

Supporting Information

Development and Biological Evaluation of Potent and Selective c-KIT^{D816V} Inhibitors

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I. Rescoring of the generated 7-azaindole derivatives. The derivatives of 7-azaindole generated with LigBuilder were further screened with a new binding free energy function constructed by combining an appropriate solvation free energy term to the original scoring function of the AutoDock program. This modified scoring function can be expressed as follows.

$$\Delta G_{bind}^{aq} = W_{vdW} \sum_{i=1} \sum_{j=1} \left(\frac{A_{ij}}{r_{ij}^{12}} - \frac{B_{ij}}{r_{ij}^6} \right) + W_{hbond} \sum_{i=1} \sum_{j=1} E(t) \left(\frac{C_{ij}}{r_{ij}^{12}} - \frac{D_{ij}}{r_{ij}^{10}} \right) + W_{elec} \sum_{i=1} \sum_{j=1} \frac{q_i q_j}{\mathcal{E}(r_{ij}) r_{ij}} + W_{tor} N_{tor} + W_{sol} \sum_{i=1} S_i \left(O_i^{\max} - \sum_{j \neq i} V_j e^{-\frac{r_{ij}^2}{2\sigma^2}} \right) \quad (1)$$

Here, W_{vdW} , W_{hbond} , W_{elec} , W_{tor} , and W_{sol} are the weighting factors of van der Waals, hydrogen bond, electrostatic interactions, torsional term, and solvation free energy of inhibitors, respectively. r_{ij} represents the interatomic distance, and A_{ij} , B_{ij} , C_{ij} , and D_{ij} are related to the depths of the potential energy well and the equilibrium separations between the protein and ligand atoms. The hydrogen bond term has an additional weighting factor, $E(t)$, representing the angle-dependent directionality. With respect to the distance-dependent dielectric constant ($\mathcal{E}(r_{ij})$), a sigmoidal function was used in computing the interatomic electrostatic interactions between c-KIT and 7-azaindole derivatives. Gasteiger-Marsili atomic charges were then used for both proteins and ligands to compute the electrostatic interaction energies. In the entropic term, N_{tor} is the number of rotatable bonds in the ligand. In the desolvation term, S_i and V_i are the solvation parameter and the fragmental volume of atom i , respectively, while $O_i^{\max}$ stands for the maximum atomic occupancy.

In the calculation of molecular solvation free energy of 7-azaindole derivatives, we used the atomic parameters. The addition of this solvation free energy term is expected to increase the accuracy of the scoring function because the underestimation of ligand solvation often leads to the overestimation of the binding affinity of a ligand with many polar atoms. Indeed, the superiority of this modified scoring function to the previous one was well-appreciated in recent studies for virtual screening of kinase inhibitors.

II. Kinase Selectivity Profiling. A panel of 48 kinases was tested at 1 μ M concentrations in a high-throughput binding assay (Ambit Bioscience). Lower numbers of POC (percent of control) values indicate stronger hits.

Table 5. KINOMEScan Profile of Compound 19^a

Kinase	POC ^b	Kinase	POC ^b	Kinase	POC ^b
ABL ^{T315I}	51	ERK1	93	MEK1	74
AKT1	100	FAK	88	MEK2	92
AKT2	100	FGFR1	89	MET	34
ALK	43	FGFR2	100	MET ^{M1250T}	35
AMPK α 1	100	FLT1	81	p38 α	96
AMPK α 2	81	FLT3	2.2	PAK1	85
AURKA	13	GSK3 β	94	PDGFRA	16
AURKB	82	IGF1R	100	PDPK1	65
BRAF	81	IKK α	10	PI3K α	66
BRAF ^{V600E}	88	IKK β	12	PI3K β	100
CAMK1	63	JAK1	100	PIM1	68
CDK4	85	JAK2	49	PLK1	98
CDK9	100	c-KIT	0.8	ROCK1	33
CDK11	3.8	c-KIT ^{D816V}	0	TRKA	26
DRAK1	0.2	c-KIT (autoinhibited)	48	TRKB	36
EGFR	70	c-KIT ^{D816H}	16	VEGFR2	96

^aA panel of 48 kinases was tested at 1 μ M concentrations in a high-throughput binding assay (Ambit Bioscience). ^bLower numbers of POC (percent of control) values indicate stronger hits.

Table S1. KINOMEScan Profile of Compound 21

Kinase	POC ^b	Kinase	POC ^b	Kinase	POC ^b
ABL ^{T315I}	47	ERK1	23	MEK1	85
AKT1	87	FAK	92	MEK2	74

AKT2	100	FGFR1	100	MET	35
ALK	33	FGFR2	100	MET ^{M1250T}	80
AMPK α 1	90	FLT1	36	p38 α	100
AMPK α 2	77	FLT3	25	PAK1	89
AURKA	8.9	GSK3 β	64	PDGFRA	65
AURKB	31	IGF1R	100	PDPK1	100
BRAF	28	IKK α	46	PI3K α	71
BRAF ^{V600E}	34	IKK β	22	PI3K β	87
CAMK1	53	JAK1	71	PIM1	88
CDK4	85	JAK2	78	PLK1	100
CDK9	83	c-KIT	9.8	ROCK1	94
CDK11	96	c-KIT ^{D816V}	2.1	TRKA	83
DRAK1	86	c-KIT (autoinhibited)	53	TRKB	68
EGFR	70	c-KIT ^{D816H}	85	VEGFR2	96

Table S2. KINOMEScan Profile of Compound 31

Kinase	POC ^b	Kinase	POC ^b	Kinase	POC ^b
ABL ^{T315I}	17	ERK1	100	MEK1	59
AKT1	100	FAK	88	MEK2	72
AKT2	97	FGFR1	90	MET	54
ALK	76	FGFR2	89	MET ^{M1250T}	53
AMPK α 1	84	FLT1	56	p38 α	94
AMPK α 2	82	FLT3	7	PAK1	87
AURKA	0.85	GSK3 β	63	PDGFRA	36
AURKB	44	IGF1R	96	PDPK1	31
BRAF	78	IKK α	2.2	PI3K α	100
BRAF ^{V600E}	66	IKK β	0.75	PI3K β	95
CAMK1	62	JAK1	100	PIM1	27

CDK4	82	JAK2	3.2	PLK1	84
CDK9	100	c-KIT	51	ROCK1	16
CDK11	100	c-KIT ^{D816V}	1.4	TRKA	11
DRAK1	0.25	c-KIT (autoinhibited)	76	TRKB	17
EGFR	73	c-KIT ^{D816H}	25	VEGFR2	79

Table S3. KINOMEScan Profile of Compound 32

Kinase	POC ^b	Kinase	POC ^b	Kinase	POC ^b
ABL ^{T315I}	48	ERK1	88	MEK1	78
AKT1	98	FAK	92	MEK2	93
AKT2	100	FGFR1	84	MET	54
ALK	40	FGFR2	100	MET ^{M1250T}	86
AMPK α 1	95	FLT1	75	p38 α	100
AMPK α 2	86	FLT3	1.6	PAK1	83
AURKA	25	GSK3 β	64	PDGFRA	59
AURKB	92	IGF1R	91	PDPK1	76
BRAF	78	IKK α	70	PI3K α	75
BRAF ^{V600E}	82	IKK β	69	PI3K β	94
CAMK1	61	JAK1	92	PIM1	71
CDK4	95	JAK2	48	PLK1	99
CDK9	100	c-KIT	19	ROCK1	66
CDK11	90	c-KIT ^{D816V}	0	TRKA	46
DRAK1	0.95	c-KIT (autoinhibited)	42	TRKB	45
EGFR	68	c-KIT ^{D816H}	25	VEGFR2	97

Table S4. KINOMEScan Profile of Compound 34

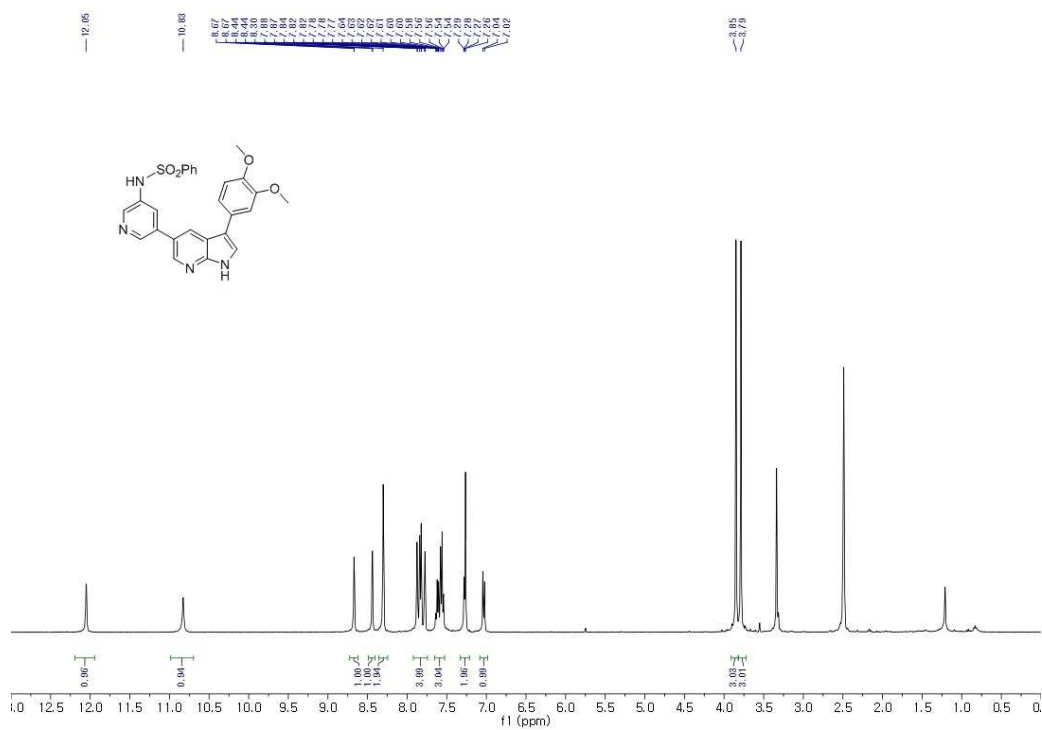
Kinase	POC ^b	Kinase	POC ^b	Kinase	POC ^b
ABL ^{T315I}	54	ERK1	88	MEK1	76
AKT1	92	FAK	93	MEK2	90
AKT2	100	FGFR1	92	MET	47
ALK	51	FGFR2	100	MET ^{M1250T}	51
AMPK α 1	98	FLT1	43	p38 α	93
AMPK α 2	87	FLT3	18	PAK1	88
AURKA	17	GSK3 β	87	PDGFRA	21
AURKB	85	IGF1R	79	PDPK1	91
BRAF	83	IKK α	26	PI3K α	71
BRAF ^{V600E}	78	IKK β	31	PI3K β	93
CAMK1	71	JAK1	93	PIM1	71
CDK4	81	JAK2	46	PLK1	84
CDK9	100	c-KIT	37	ROCK1	16
CDK11	79	c-KIT ^{D816V}	0	TRKA	11
DRAK1	2.4	c-KIT (autoinhibited)	65	TRKB	16
EGFR	43	c-KIT ^{D816H}	51	VEGFR2	79

III. Physicochemical properties predicted by Accelrys DB

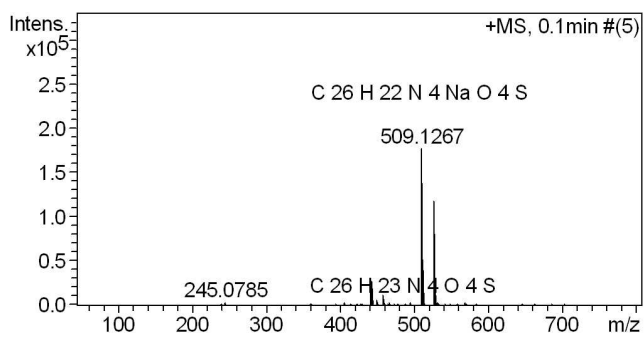
Table S5.

Compd	AlogP	LogD (pH7.4)	tPSA
19	4.143	4.290	65.60
21	3.413	3.528	82.39
31	2.531	2.534	102.70
32	4.126	4.274	74.83
34	3.413	3.560	82.39

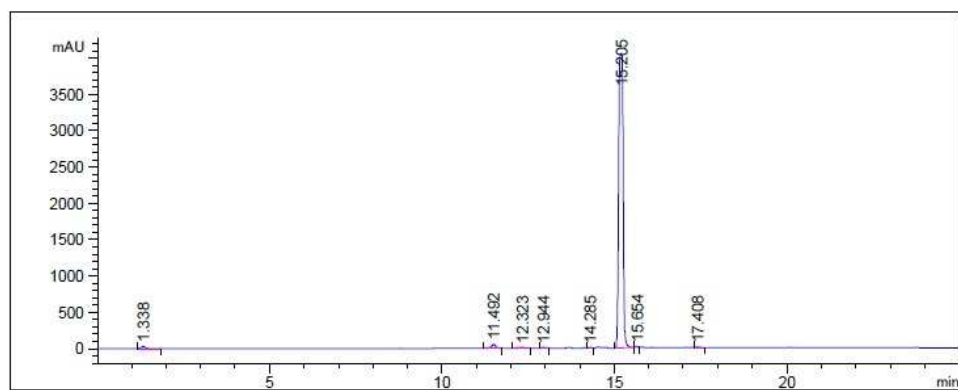
N-(5-(3-(3,4-dimethoxyphenyl)-1*H*-pyrrolo[2,3-*b*]pyridin-5-yl)pyridin-3-yl)benzenesulfonamide (1).



400 MHz, ¹H NMR in DMSO-*d*₆



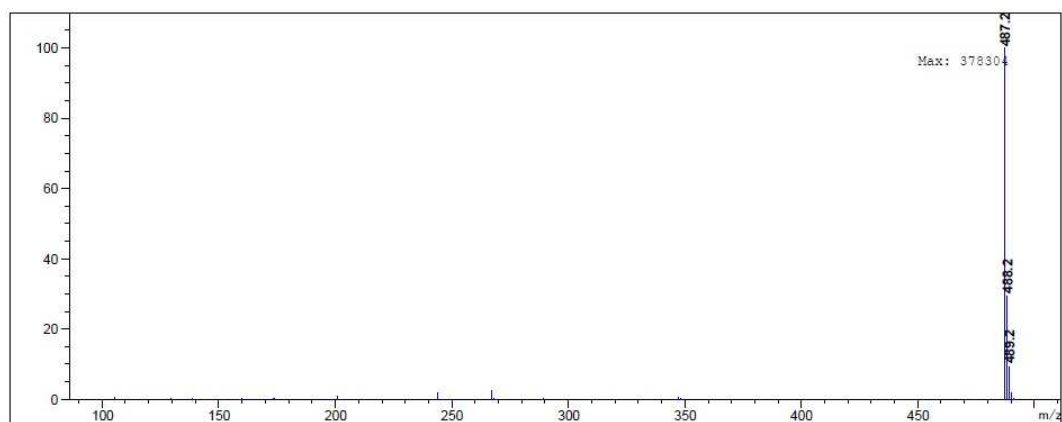
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.338	BB	0.1048	254.17989	34.99032	0.6877
2	11.492	BB	0.1344	445.91824	51.28773	1.2064
3	12.323	BB	0.1087	133.04160	16.92915	0.3599
4	12.944	BB	0.0808	71.70328	13.76776	0.1940
5	14.285	BB	0.0725	38.99753	8.49676	0.1055
6	15.205	BB	0.1442	3.58864e4	4057.29932	97.0906
7	15.654	BB	0.0618	53.55094	13.93590	0.1449
8	17.408	BB	0.0921	77.98920	12.44058	0.2110

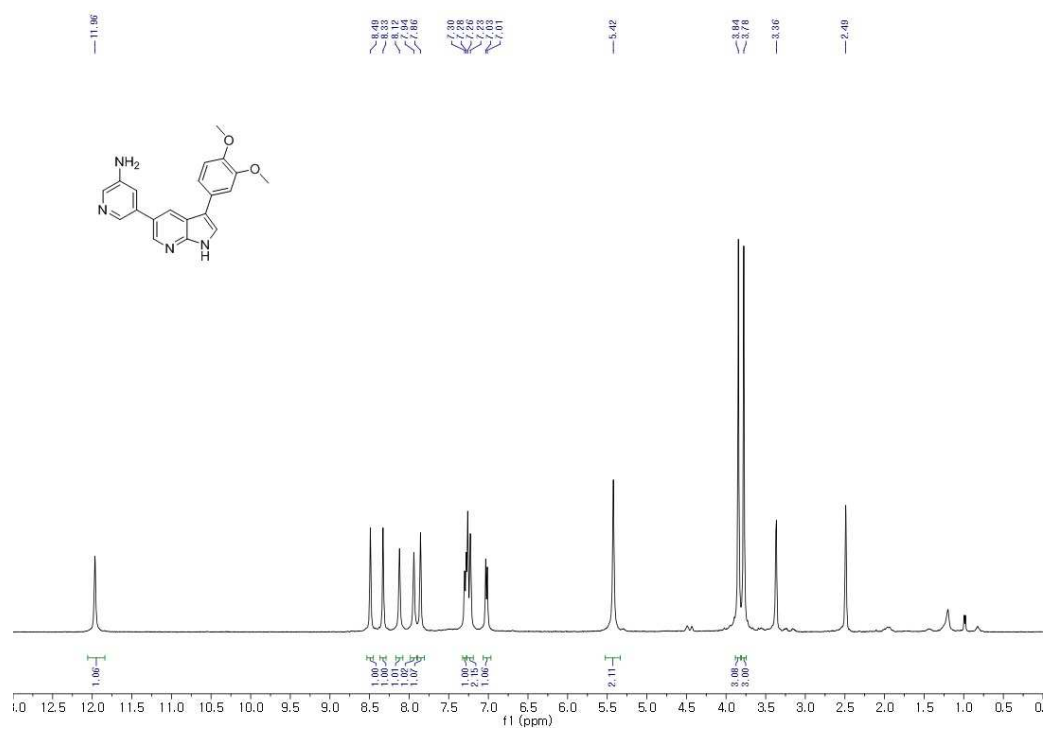
Totals : 3.69617e4 4209.14751

HPLC-Purity

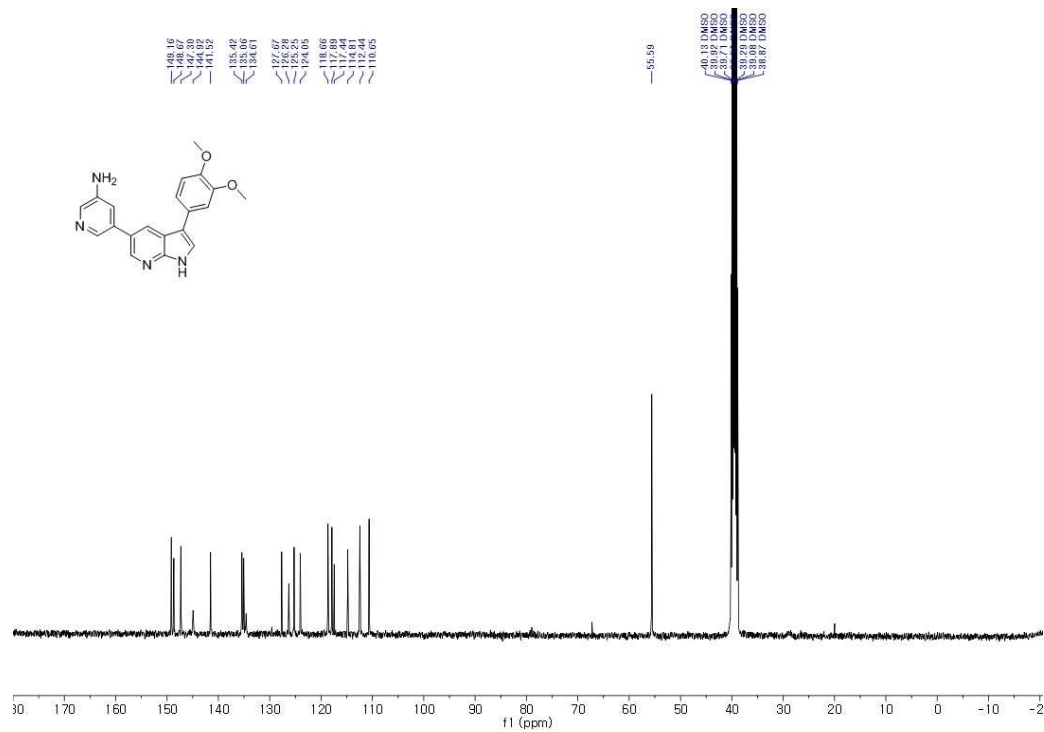


LR-MS

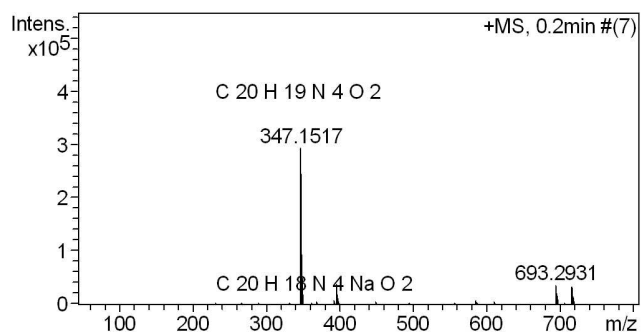
5-(3-(3,4-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)pyridin-3-amine (3).



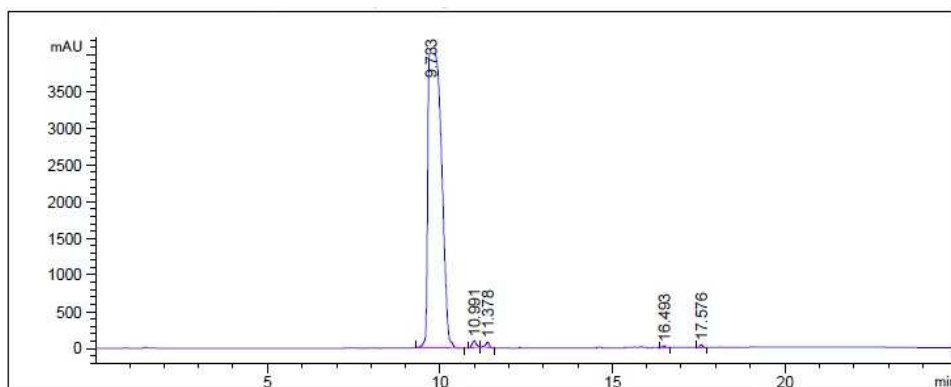
400 MHz, ¹H NMR in DMSO-*d*₆



100 MHz, ¹³C NMR in DMSO-*d*₆



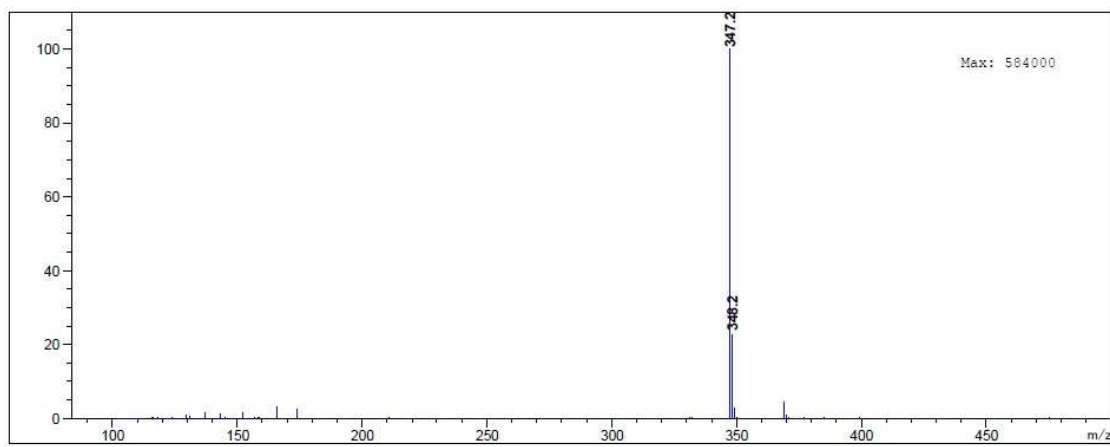
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.733	BB	0.3513	1.09998e5	4019.74512	98.4498
2	10.991	BB	0.1317	757.18665	89.47942	0.6777
3	11.378	BB	0.1165	571.83215	72.91047	0.5118
4	16.493	BB	0.0848	166.75168	29.58541	0.1492
5	17.576	BB	0.0827	236.28513	43.26823	0.2115

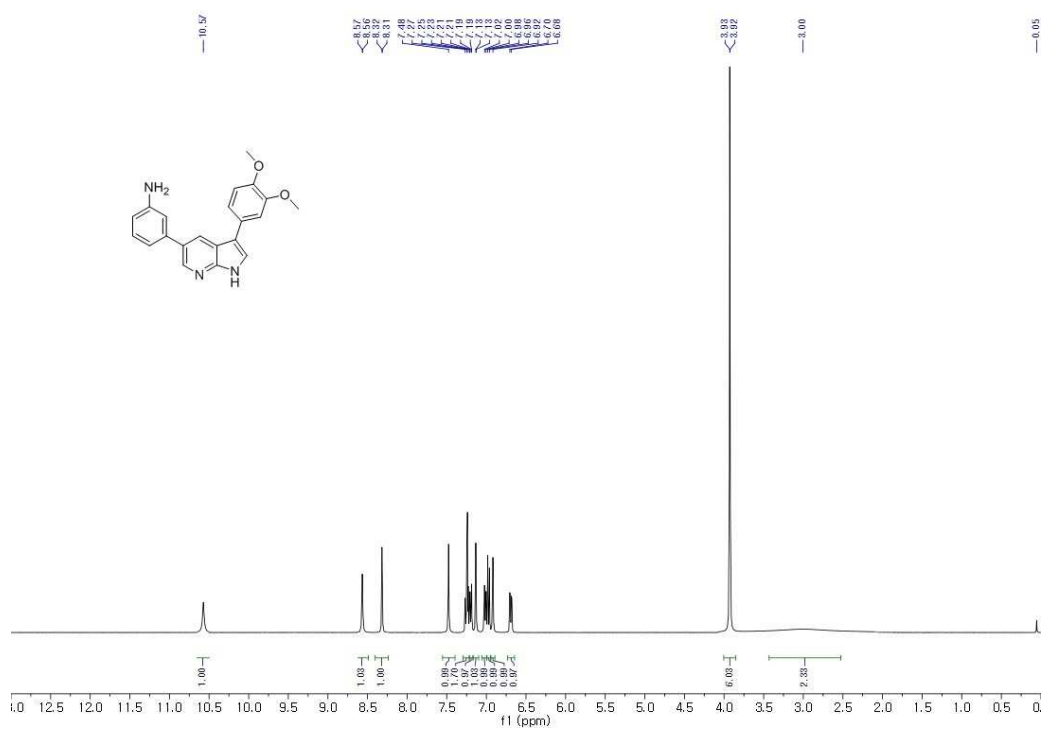
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HPLC-Purity

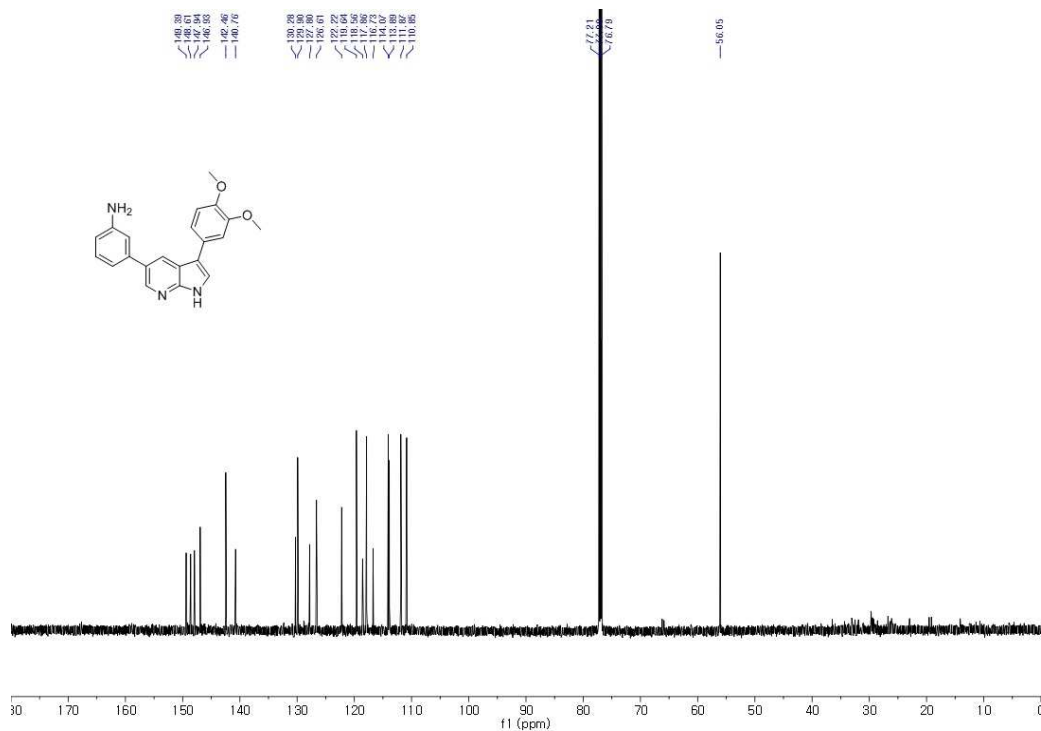


LR-MS

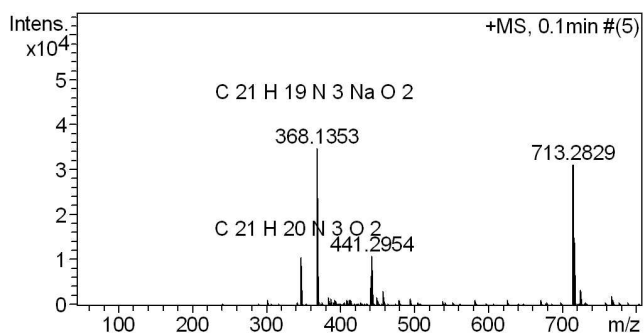
3-(3-(3,4-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)aniline (4).



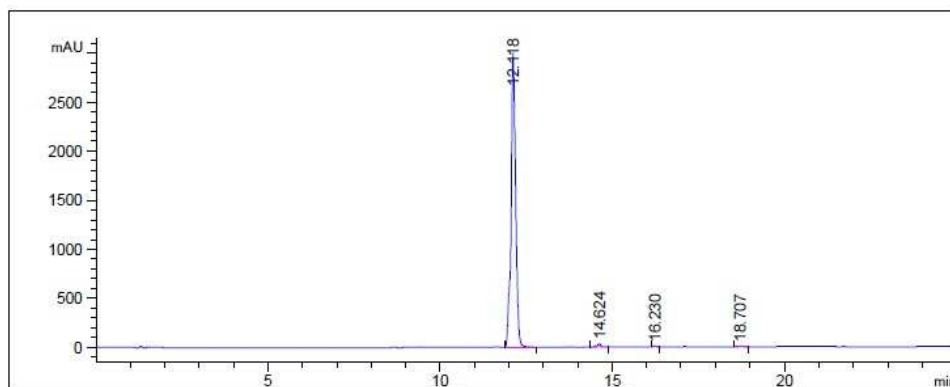
400MHz, ¹H NMR in Chloroform-*d*



150 MHz, ¹³C NMR in Chloroform-*d*



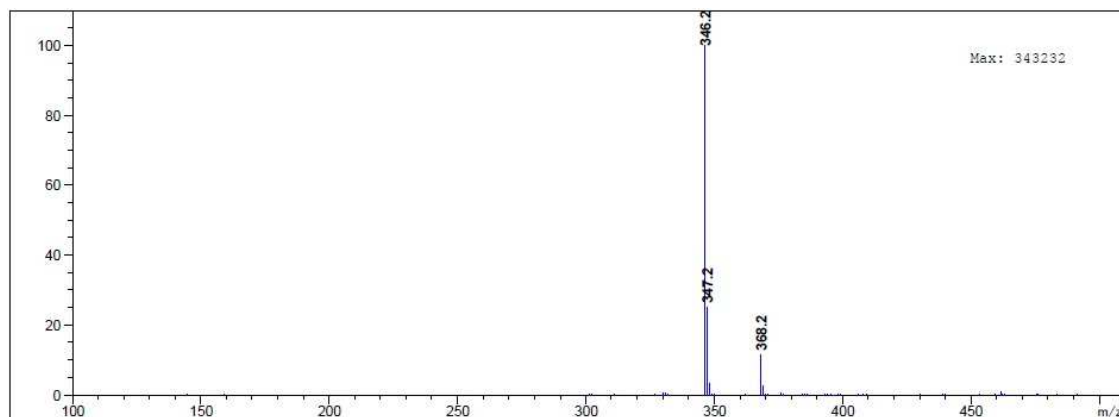
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.118	BB	0.1343	2.76159e4	3001.83496	98.8428
2	14.624	BB	0.1025	247.43184	34.14313	0.8856
3	16.230	BB	0.0765	40.52455	8.08526	0.1450
4	18.707	BB	0.0806	35.36348	6.48296	0.1266

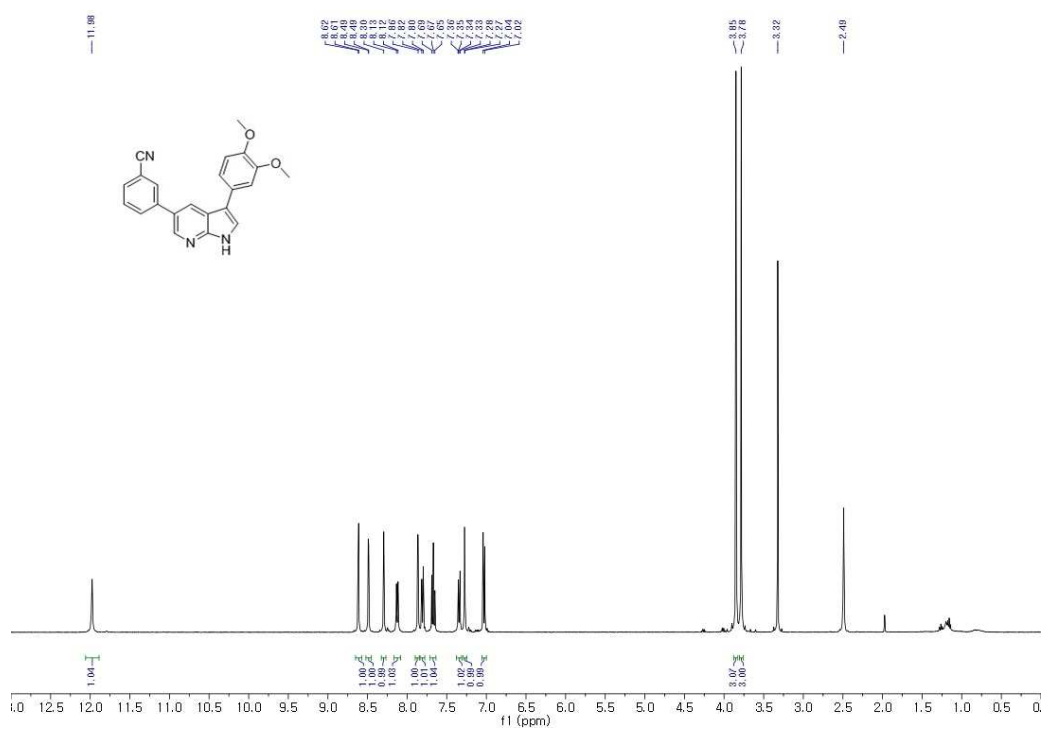
Totals : 2.79392e4 3050.54631

HPLC-Purity

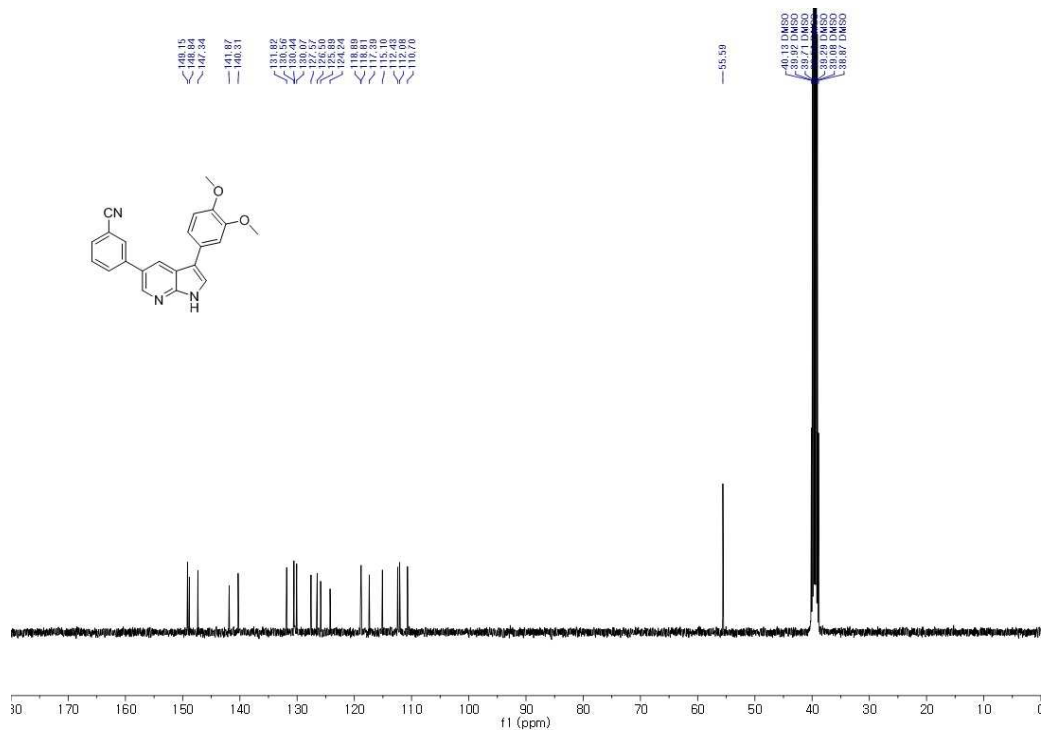


LR-MS

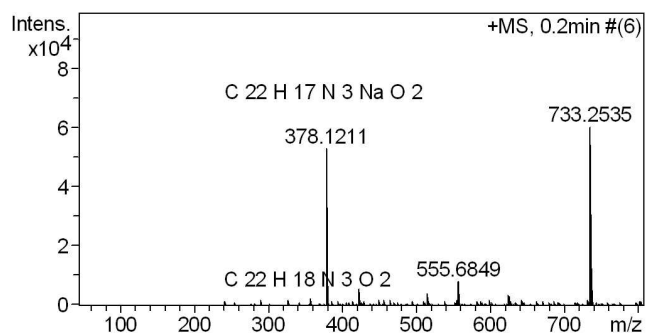
3-(3-(3,4-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)benzonitrile(5).



