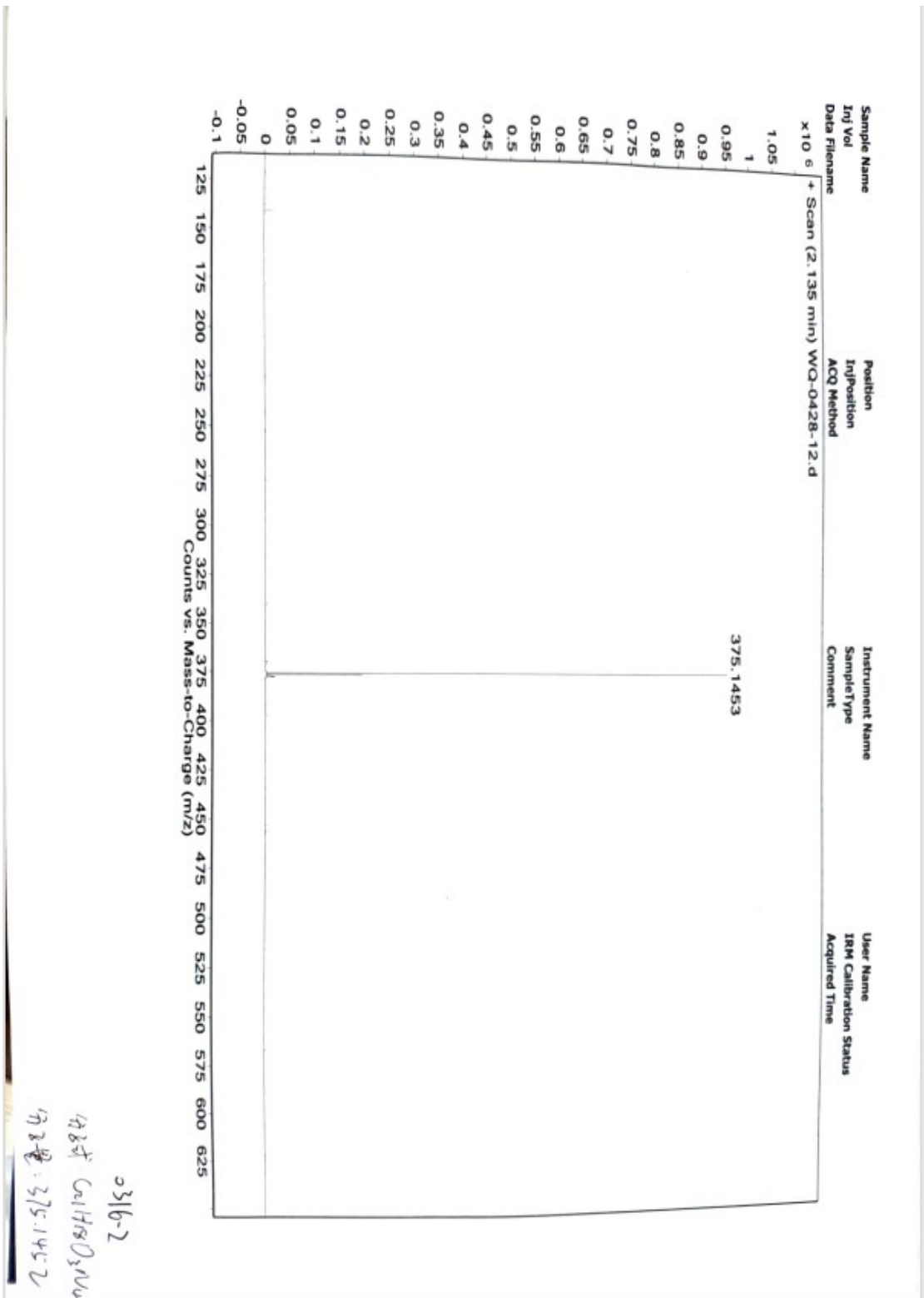
*1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3-methoxyphenyl)urea (30)*



$^1\text{H}$  NMR spectrum of **30**

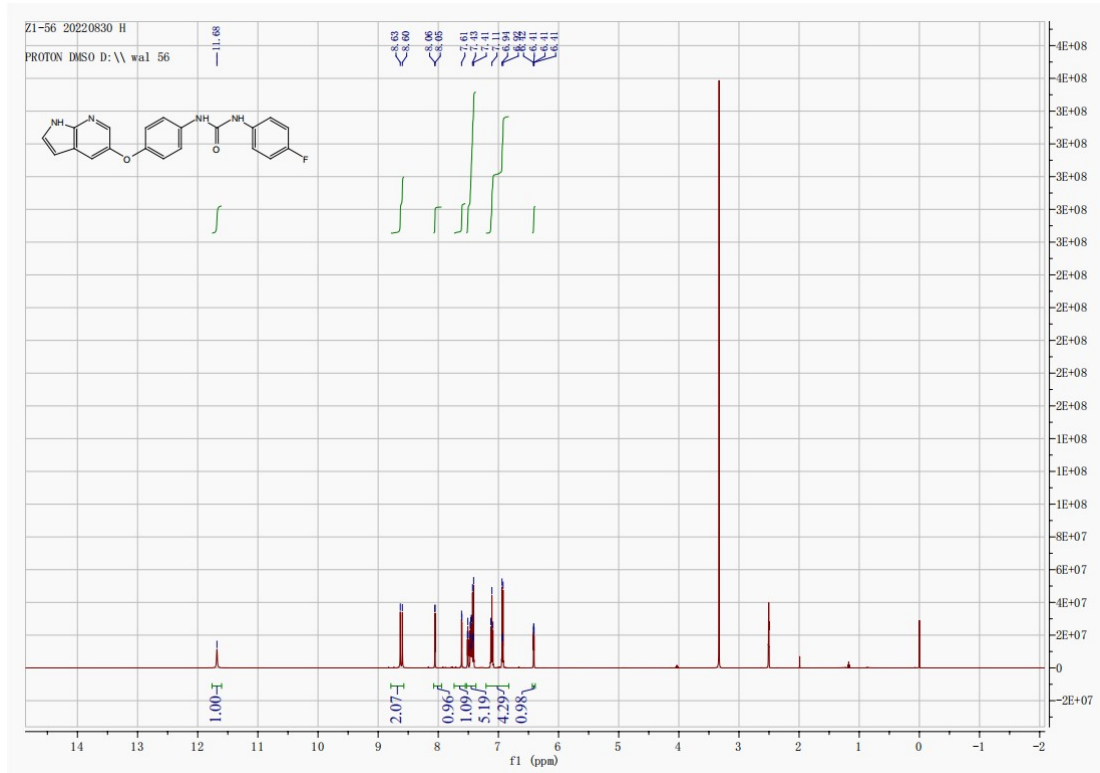


$^{13}\text{C}$  NMR spectrum of **30**

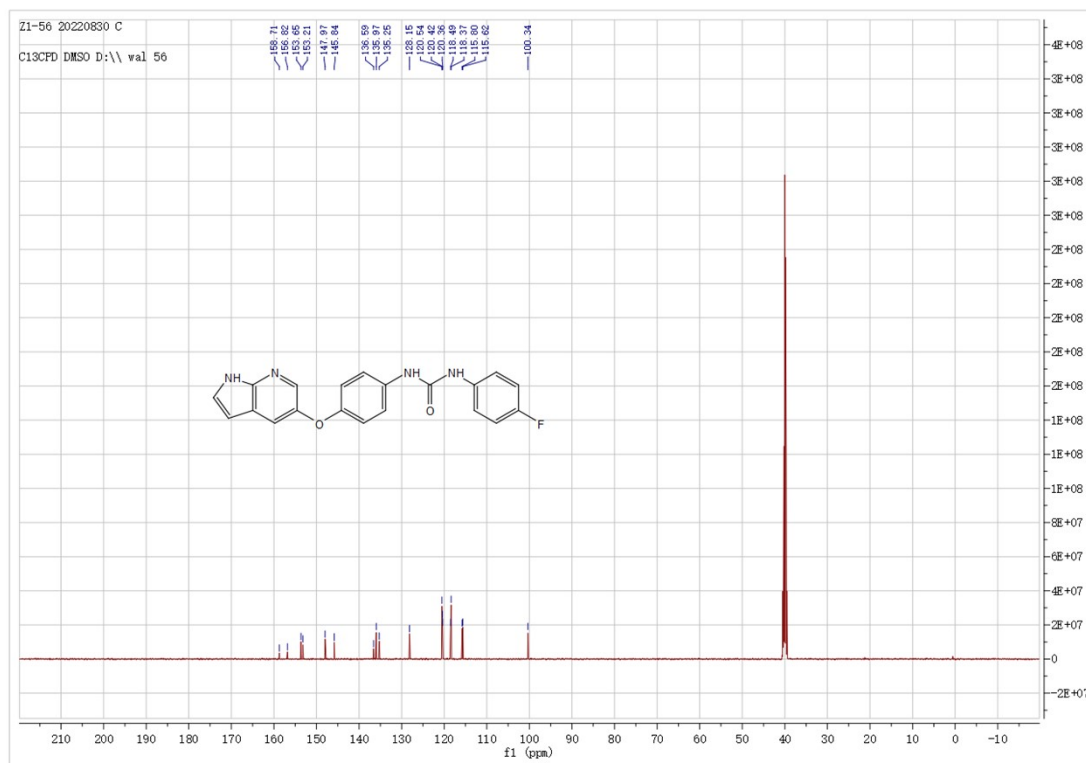


HRMS (ESI) spectrum of 30

1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(4-fluorophenyl)urea (**31**)