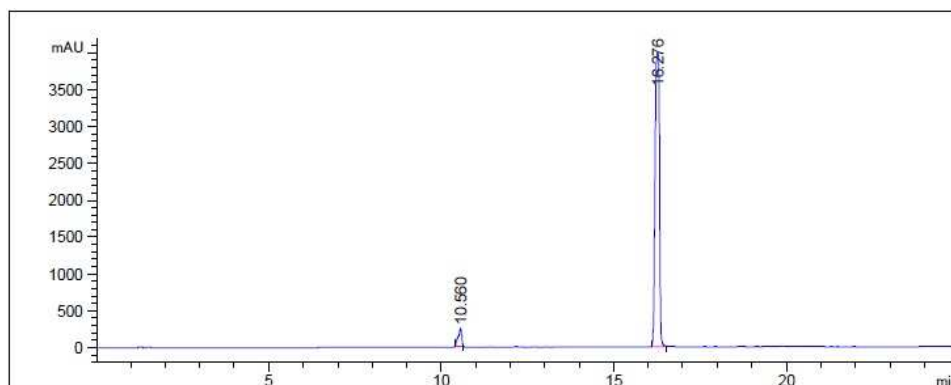
400 MHz, ¹H NMR in DMSO-*d*₆



100 MHz, ¹³C NMR in DMSO-*d*₆



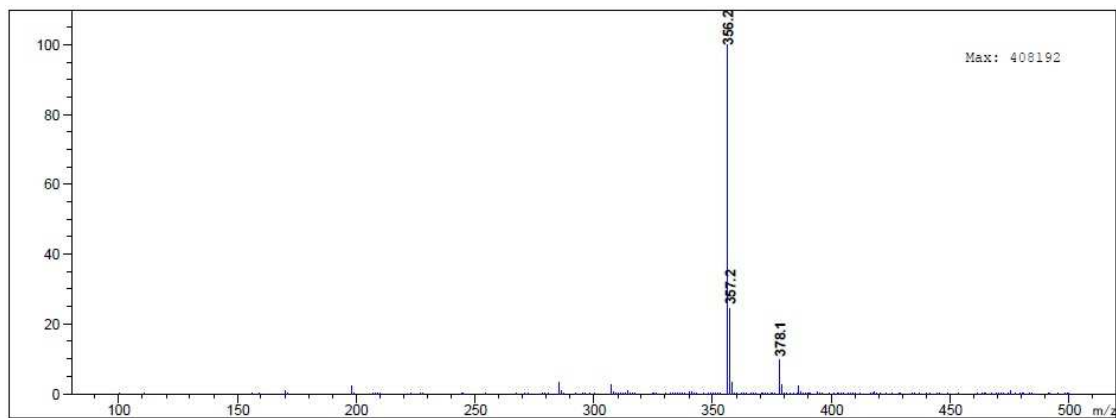
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.560	MM T	0.1167	1656.90430	236.65637	4.5392
2	16.276	MM T	0.1457	3.48454e4	3985.94775	95.4608

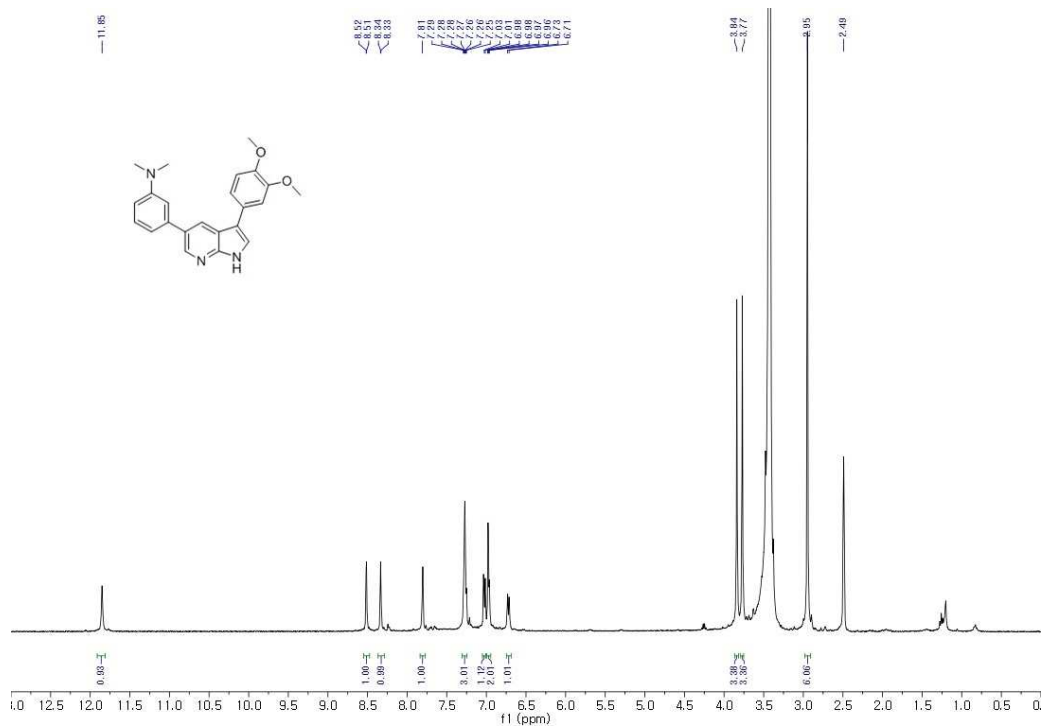
Totals : 3.65023e4 4222.60413

HPLC-Purity

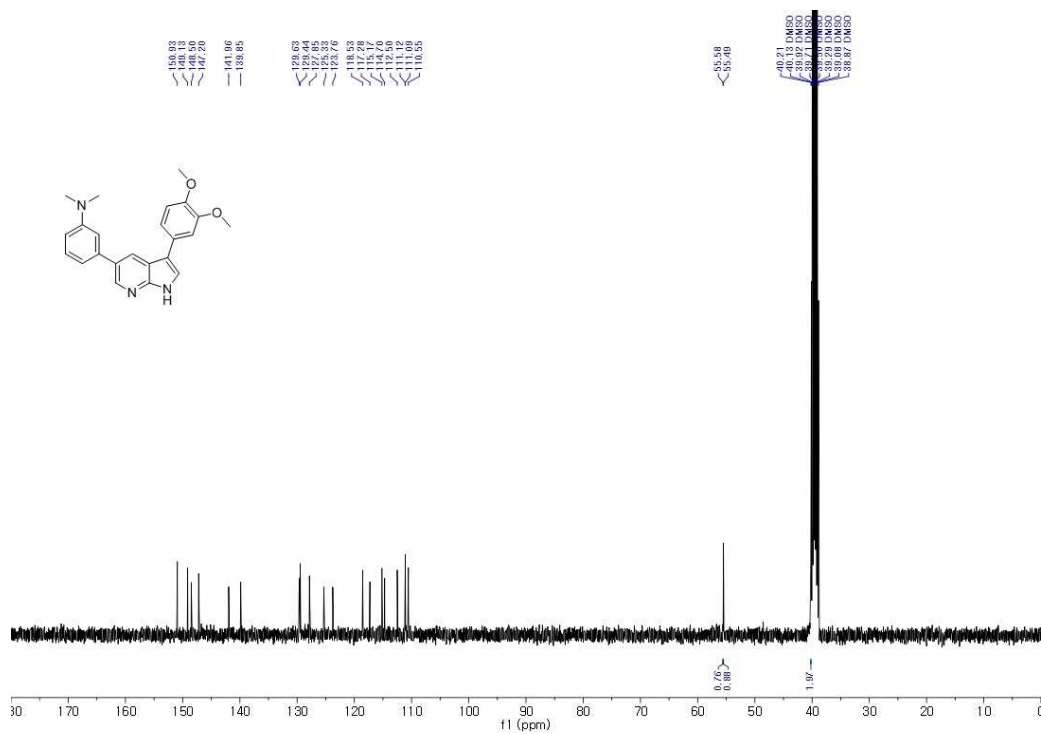


LR-MS

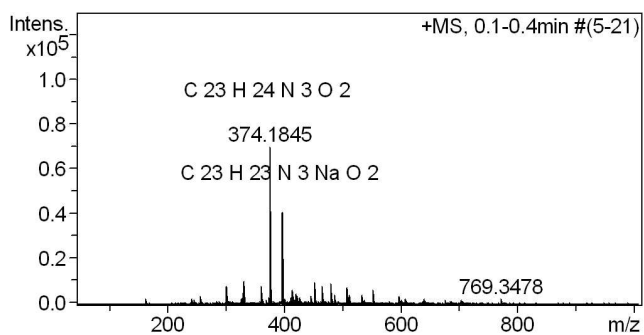
3-(3-(3,4-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)-N,N-dimethylaniline (6).



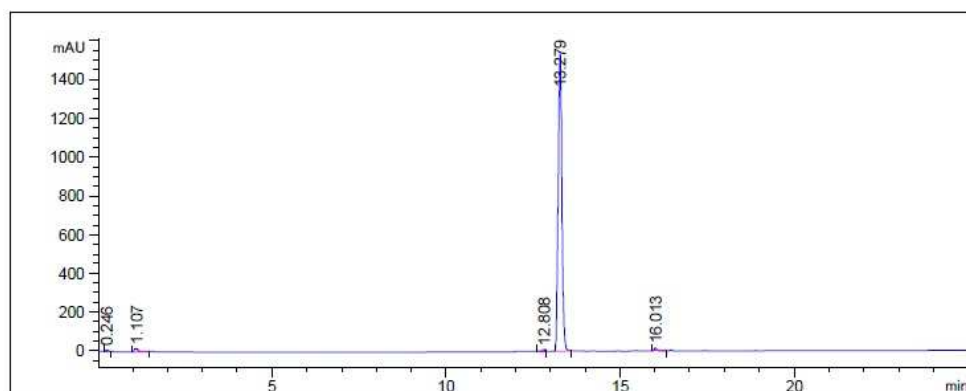
400 MHz, ¹H NMR in DMSO-*d*₆



100 MHz, ¹³C NMR in DMSO-*d*₆



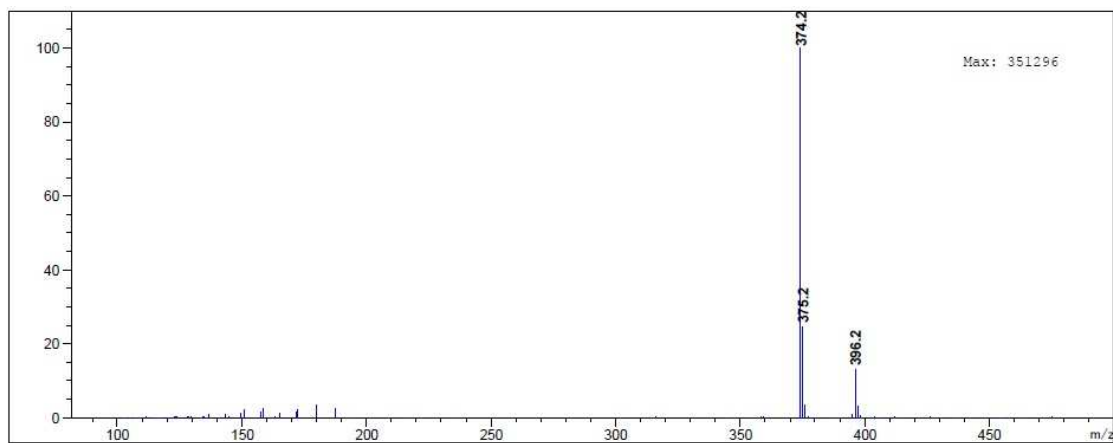
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	0.246	BB	0.0724	42.25634	8.16727	0.3606
2	1.107	BB	0.1082	130.89735	16.74431	1.1169
3	12.808	MM T	0.1033	51.54222	8.31225	0.4398
4	13.279	MM T	0.1240	1.14019e4	1532.07837	97.2930
5	16.013	BB	0.0885	92.53951	15.76269	0.7896

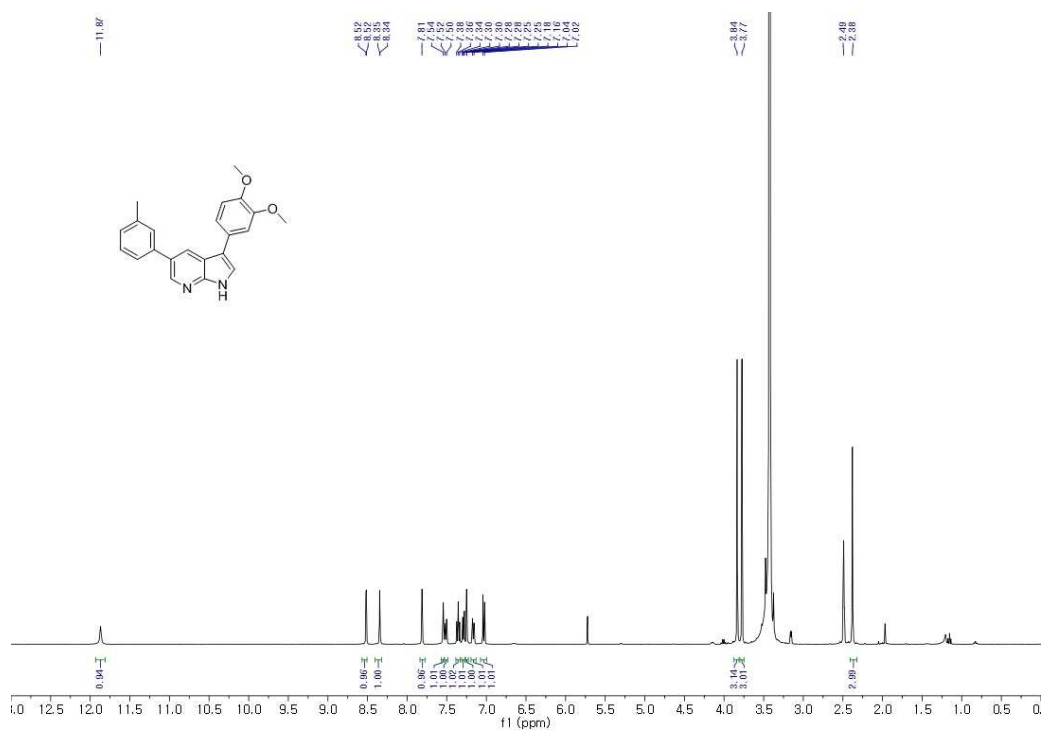
Totals : 1.17192e4 1581.06489

HPLC-Purity

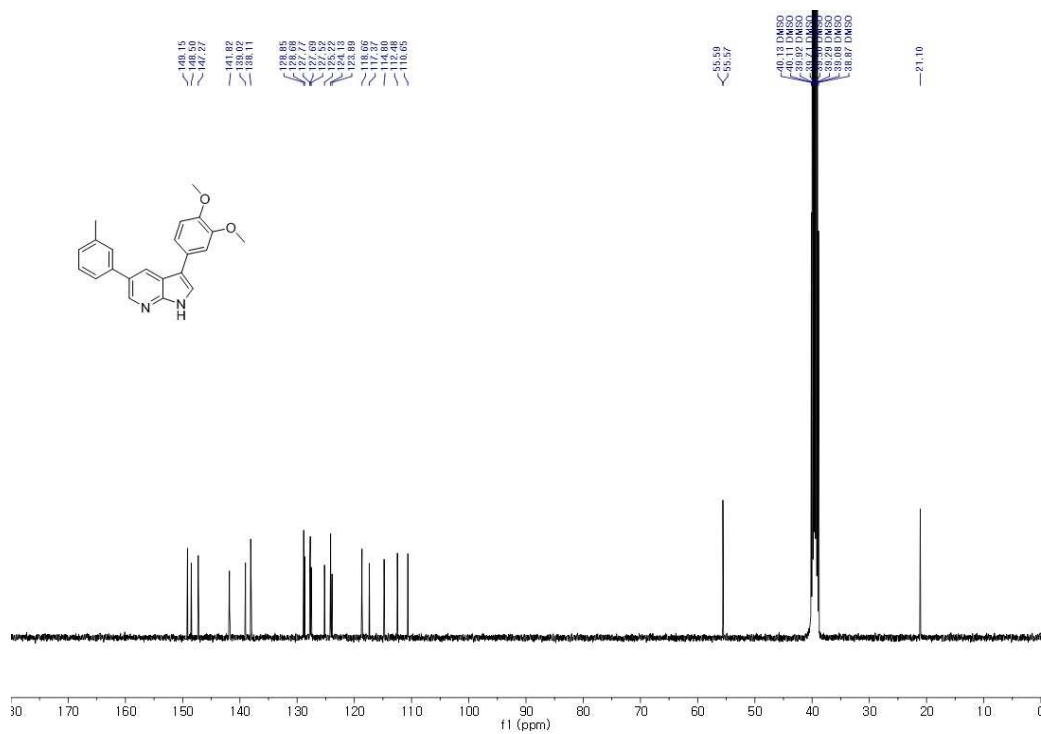


LR-MS

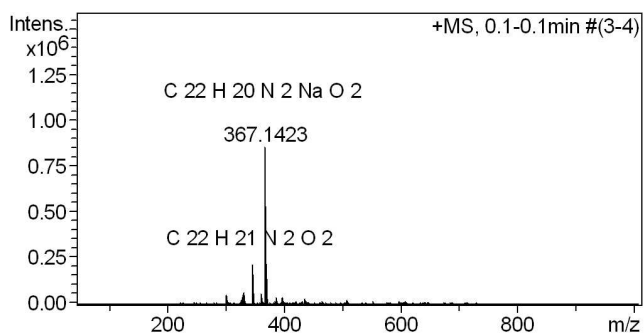
3-(3,4-Dimethoxyphenyl)-5-(*m*-tolyl)-1*H*-pyrrolo[2,3-*b*]pyridine (7).



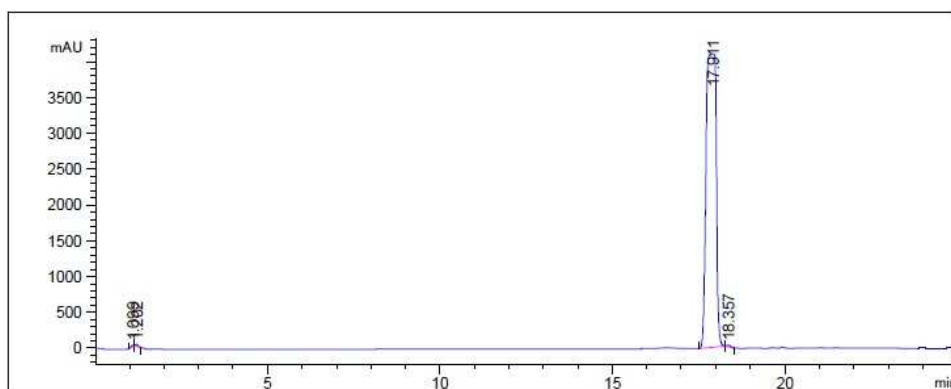
400 MHz, ^1H NMR in DMSO- d_6



100 MHz, ^{13}C NMR in DMSO- d_6



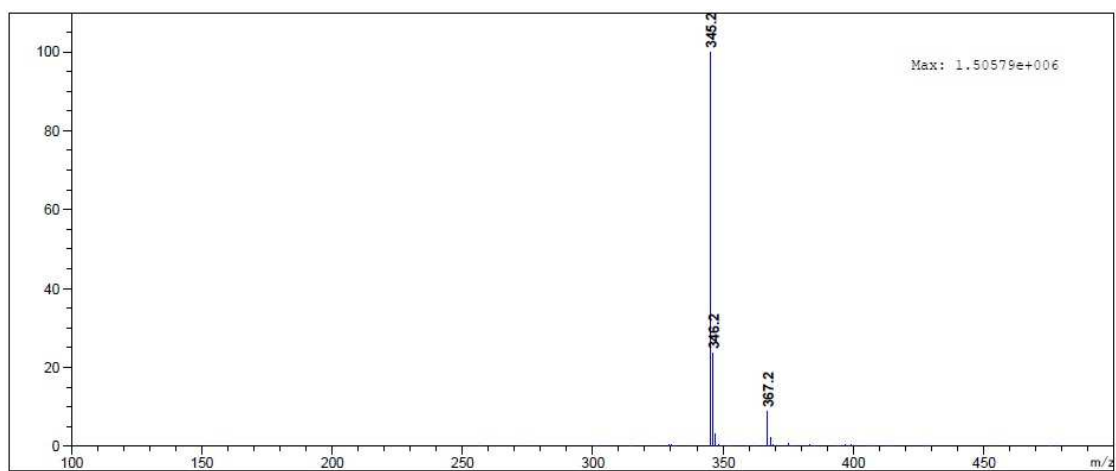
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.099	BB	0.0910	83.03332	14.25281	0.1003
2	1.202	BB	0.0819	125.21373	24.40127	0.1512
3	17.911	BB	0.2729	8.24417e4	4095.05688	99.5524
4	18.357	BB	0.1098	162.40508	21.33247	0.1961

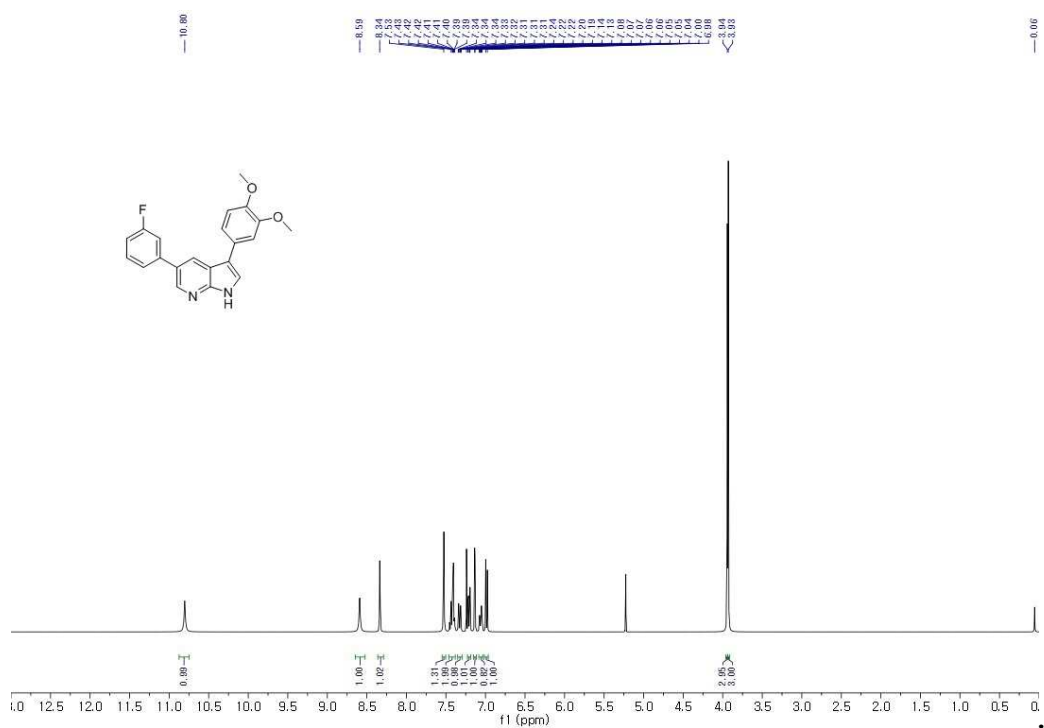
Totals : 8.28124e4 4155.04343

HPLC-Purity

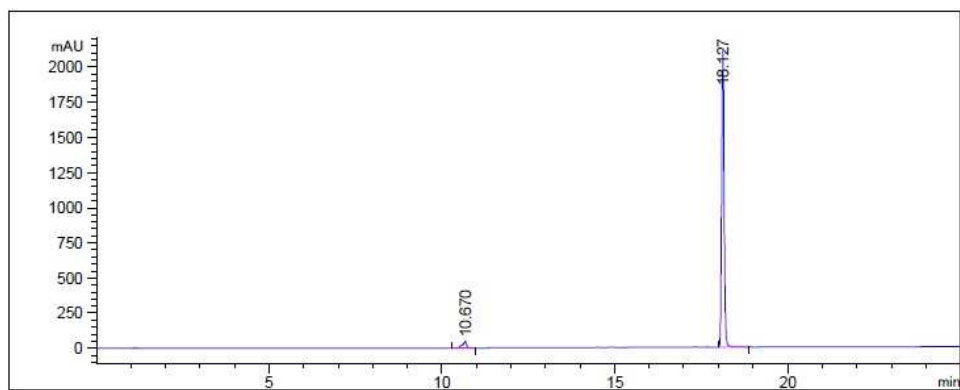


LR-MS

3-(3,4-Dimethoxyphenyl)-5-(3-fluorophenyl)-1H-pyrrolo[2,3-b]pyridine (8)

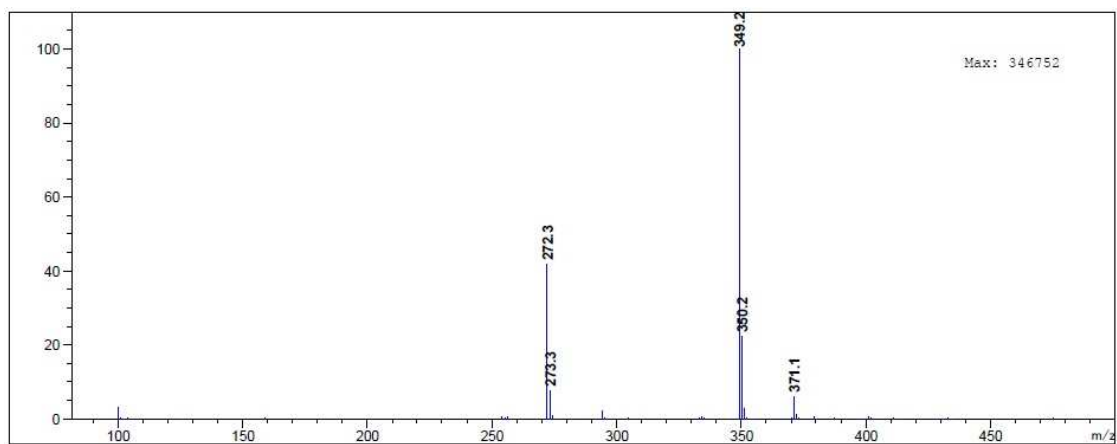


400MHz, ¹H NMR in Chloroform-*d*



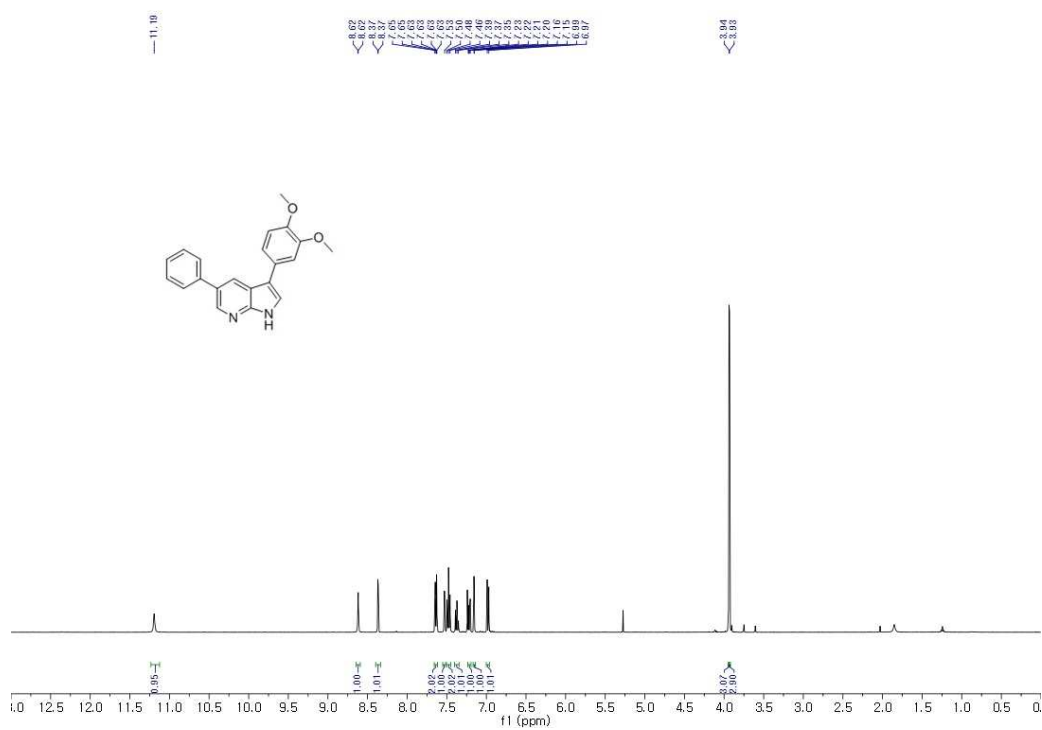
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.670	BB	0.1130	372.23685	46.19079	3.5129
2	18.127	BB	0.0750	1.02241e4	2093.39966	96.4871
Totals :				1.05964e4	2139.59045	

HPLC-Purity

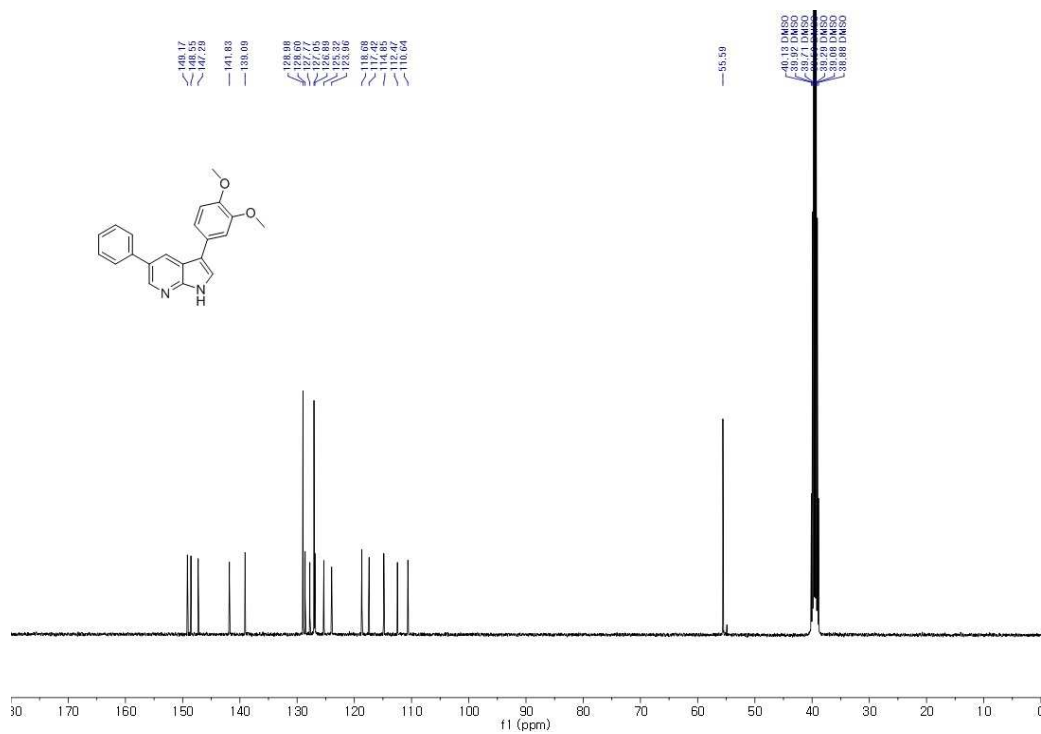


LR-MS

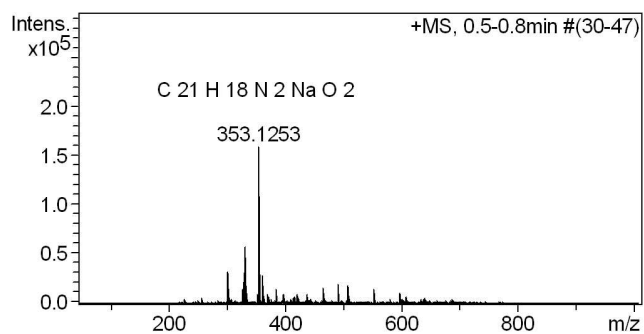
3-(3,4-Dimethoxyphenyl)-5-phenyl-1H-pyrrolo[2,3-b]pyridine (9).



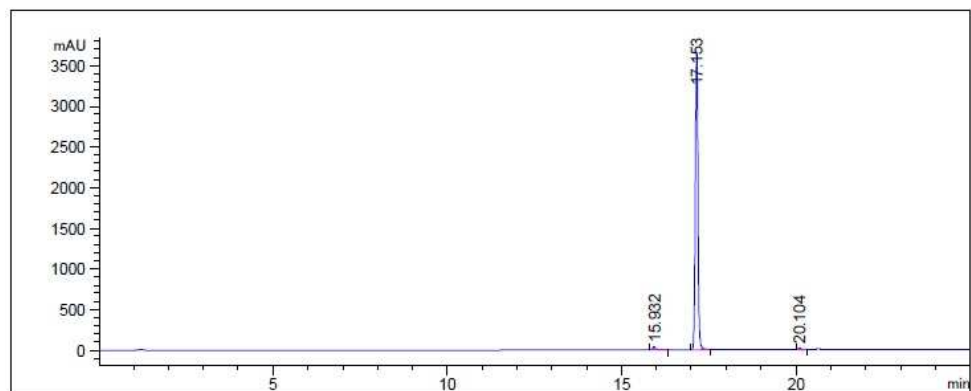
400MHz, ^1H NMR in Chloroform-*d*



100 MHz, ^{13}C NMR in DMSO- d_6



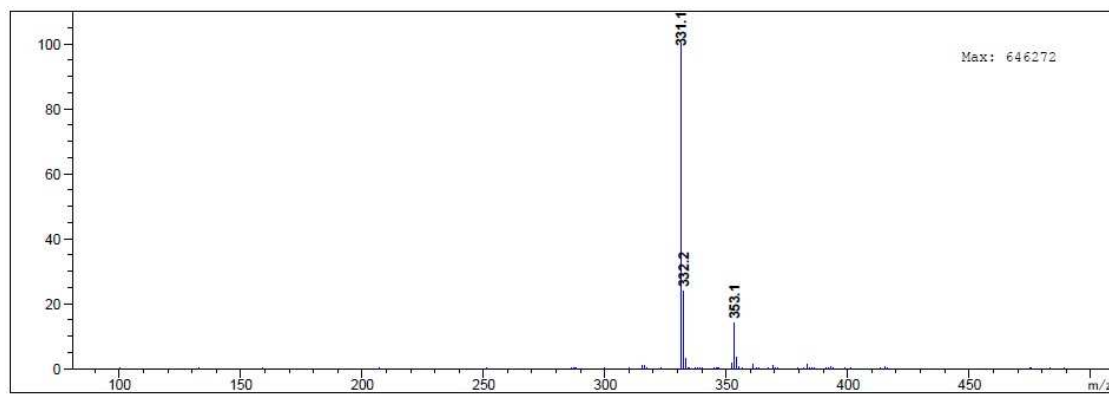
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	15.932	BB	0.0805	214.76395	40.11813	1.0982
2	17.153	BB	0.0824	1.92624e4	3659.06616	98.5006
3	20.104	BB	0.0773	78.45348	15.16683	0.4012

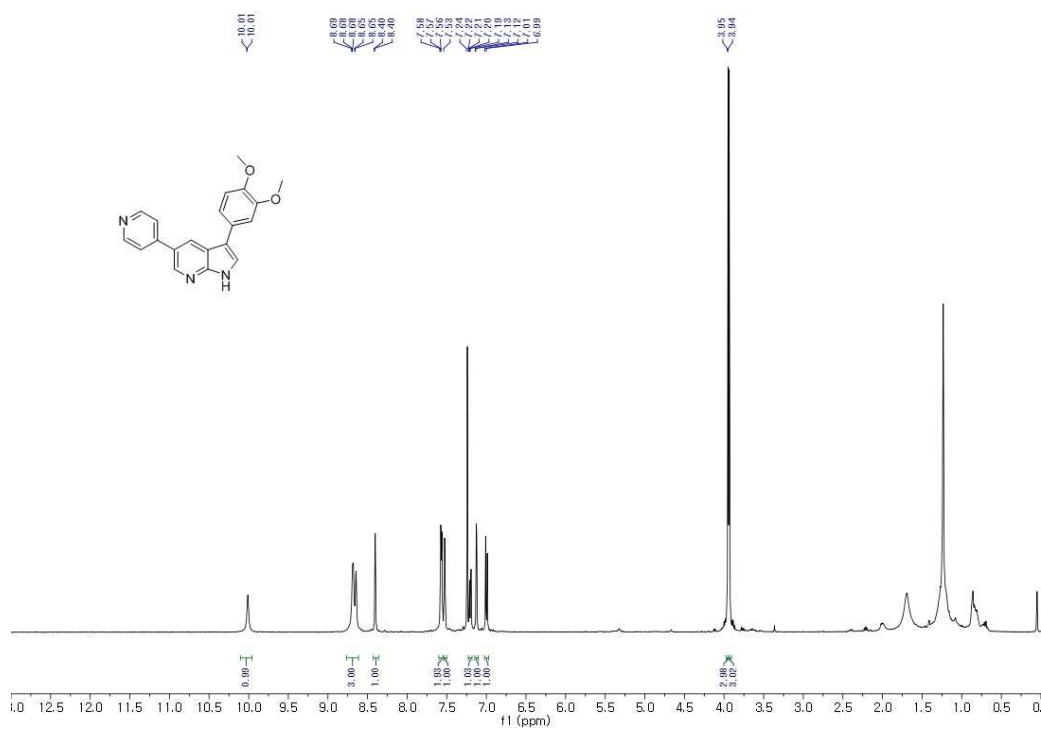
Totals : 1.95556e4 3714.35112

HPLC-Purity

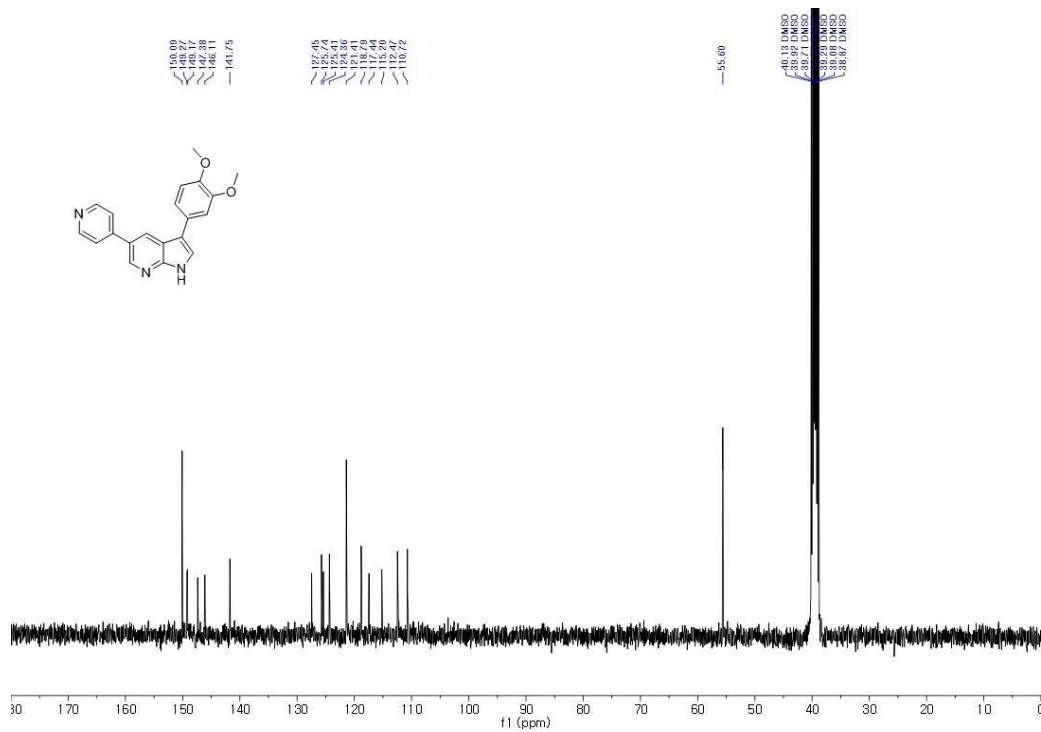


LR-MS

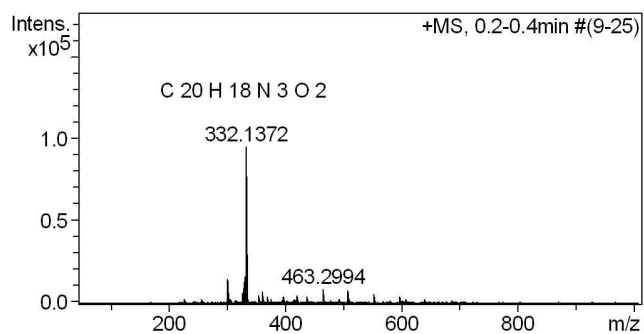
3-(3,4-Dimethoxyphenyl)-5-(pyridin-4-yl)-1H-pyrrolo[2,3-b]pyridine (10).



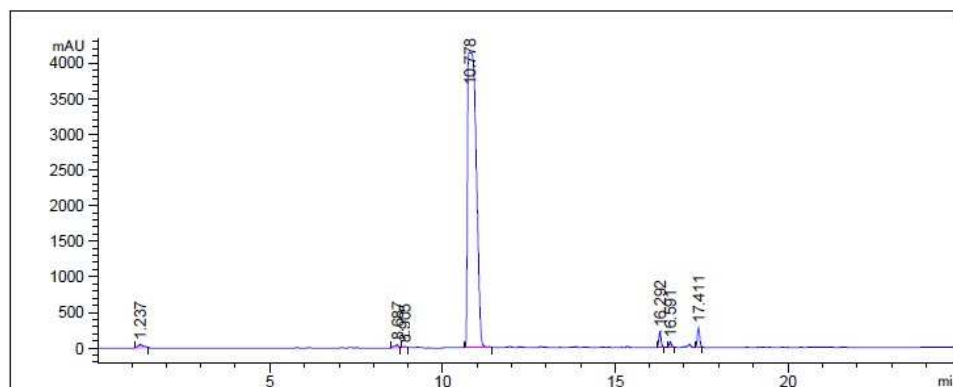
400MHz, ¹H NMR in Chloroform-d



100 MHz, ¹³C NMR in DMSO-d₆



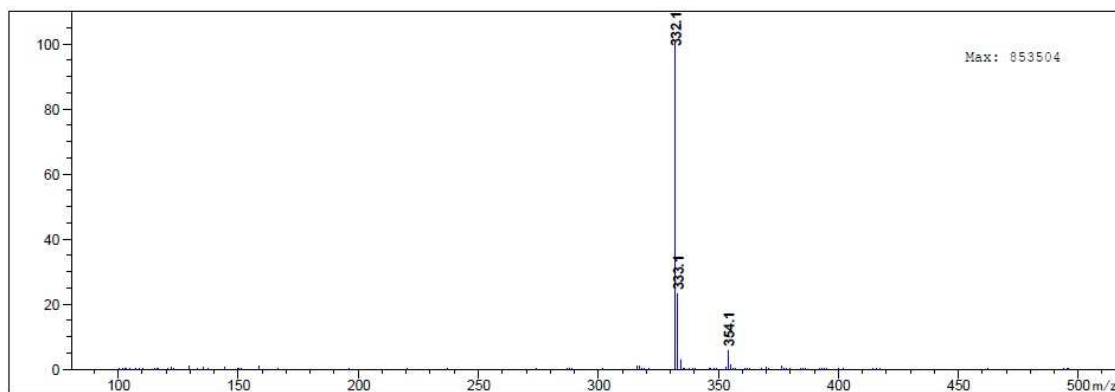
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.237	MM T	0.1738	519.71863	48.66326	0.6852
2	8.687	MM T	0.1328	325.94653	40.90494	0.4297
3	8.905	BB	0.0939	89.44854	15.13894	0.1179
4	10.778	MM T	0.2908	7.22738e4	4142.93115	95.2890
5	16.292	MM T	0.0733	971.92487	220.96599	1.2814
6	16.591	MM	0.0739	353.70786	79.74953	0.4663
7	17.411	MM	0.0798	1312.43640	273.97653	1.7304

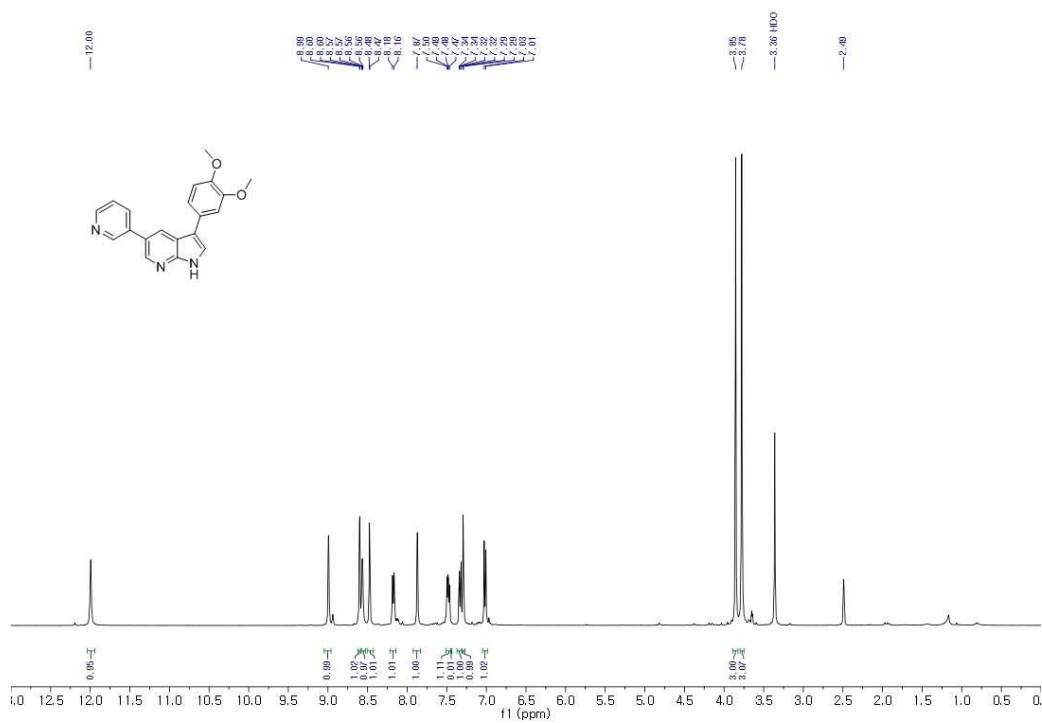
Totals : 7.58469e4 4822.33035

HPLC-Purity

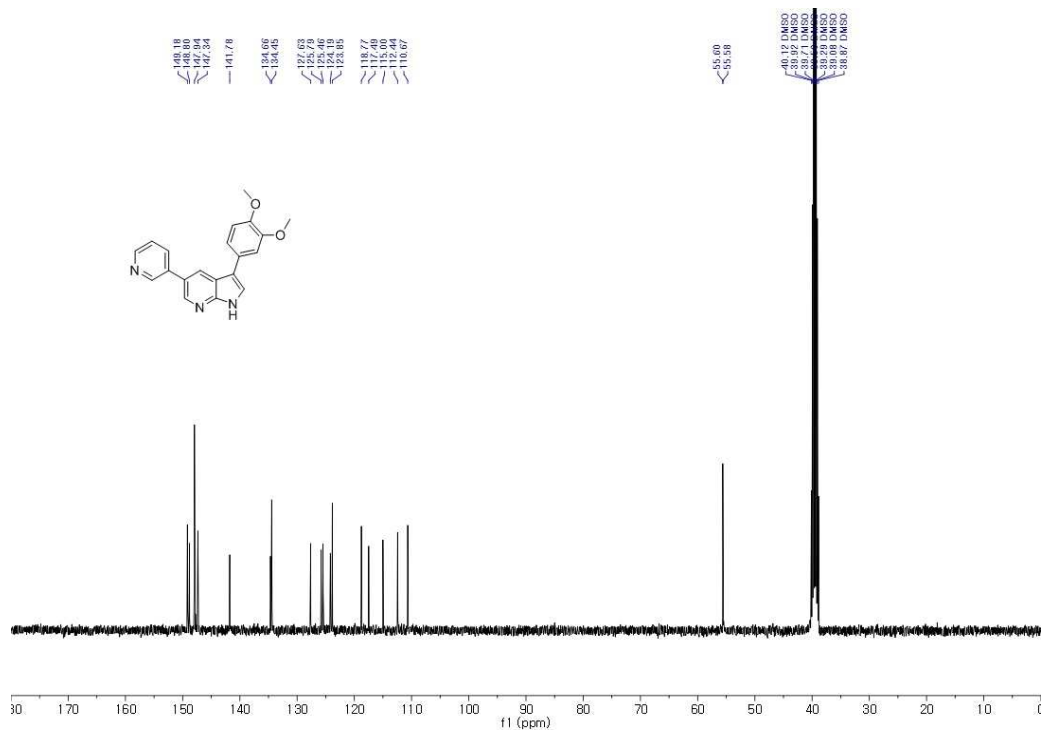


LR-MS

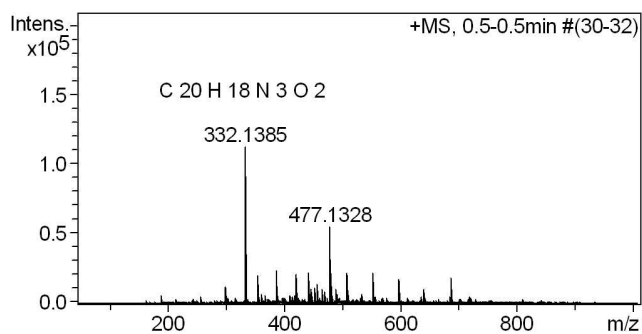
3-(3,4-Dimethoxyphenyl)-5-(pyridin-3-yl)-1H-pyrrolo[2,3-b]pyridine (11).



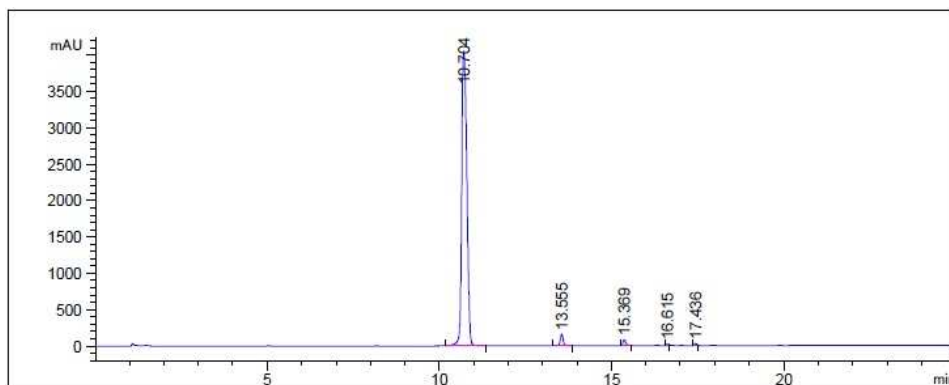
400 MHz, ¹H NMR in DMSO-d₆



100 MHz, ¹³C NMR in DMSO-d₆



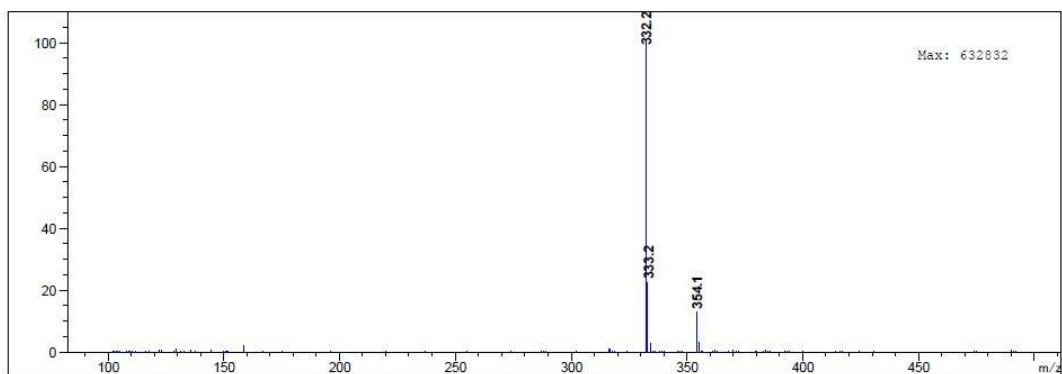
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.704	BB	0.1653	4.20592e4	4044.42236	96.2626
2	13.555	BB	0.0881	890.94788	157.14629	2.0391
3	15.369	MM T	0.0952	511.51480	89.55718	1.1707
4	16.615	MM T	0.0735	87.67804	19.88491	0.2007
5	17.436	MM T	0.0783	142.82309	30.39670	0.3269

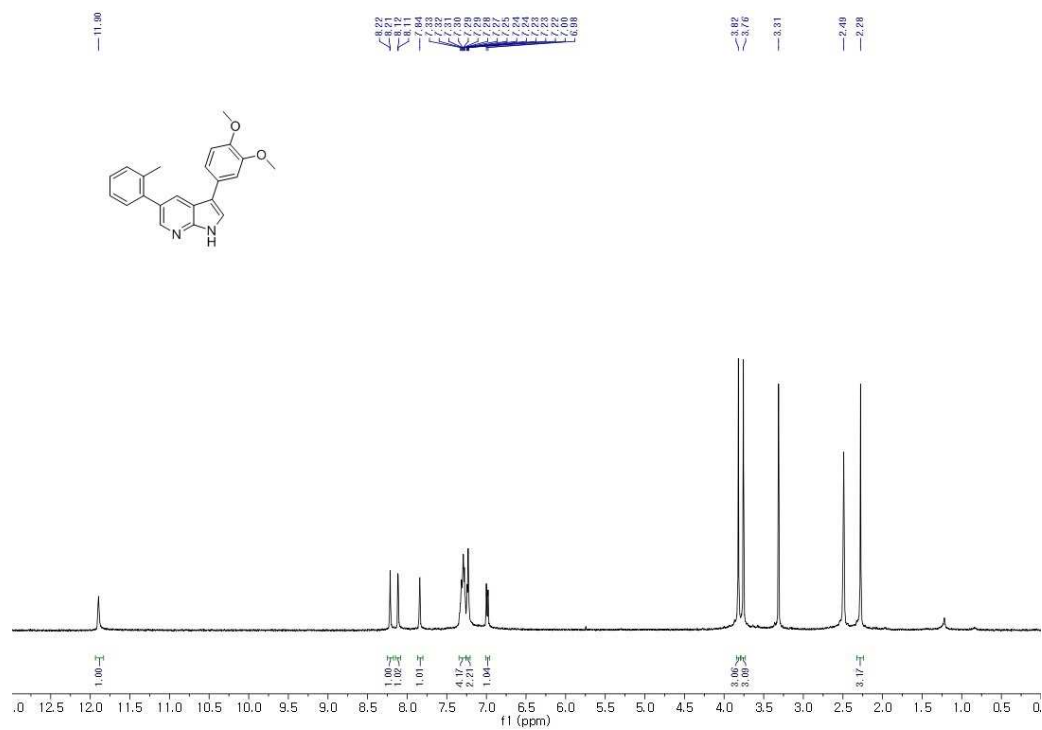
Totals : 4.36922e4 4341.40745

HPLC-Purity

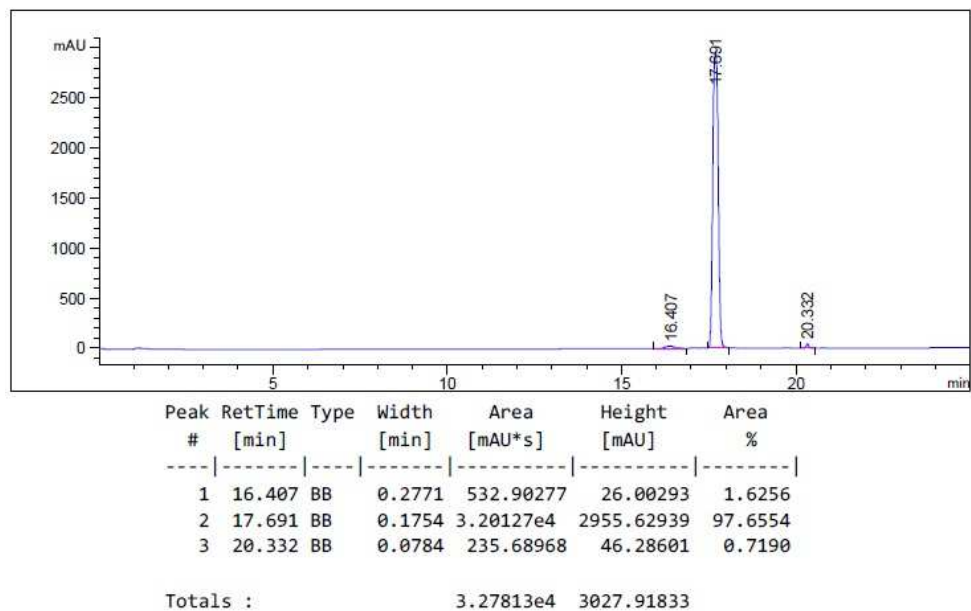


LR-MS

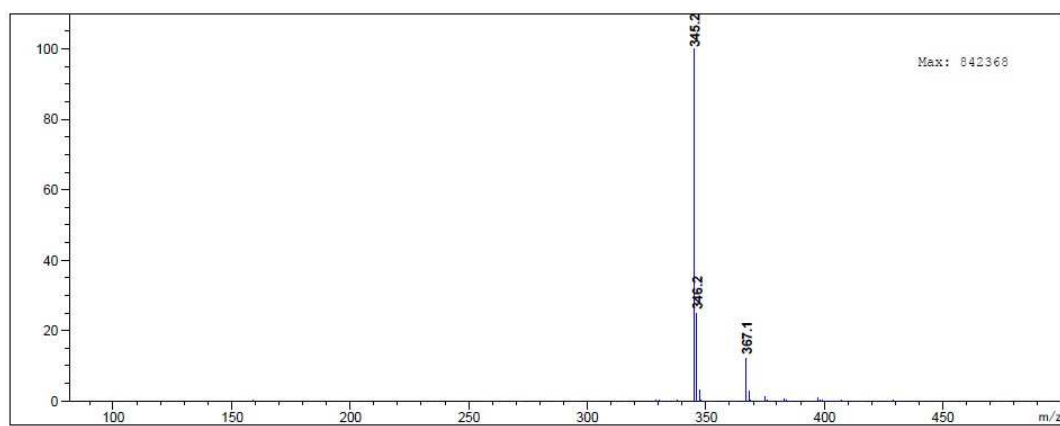
3-(3,4-Dimethoxyphenyl)-5-o-tolyl-1H-pyrrolo[2,3-b]pyridine (12).



400 MHz, ¹H NMR in DMSO-d₆

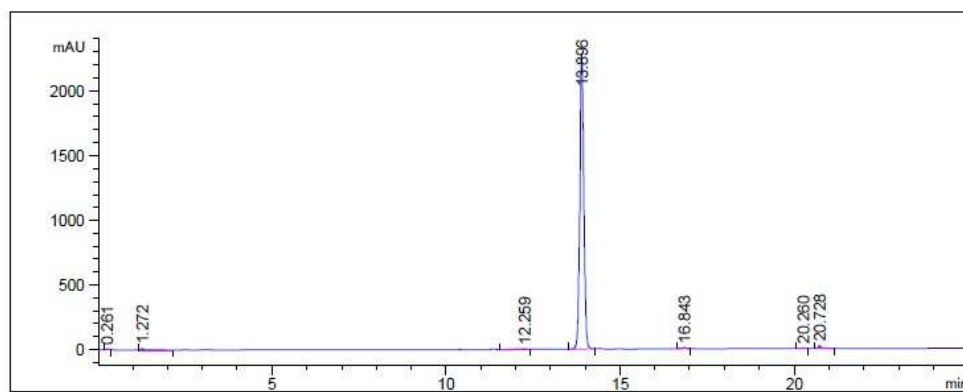
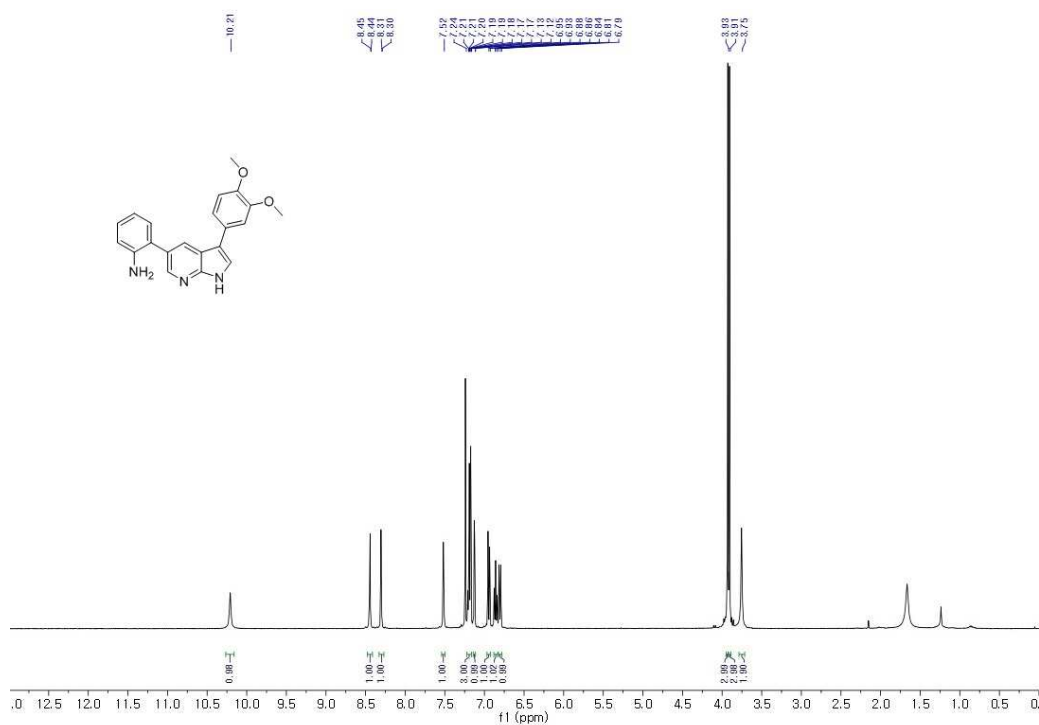


HPLC-Purity



LR-MS

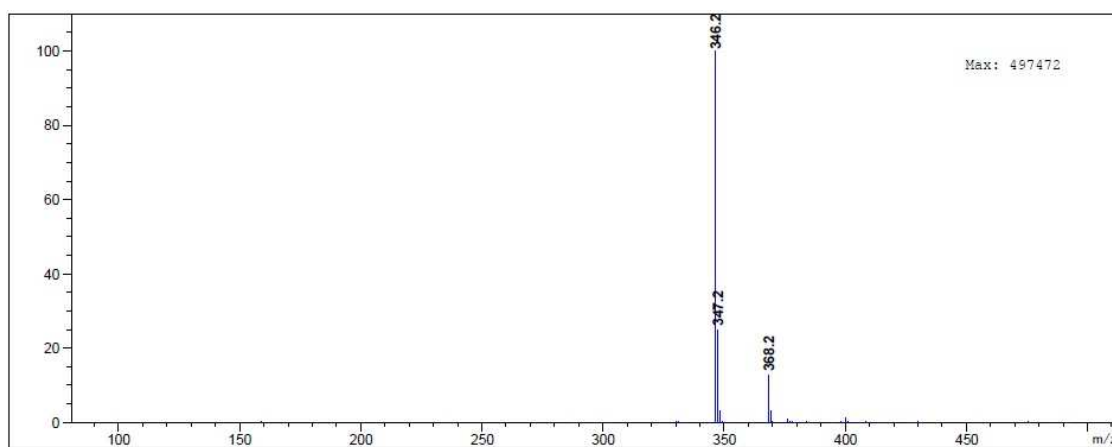
2-(3-(3,4-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)aniline (13).



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	0.261	BB	0.0700	35.45463	7.25414	0.1918
2	1.272	BB	0.0807	72.99140	12.56935	0.3948
3	12.259	BB	0.1267	51.47653	5.52631	0.2785
4	13.896	BB	0.1186	1.81215e4	2284.27173	98.0247
5	16.843	BB	0.0903	63.12873	10.62380	0.3415
6	20.260	BB	0.0717	22.20350	4.73192	0.1201
7	20.728	BB	0.0981	119.91526	17.67630	0.6487

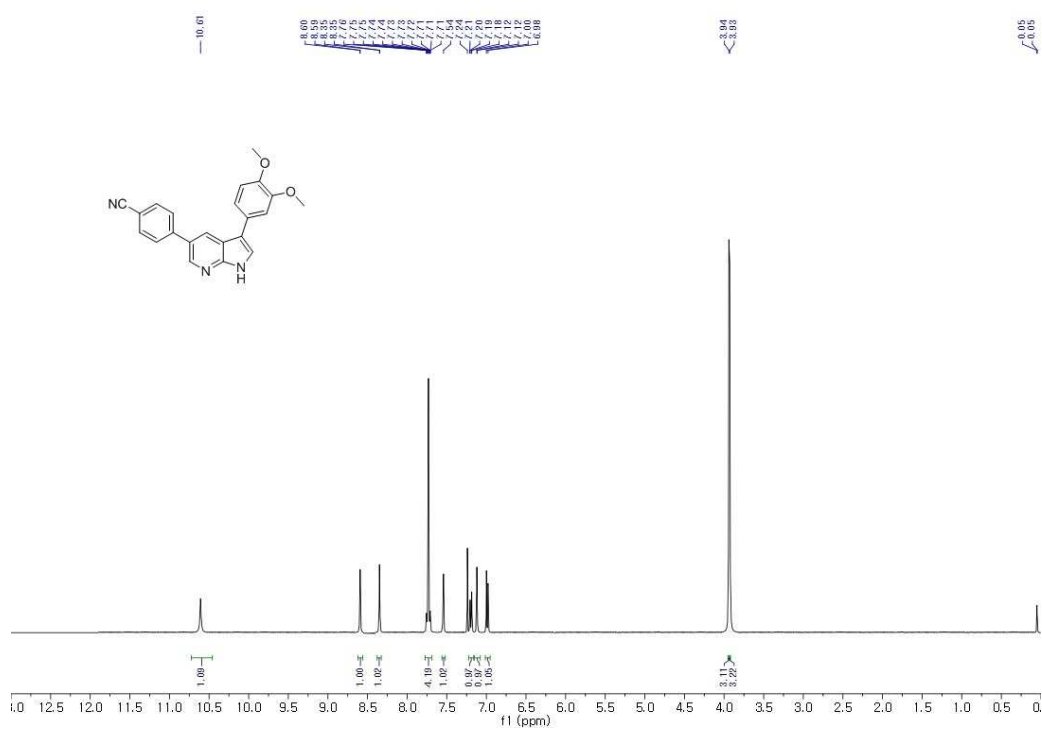
Totals : 1.84867e4 2342.65356

HPLC-Purity

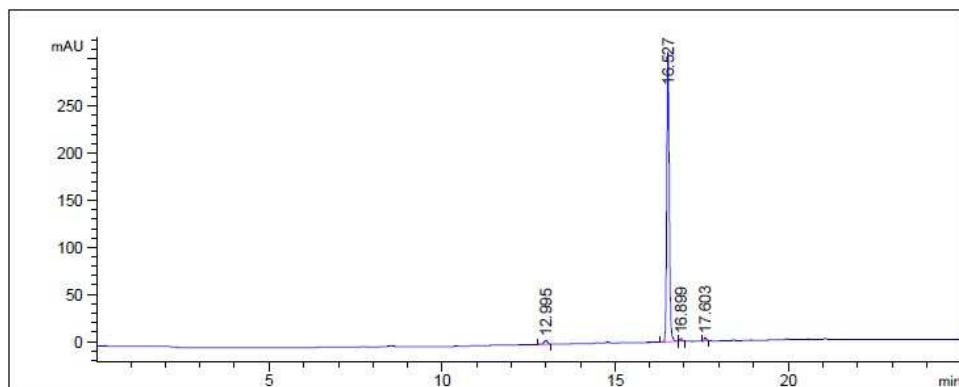


LR-MS

4-(3-(3,4-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)benzonitrile (14).