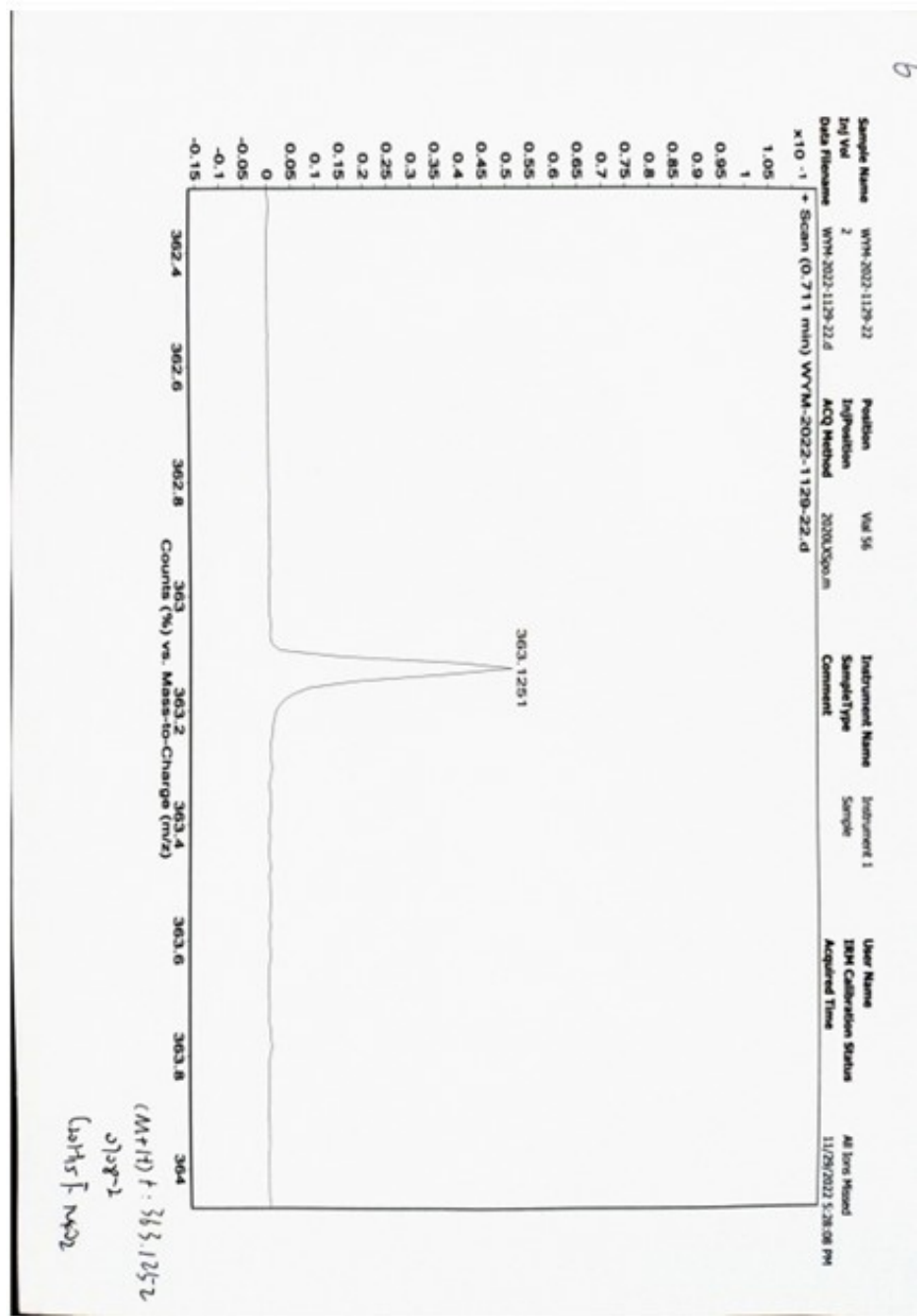


<sup>1</sup>H NMR spectrum of **31**



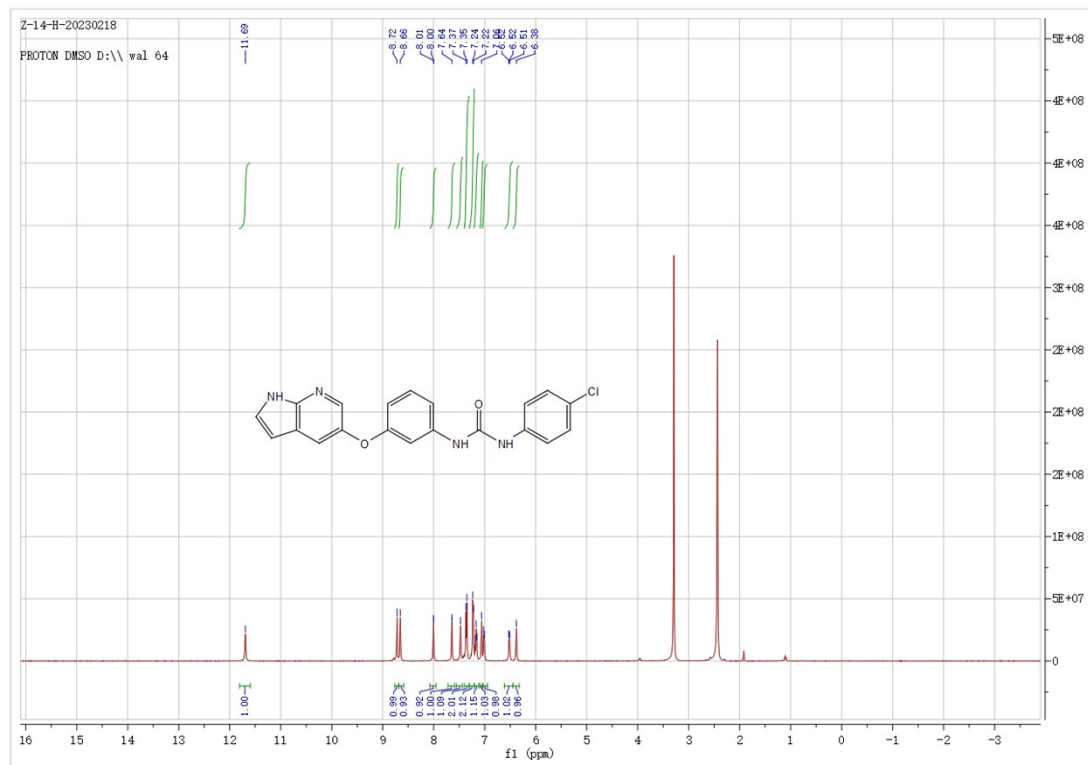
<sup>13</sup>C NMR spectrum of **31**

6

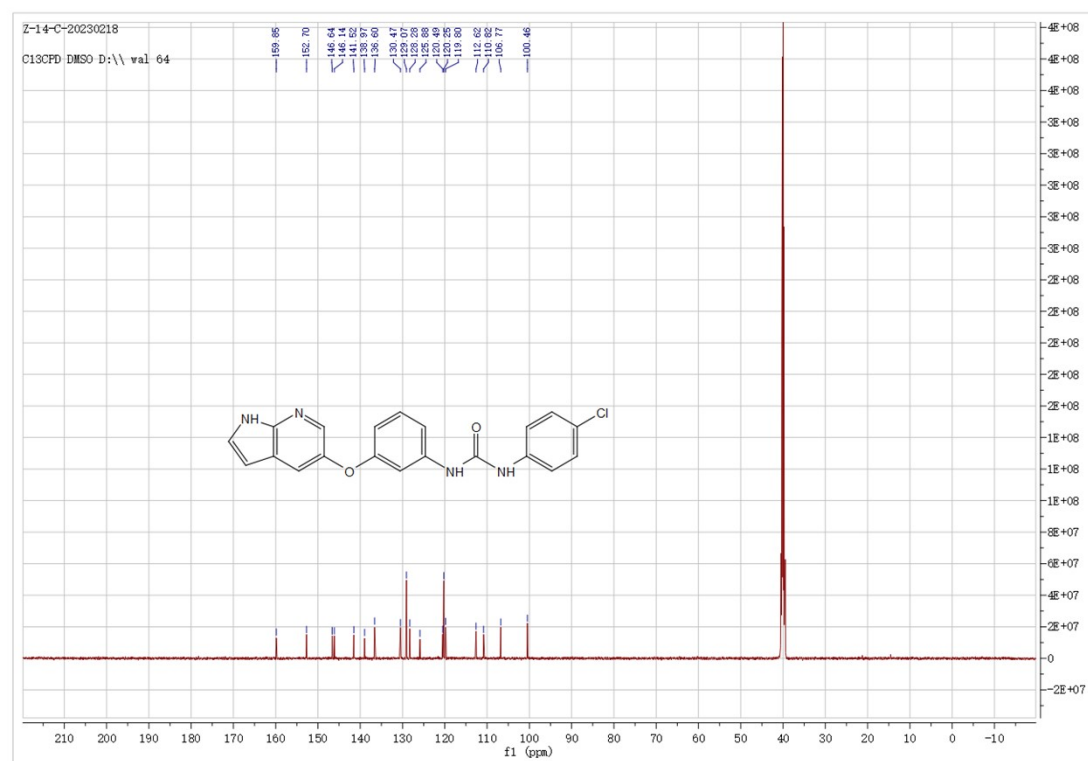


HRMS (ESI) spectrum of 31

1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(4-chlorophenyl)urea (32)