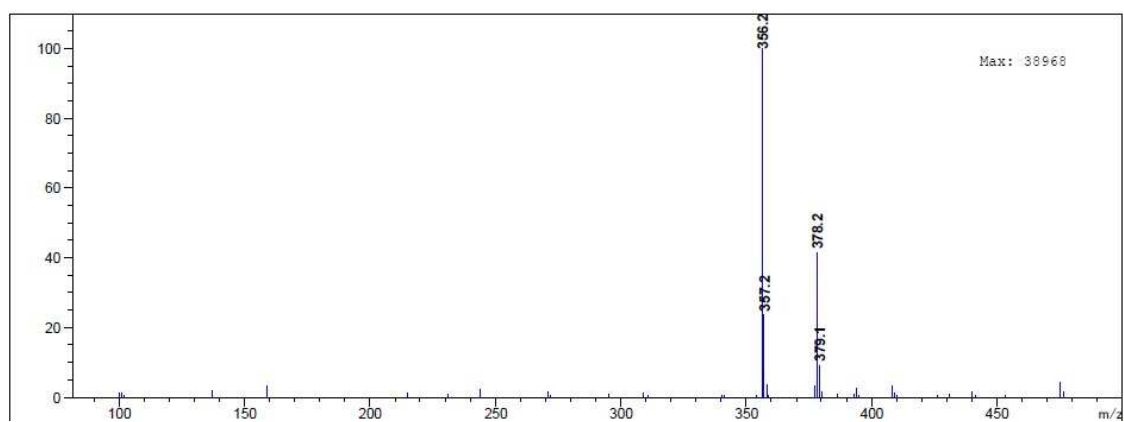
400MHz, ¹H NMR in Chloroform-d



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.995	BB	0.0999	28.71048	4.35517	1.7891
2	16.527	BB	0.0775	1545.60620	308.04178	96.3134
3	16.899	BB	0.0741	14.25901	3.02136	0.8885
4	17.603	BB	0.0749	16.19145	3.43986	1.0090

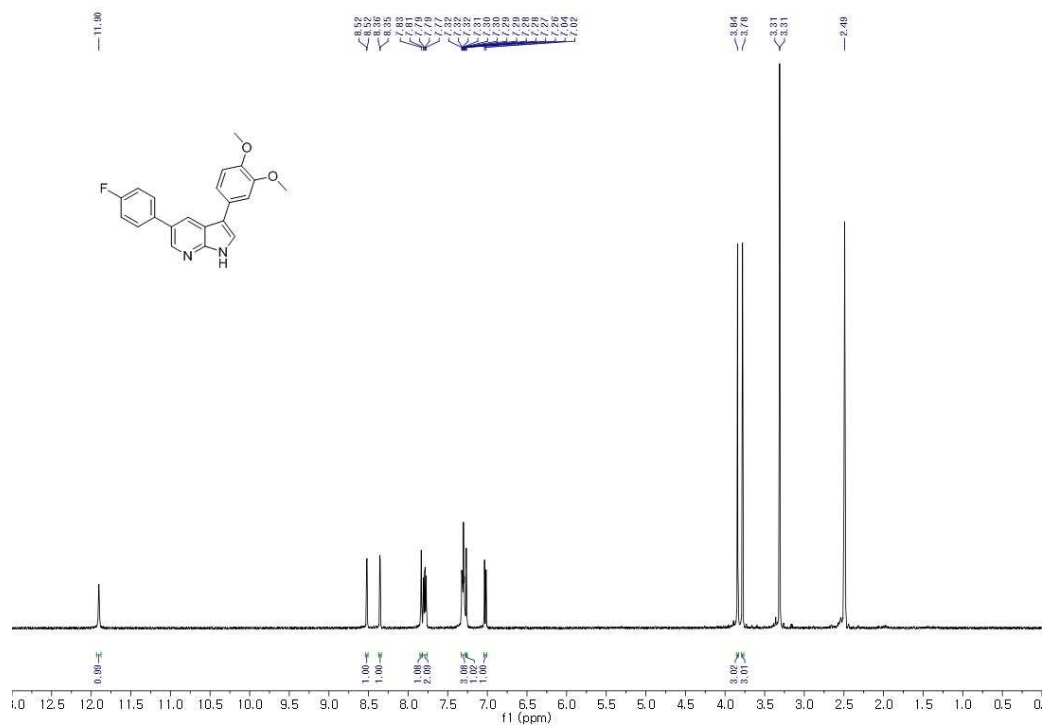
Totals : 1604.76713 318.85816

HPLC-Purity

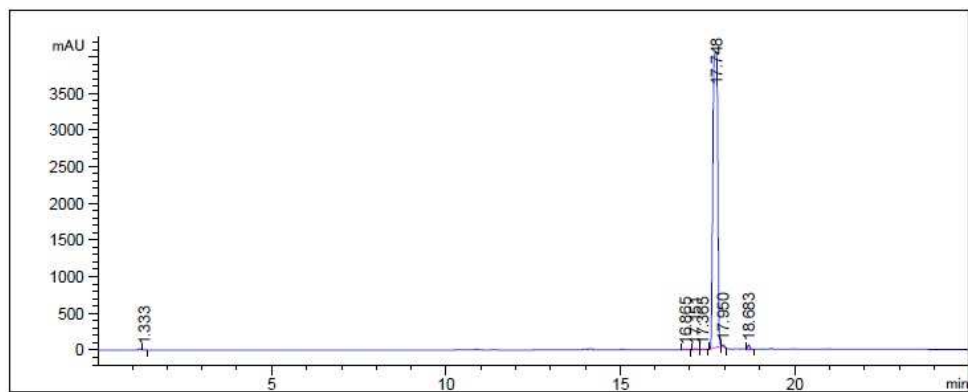


LR-MS

3-(3,4-Dimethoxyphenyl)-5-(4-fluorophenyl)-1H-pyrrolo[2,3-b]pyridine (15).



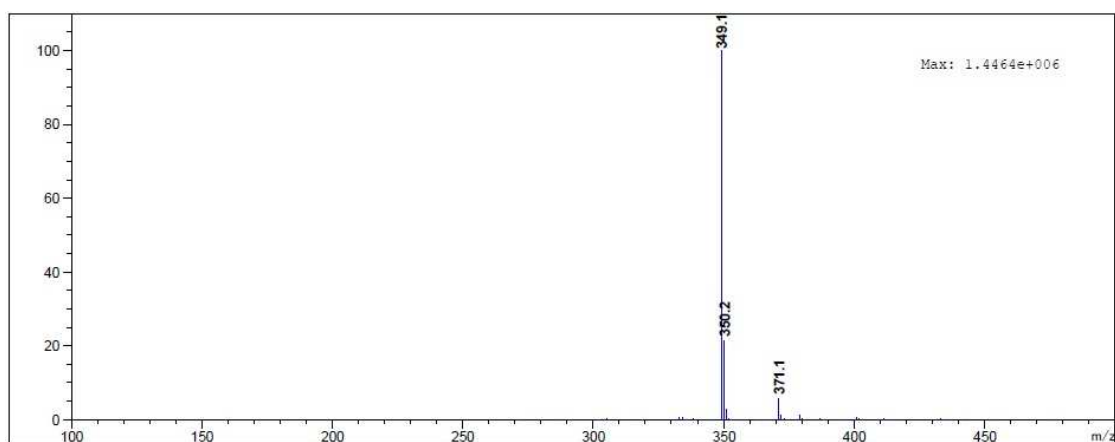
400 MHz, ¹H NMR in DMSO-*d*₆



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.333	BB	0.0647	10.44426	2.50038	0.0271
2	16.865	BB	0.0849	26.20078	4.71307	0.0680
3	17.151	BB	0.0796	46.02241	9.00186	0.1194
4	17.365	BB	0.0935	16.06758	2.48312	0.0417
5	17.748	BB	0.1543	3.80869e4	4030.25317	98.8242
6	17.950	BB	0.0671	104.59222	24.86839	0.2714
7	18.683	BB	0.0670	249.81238	58.24056	0.6482

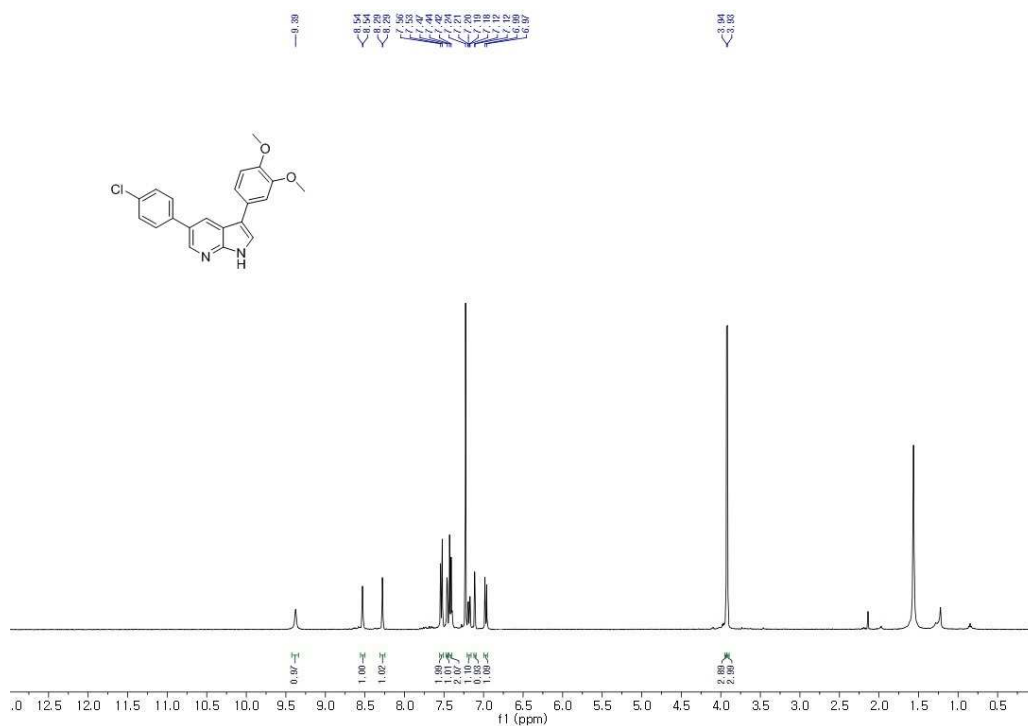
Totals : 3.85401e4 4132.06054

HPLC-Purity

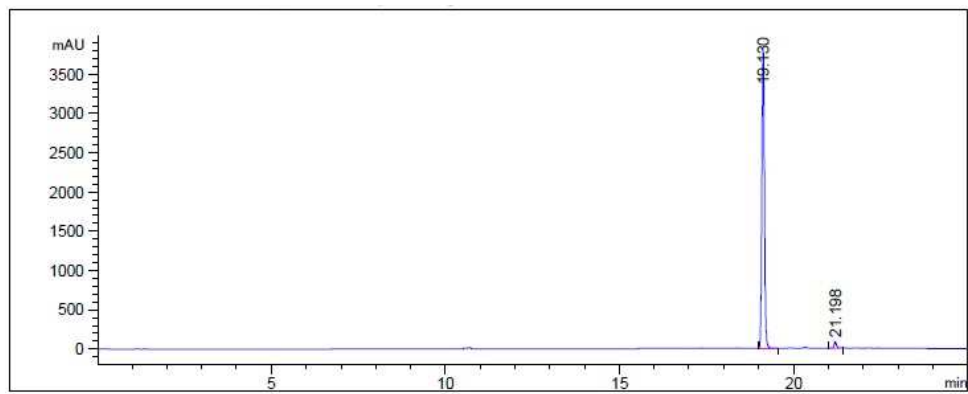


LR-MS

5-(4-Chlorophenyl)-3-(3,4-dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridine (16)

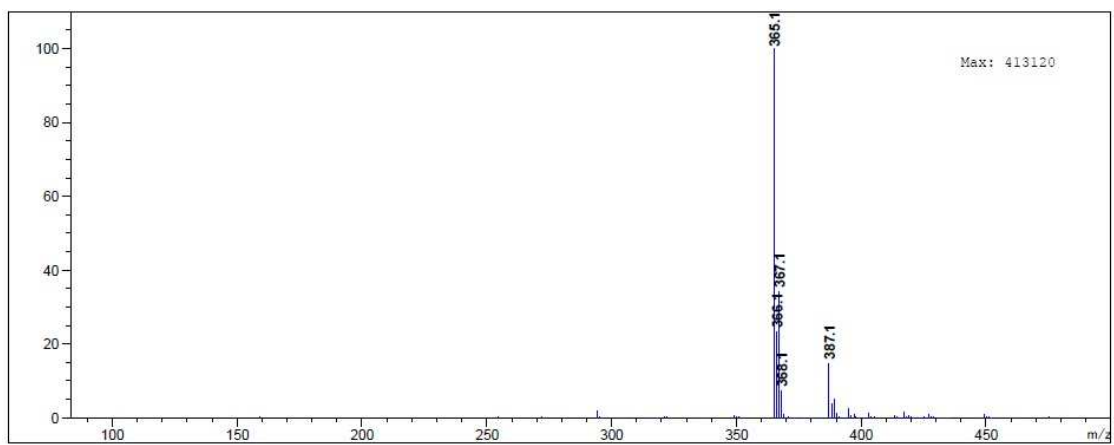


400MHz, ¹H NMR in Chloroform-*d*



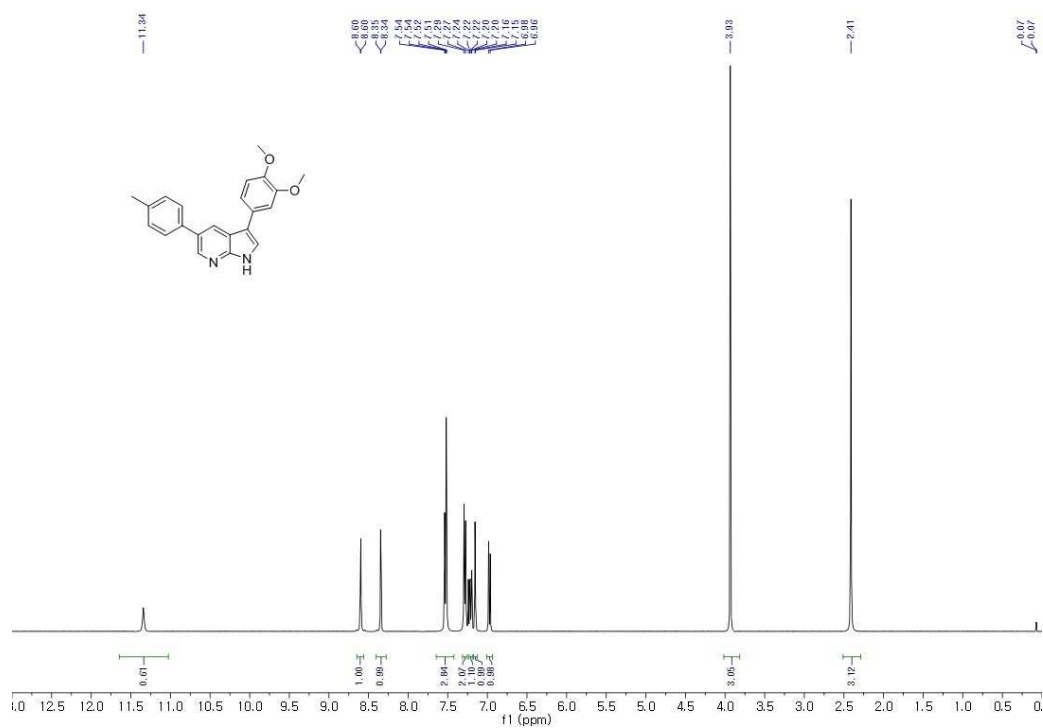
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	19.130	BB	0.0825	1.99328e4	3779.87842	97.9569
2	21.198	BB	0.0775	415.73605	81.54125	2.0431
Totals :				2.03485e4	3861.41967	

HPLC-Purity

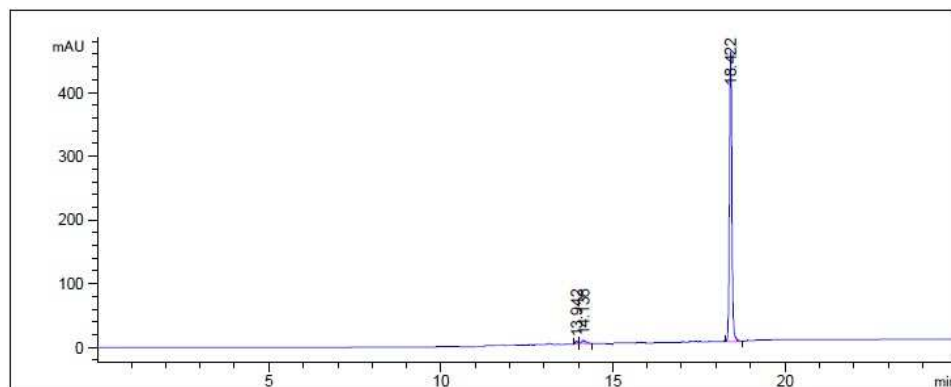


LR-MS

3-(3,4-Dimethoxyphenyl)-5-p-tolyl-1H-pyrrolo[2,3-b]pyridine (17)



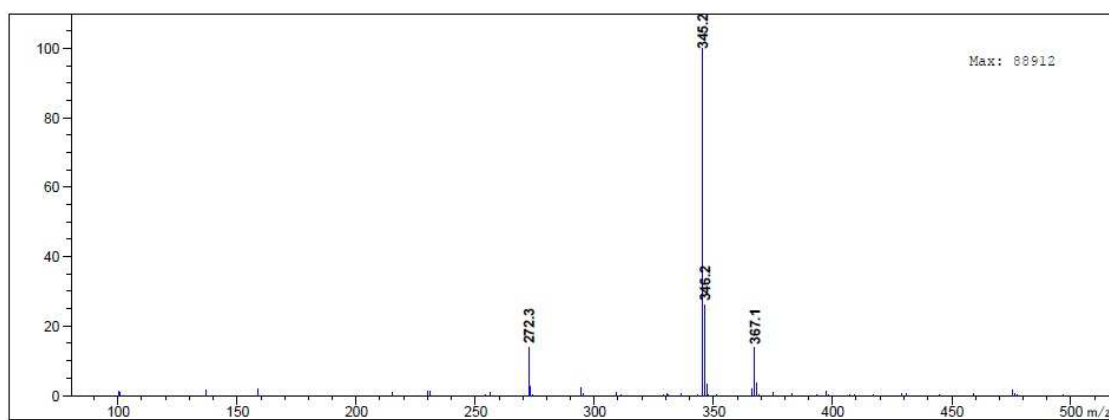
400 MHz, ^1H NMR in $\text{DMSO}-d_6$



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	13.942	BB	0.0628	14.31268	3.56803	0.6212
2	14.136	BB	0.1179	37.82904	4.41582	1.6418
3	18.422	BB	0.0769	2252.01709	453.51923	97.7371

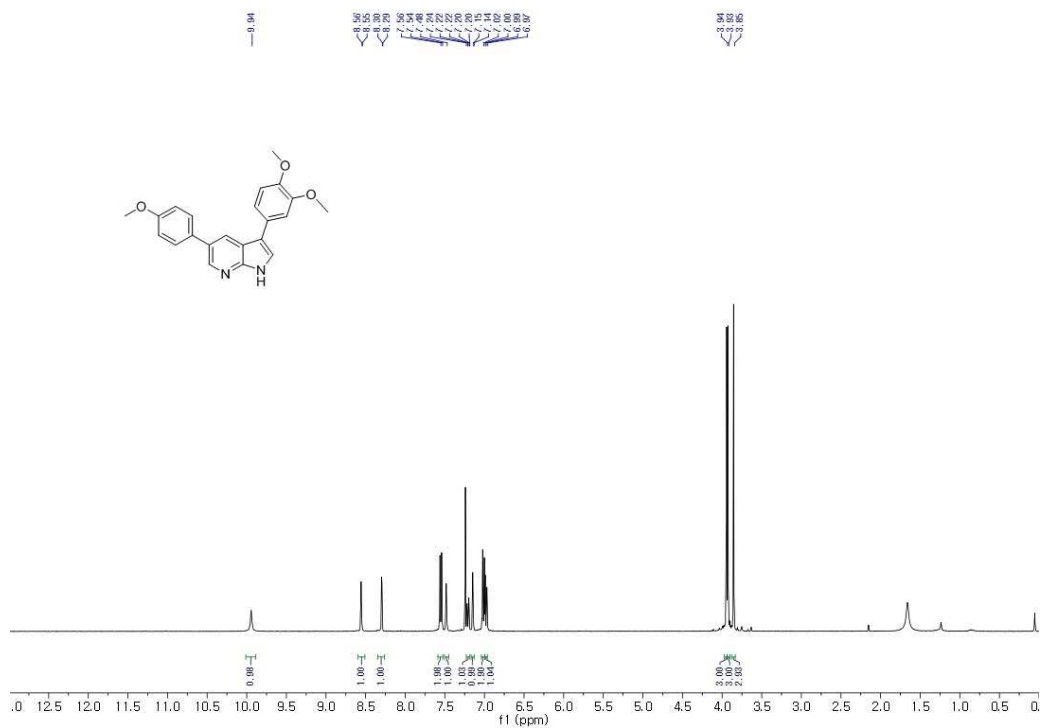
Totals : 2304.15881 461.50307

HPLC-Purity

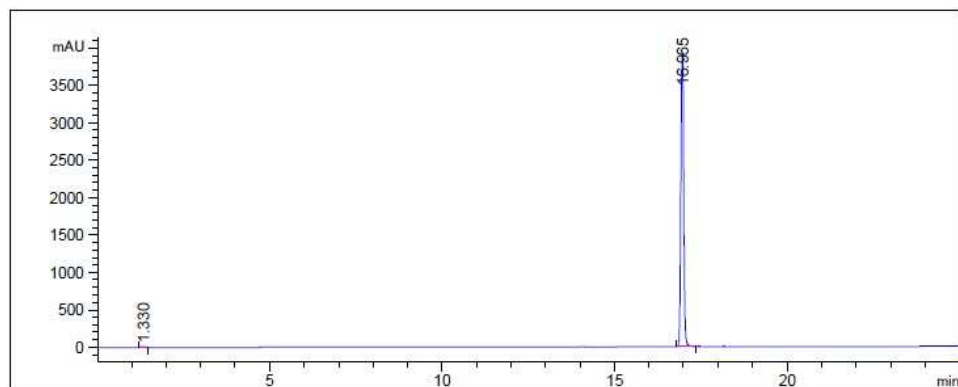


LR-MS

3-(3,4-Dimethoxyphenyl)-5-(4-methoxyphenyl)-1H-pyrrolo[2,3-b]pyridine (18).



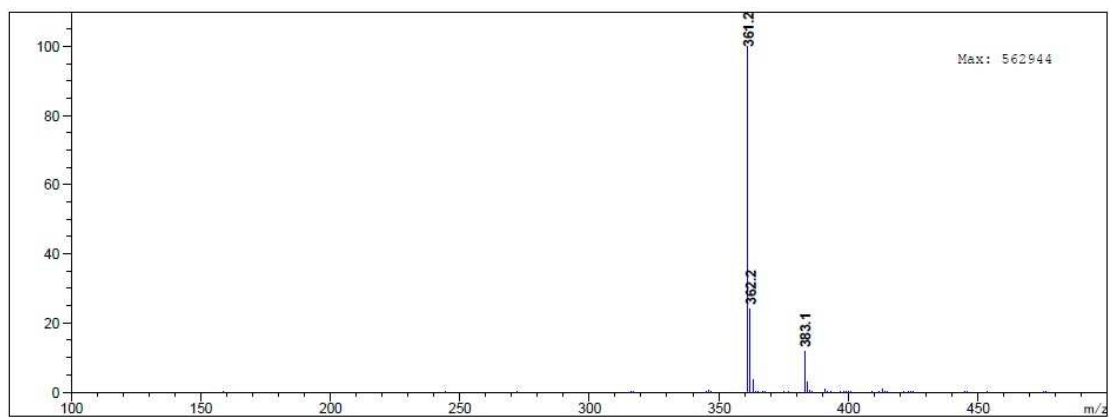
400MHz, ¹H NMR in Chloroform-*d*



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.330	BB	0.0844	65.32200	10.52975	0.2854
2	16.965	BB	0.0917	2.28242e4	3932.92871	99.7146

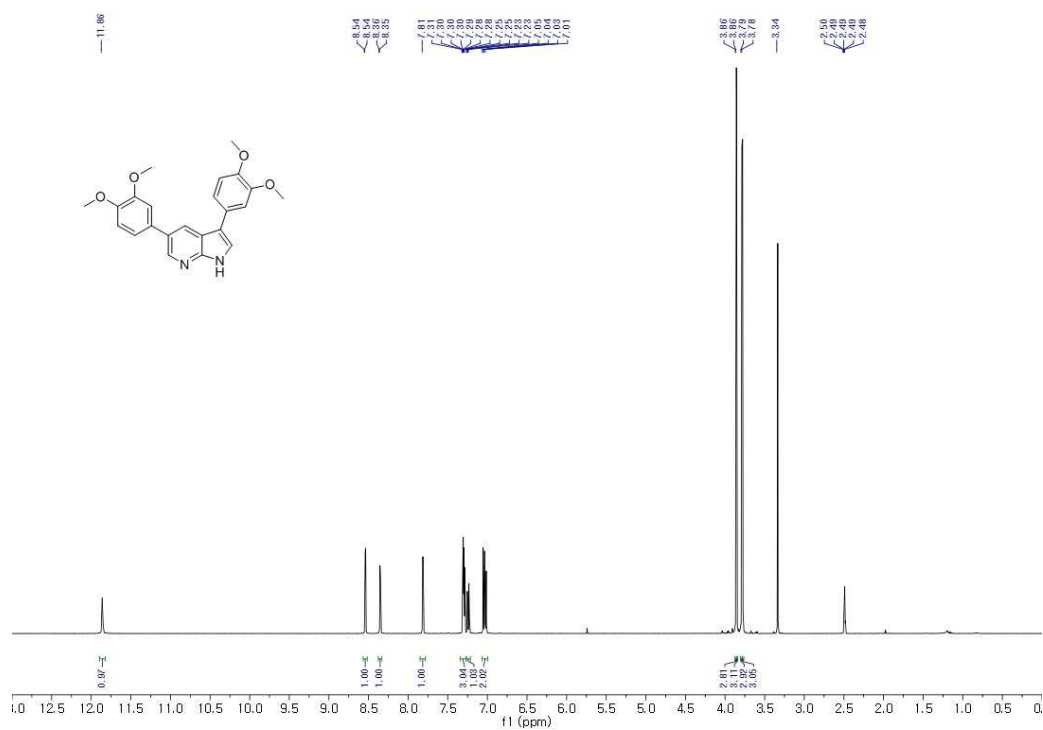
Totals : 2.28895e4 3943.45846

HPLC-Purity

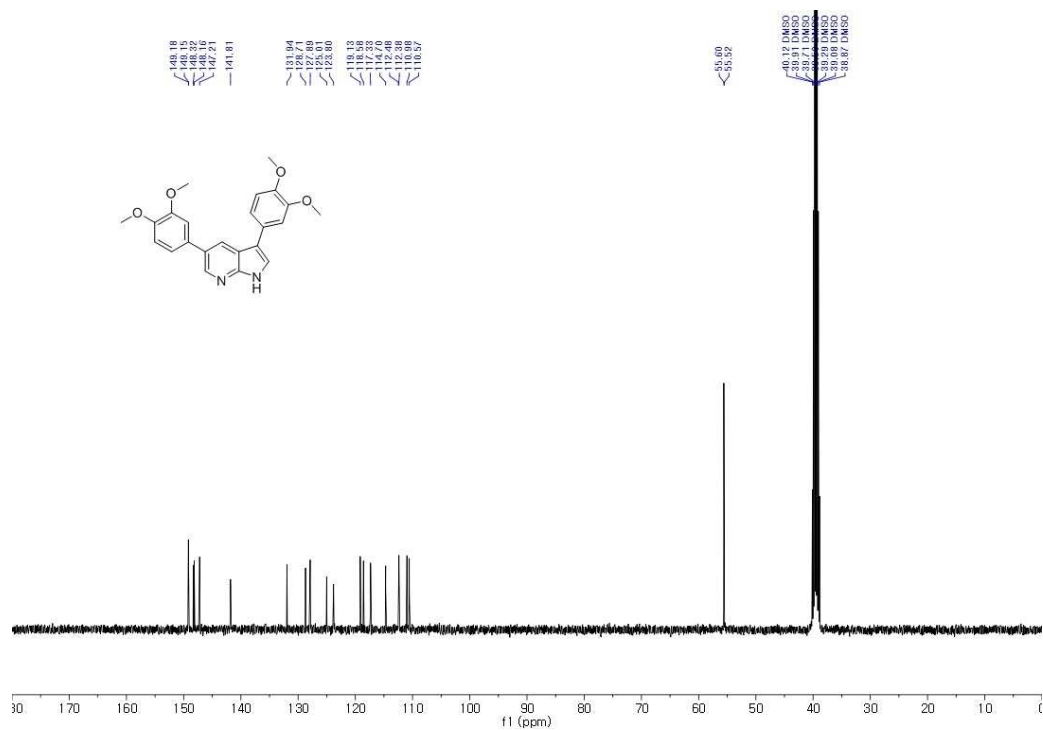


LR-MS

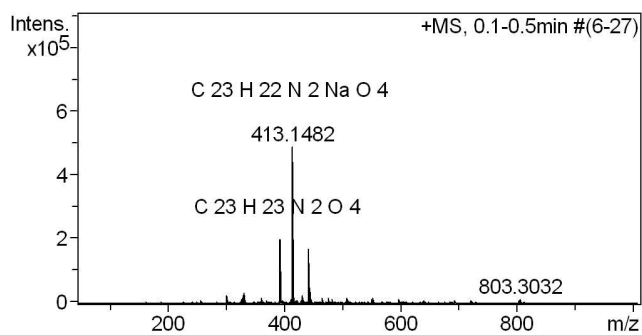
3,5-bis(3,4-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridine (19).



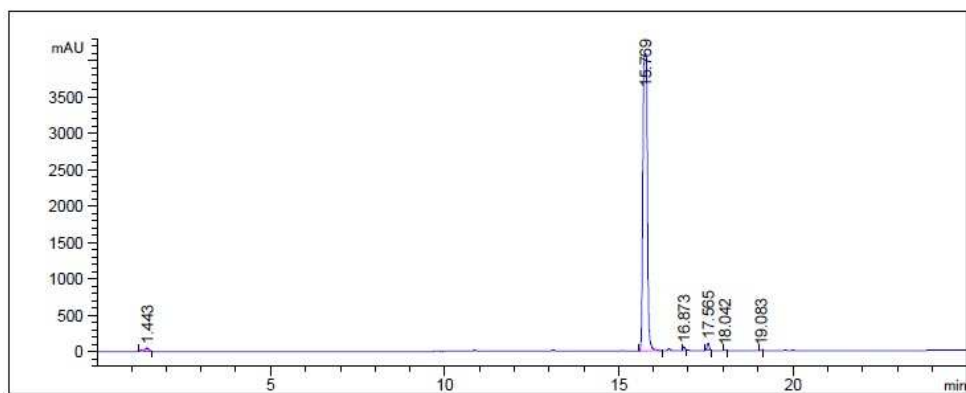
400 MHz, ¹H NMR in DMSO-*d*₆



100 MHz, ¹³C NMR in DMSO-*d*₆



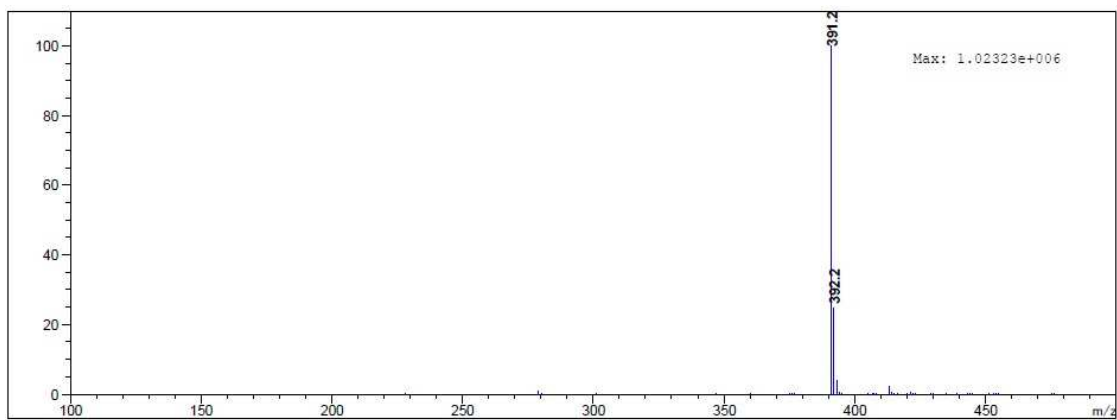
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.443	MM T	0.1827	462.21384	42.15599	1.2128
2	15.769	MM	0.1500	3.68755e4	4096.28271	96.7576
3	16.873	MM	0.0662	213.68790	53.78279	0.5607
4	17.565	MM	0.0759	483.04883	106.13663	1.2675
5	18.042	MM	0.0806	40.86882	8.44898	0.1072
6	19.083	MM	0.0666	35.89807	8.98415	0.0942

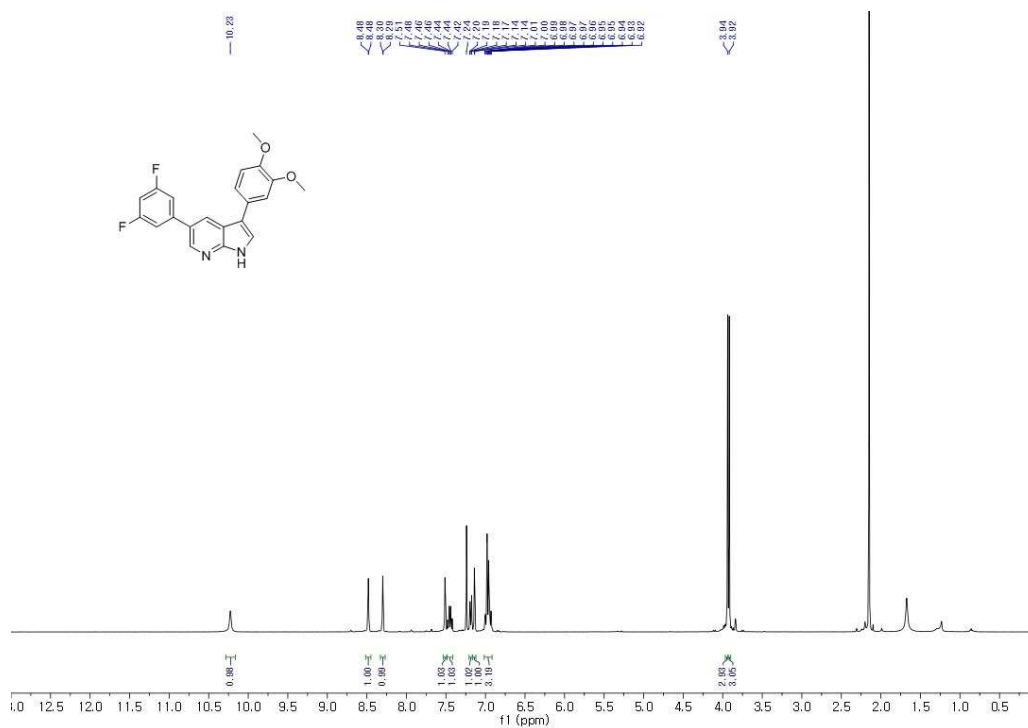
Totals : 3.81112e4 4315.79125

HPLC-Purity

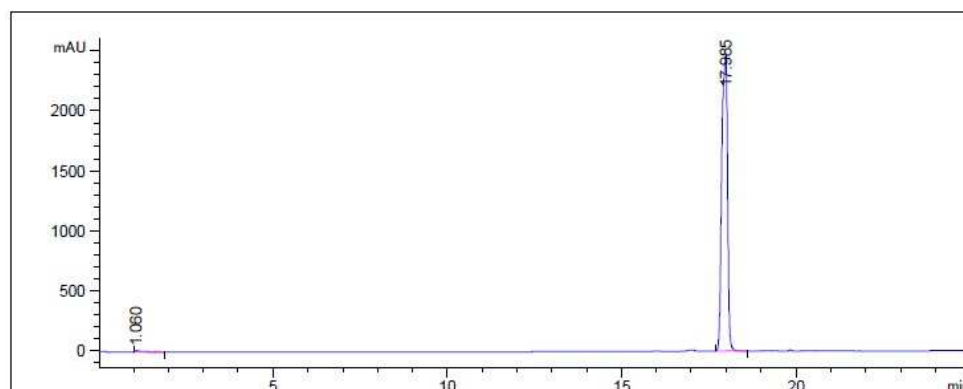


LR-MS

5-(3,5-Difluorophenyl)-3-(3,4-dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridine (20).