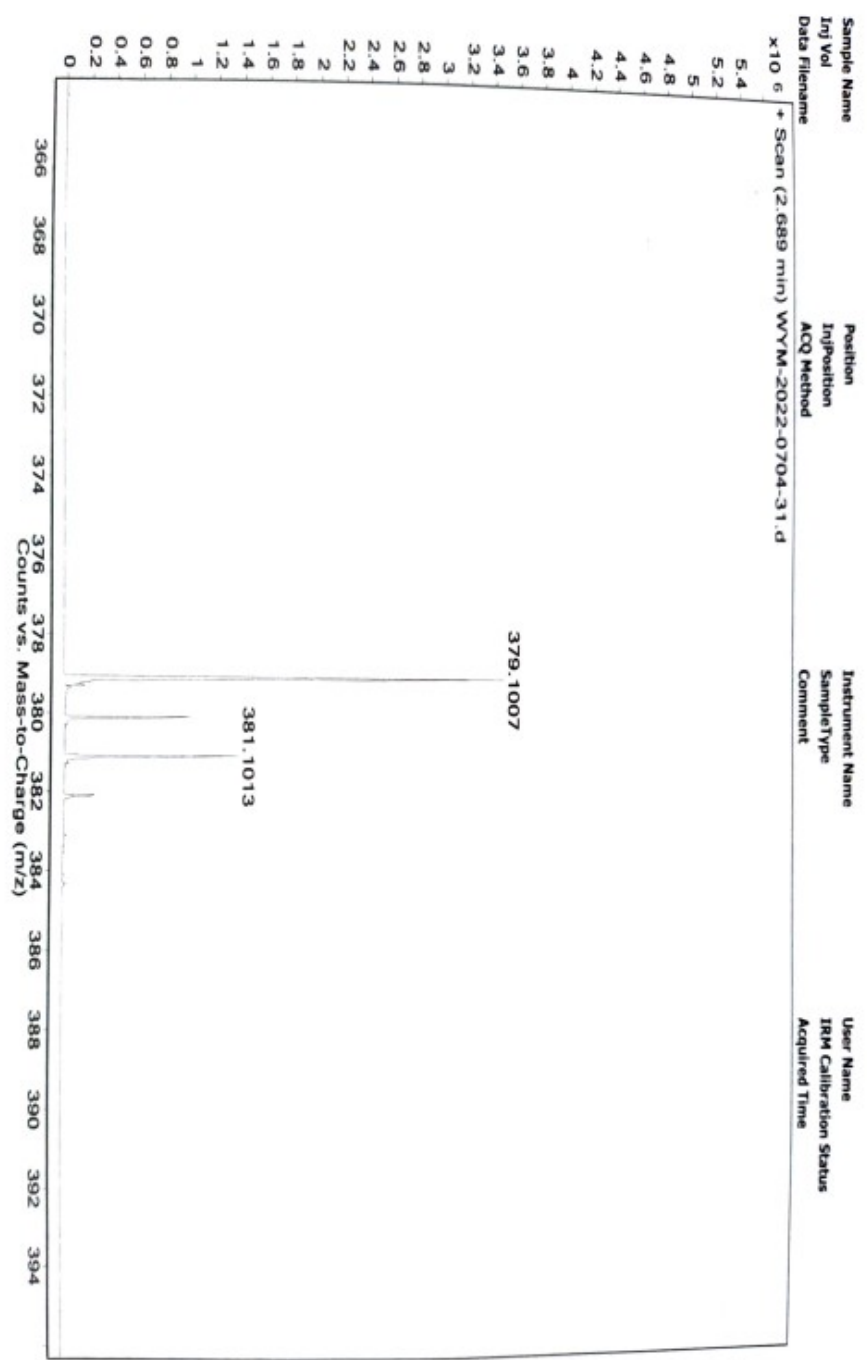


<sup>1</sup>H NMR spectrum of 32



<sup>13</sup>C NMR spectrum of 32

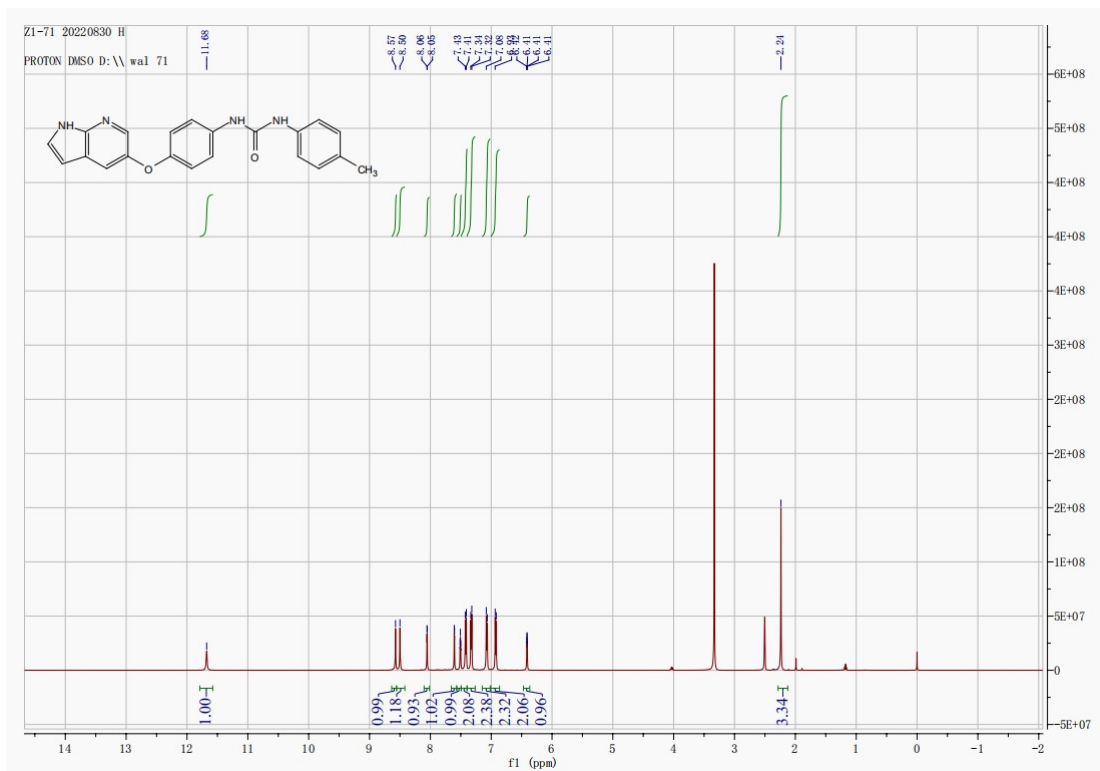
32



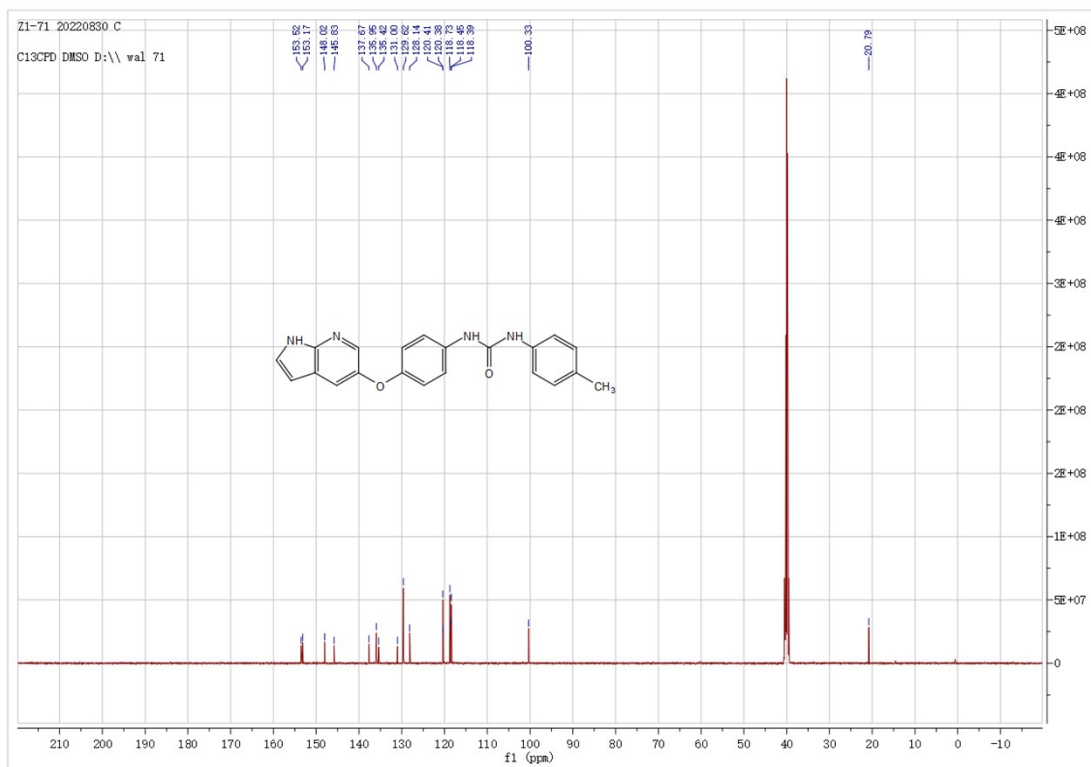
0724-1  
20211217.0956

HRMS (ESI) spectrum of 32

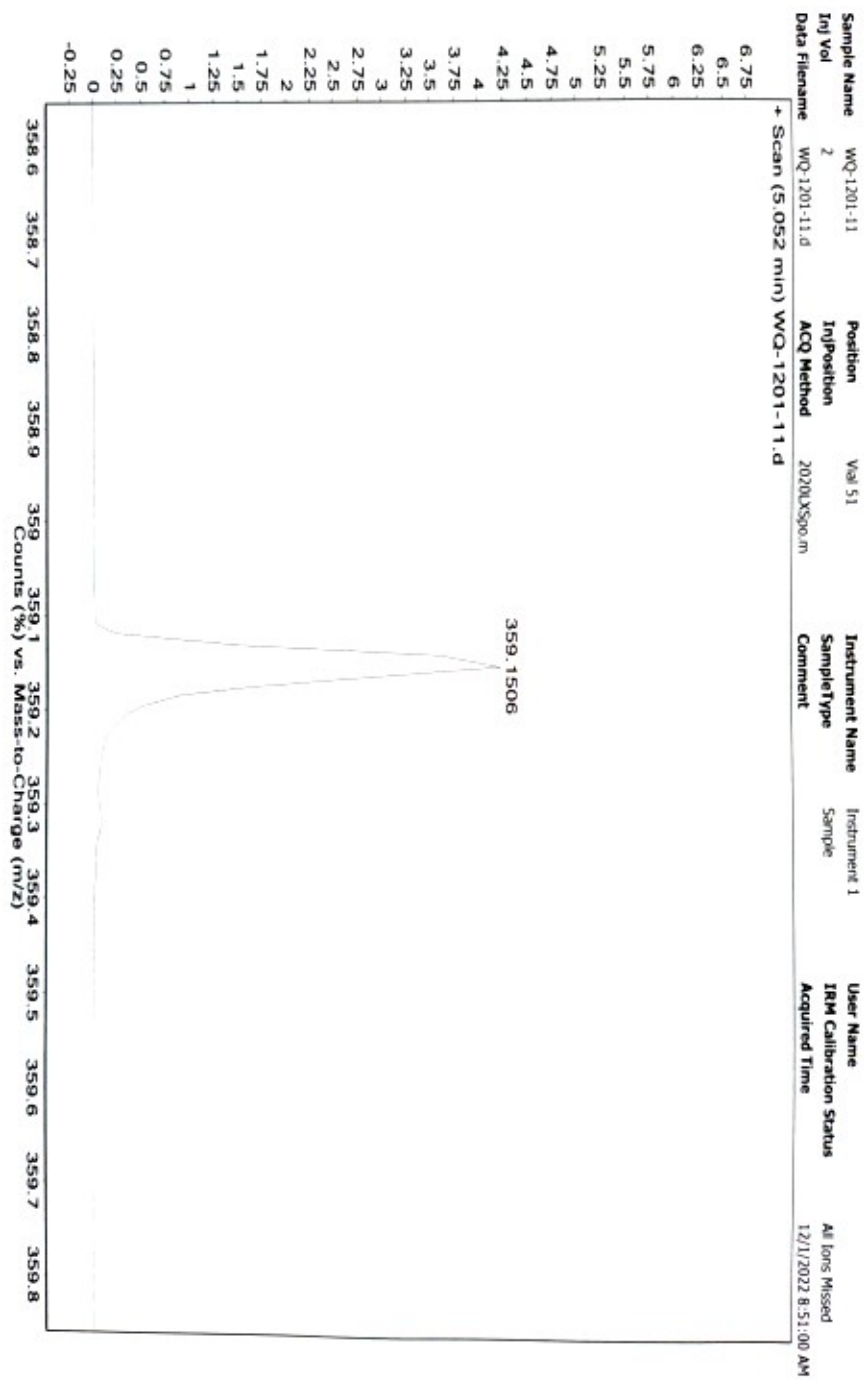
*1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(4-methylphenyl)urea (33)*



$^1\text{H}$  NMR spectrum of **33**



$^{13}\text{C}$  NMR spectrum of **33**



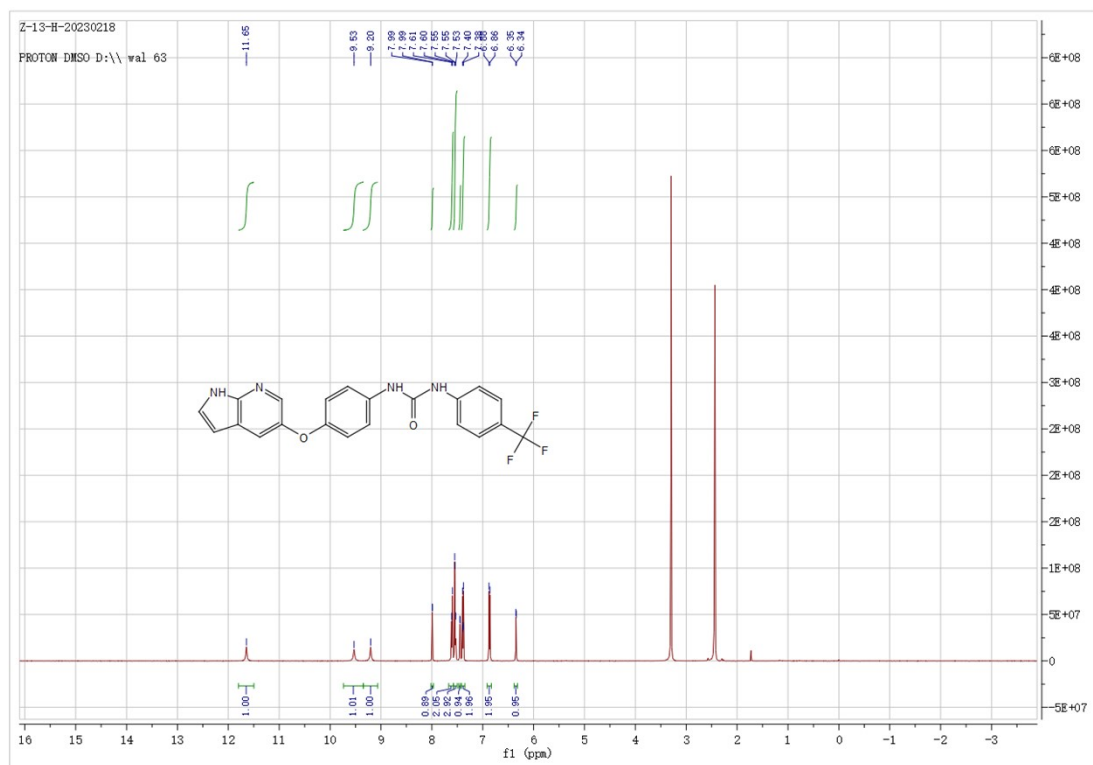
(M+H)<sup>+</sup>: 359.1503  
 C<sub>21</sub>H<sub>18</sub>N<sub>4</sub>O<sub>2</sub>  
 0720-2

HRMS (ESI) spectrum of 33

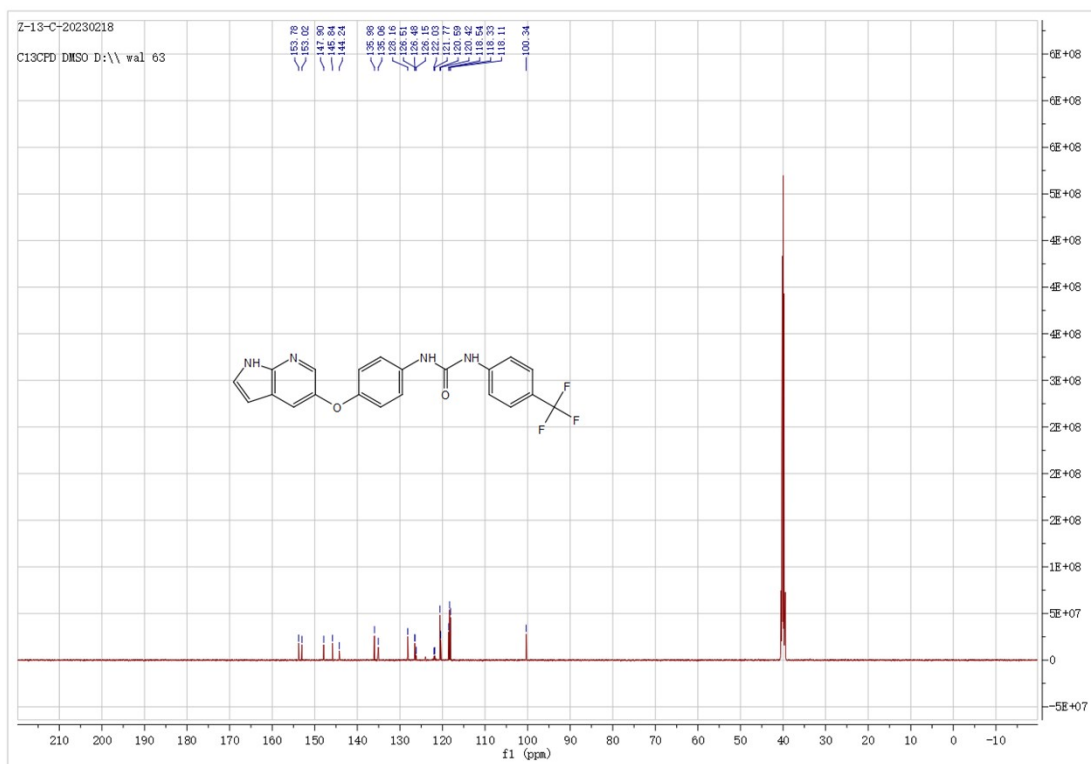


1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(4-(trifluoromethyl)phenyl)urea

(34)

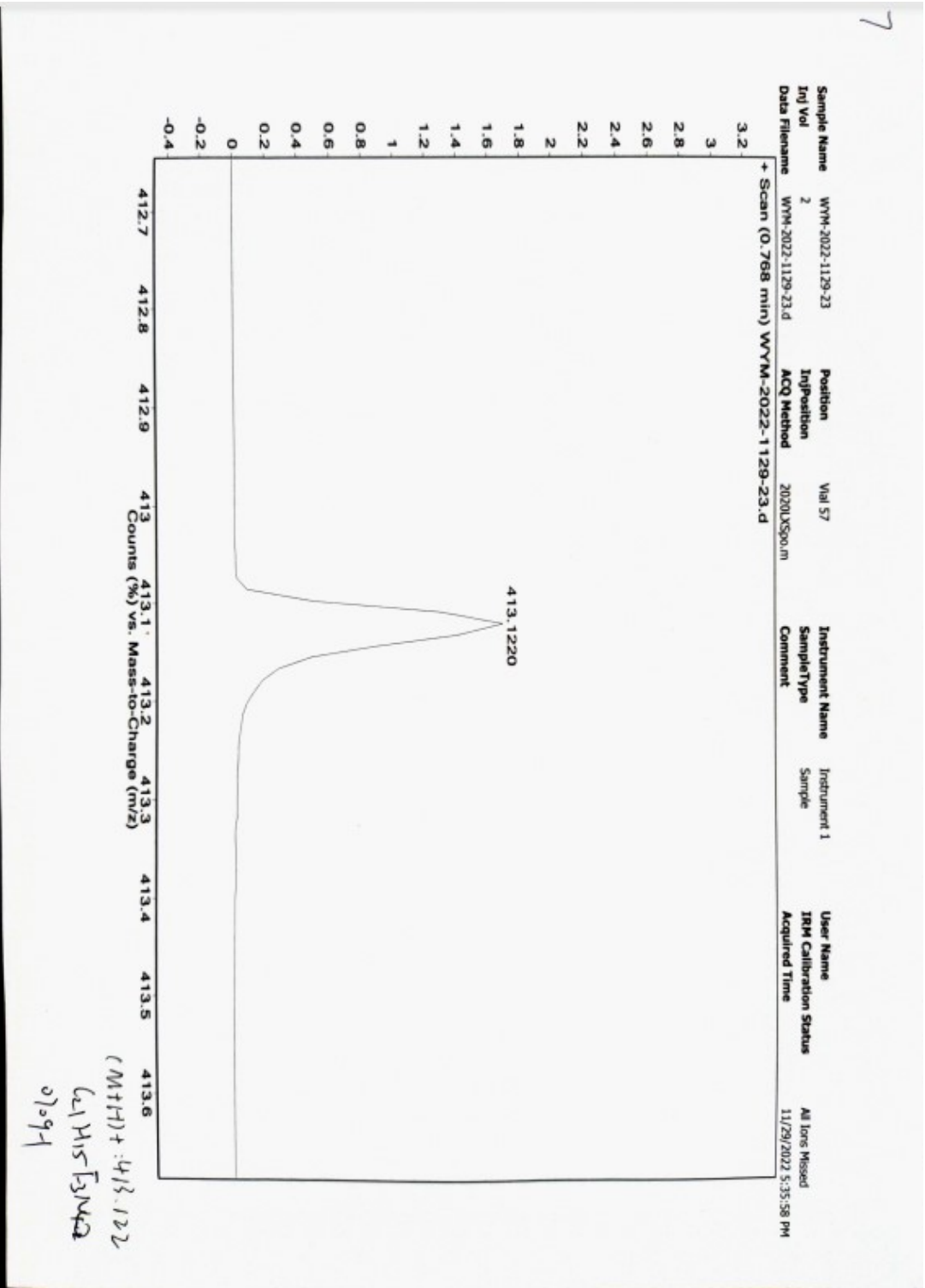


<sup>1</sup>H NMR spectrum of 34



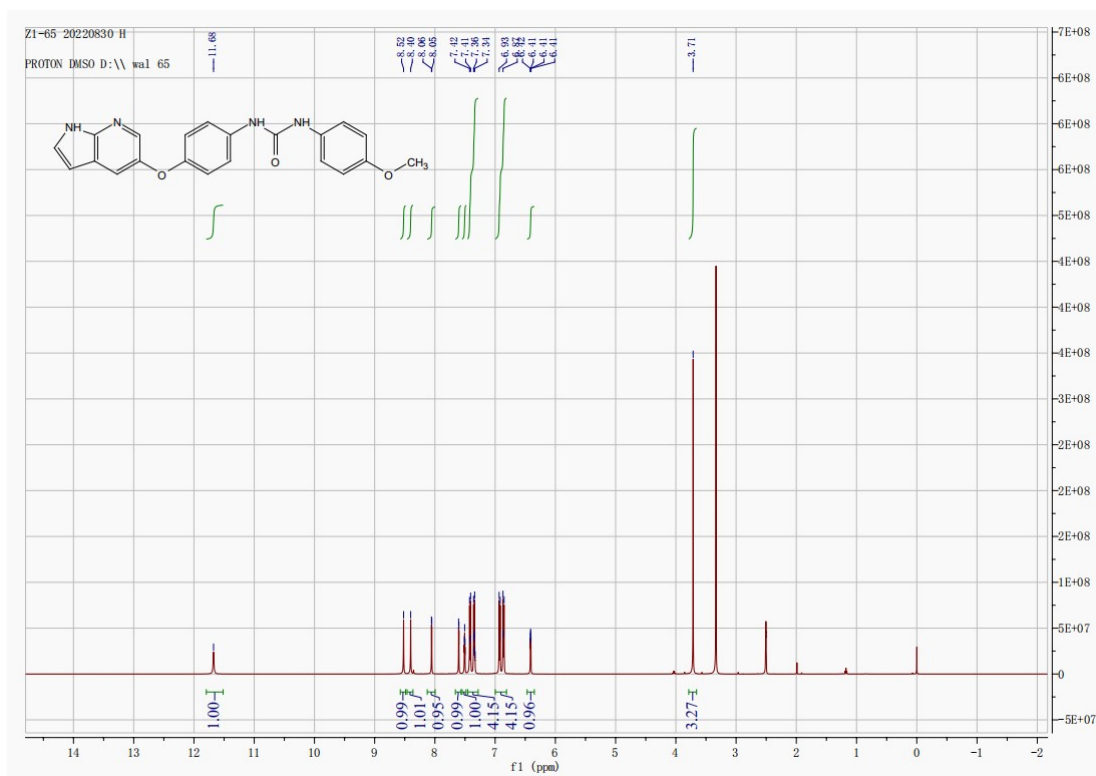
<sup>13</sup>C NMR spectrum of 34

7

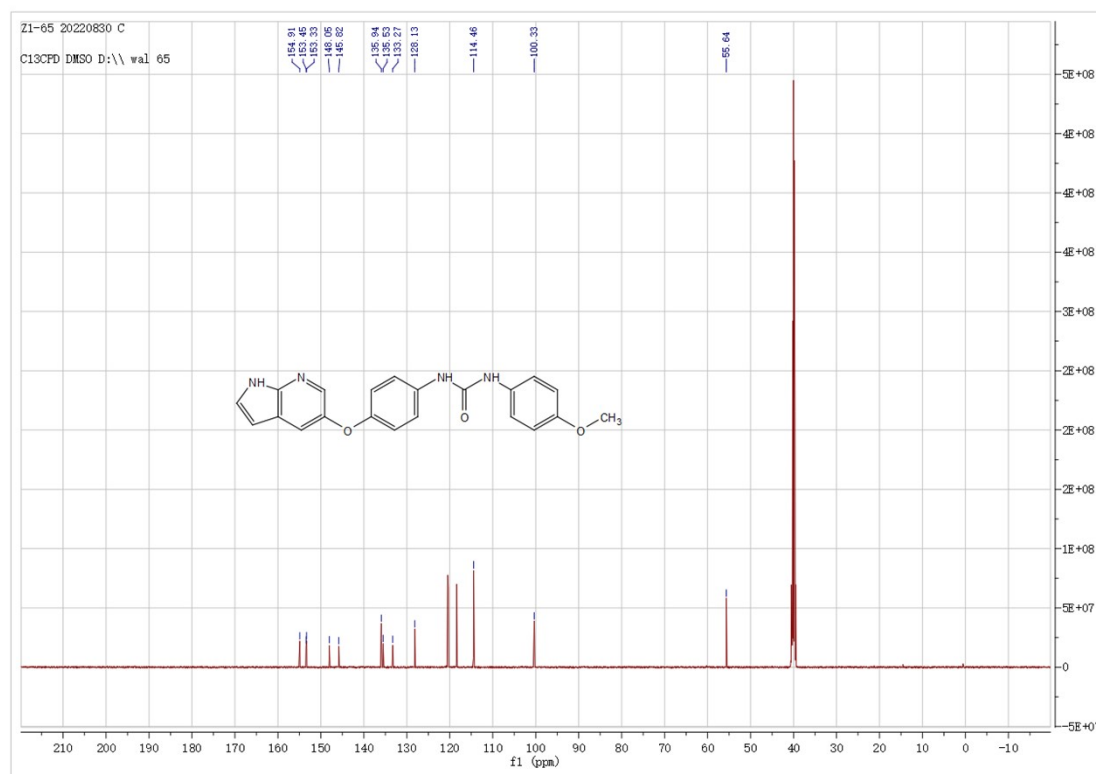


HRMS (ESI) spectrum of 34

*1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(4-methoxyphenyl)urea (35)*

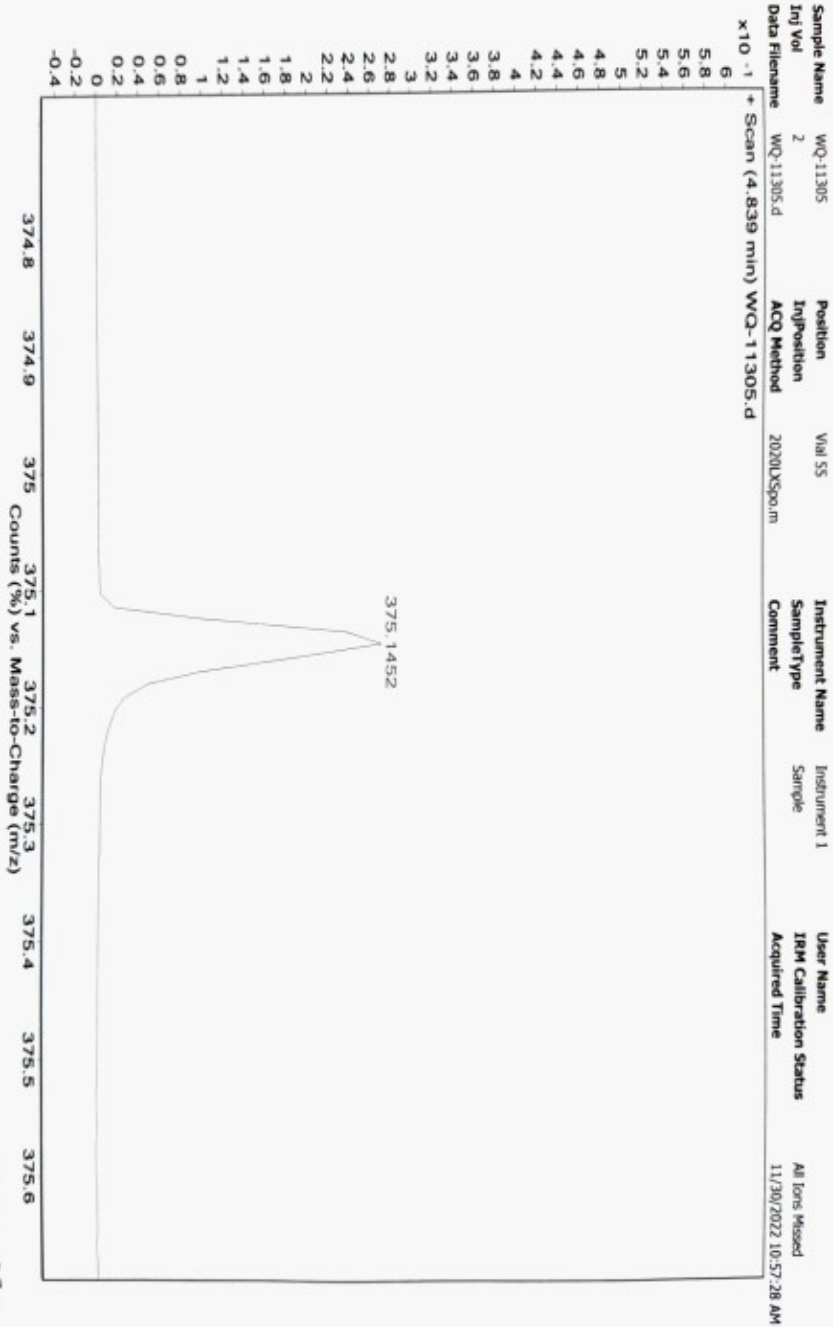


<sup>1</sup>H NMR spectrum of 35



<sup>13</sup>C NMR spectrum of 35

15



Sample Name WQ-11305  
Inj Vol 2  
Data Filename WQ-11305.D  
Position InjPosition  
ACQ Method 2020LXSp.m  
Vial 55  
Instrument Name Instrument 1  
SampleType Sample  
Comment  
User Name  
IRM Calibration Status  
Acquired Time 11/30/2022 10:57:28 AM  
All Ions Mixed

x10<sup>-1</sup>

374.8 374.9 375 375.1 375.2 375.3 375.4 375.5 375.6

Counts (%) vs. Mass-to-Charge (m/z)

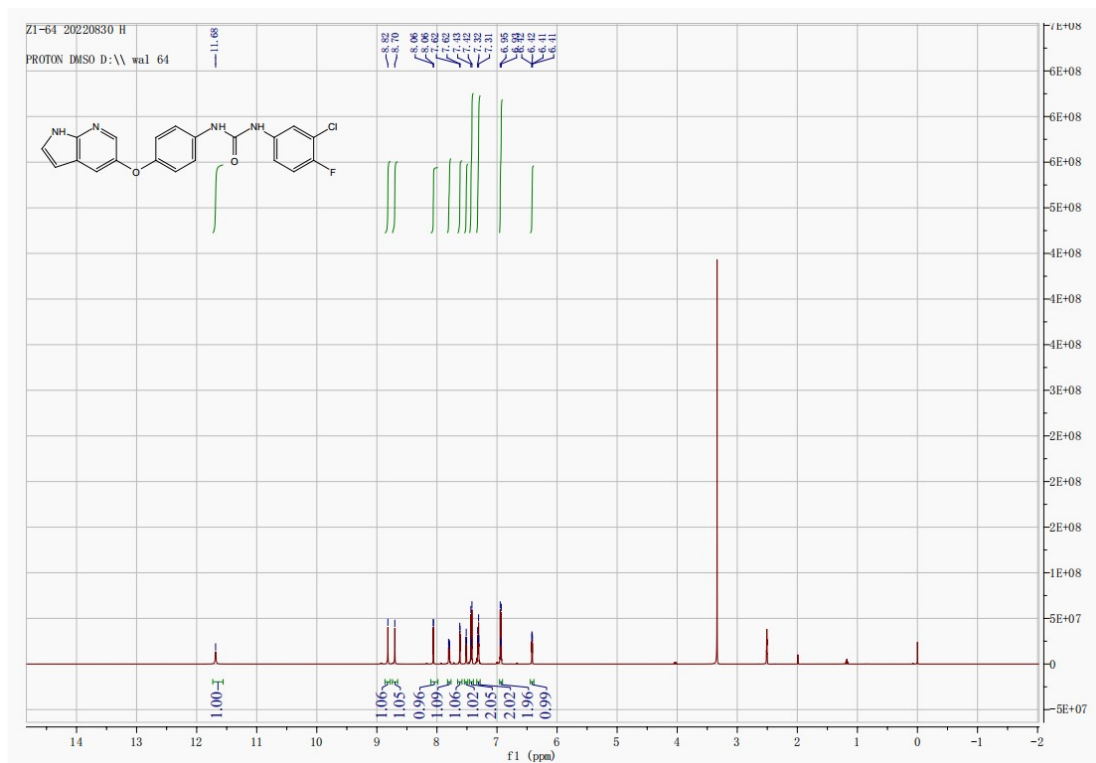
375.1452

(M+H)<sup>+</sup>: 375.1452  
C<sub>21</sub>H<sub>18</sub>N<sub>4</sub>O<sub>3</sub>  
07/6-3

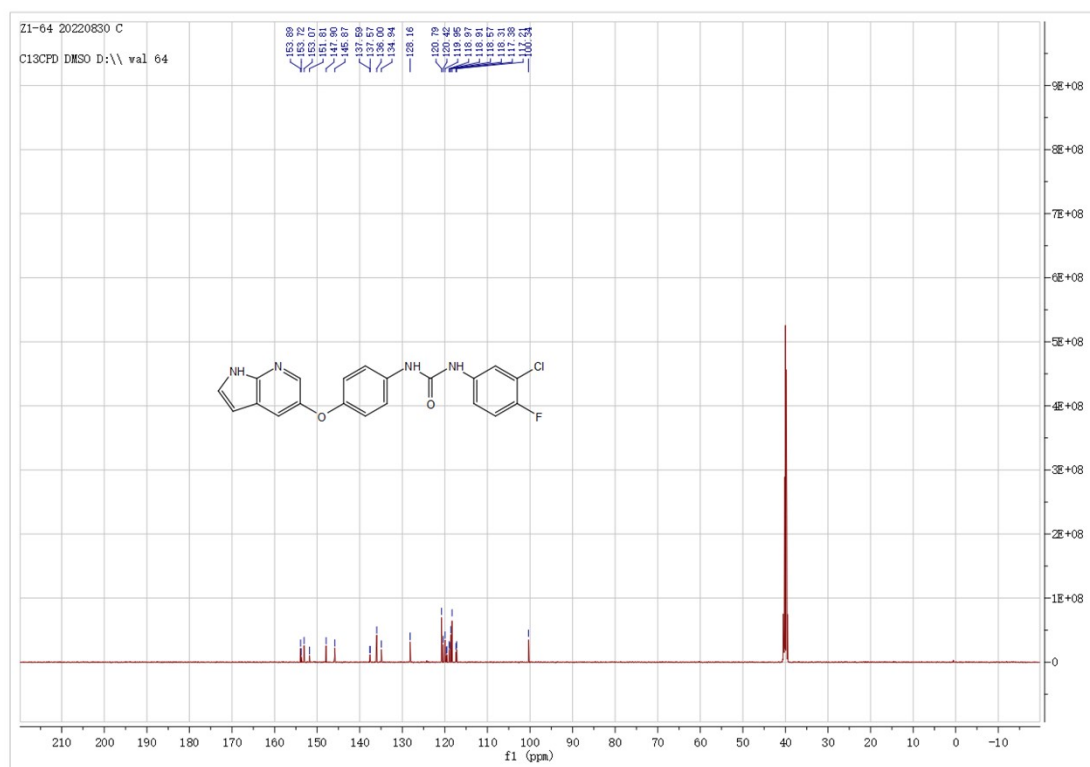
HRMS (ESI) spectrum of 35

1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3-chloro-4-fluorophenyl)urea