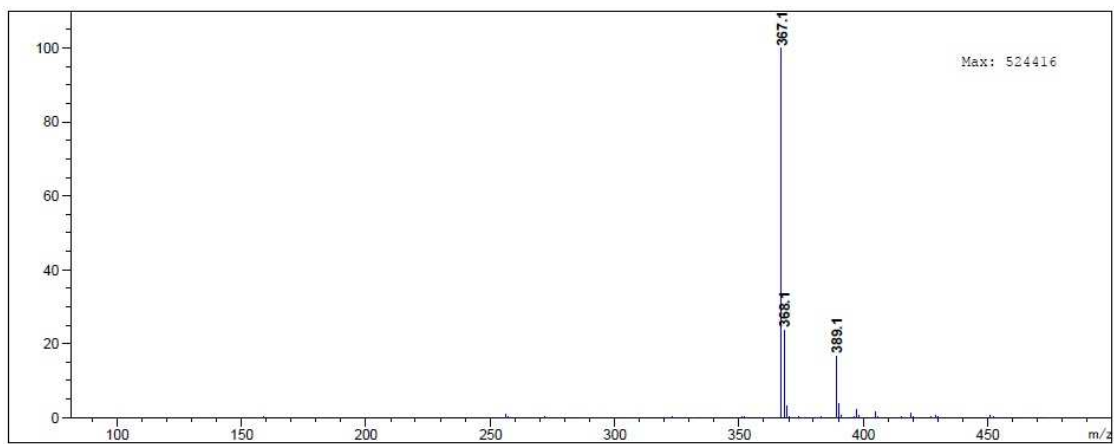


400MHz, ¹H NMR in Chloroform-*d*



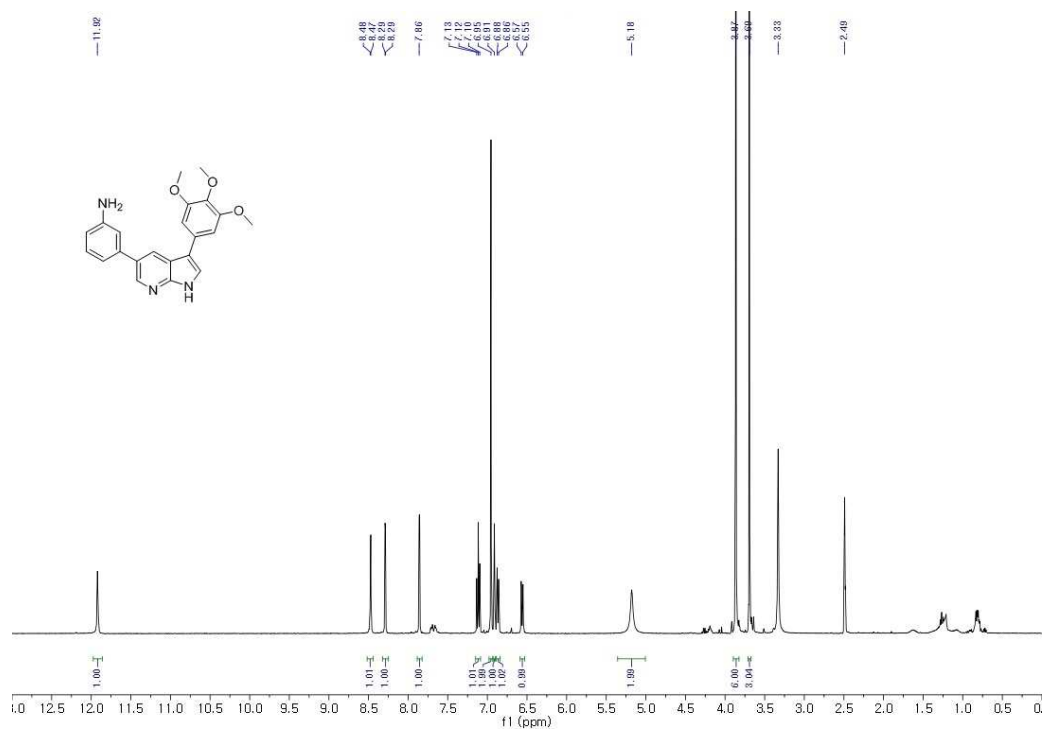
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.060	MM T	0.3348	291.79898	14.52769	1.0198
2	17.985	MM T	0.1907	2.83222e4	2475.01025	98.9802
Totals :				2.86140e4	2489.53795	

HPLC-Purity

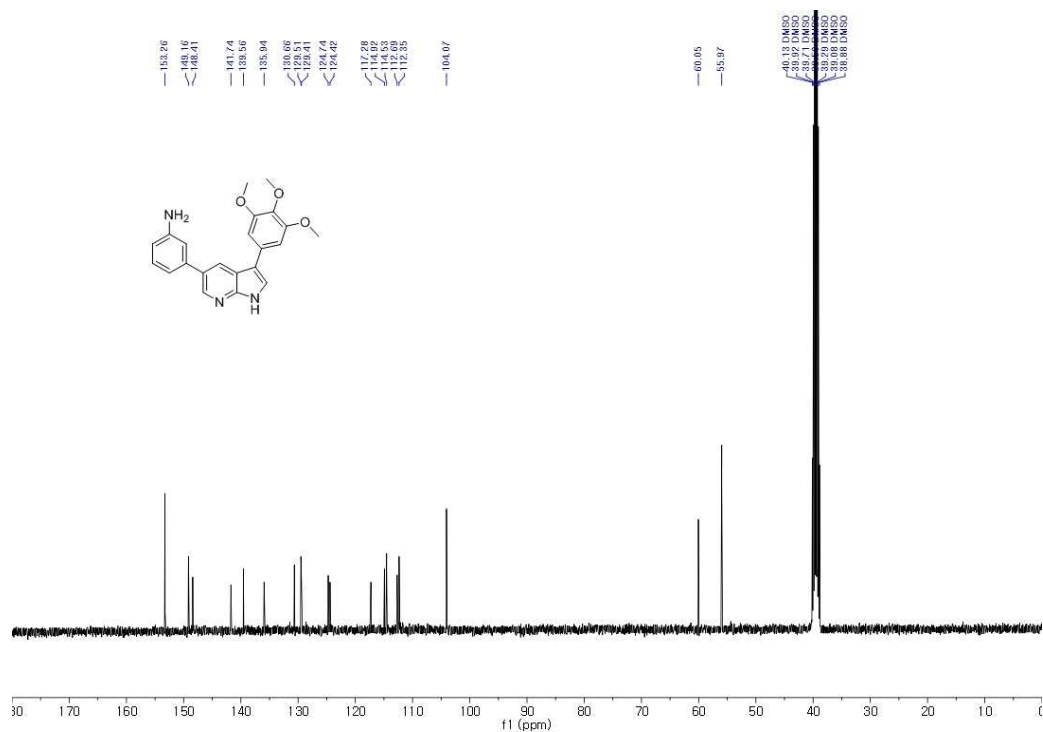


LR-MS

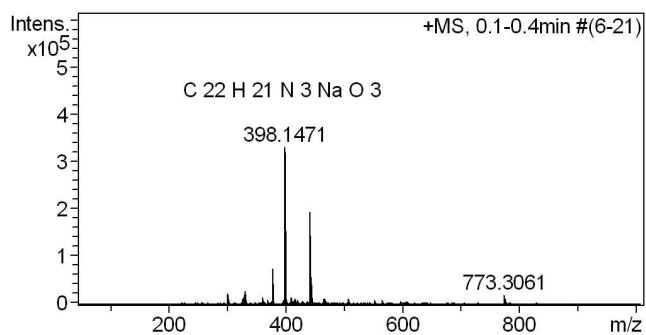
3-(3-(3,4,5-Trimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)aniline (21).



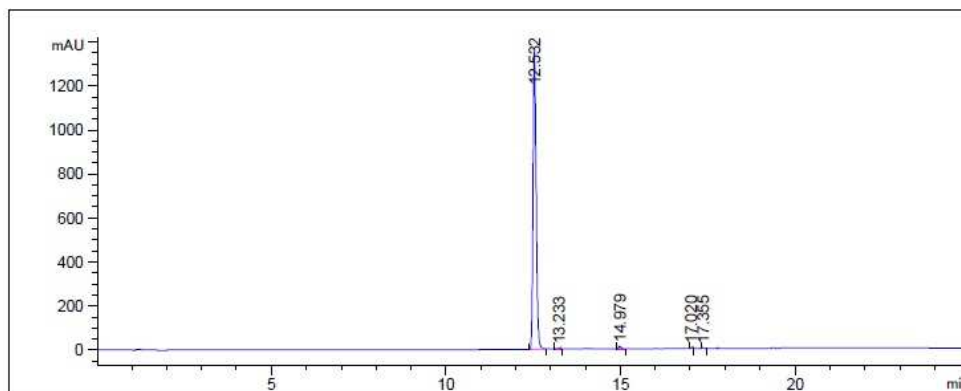
400 MHz, ¹H NMR in DMSO-*d*₆



100 MHz, ¹³C NMR in DMSO-*d*₆



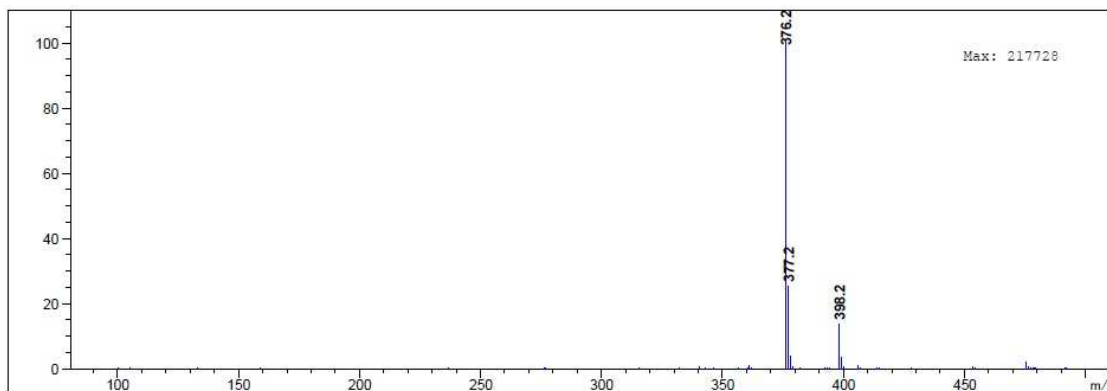
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.532	MM T	0.1034	8387.05469	1351.74011	98.6636
2	13.233	MM T	0.1348	29.03403	3.59076	0.3416
3	14.979	BB	0.0802	50.37392	9.59765	0.5926
4	17.020	MM T	0.0601	13.30170	3.68964	0.1565
5	17.355	MM T	0.0678	20.89412	5.13256	0.2458

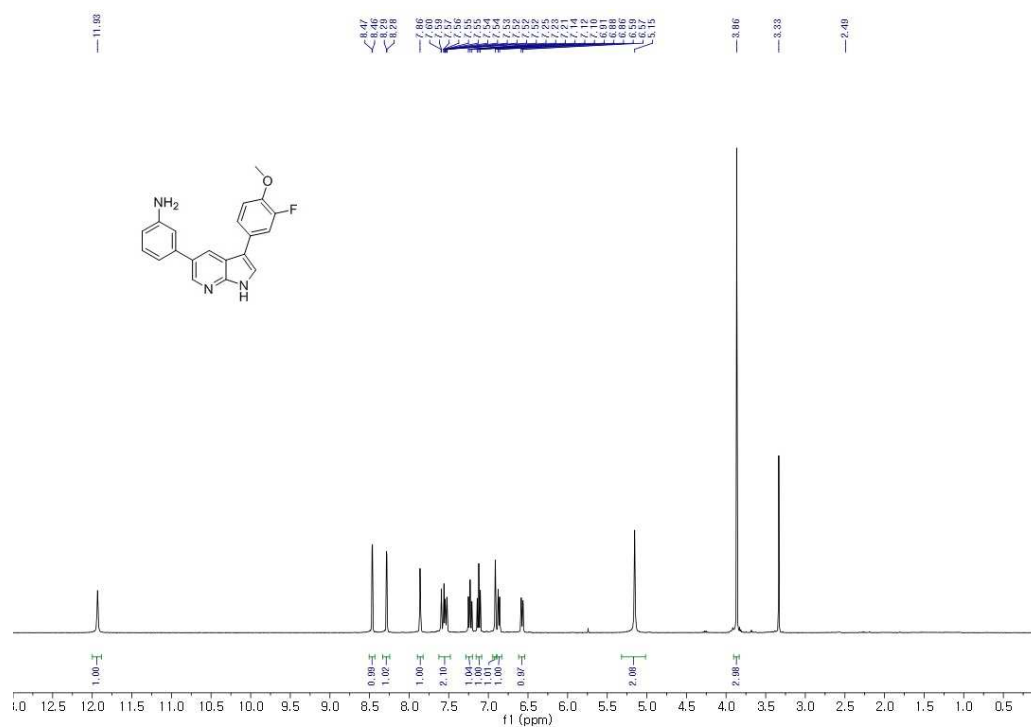
Totals : 8500.65846 1373.75073

HPLC-Purity

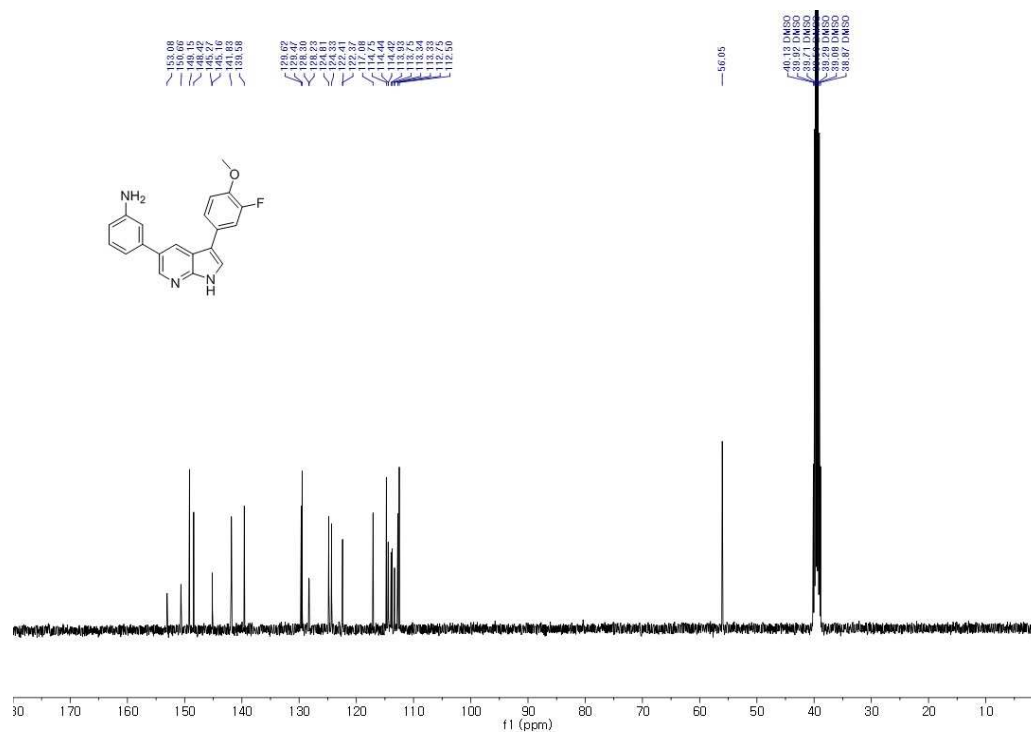


LR-MS

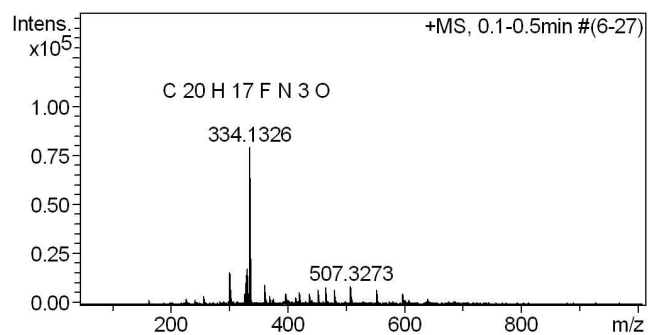
3-(3-(3-Fluoro-4-methoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)aniline (22).



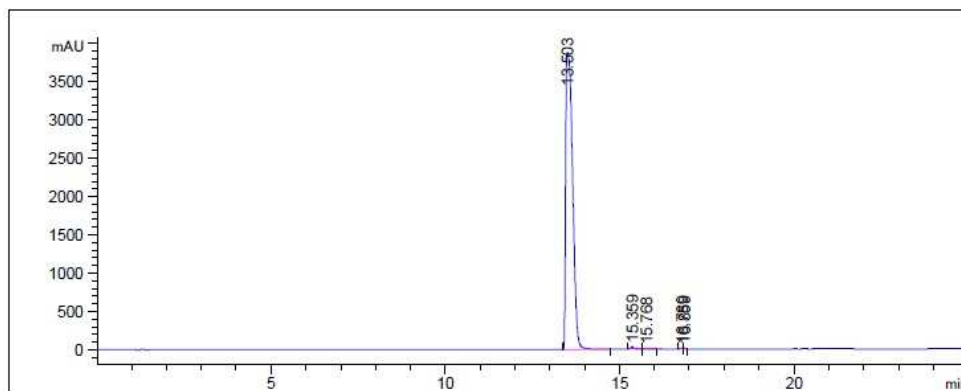
400 MHz, ¹H NMR in DMSO-*d*₆



100 MHz, ^{13}C NMR in DMSO- d_6



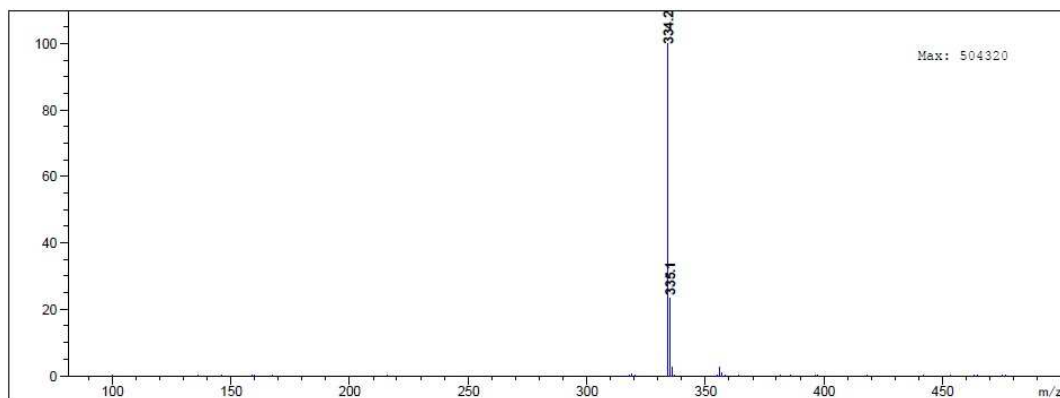
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	13.503	BB	0.2220	5.35046e4	3878.17090	99.5791
2	15.359	BB	0.0804	160.53123	30.50837	0.2988
3	15.768	BB	0.0863	36.09192	6.25452	0.0672
4	16.789	BB	0.0754	20.86481	4.16624	0.0388
5	16.859	BB	0.0511	8.64149	2.71577	0.0161

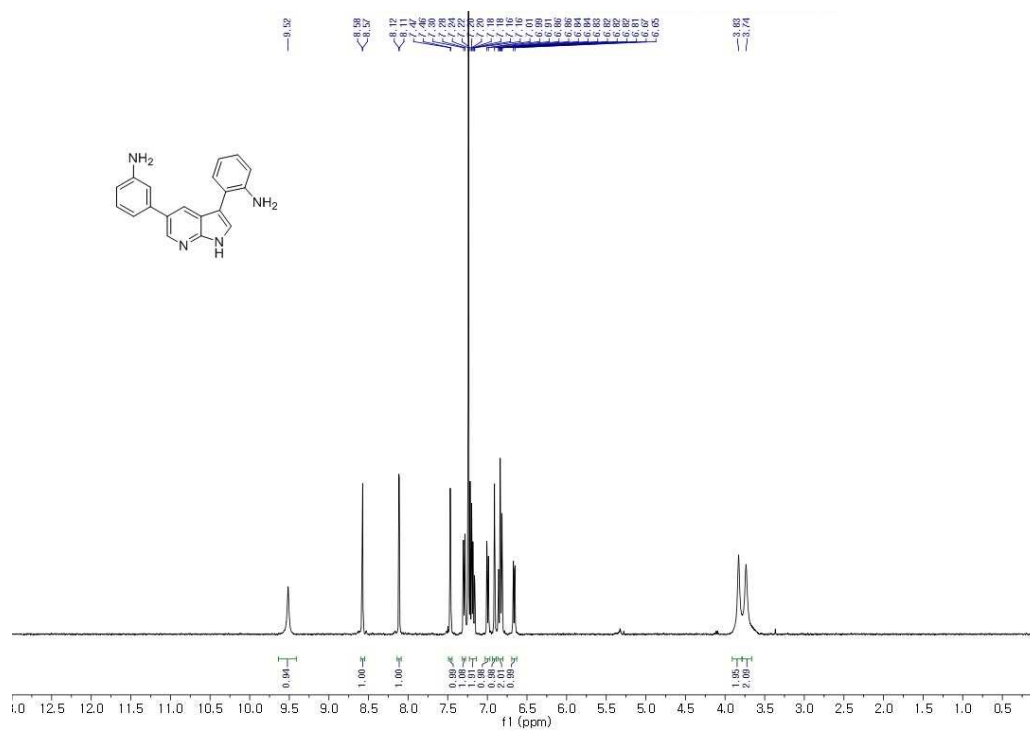
Totals : 5.37307e4 3921.81580

HPLC-Purity

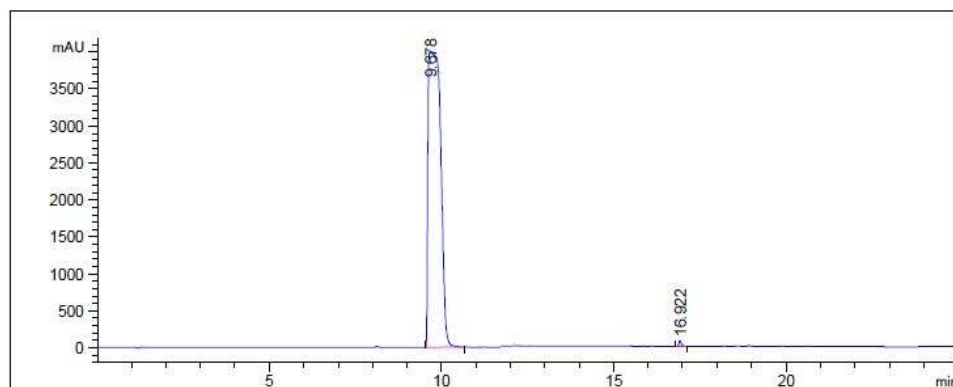


LR-MS

2,3'-(1H-Pyrrolo[2,3-b]pyridine-3,5-diyl)dianiline (23)



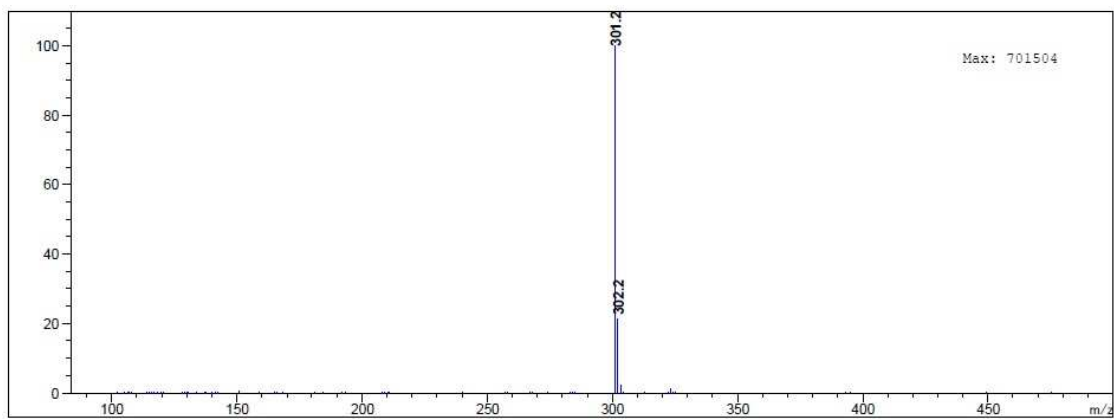
400MHz, ¹H NMR in Chloroform-*d*



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.678	BB	0.3394	1.01607e5	3985.88794	99.6141
2	16.922	BB	0.0739	393.64014	80.69319	0.3859

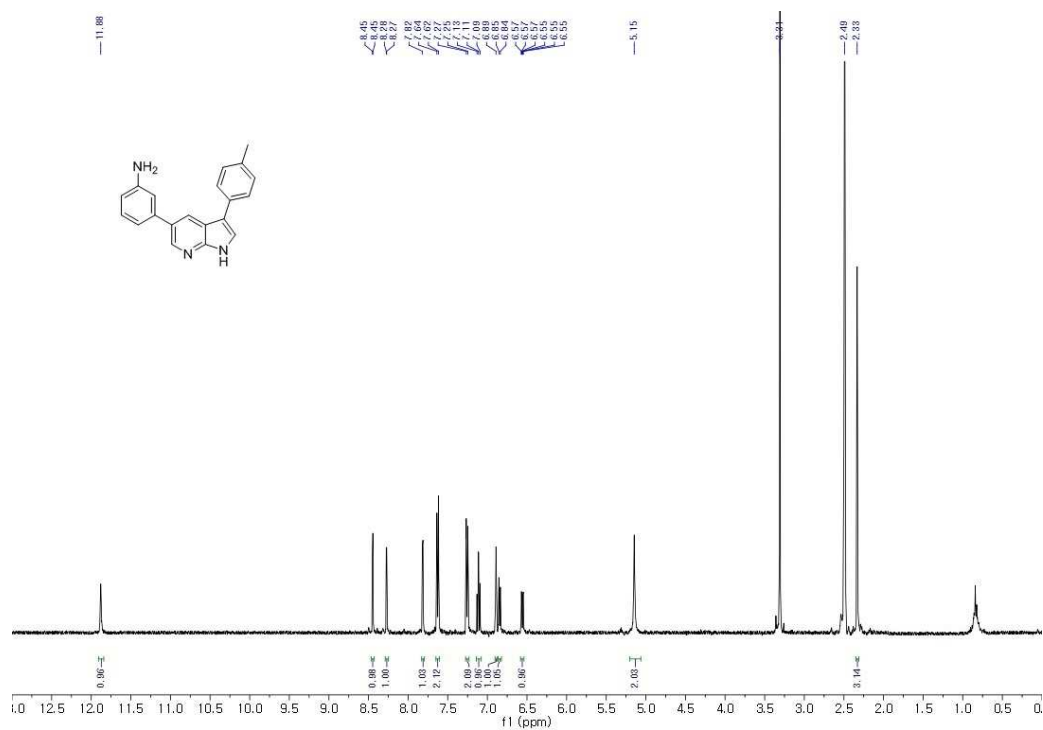
Totals : 1.02001e5 4066.58113

HPLC-Purity

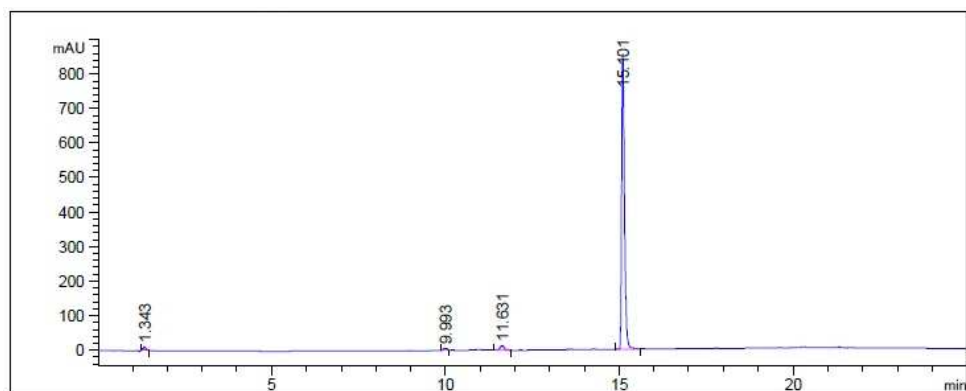


LR-MS

5-Bromo-3-(p-tolyl)-1H-pyrrolo[2,3-b]pyridine (24)



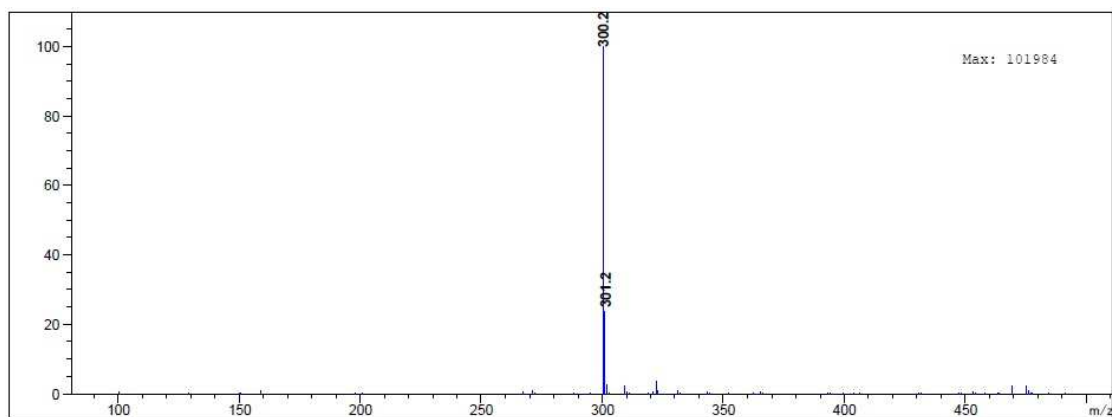
400 MHz, ¹H NMR in DMSO-*d*₆



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.343	MM	0.1040	71.66726	11.48269	1.3955
2	9.993	MM	0.1248	45.49262	6.07352	0.8858
3	11.631	BB	0.1245	104.63469	13.05781	2.0375
4	15.101	BB	0.0880	4913.74756	856.24084	95.6812

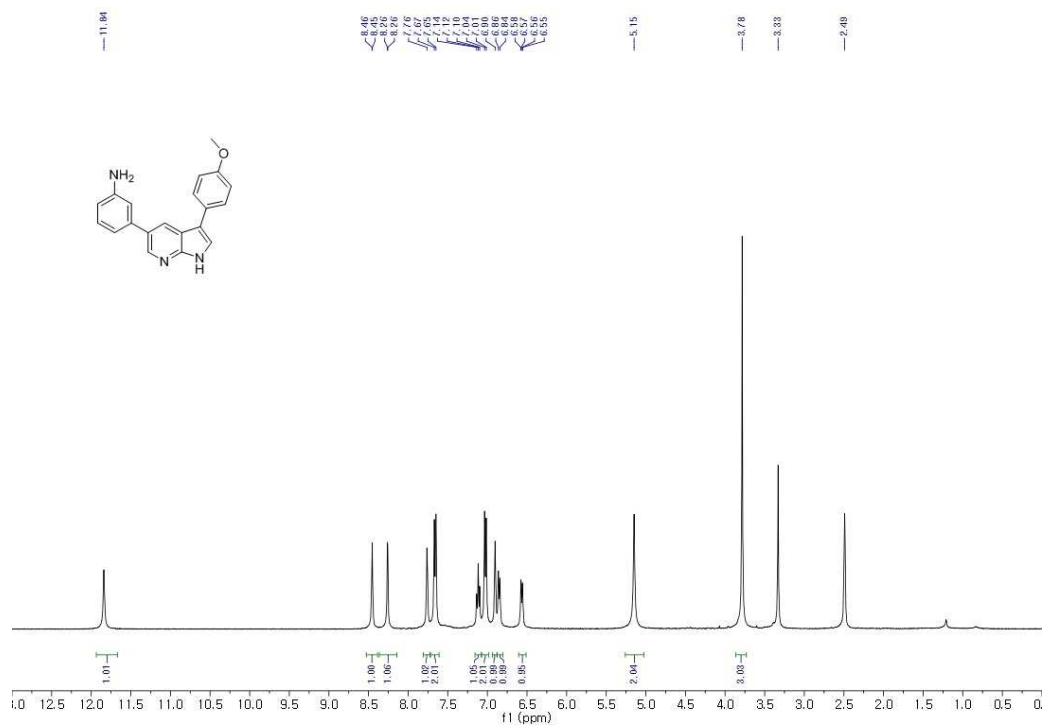
Totals : 5135.54213 886.85488

HPLC-Purity

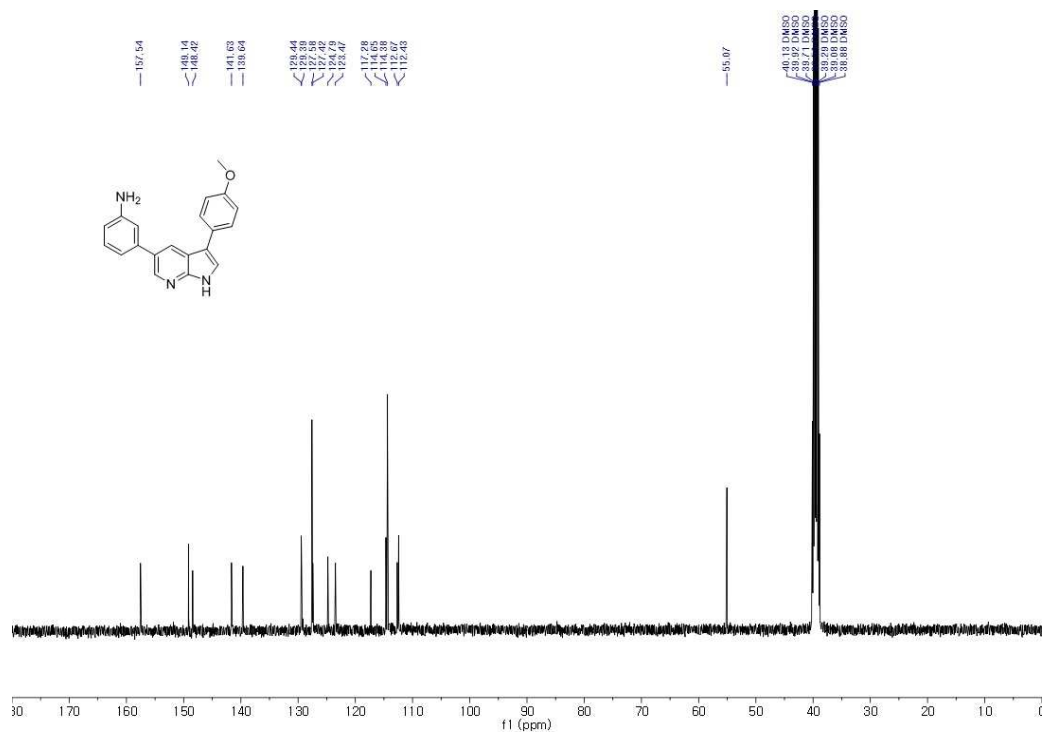


LR-MS

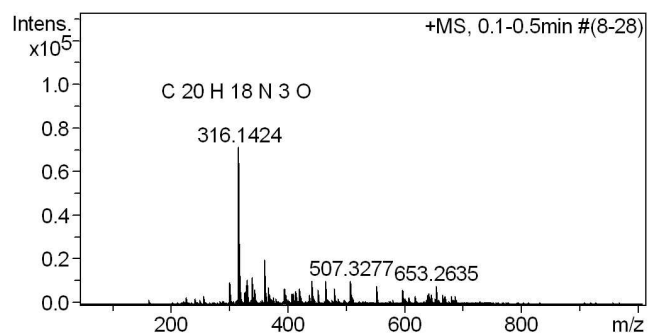
3-(3-(4-Methoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)aniline (25).



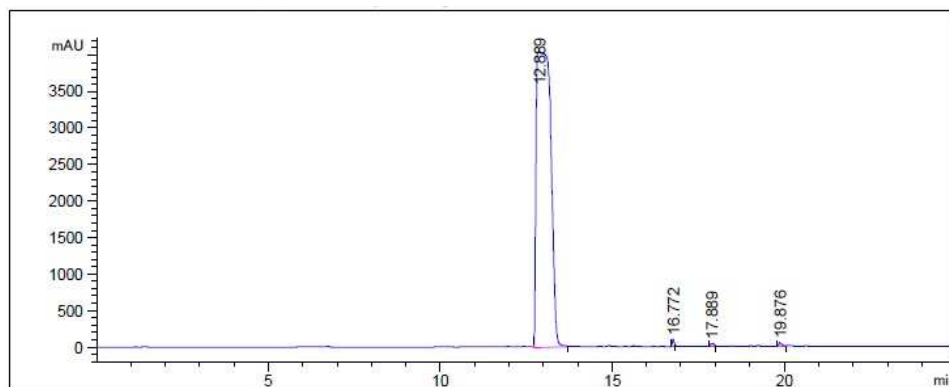
400 MHz, ¹H NMR in DMSO-*d*₆



100 MHz, ¹³C NMR in DMSO-*d*₆



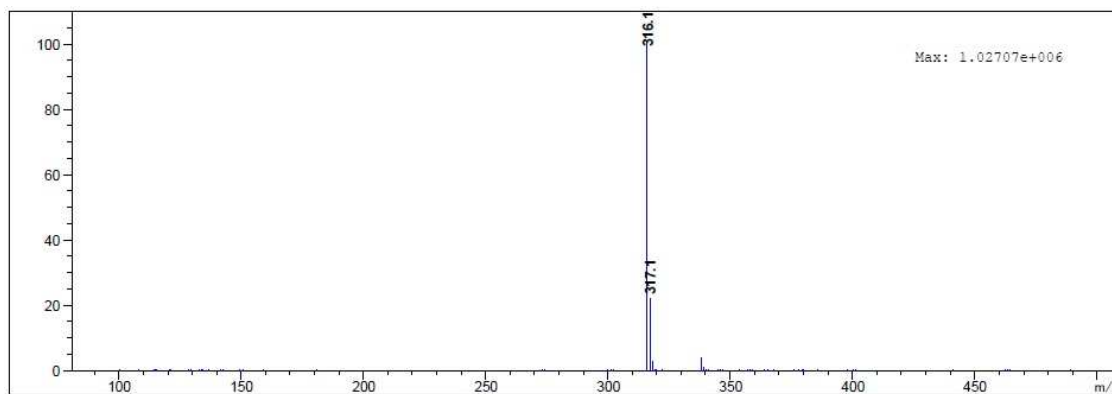
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.889	MM T	0.4877	1.18490e5	4049.09521	99.1299
2	16.772	MM T	0.0675	388.80984	95.95239	0.3253
3	17.889	MM T	0.1120	263.83249	39.25144	0.2207
4	19.876	MM T	0.1102	387.35699	58.59467	0.3241

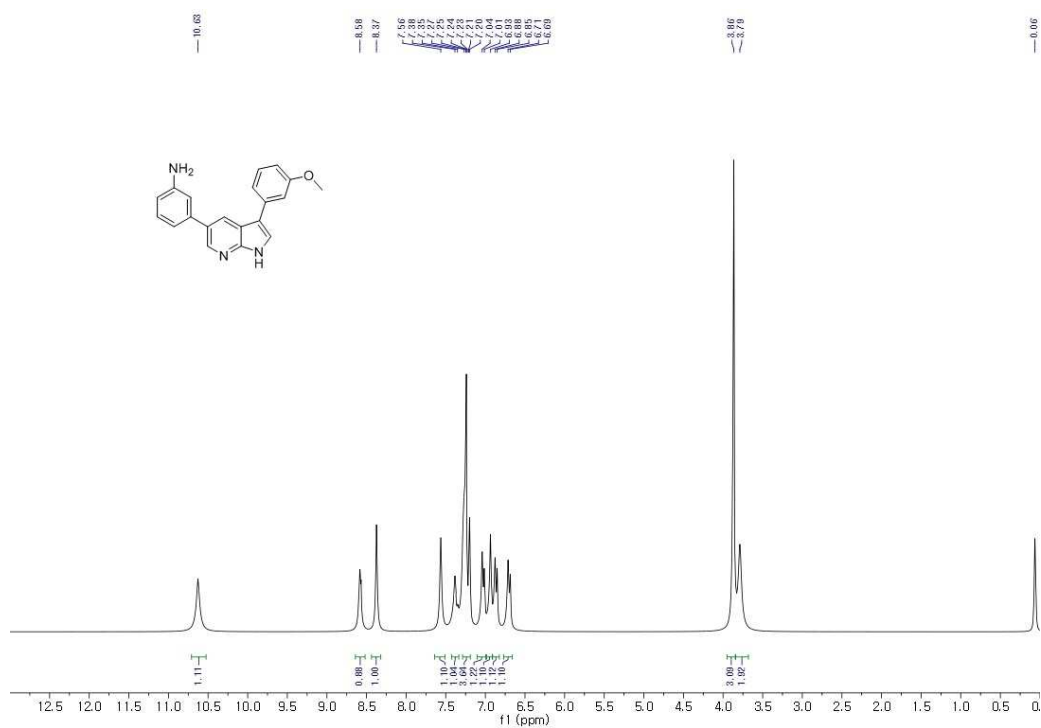
Totals : 1.19530e5 4242.89372

HPLC-Purity

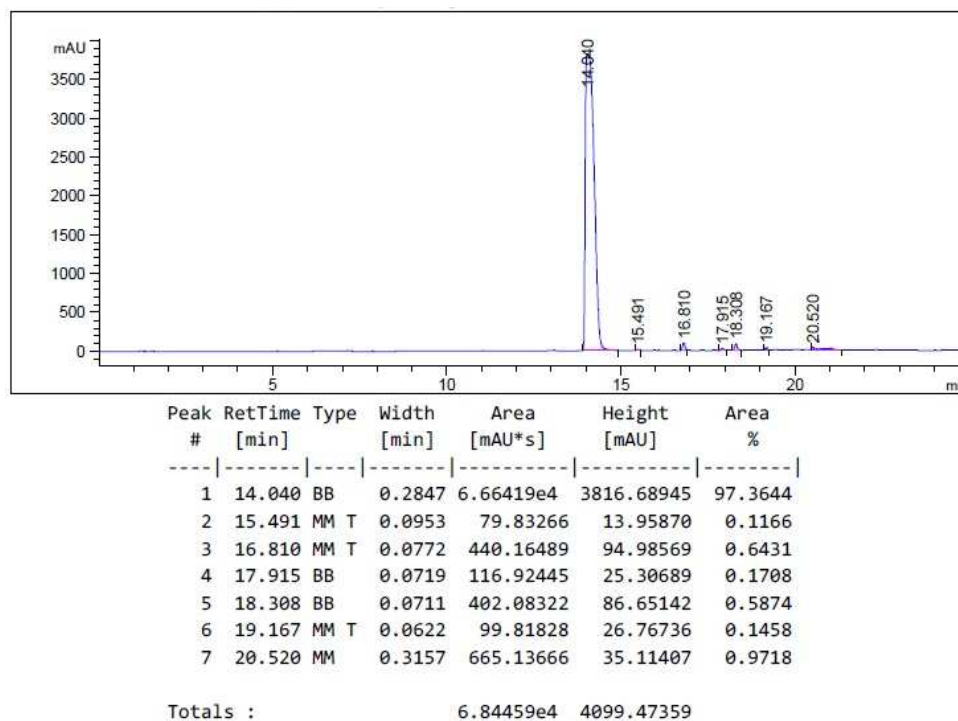


LR-MS

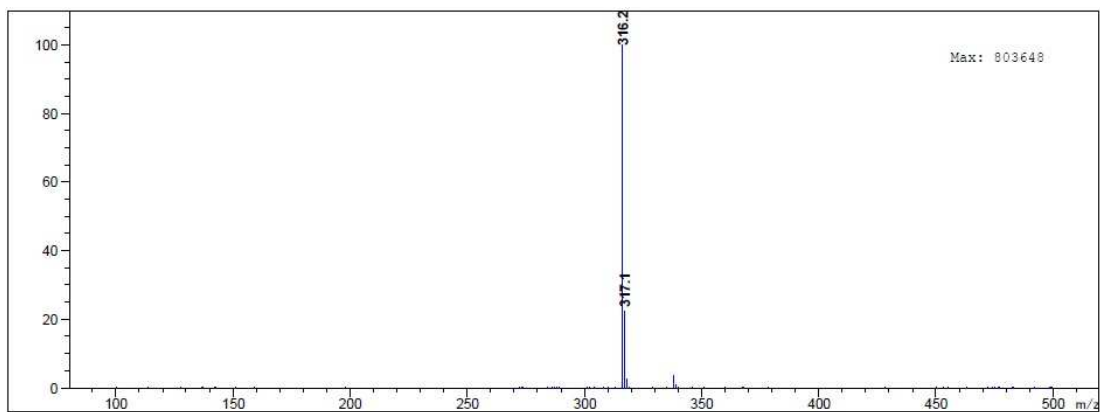
3-(3-(3-Methoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)aniline (26).



400MHz, ¹H NMR in Chloroform-*d*

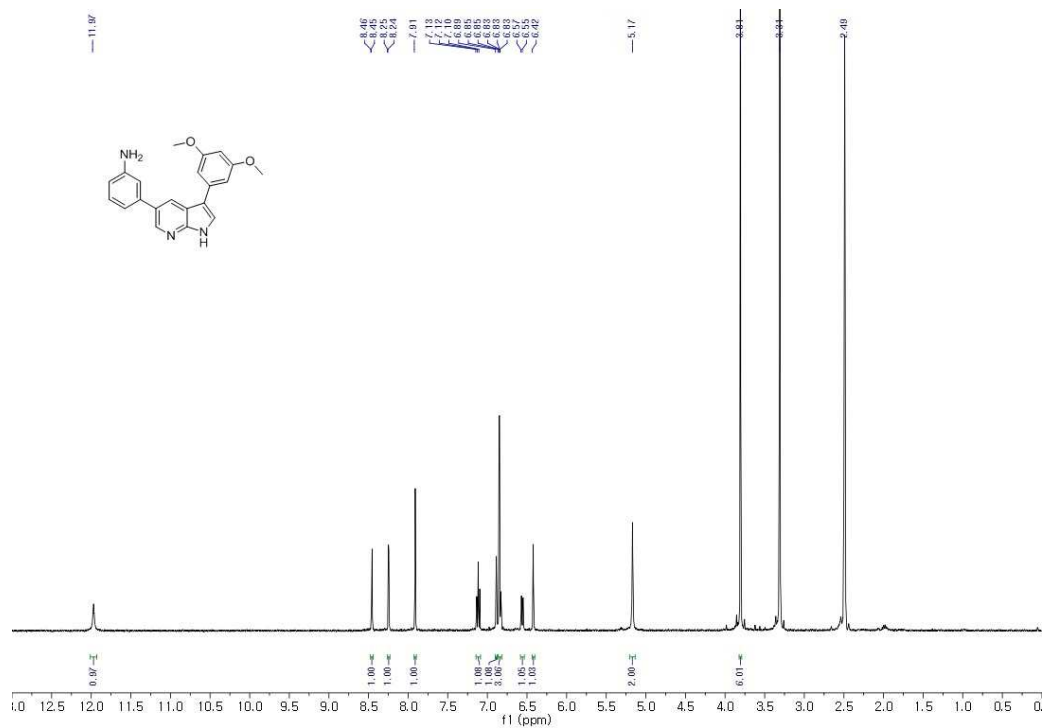


HPLC-Purity

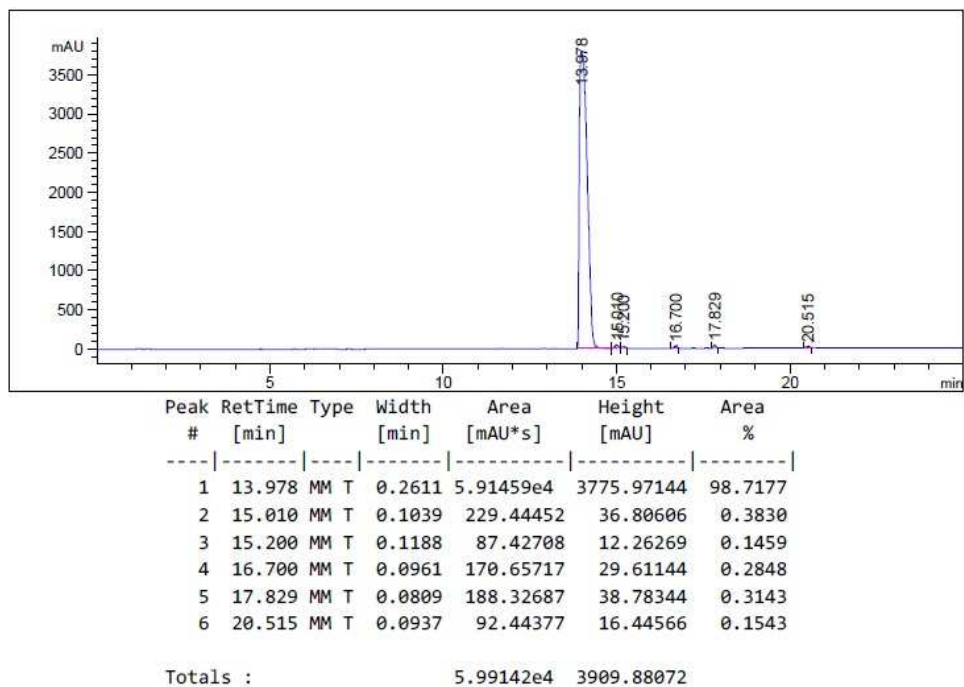


LR-MS

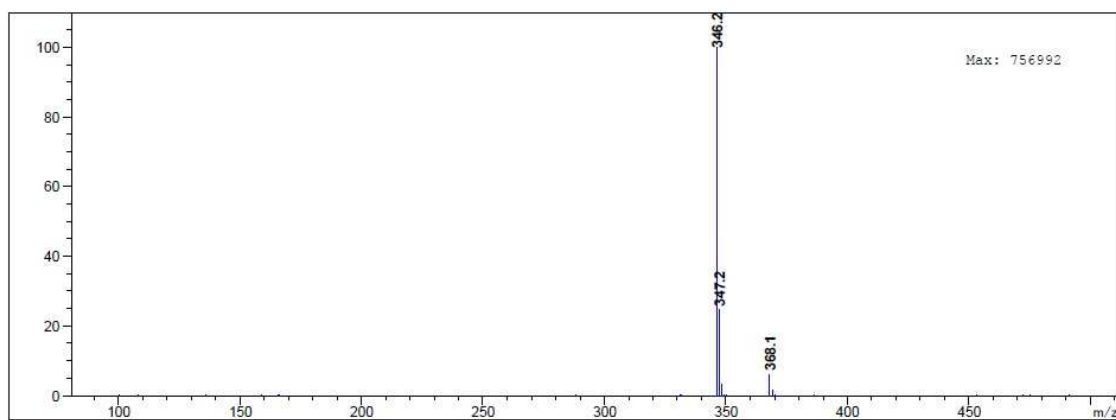
3-(3-(3,5-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)aniline (27).



400 MHz, ¹H NMR in DMSO-*d*₆

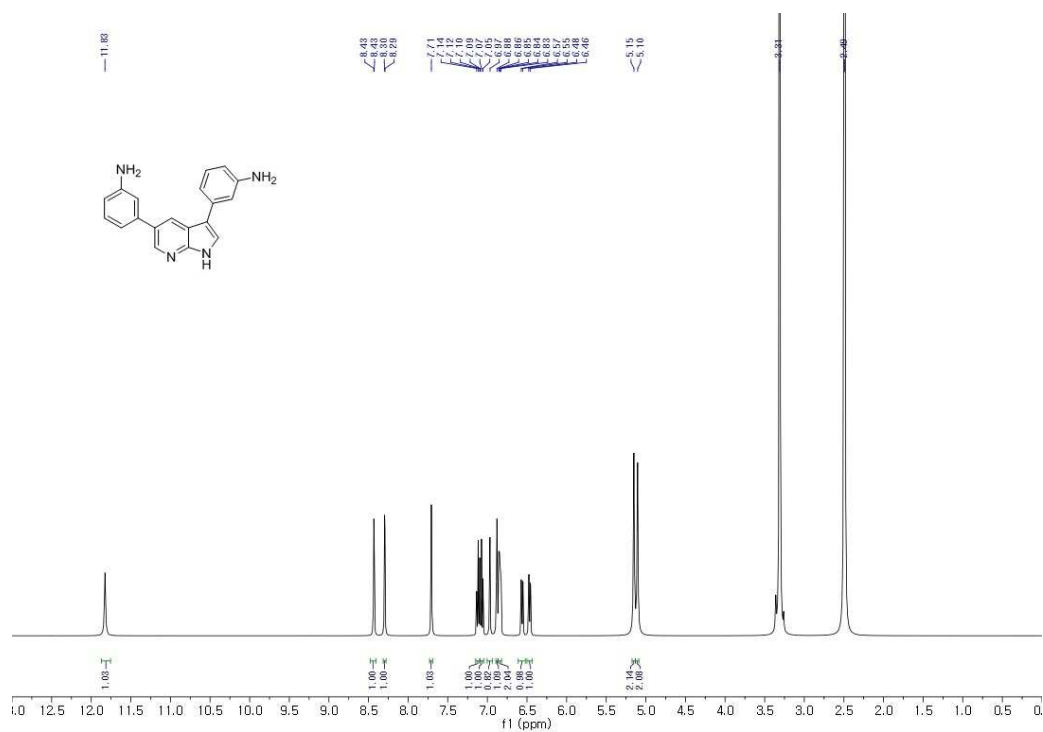


HPLC-Purity

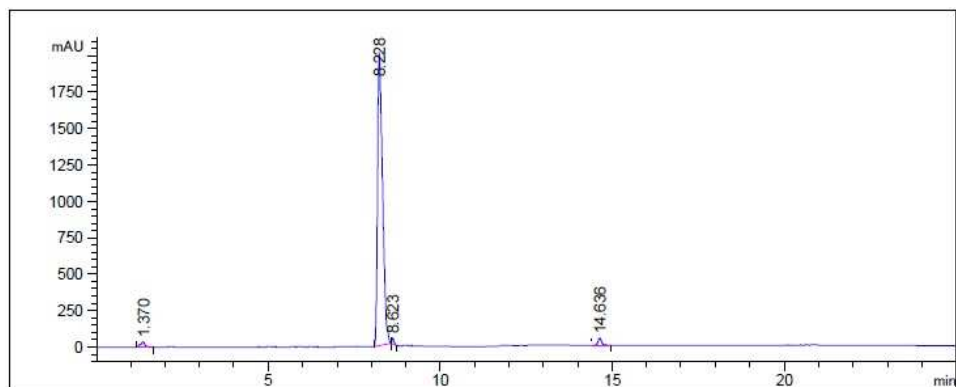


LR-MS

3,3'-(1H-Pyrrolo[2,3-b]pyridine-3,5-diyl)dianiline (28)



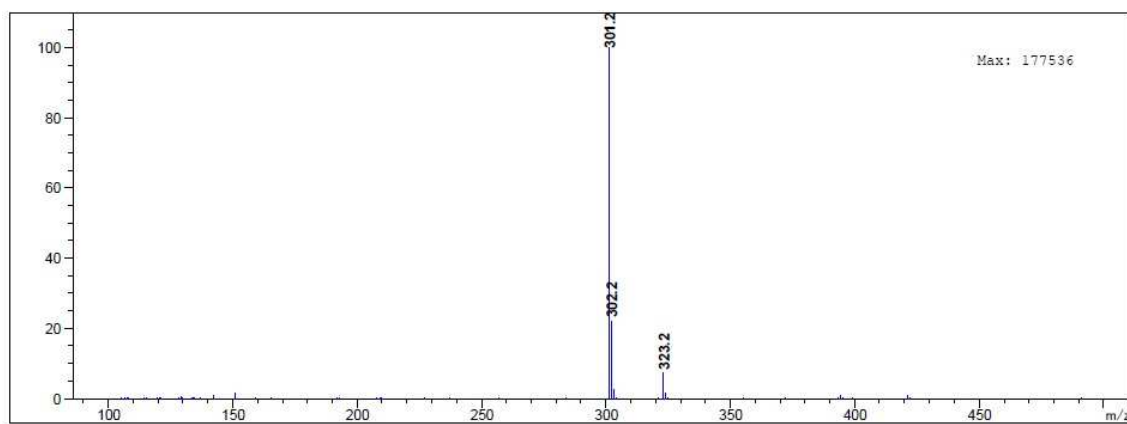
400 MHz, ¹H NMR in DMSO-d₆



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.370	BB	0.1115	305.67807	36.18871	1.4416
2	8.228	BB	0.1560	2.03715e4	2014.64600	96.0729
3	8.623	BB	0.0659	174.17036	40.75727	0.8214
4	14.636	BB	0.1120	352.86243	49.02395	1.6641

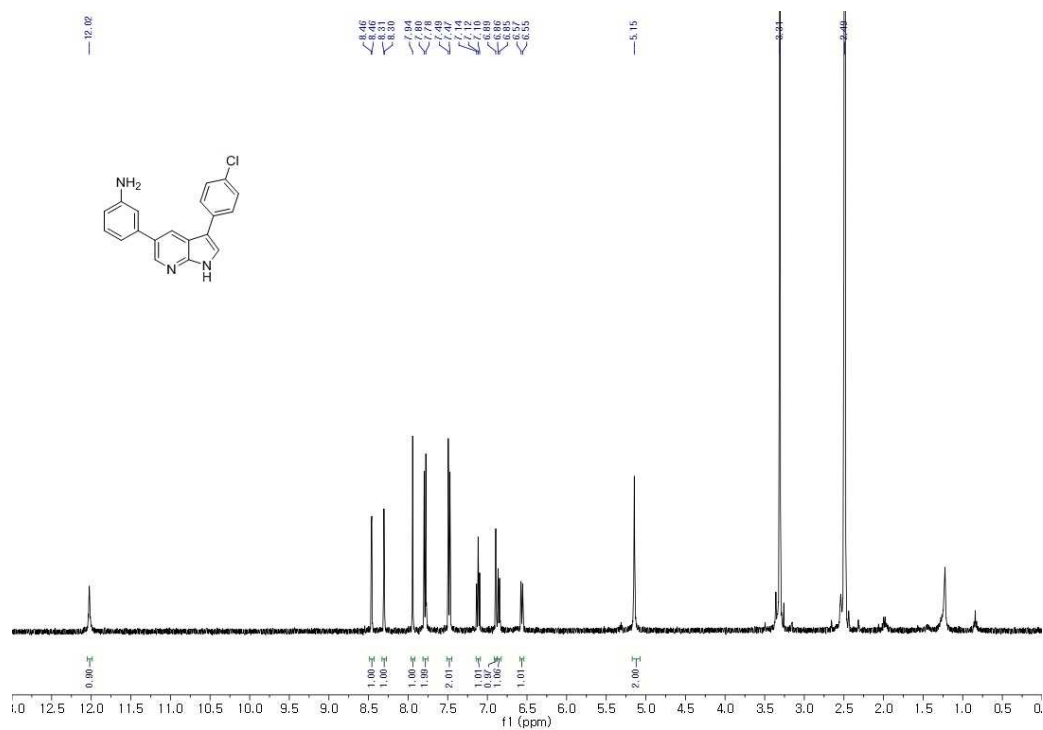
Totals : 2.12042e4 2140.61593

HPLC-Purity

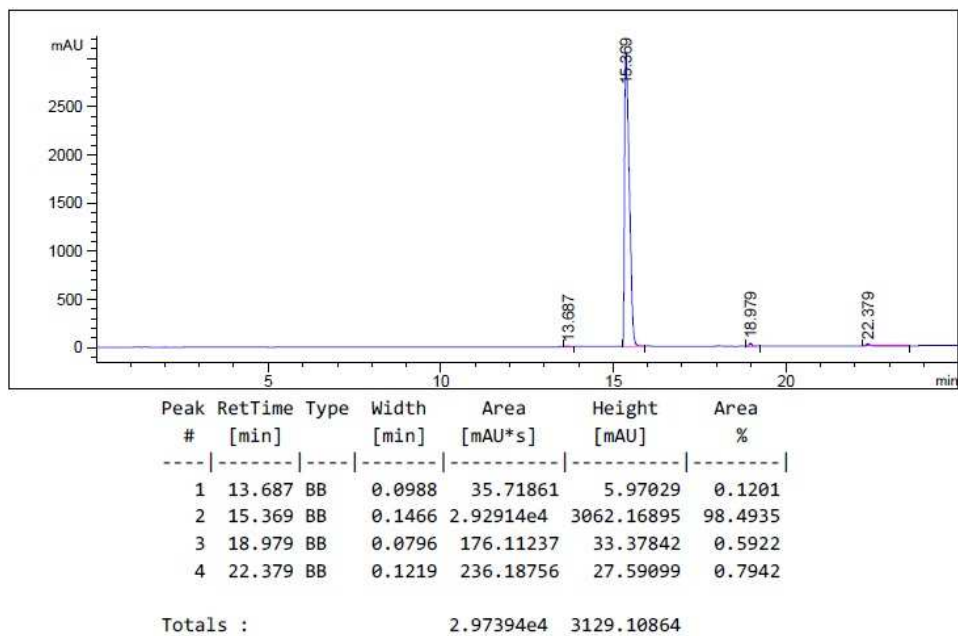


LR-MS

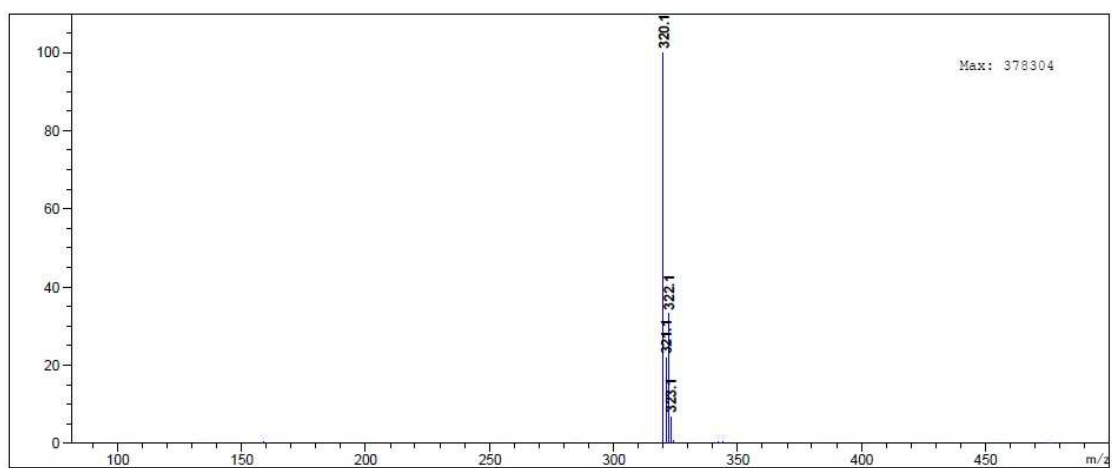
3-(3-(4-Chlorophenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)aniline (29).



400 MHz, ¹H NMR in DMSO-*d*₆

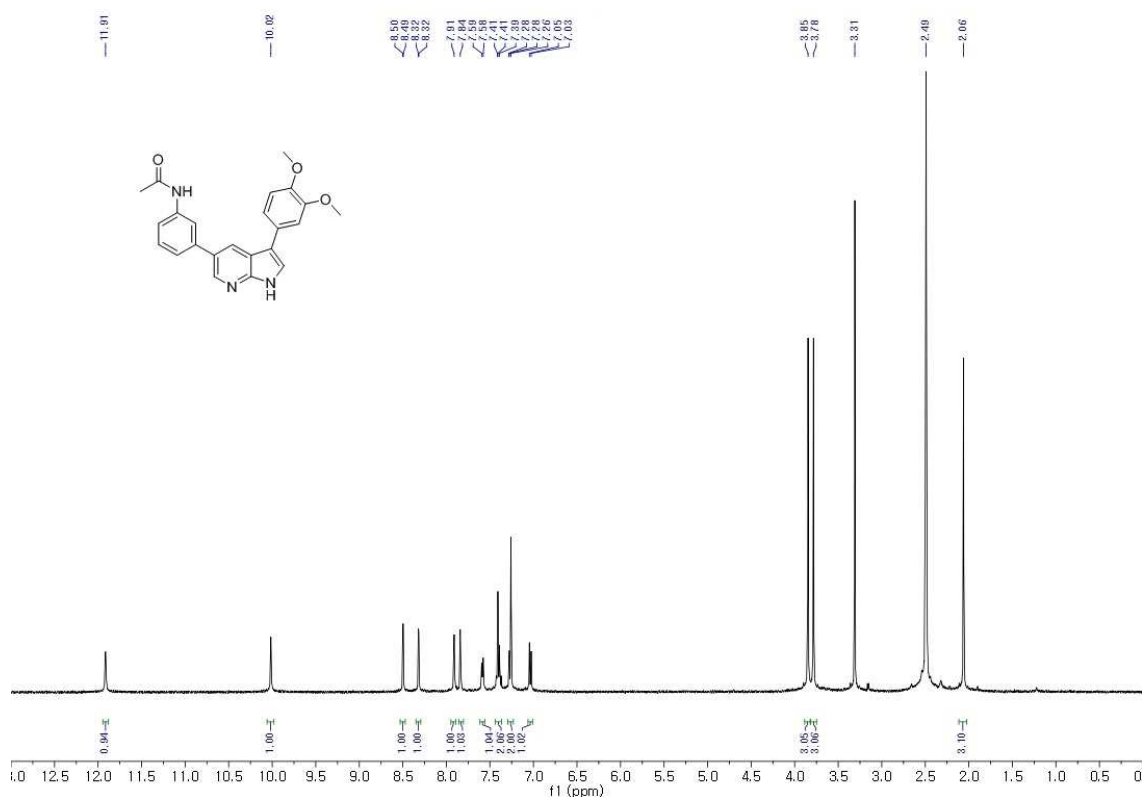


HPLC-Purity

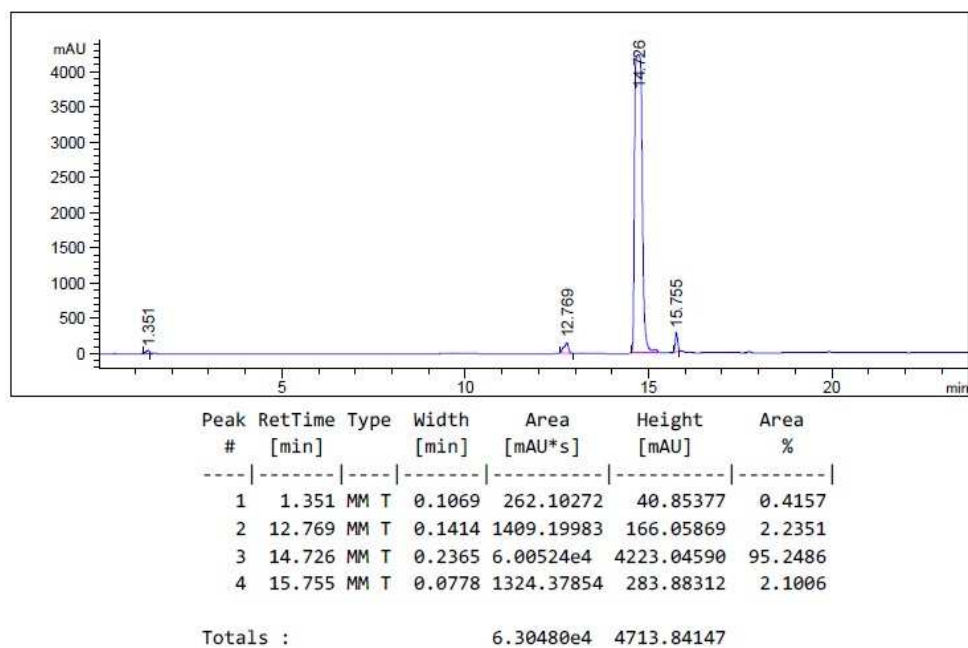


LR-MS

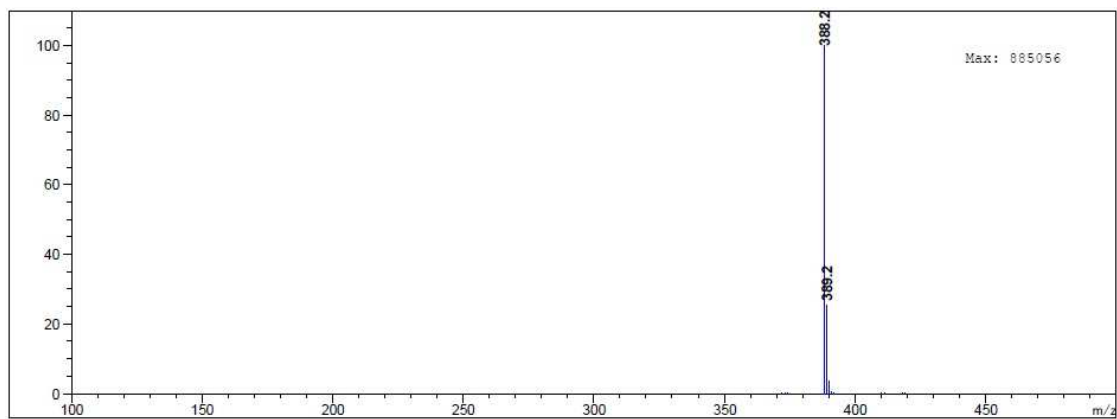
N-(3-(3,4-Dimethoxyphenyl)-1*H*-pyrrolo[2,3-*b*]pyridin-5-yl)phenylacetamide (30).