(36)

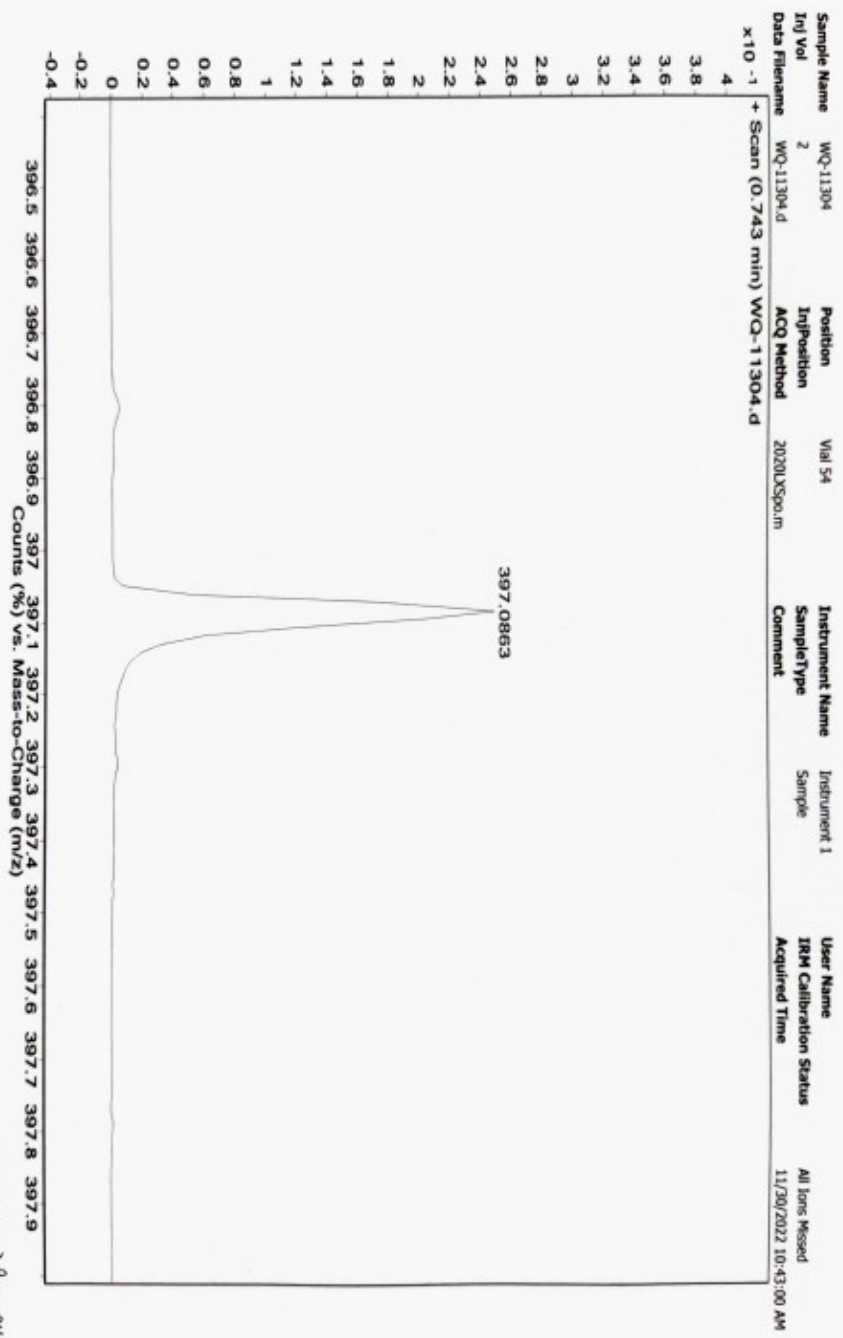


<sup>1</sup>H NMR spectrum of **36**



<sup>13</sup>C NMR spectrum of **36**

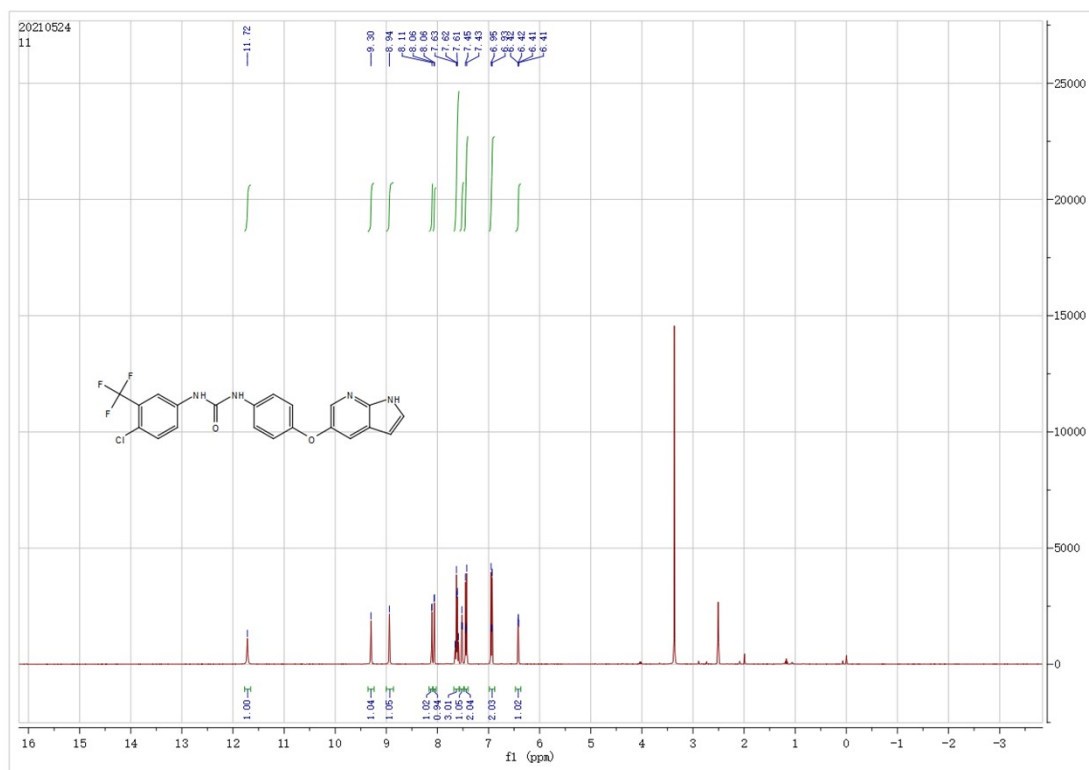
114



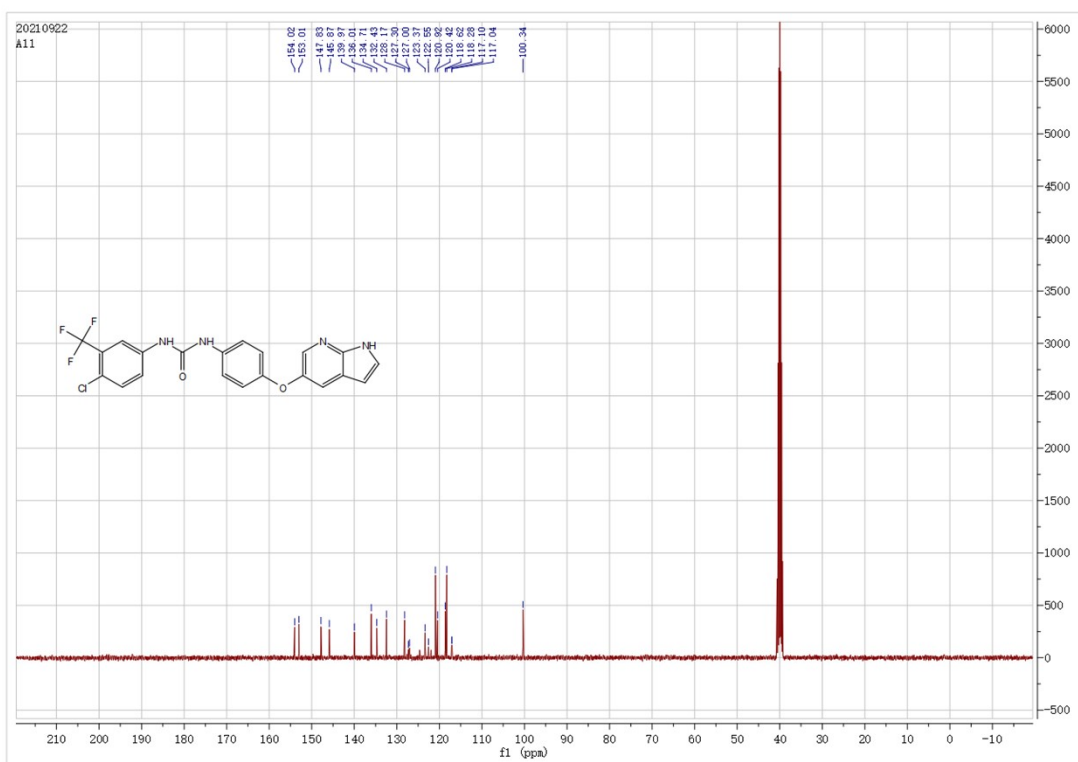
(M+H)<sup>+</sup>: 397.0862  
C<sub>20</sub>H<sub>14</sub>O<sub>2</sub>  
07/16-2

HRMS (ESI) spectrum of 36

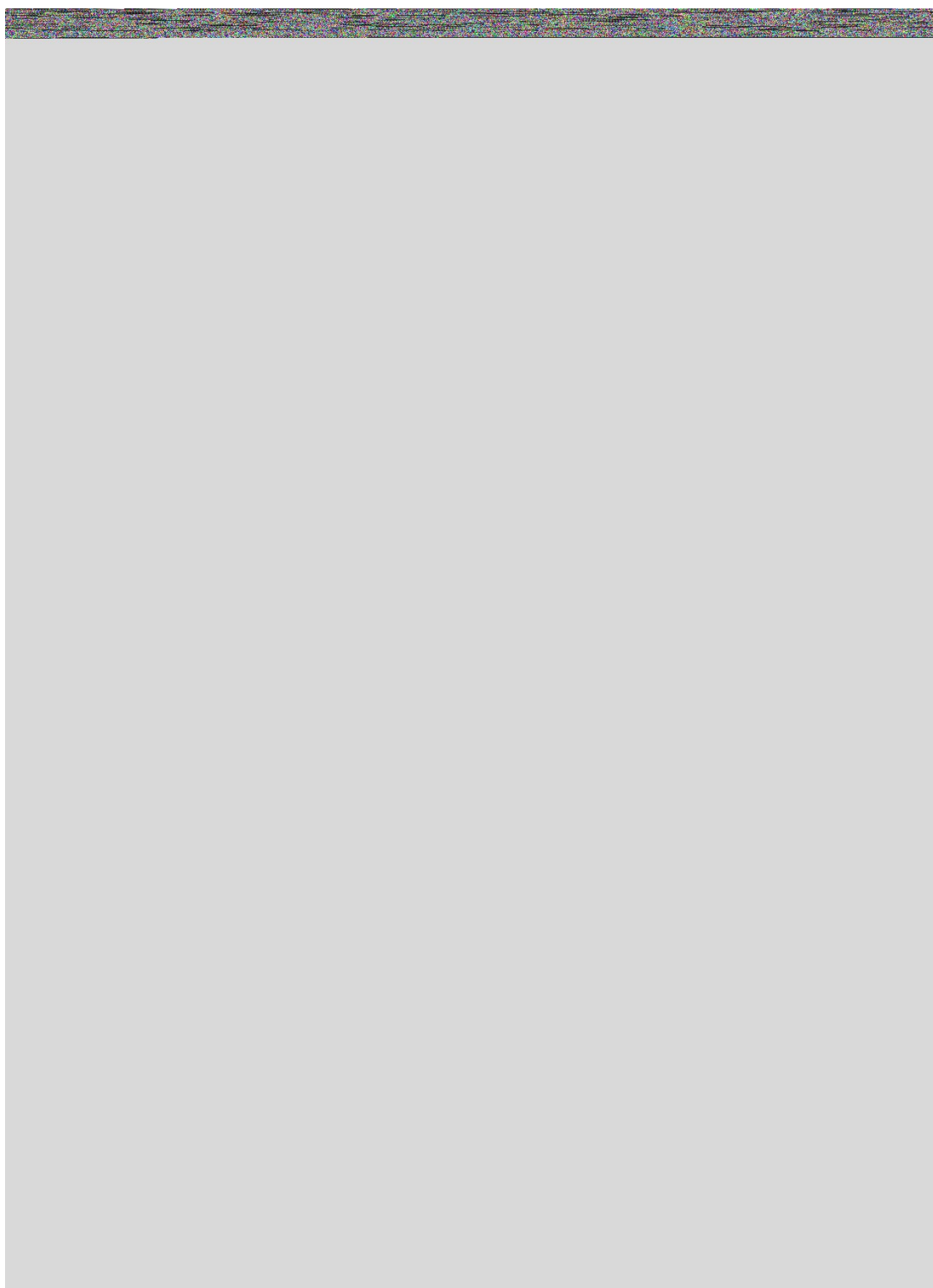
1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(4-chloro-3-(trifluoromethyl)phenyl)urea (**37**)