400 MHz, ¹H NMR in DMSO-*d*₆

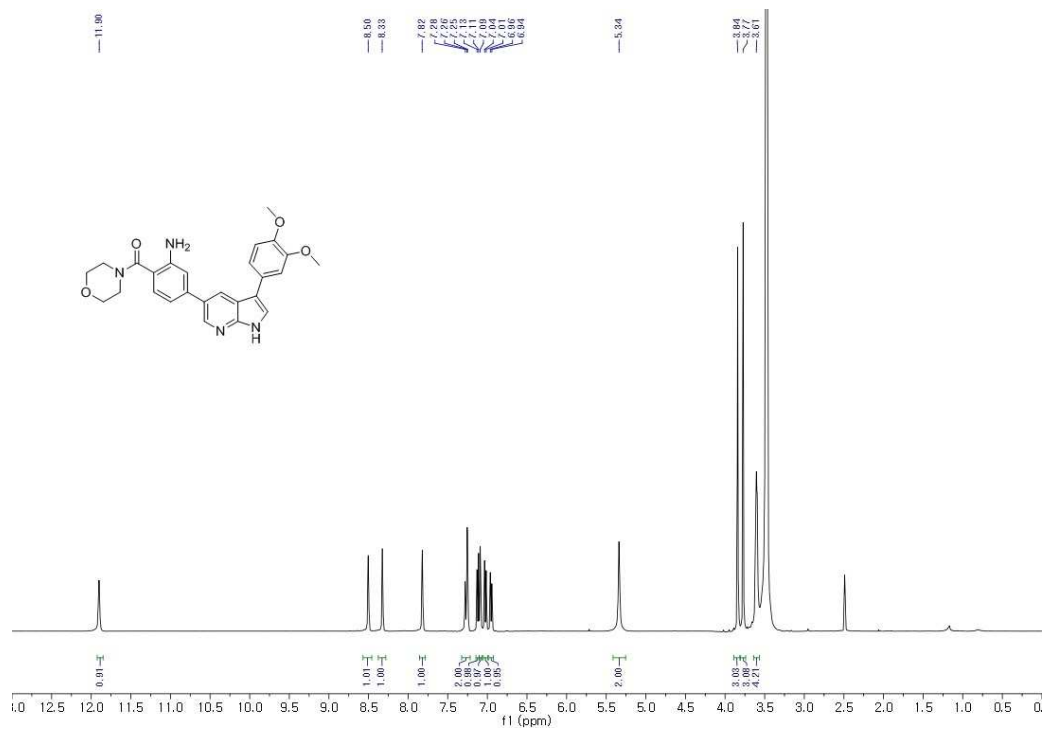


HPLC-Purity

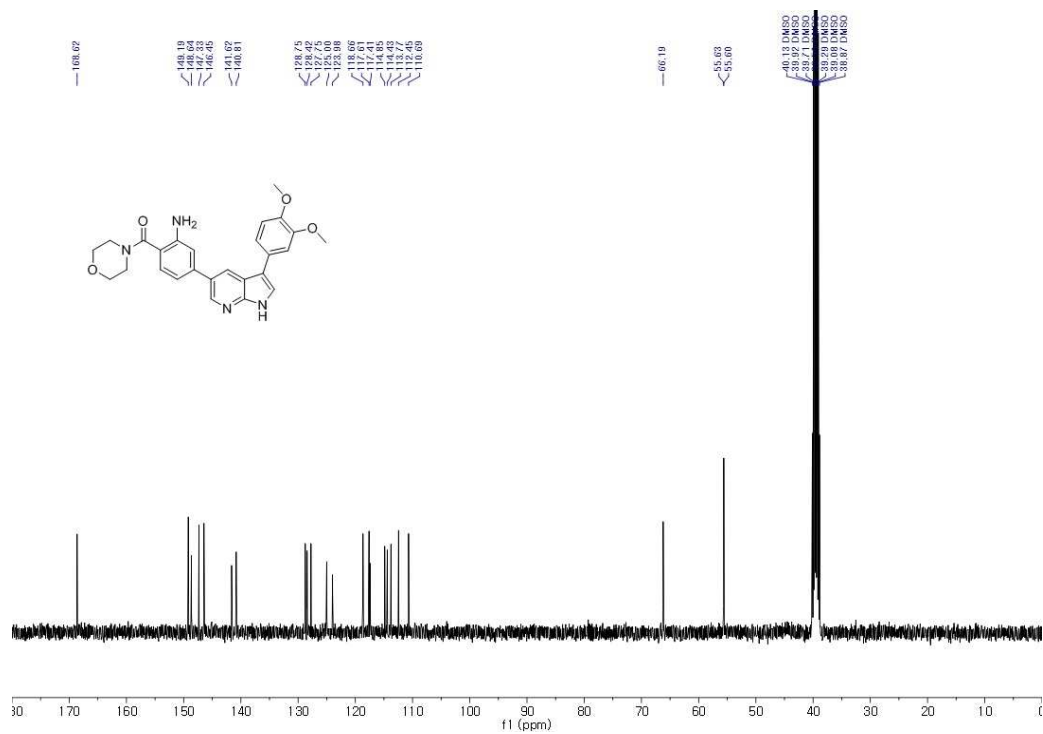


LR-MS

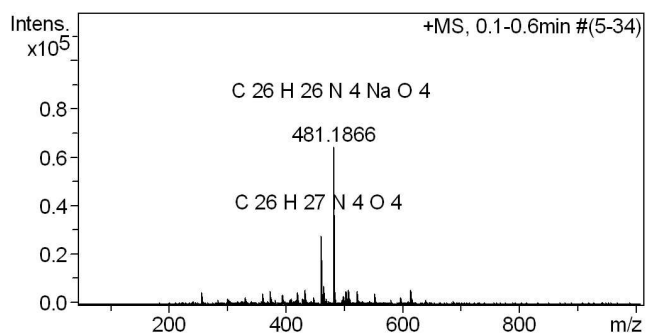
(2-Amino-4-(3-(3,4-dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)phenyl)(morpholino)methanone (31).



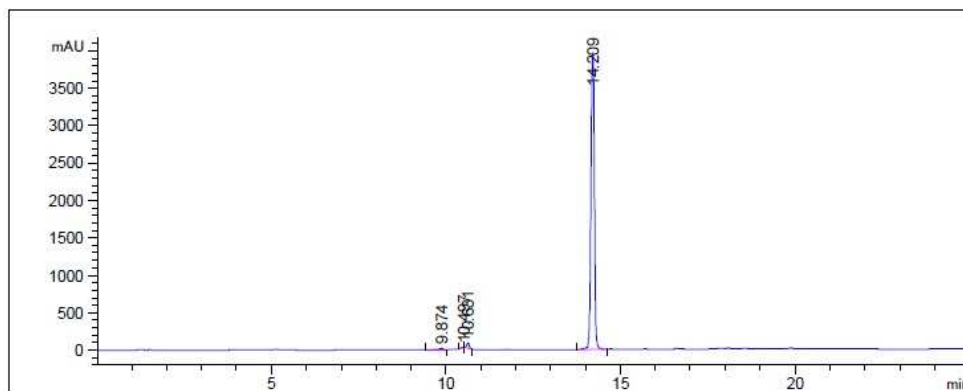
400 MHz, ¹H NMR in DMSO-*d*₆



100 MHz, ^{13}C NMR in DMSO- d_6



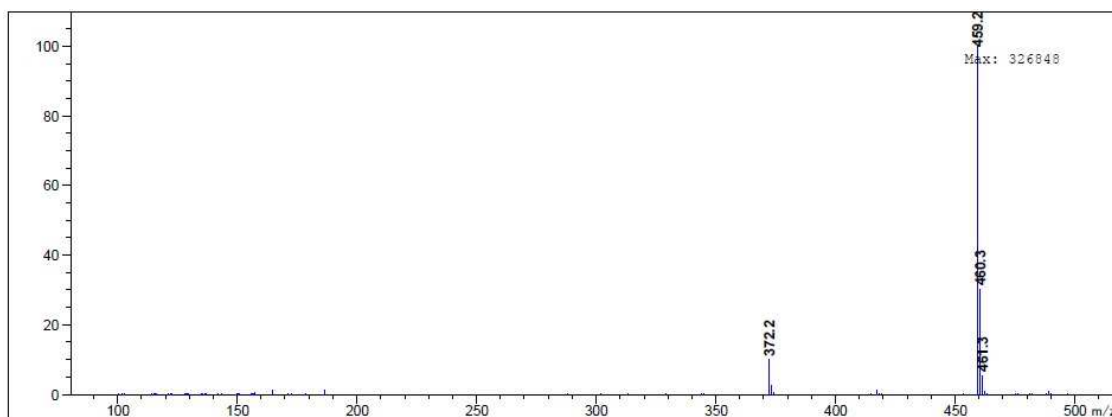
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.874	BB	0.1228	184.06461	20.69658	0.6695
2	10.497	BB	0.1144	35.46098	4.68082	0.1290
3	10.631	BB	0.0747	347.03796	71.44302	1.2624
4	14.209	BB	0.1070	2.69243e4	3973.78296	97.9391

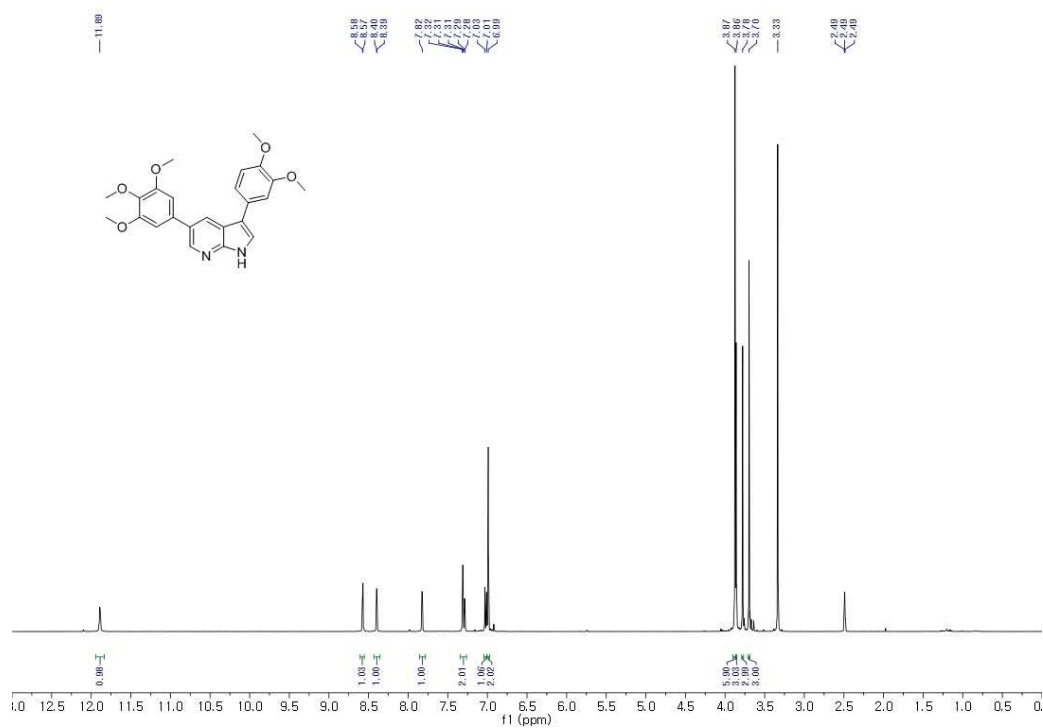
Totals : 2.74908e4 4070.60338

HPLC-Purity

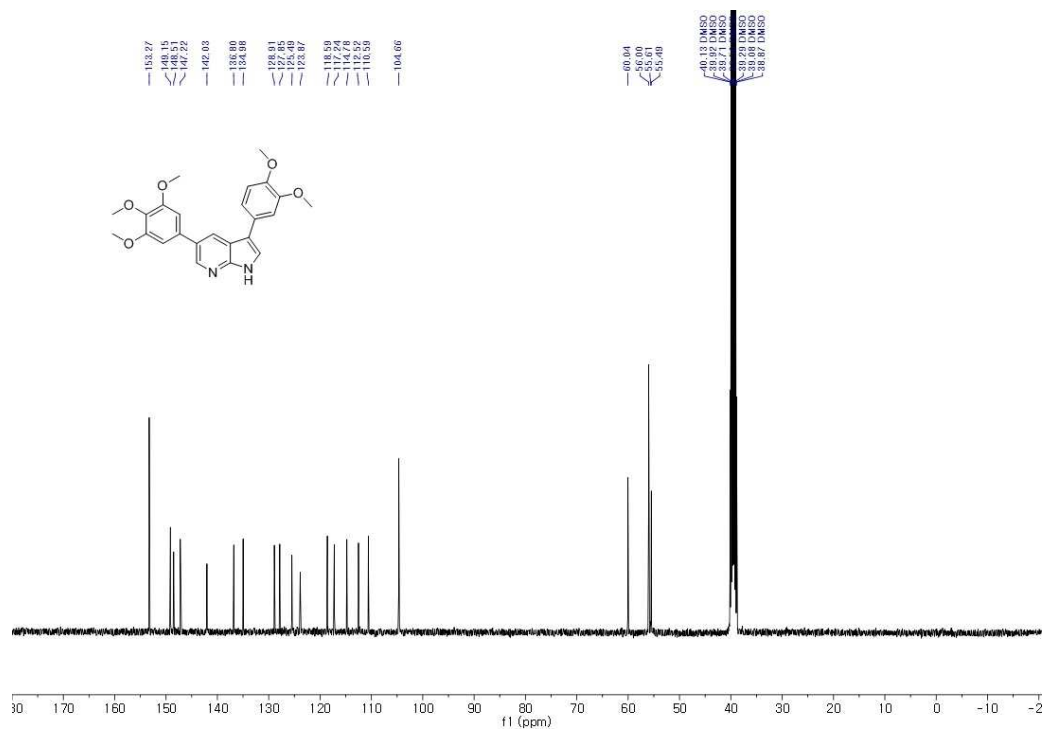


LR-MS

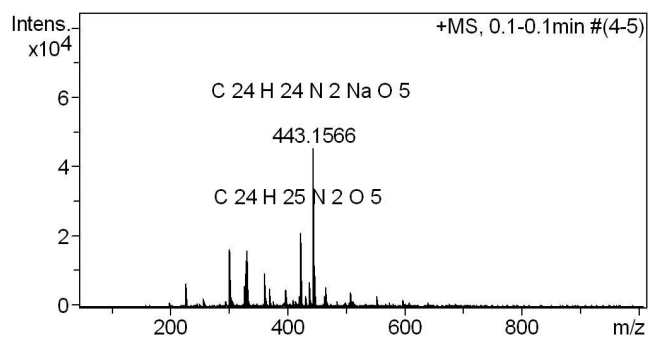
3-(3,4-Dimethoxyphenyl)-5-(3,4,5-trimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridine(32).



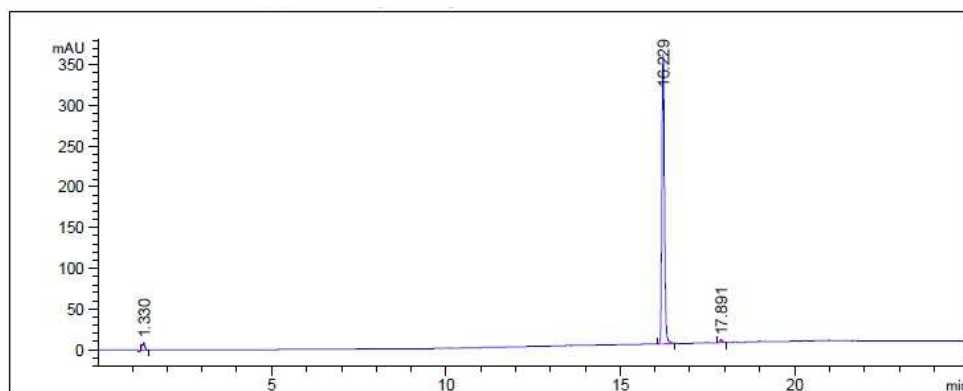
400 MHz, ¹H NMR in DMSO-*d*₆



100 MHz, ¹³C NMR in DMSO-*d*₆



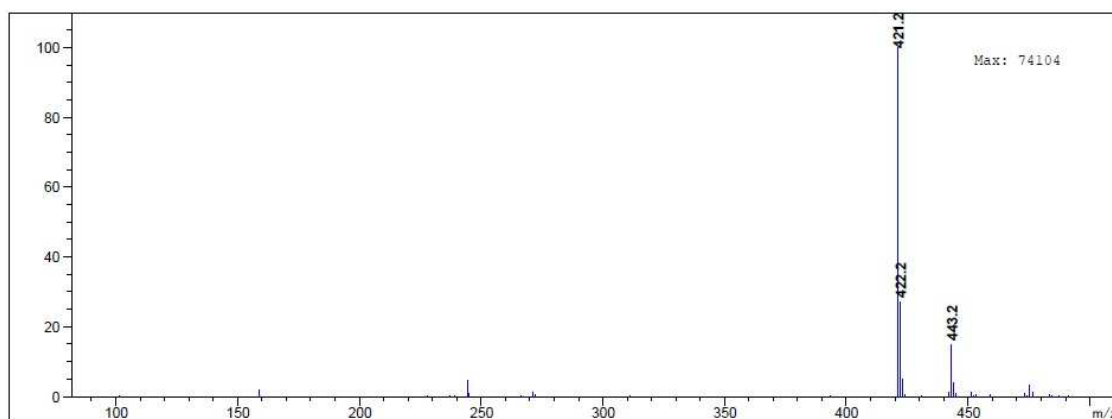
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.330	MM	0.0909	50.98401	9.34773	2.7535
2	16.229	BB	0.0774	1781.53796	356.17981	96.2167
3	17.891	BB	0.0732	19.06693	3.96162	1.0298

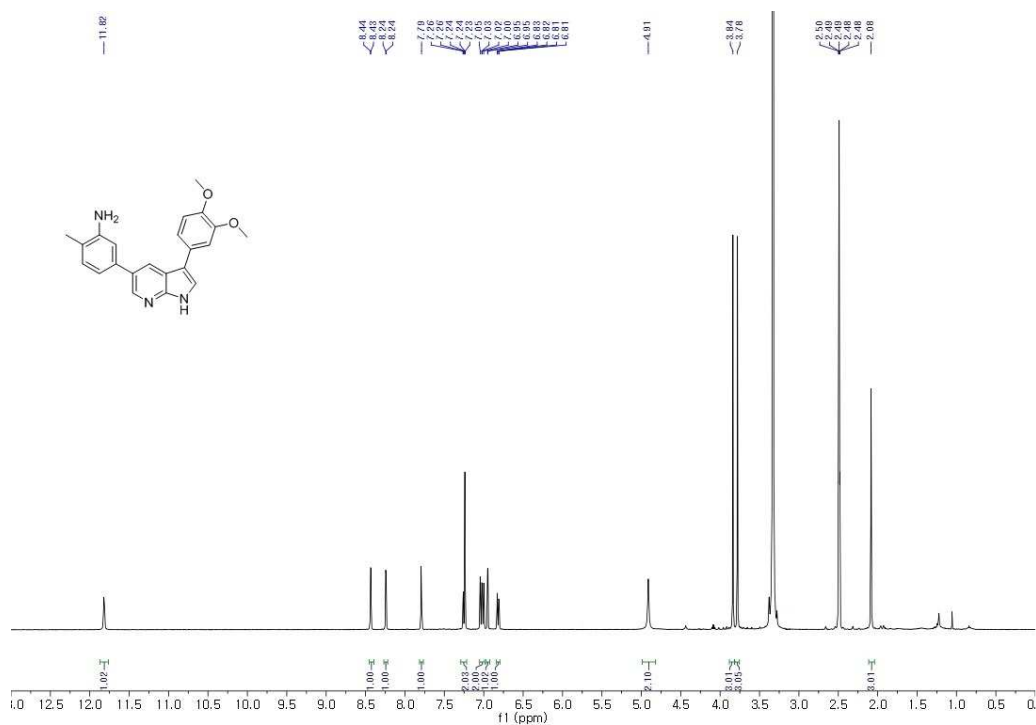
Totals : 1851.58890 369.48916

HPLC-Purity

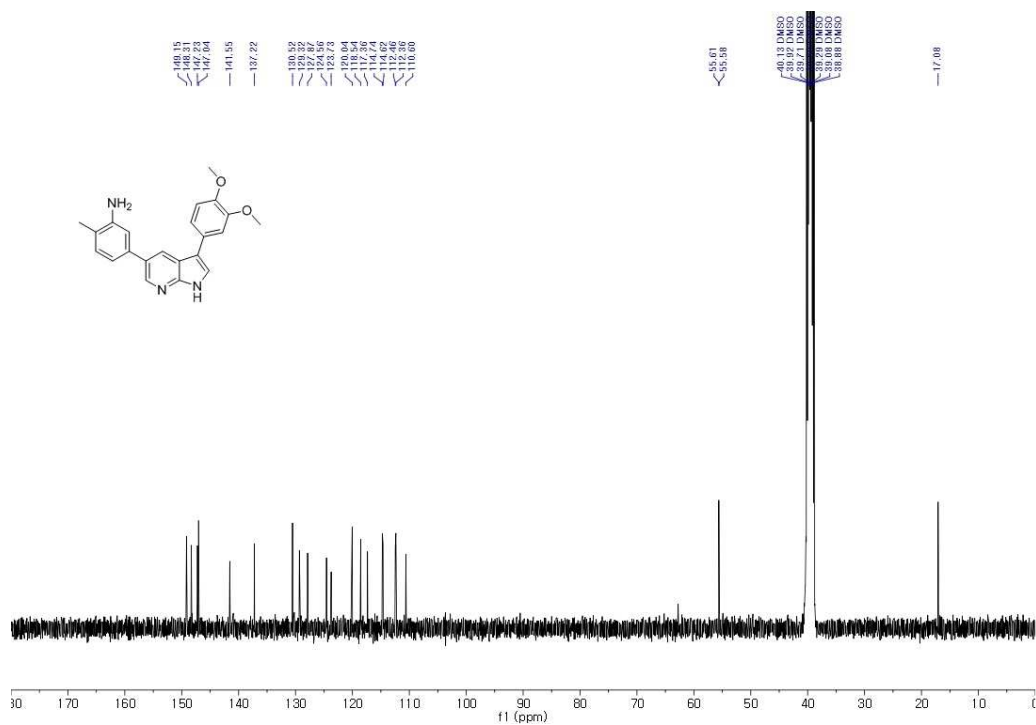


LR-MS

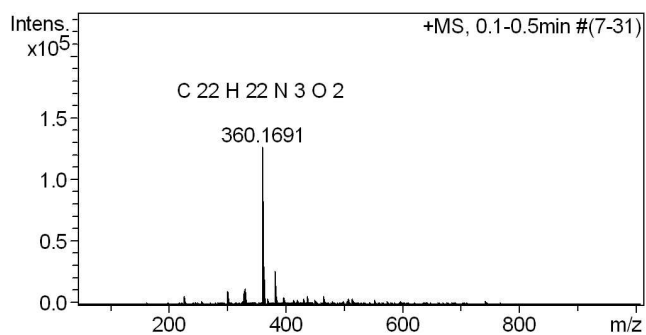
5-(3-(3,4-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)-2-methylaniline (33).



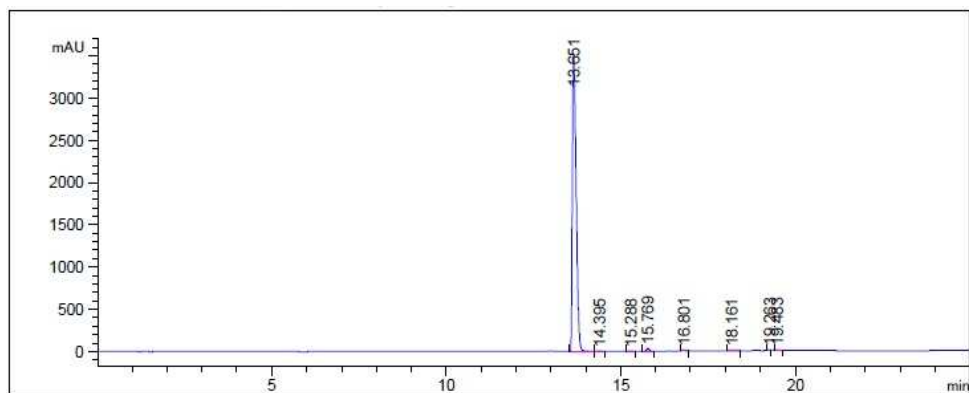
400 MHz, ¹H NMR in DMSO-*d*₆



100 MHz, ¹³C NMR in DMSO-*d*₆



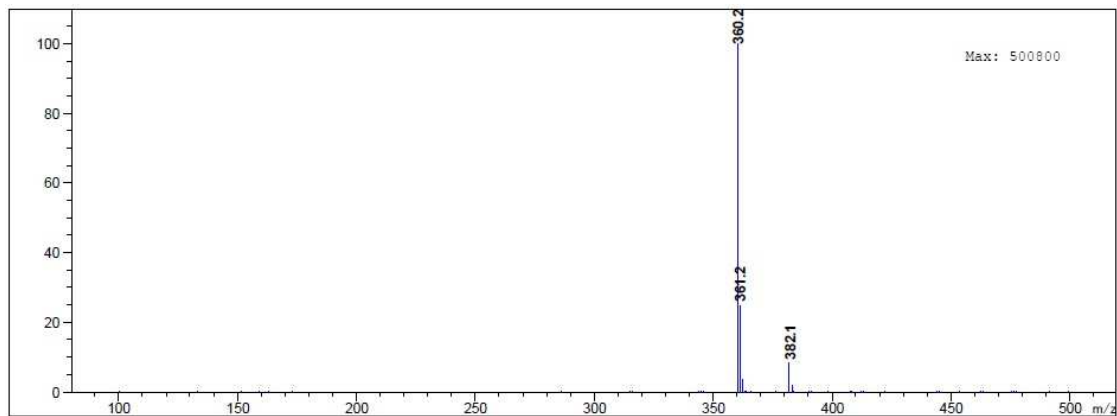
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	13.651	BB	0.1196	2.67930e4	3527.59082	98.5667
2	14.395	BB	0.1008	36.63892	5.79483	0.1348
3	15.288	BB	0.0848	21.44354	3.86310	0.0789
4	15.769	BB	0.0834	180.62706	32.73677	0.6645
5	16.801	BB	0.0682	72.22305	16.46530	0.2657
6	18.161	BB	0.0794	30.78658	5.66325	0.1133
7	19.263	BB	0.0790	18.29849	3.87810	0.0673
8	19.483	BB	0.0801	29.60229	5.56288	0.1089

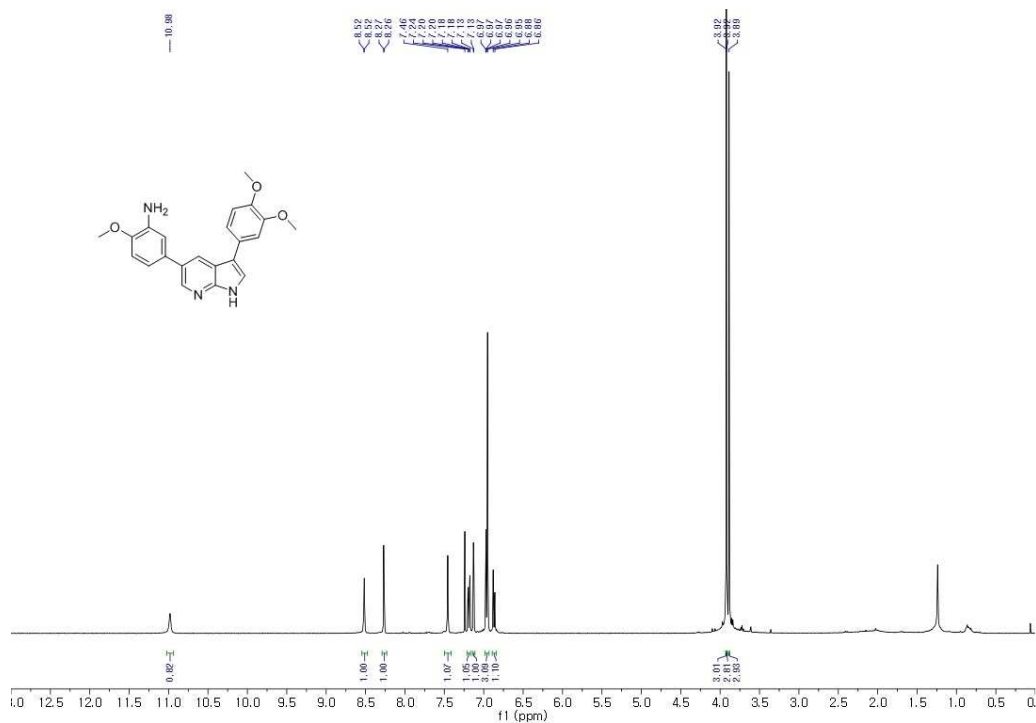
Totals : 2.71826e4 3601.55504

HPLC-Purity

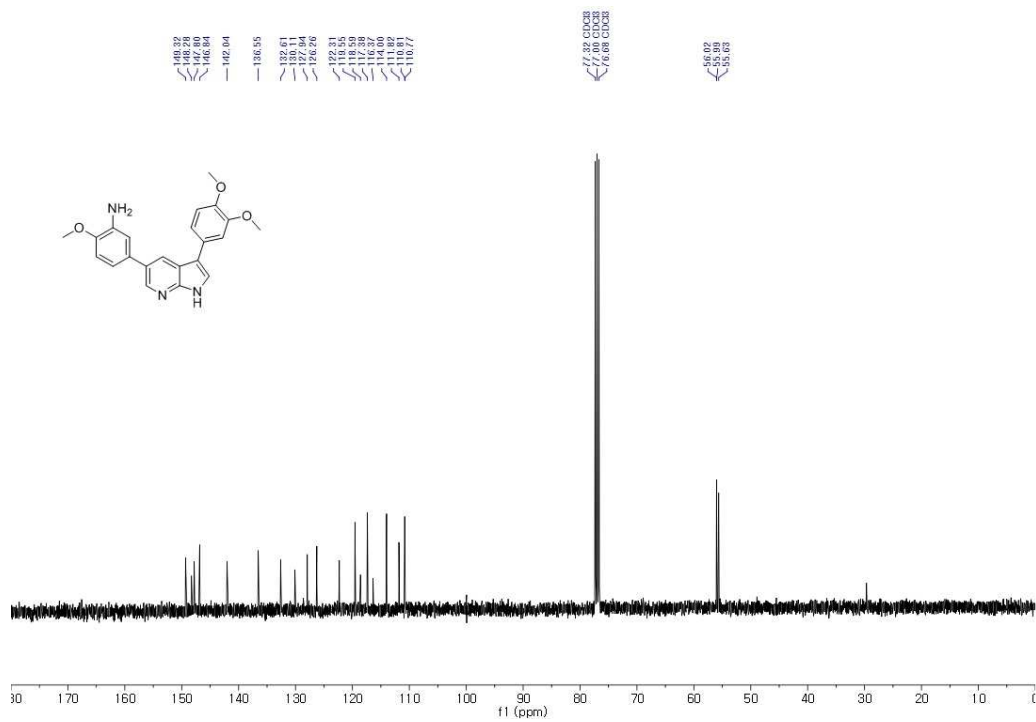


LR-MS

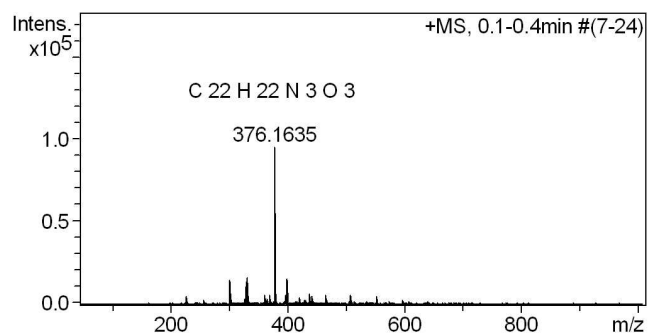
5-(3-(3,4-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)-2-methoxyaniline (34).