<sup>1</sup>H NMR spectrum of **37**



<sup>13</sup>C NMR spectrum of **37**

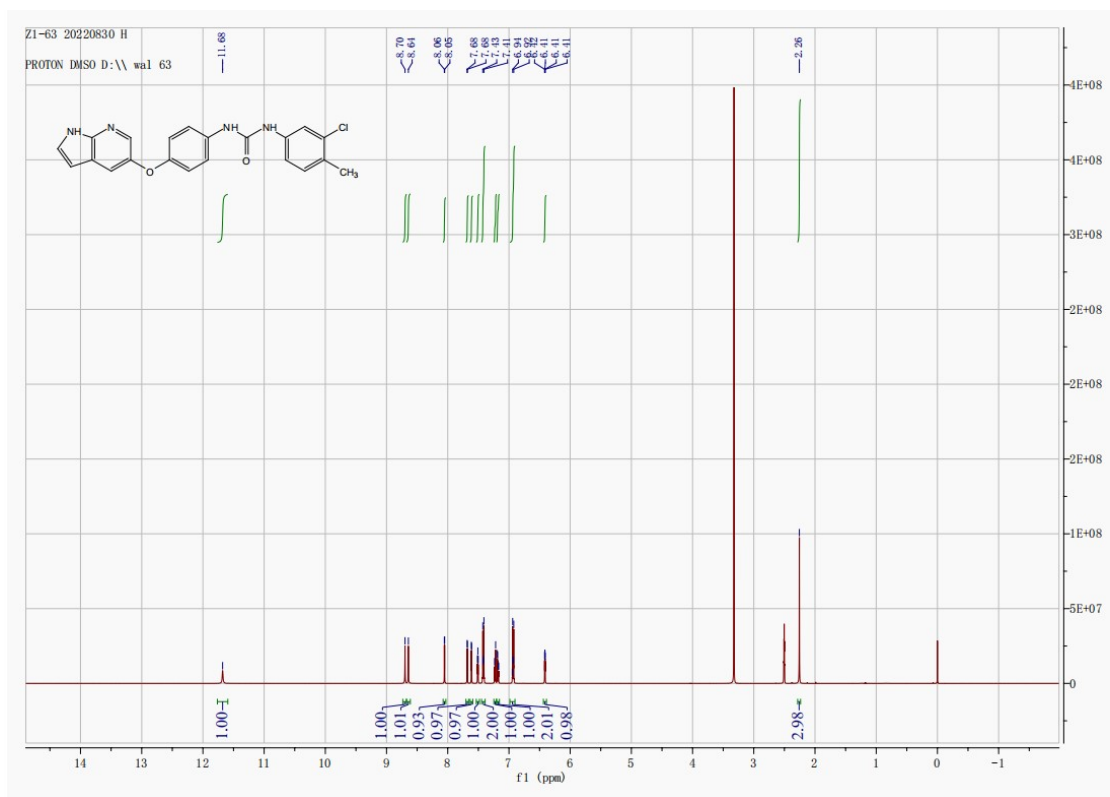


HRMS (ESI) spectrum of **37**

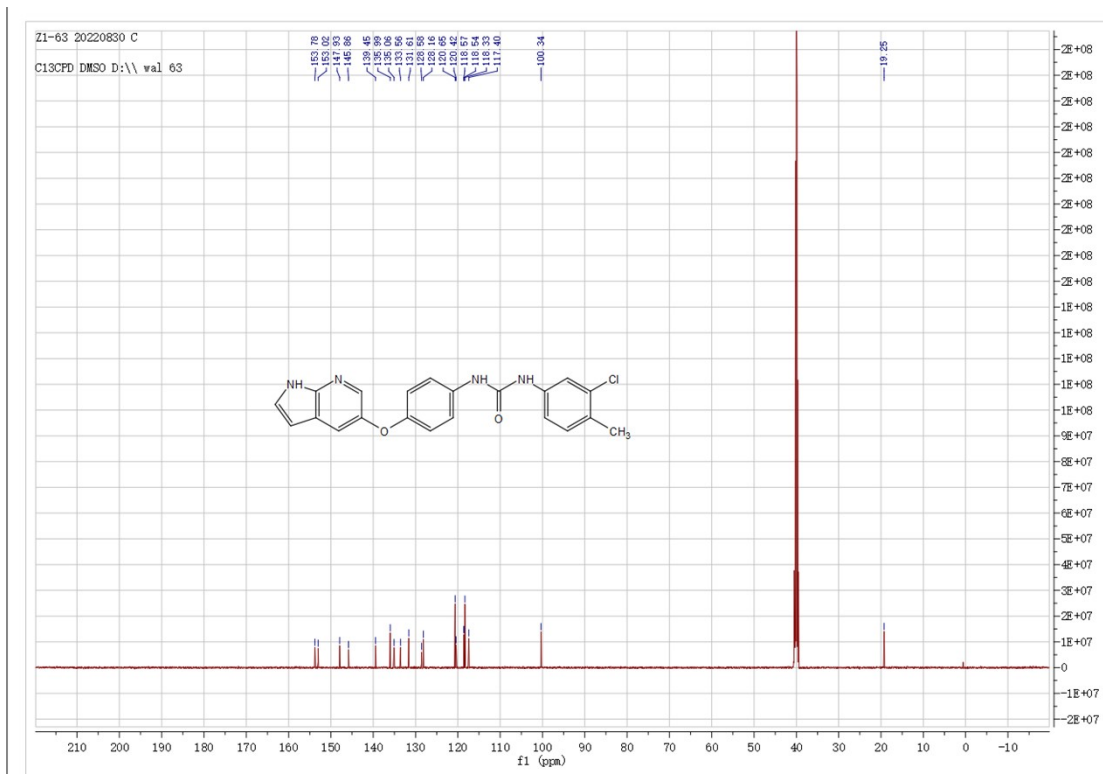


1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3-chloro-4-methylphenyl)urea

(38)

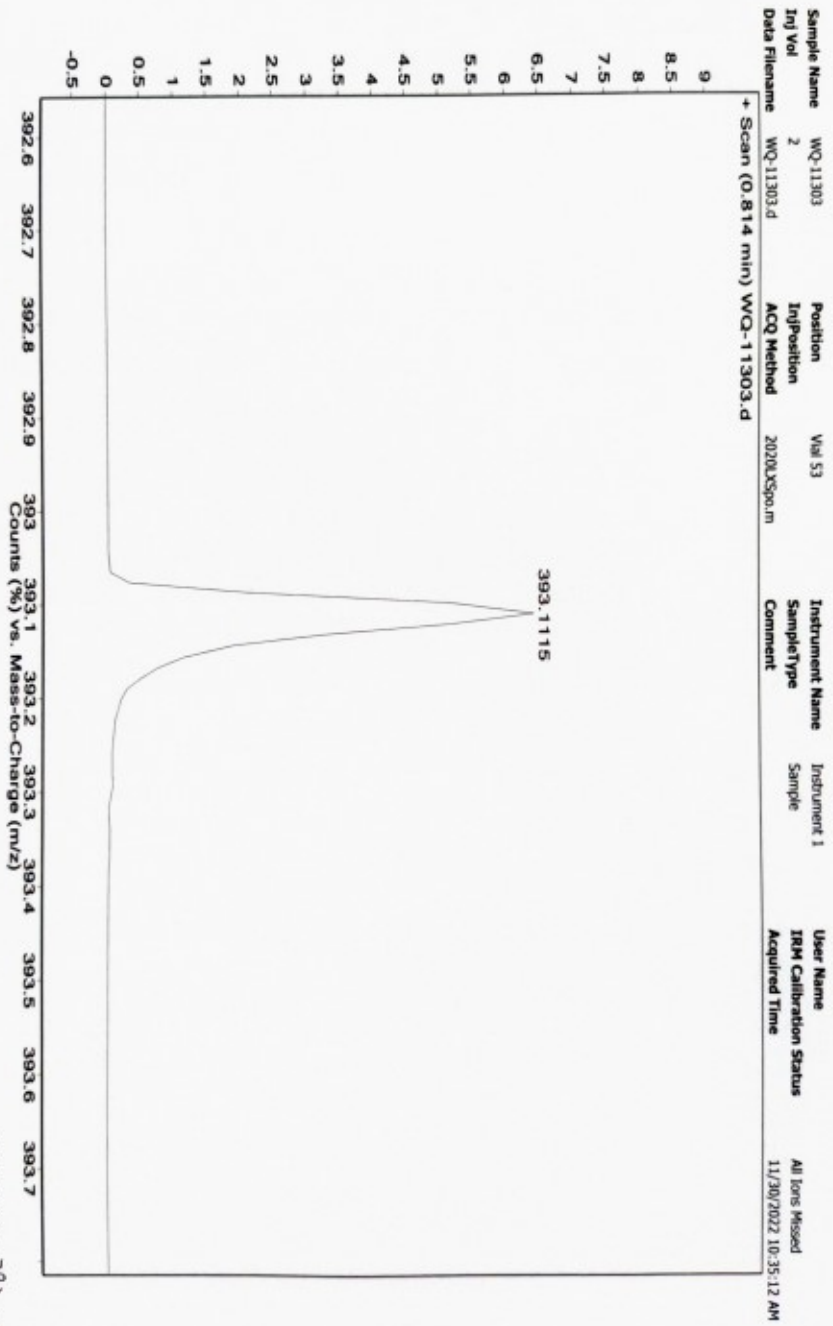


<sup>1</sup>H NMR spectrum of **38**



<sup>13</sup>C NMR spectrum of **38**

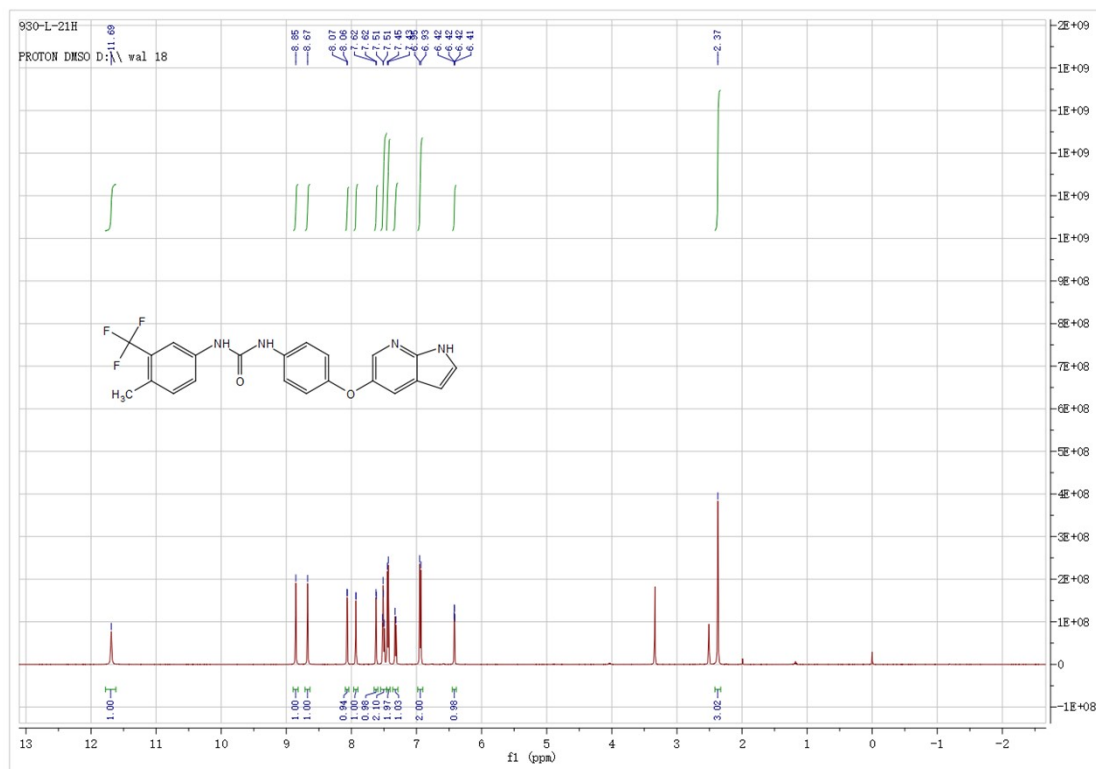
13



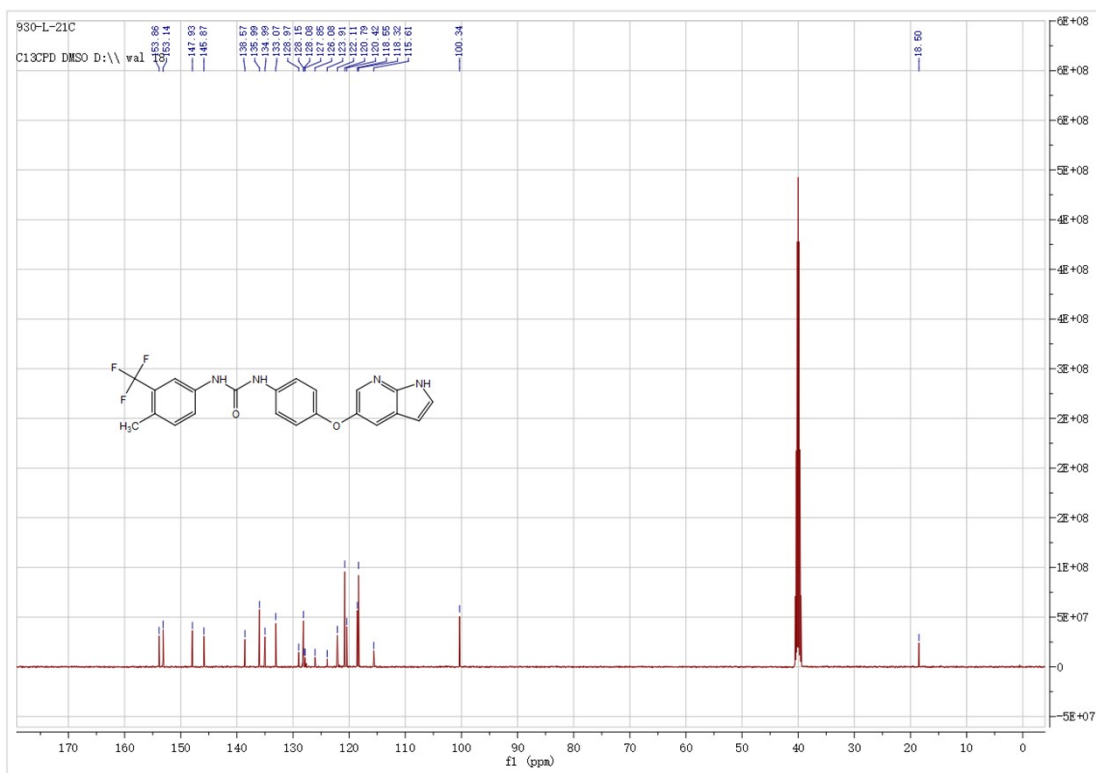
(M+H)<sup>+</sup> : 393.1113  
C<sub>11</sub>H<sub>17</sub>O<sub>2</sub>N<sub>4</sub><sub>2</sub>  
316-1

HRMS (ESI) spectrum of 38

*1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(4-methyl-3-(trifluoromethyl)phenyl)urea (39)*



$^1\text{H}$  NMR spectrum of **39**

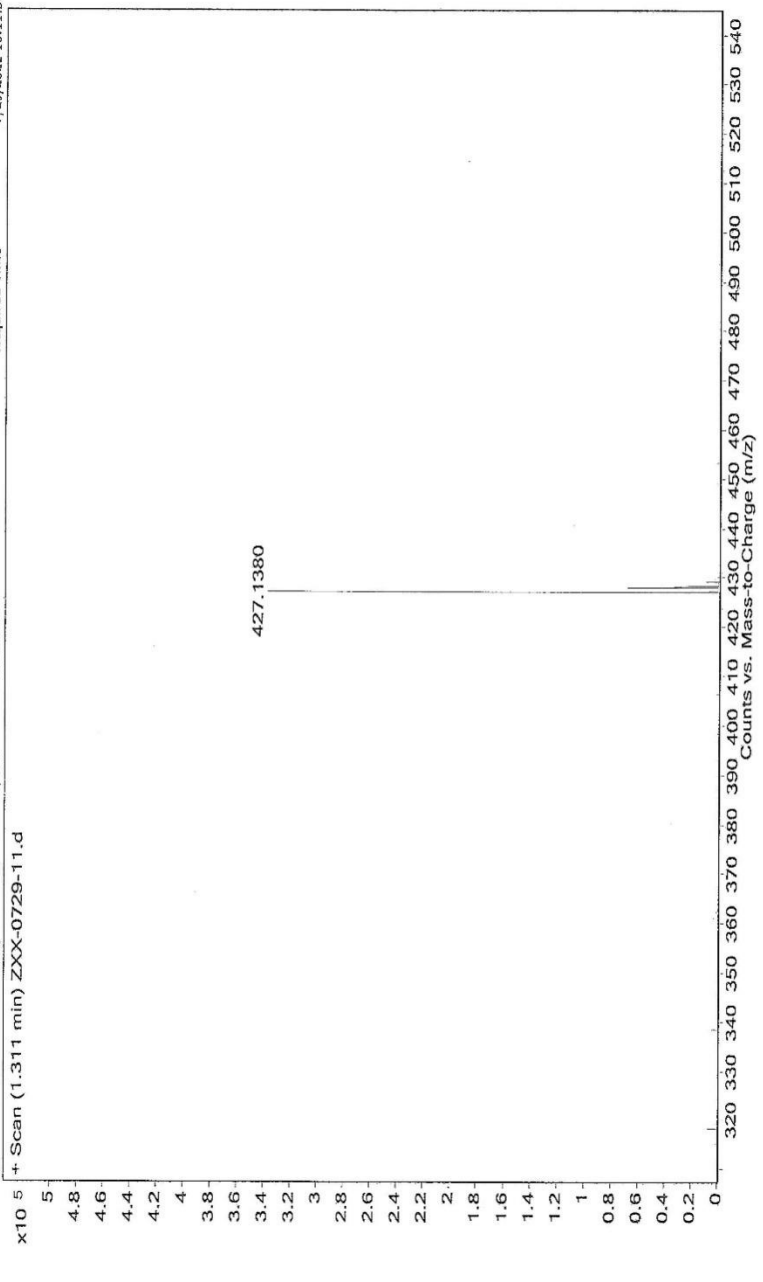


$^{13}\text{C}$  NMR spectrum of **39**



C22H17N4O2F3  
CA(MH+): 427.376  
All Ions Missed  
7/29/2021 10:11:56 AM

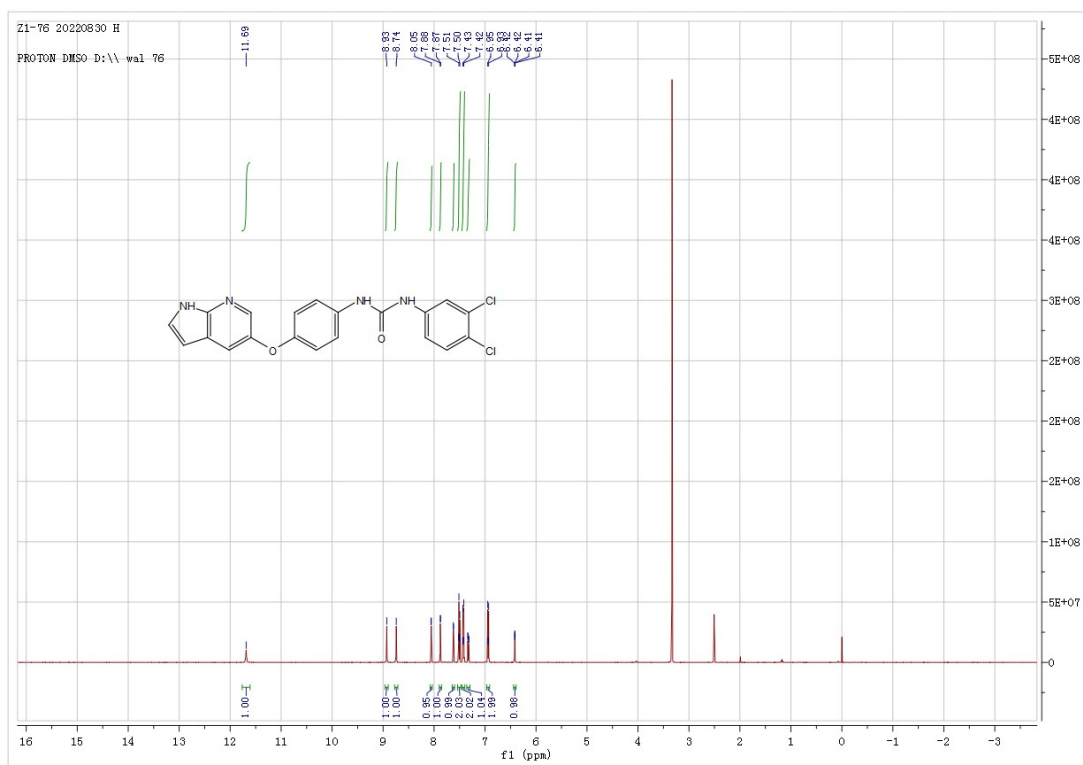
Sample Name ZX-0729-11  
Inj Vol 2  
Data Filename ZX-0729-11.d  
Position InjPosition  
ACQ Method  
Vial 41  
2020LXSp0.m  
Instrument Name  
SampleType  
Comment  
Instrument 1  
Sample  
User Name  
IRM Calibration Status  
Acquired Time



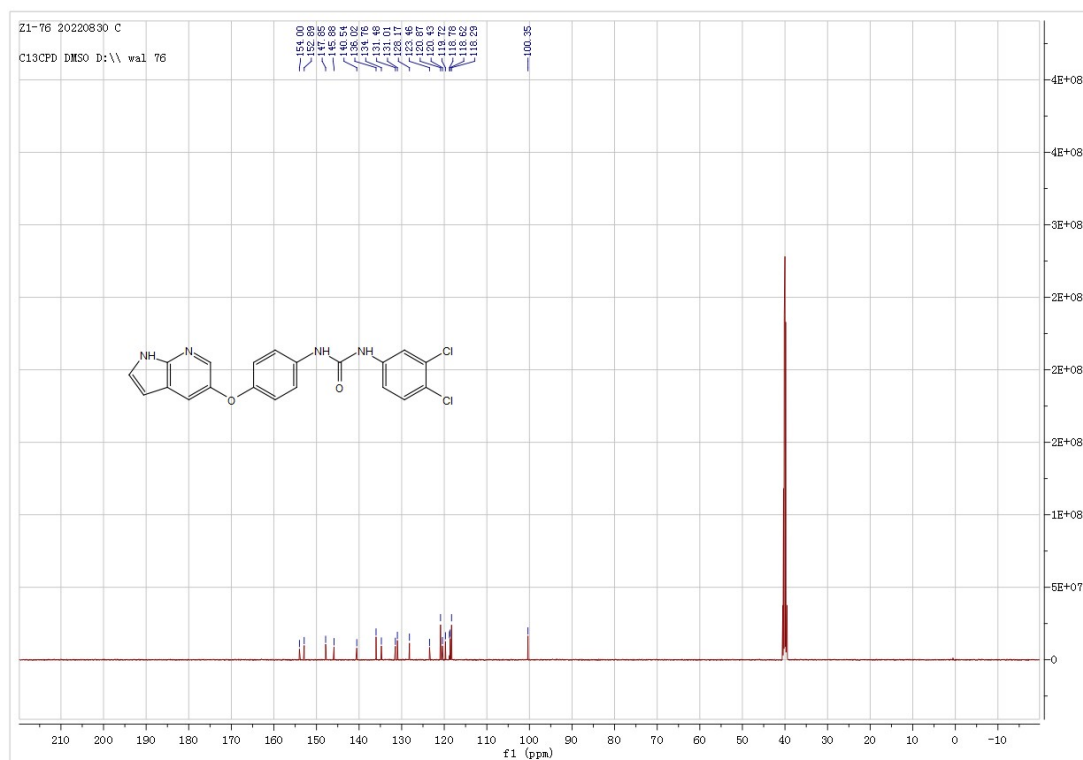
HRMS (ESI) spectrum of 39

0605-3

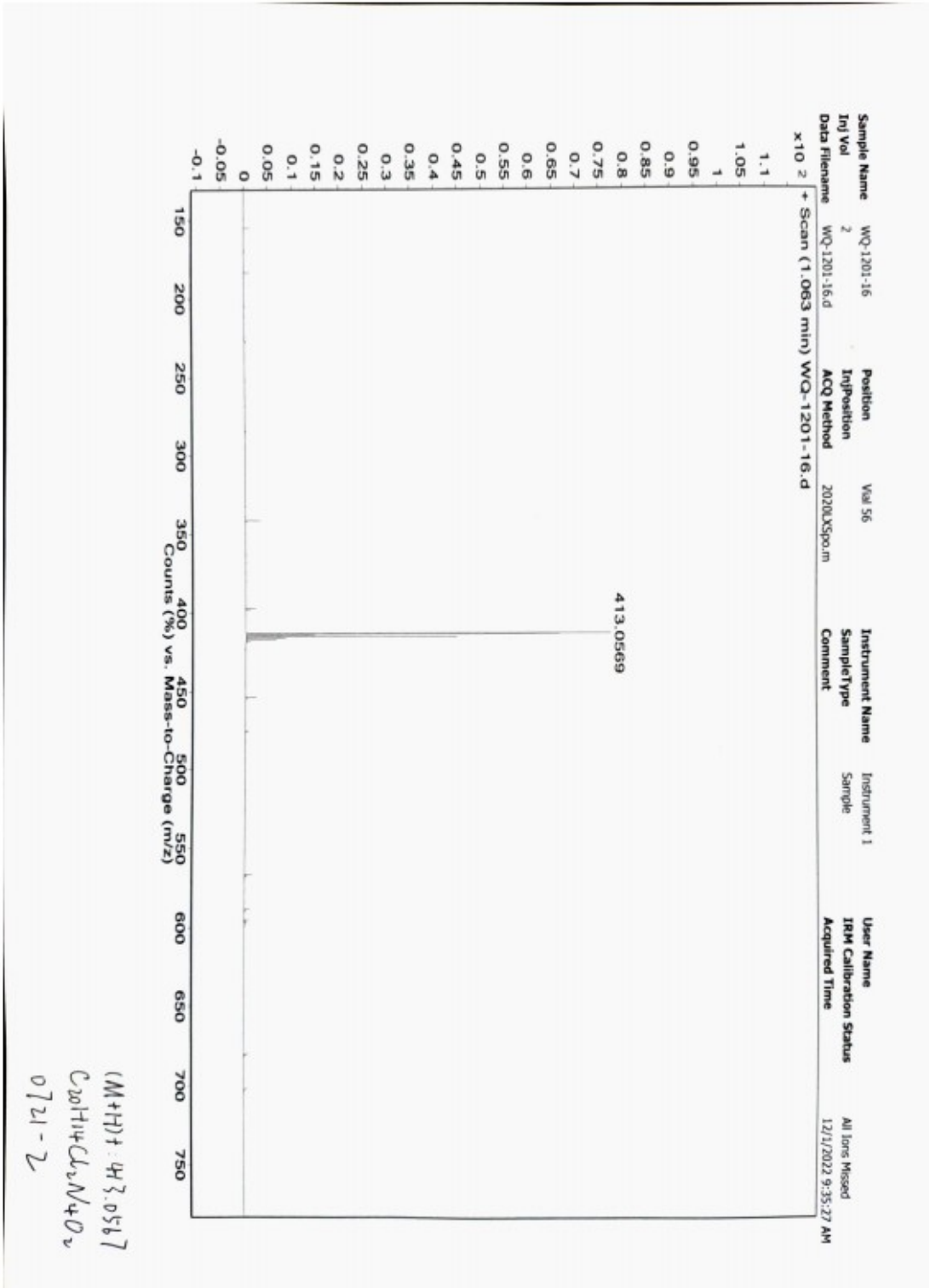
1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3,4-dichlorophenyl)urea (40)



<sup>1</sup>H NMR spectrum of 40

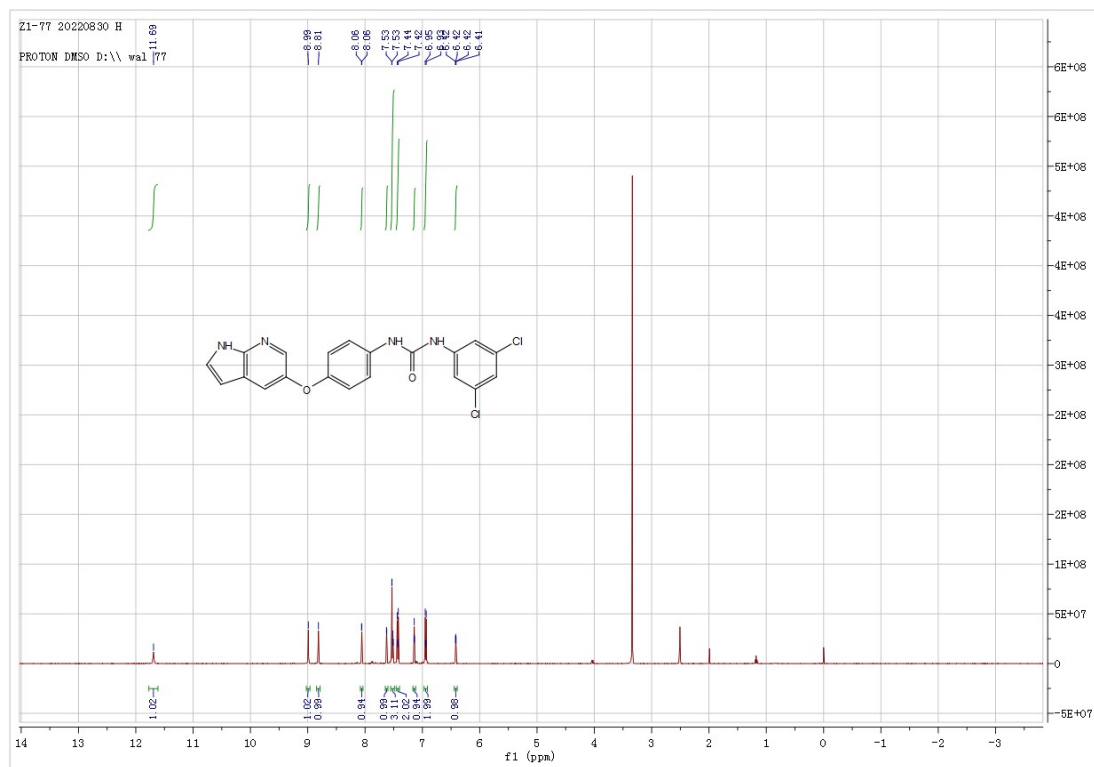


<sup>13</sup>C NMR spectrum of 40

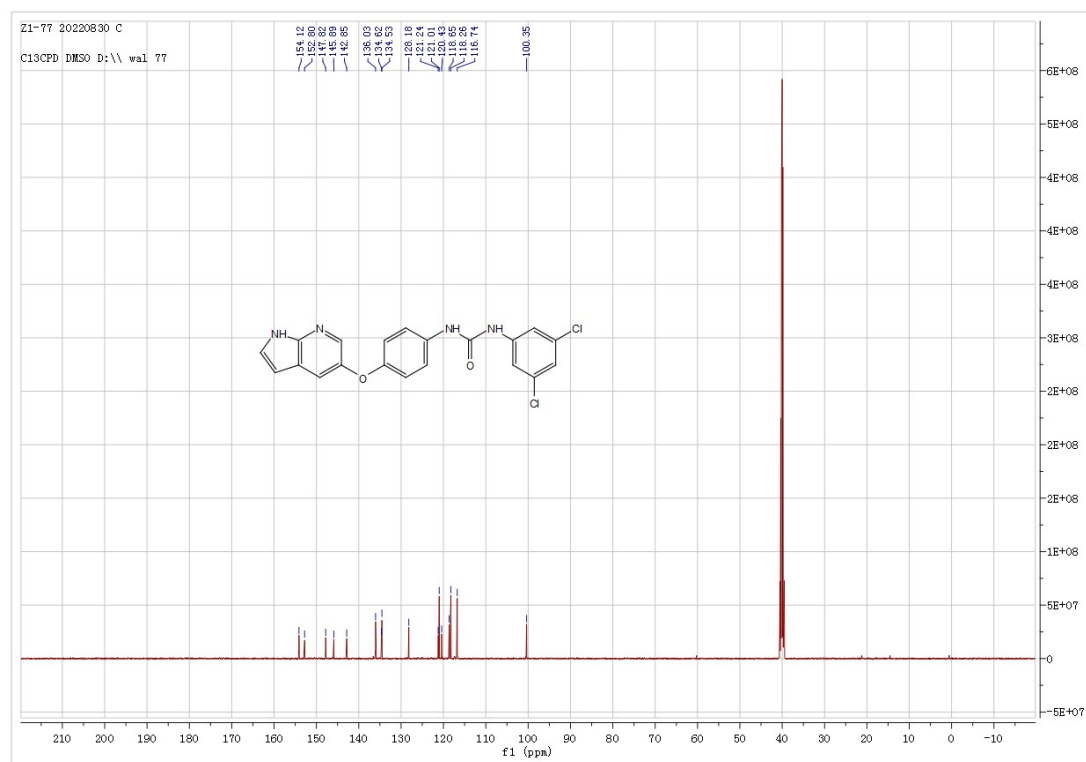


HRMS (ESI) spectrum of 40

*1-(4-((1H-pyrrolo[2,3-b]pyridin-5-yl)oxy)phenyl)-3-(3,5-dichlorophenyl)urea (41)*

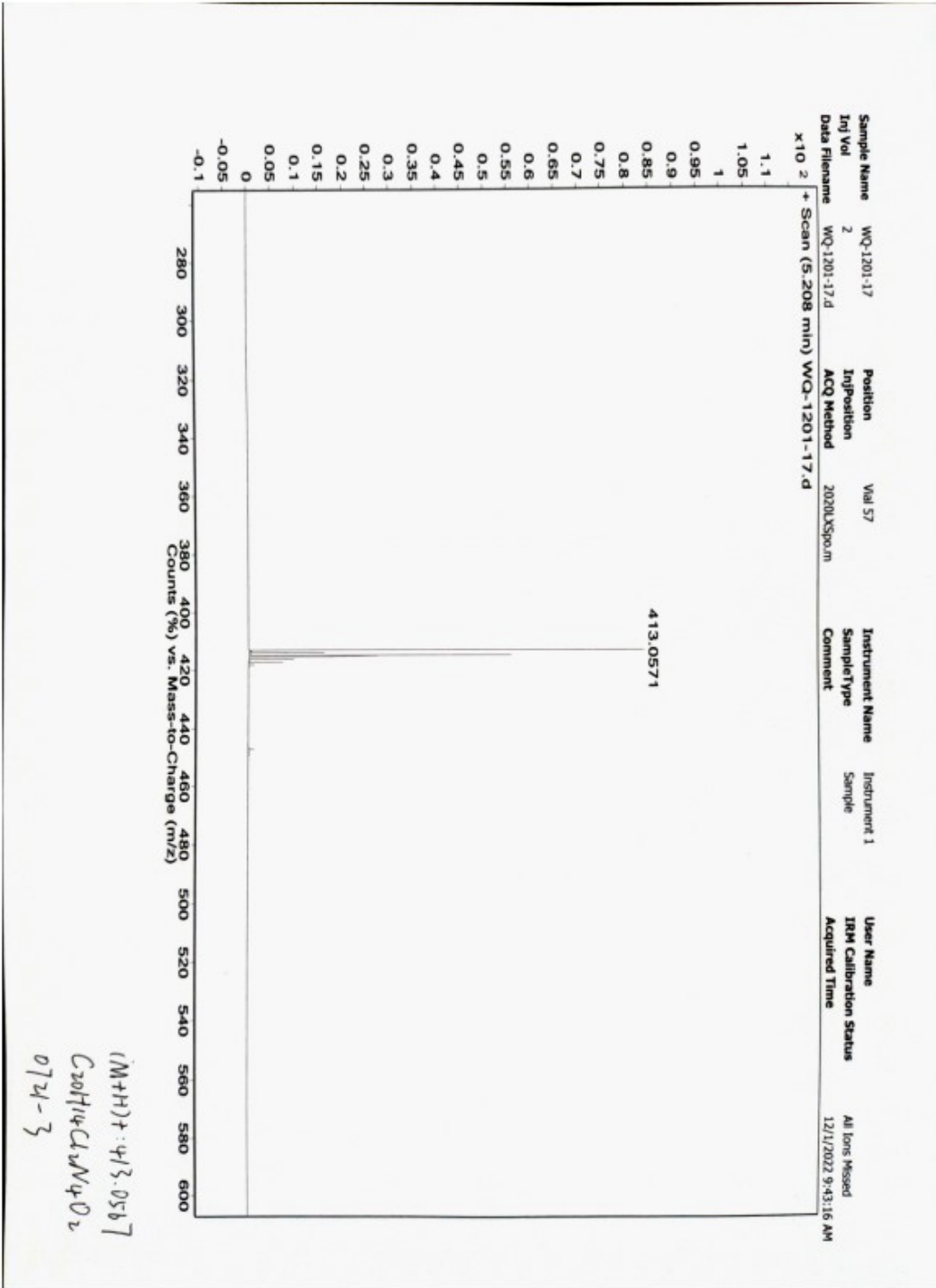


<sup>1</sup>H NMR spectrum of **41**



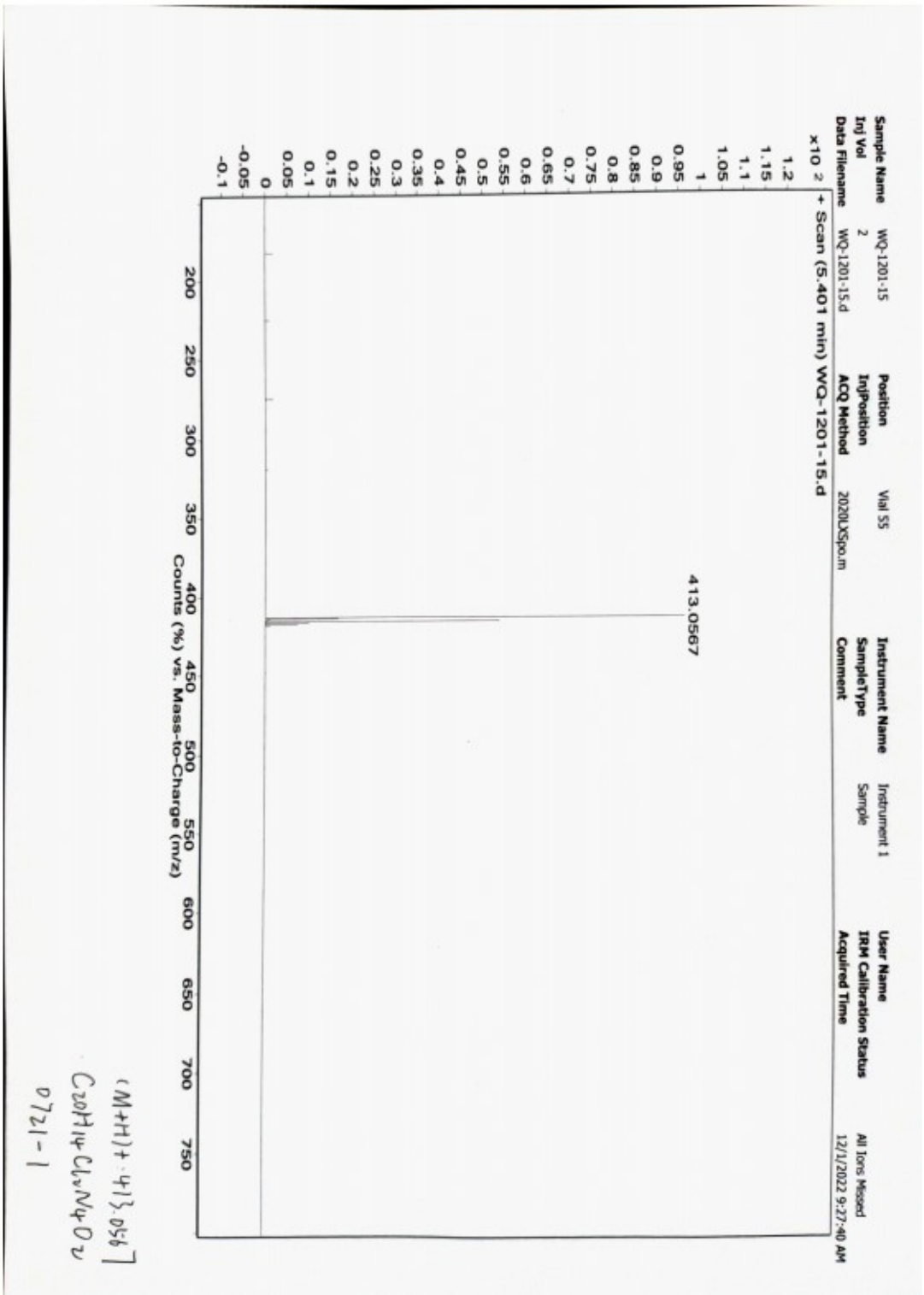
<sup>13</sup>C NMR spectrum of **41**





HRMS (ESI) spectrum of 41





HRMS (ESI) spectrum of 42