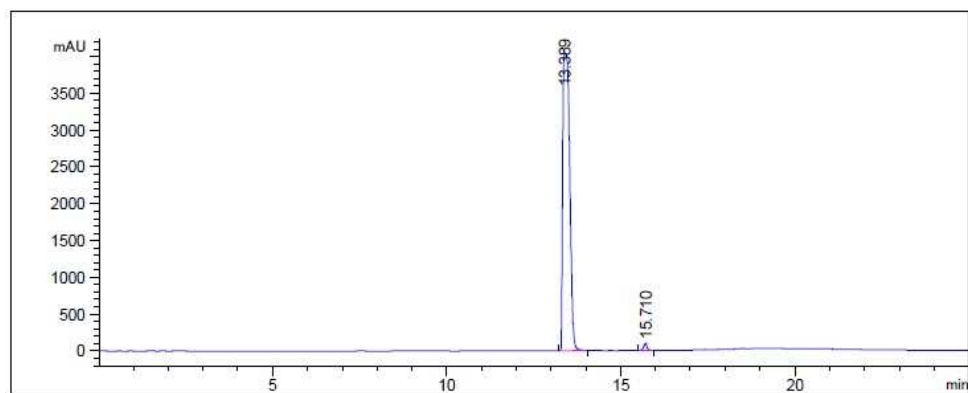
400MHz, ¹H NMR in Chloroform-*d*



100 MHz, ¹³C NMR in Chloroform-*d*



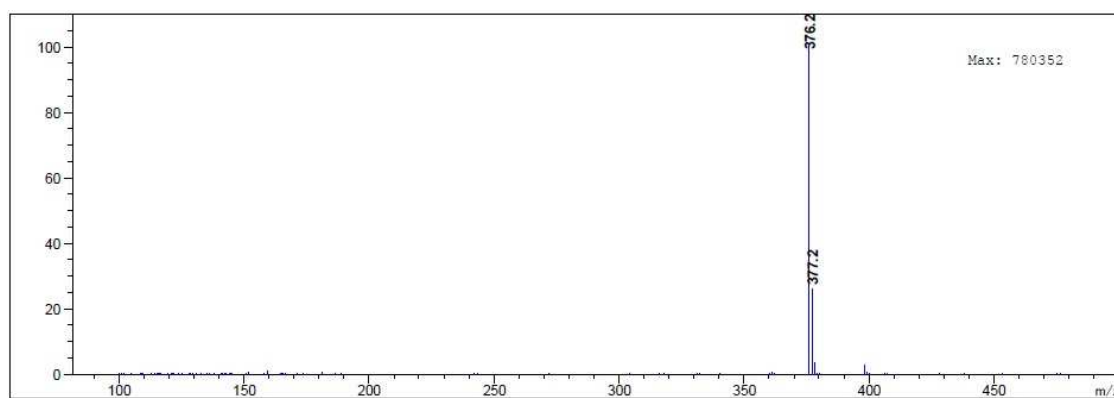
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	13.389	BB	0.2241	5.58258e4	4041.59448	98.8548
2	15.710	BB	0.1015	646.73853	96.14762	1.1452

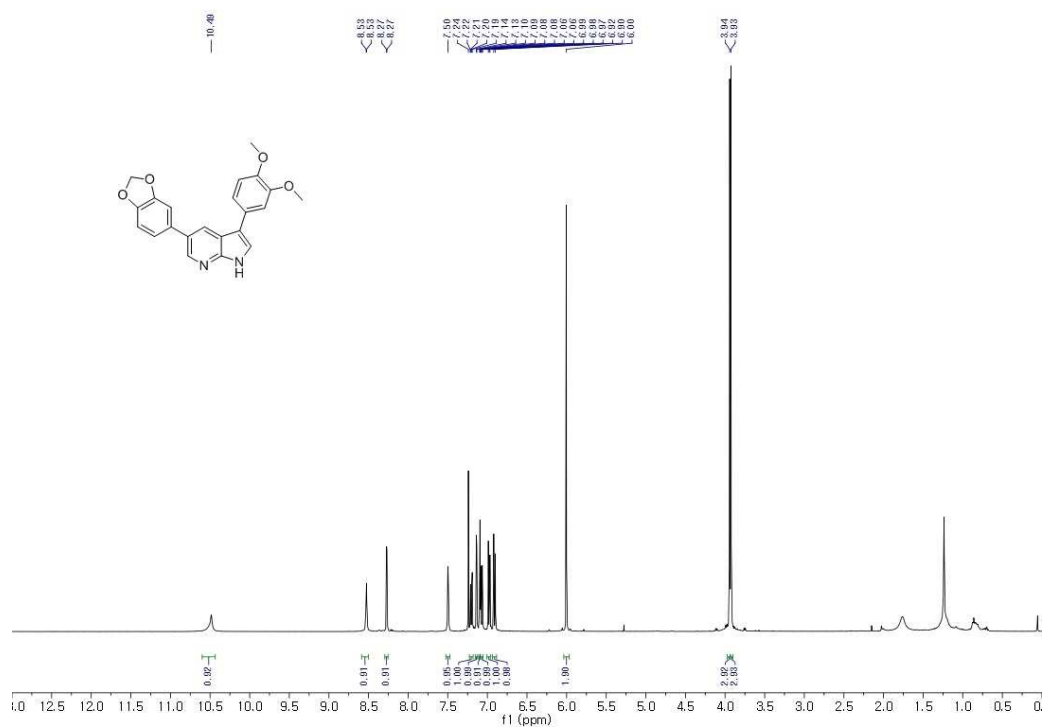
Totals : 5.64725e4 4137.74210

HPLC-Purity

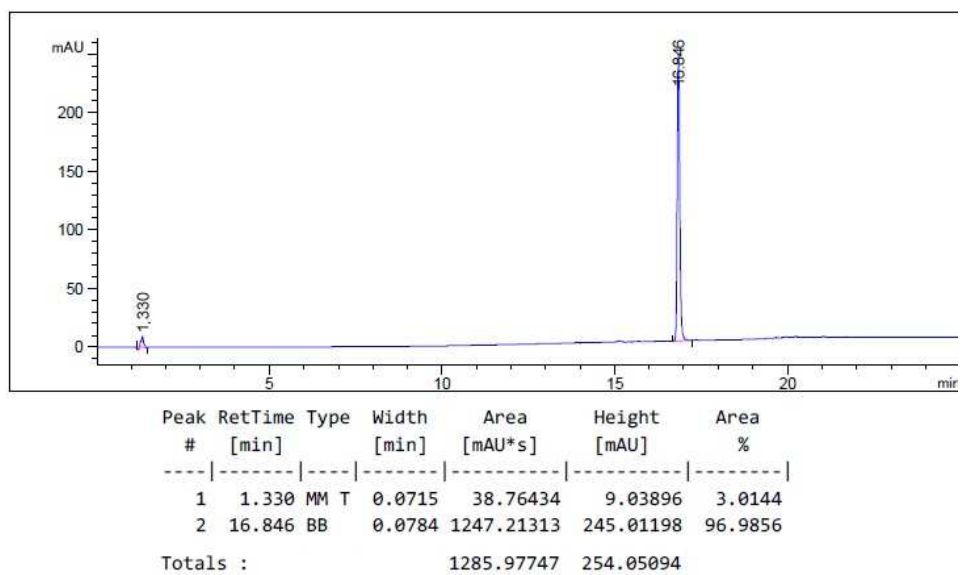


LR-MS

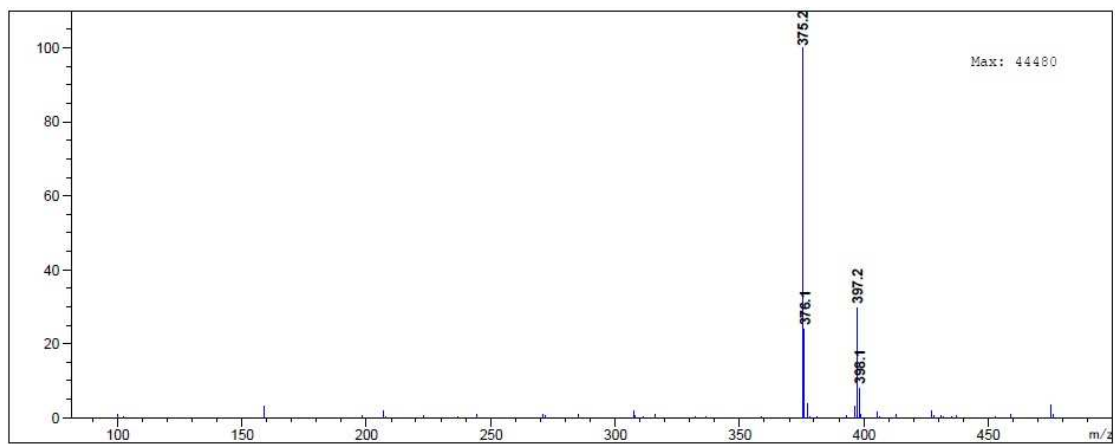
5-(Benzo[d][1,3]dioxol-5-yl)-3-(3,4-dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridine (35).



400MHz, ¹H NMR in Chloroform-d

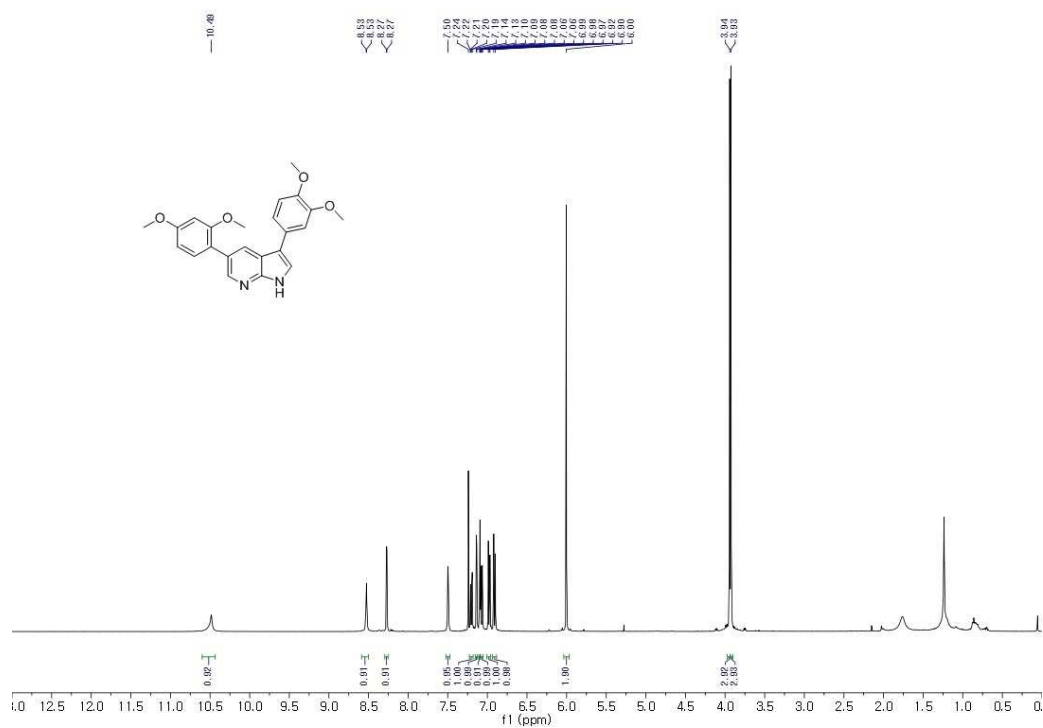


HPLC-Purity

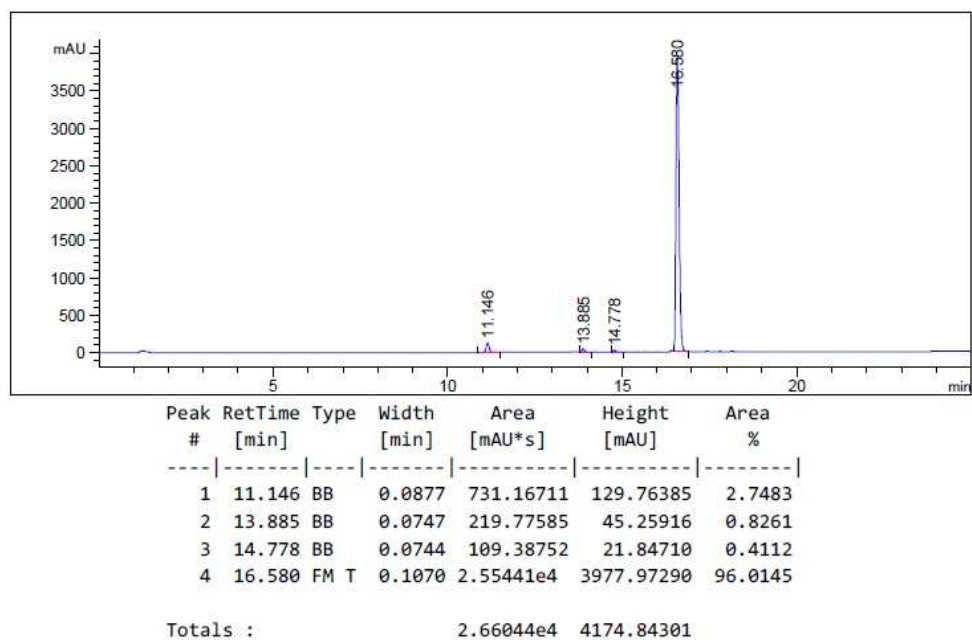


LR-MS

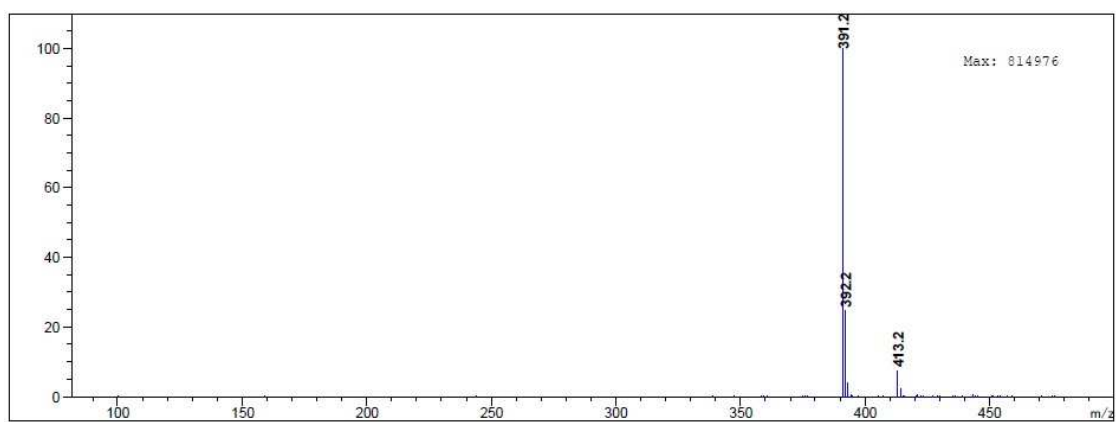
5-(2,4-Dimethoxyphenyl)-3-(3,4-dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridine (36).



400MHz, ^1H NMR in Chloroform-*d*

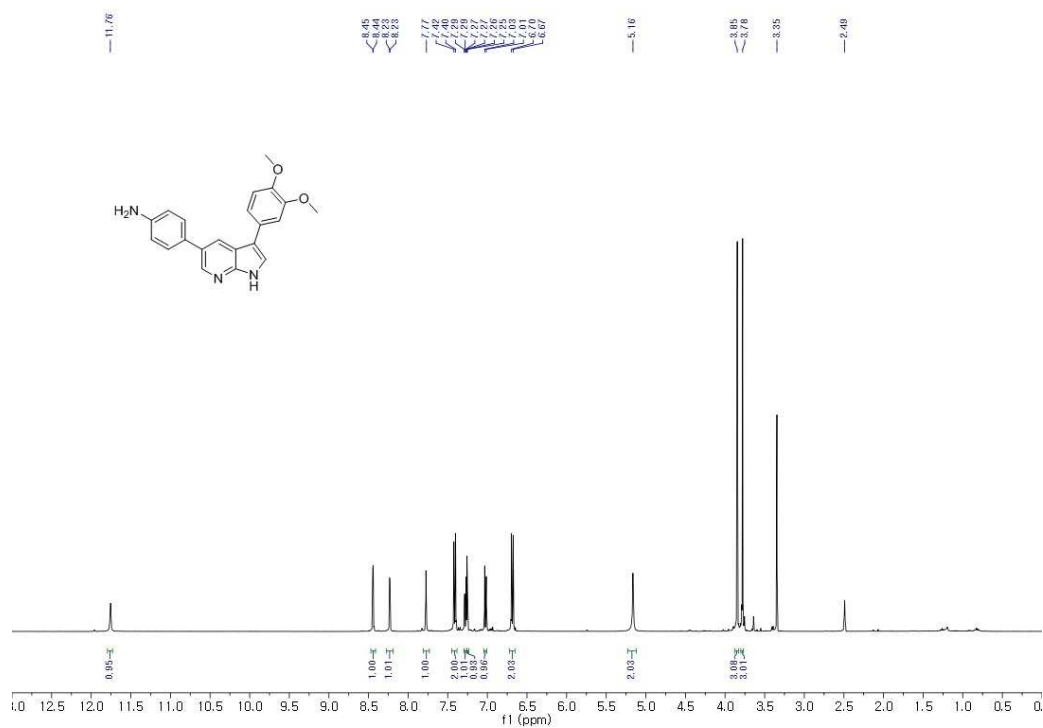


HPLC-Purity

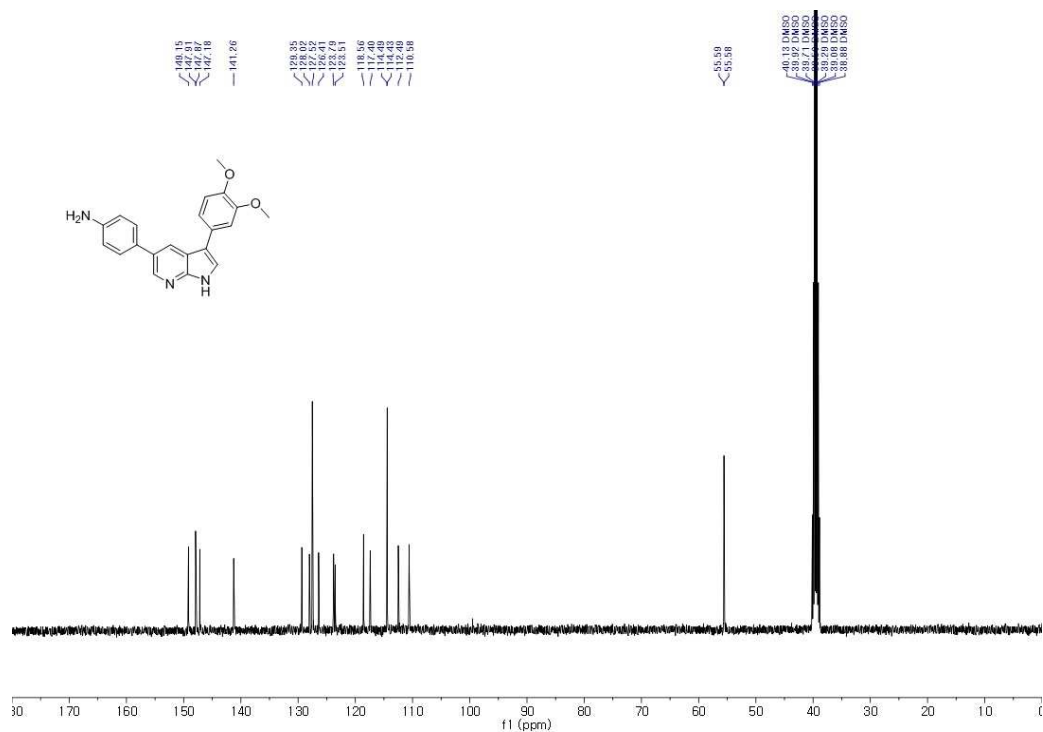


LR-MS

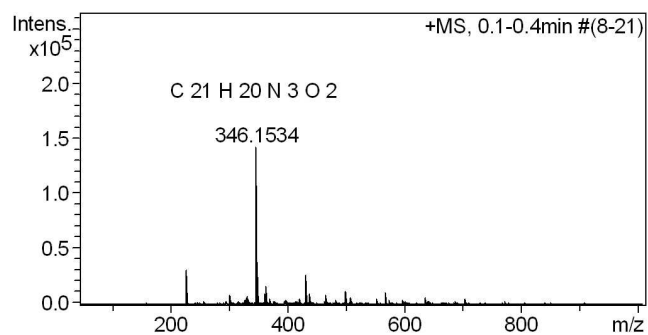
4-(3-(3,4-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)aniline (37).



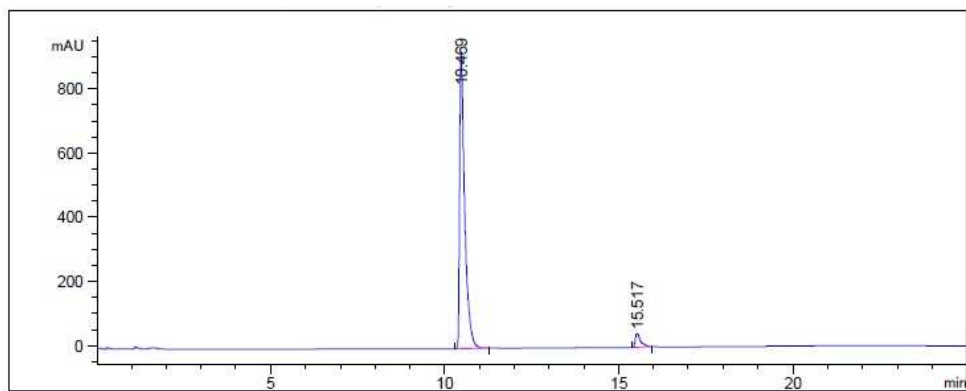
400 MHz, ¹H NMR in DMSO-*d*₆



100 MHz, ¹³C NMR in DMSO-*d*₆

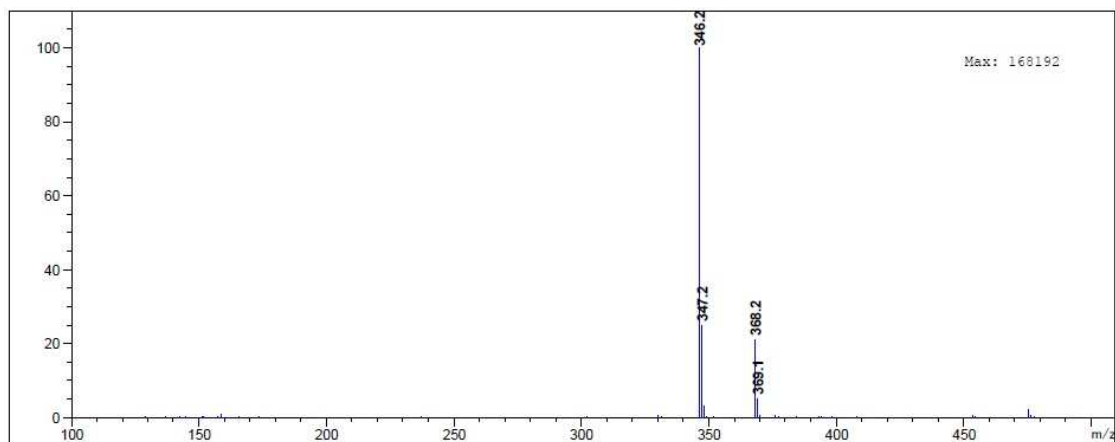


HR-MS



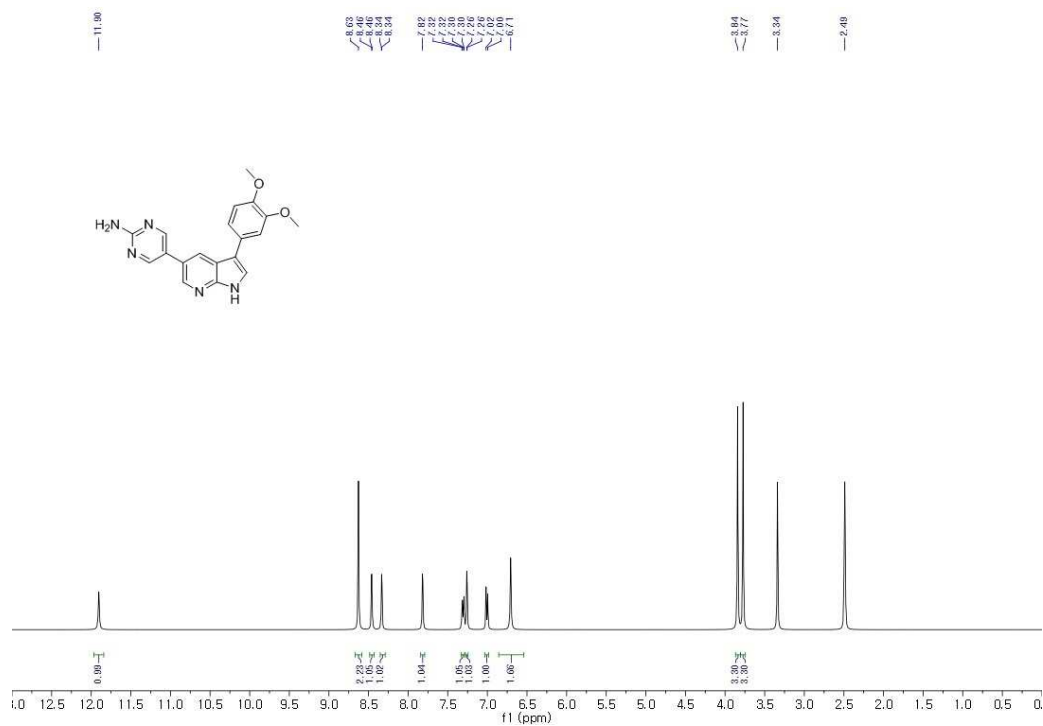
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.469	BB	0.1490	9412.37500	922.57440	95.4882
2	15.517	BB	0.1432	444.73642	41.43380	4.5118
Totals :				9857.11142	964.00820	

HPLC-Purity

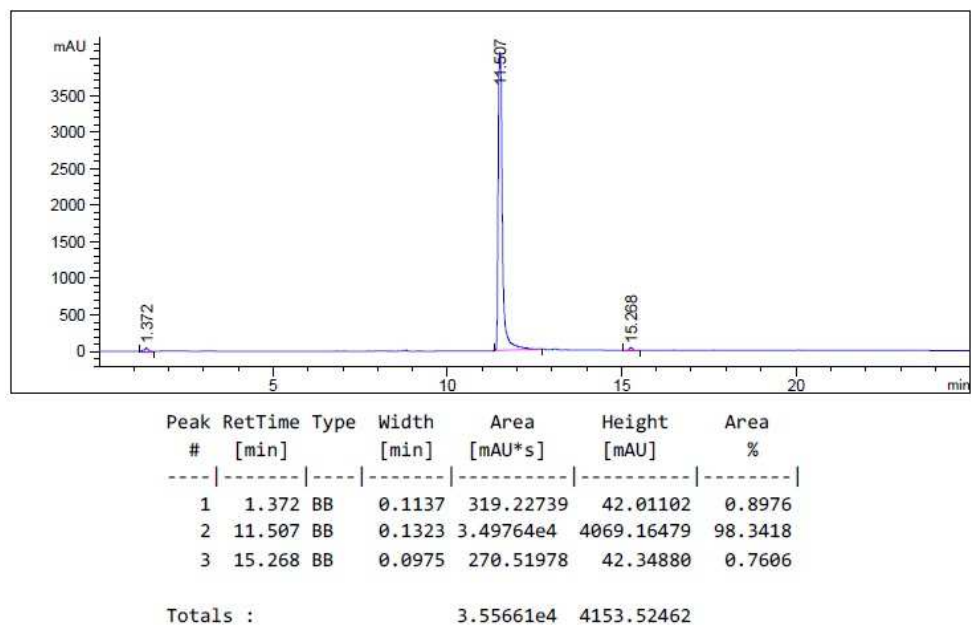


LR-MS

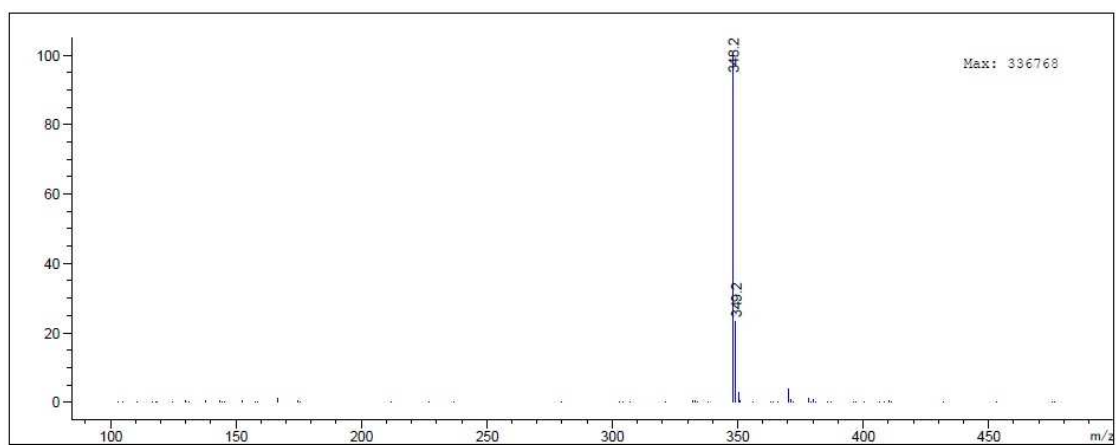
5-(3-(3,4-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)pyrimidin-2-amine (38).



400 MHz, ¹H NMR in DMSO-*d*₆

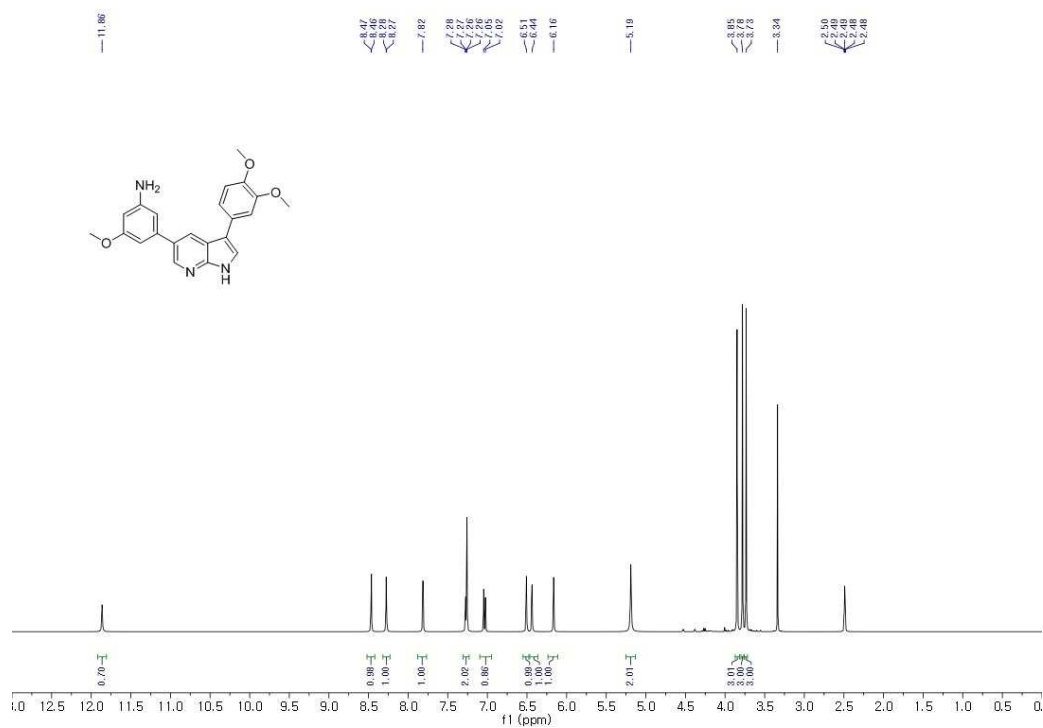


HPLC-Purity

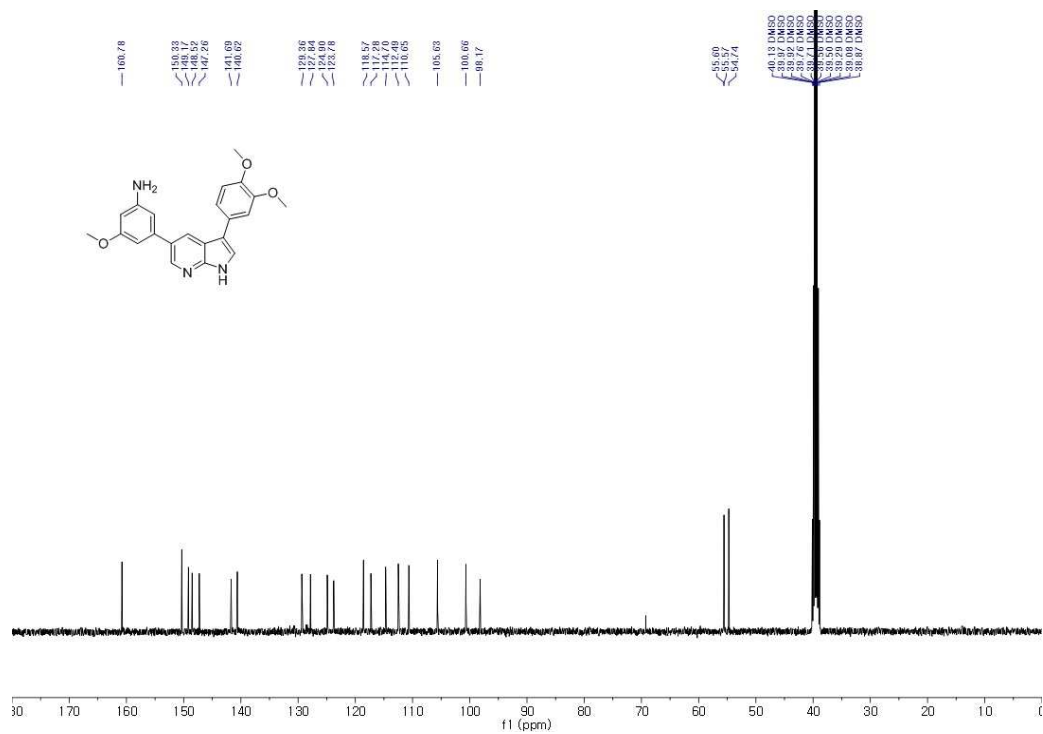


LR-MS

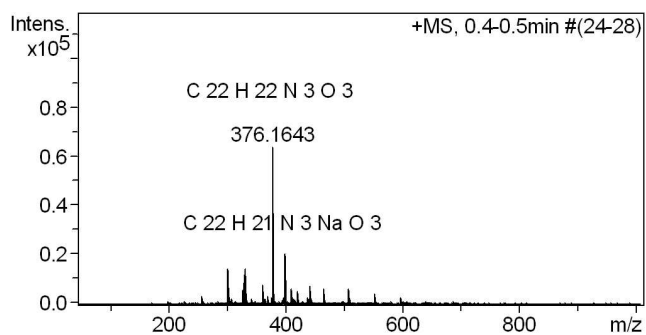
3-(3-(3,4-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)-5-methoxyaniline (39).



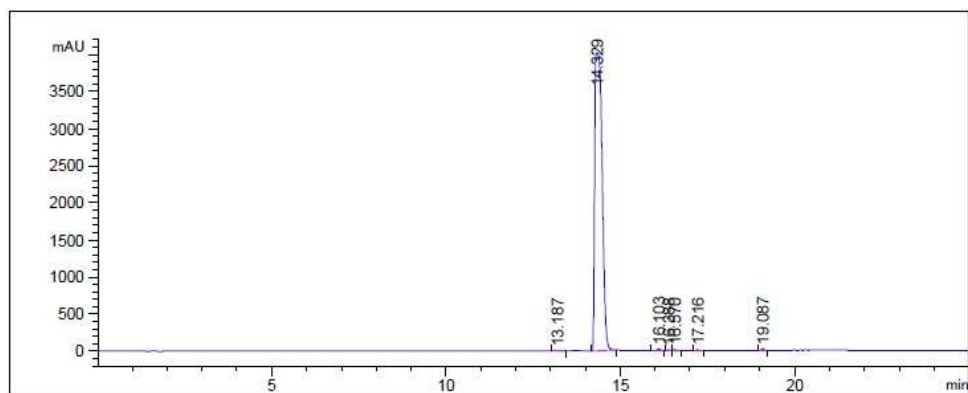
400 MHz, ¹H NMR in DMSO-*d*₆



100 MHz, ¹³C NMR in DMSO-*d*₆



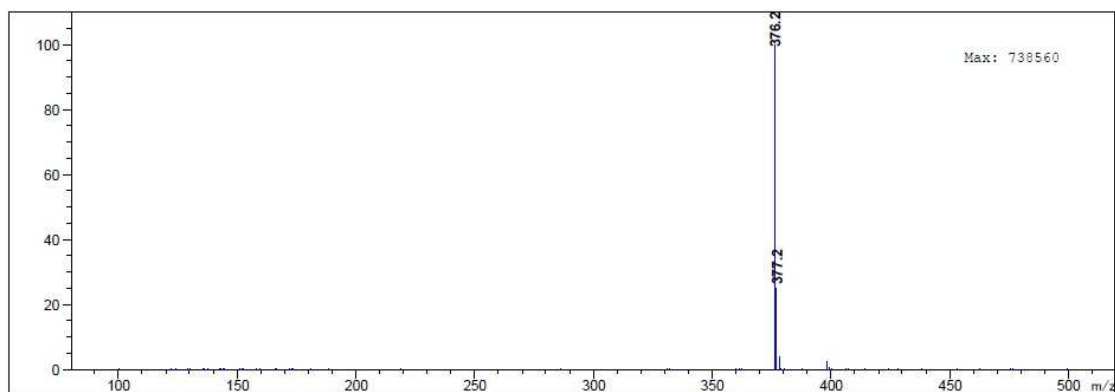
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	13.187	BB	0.1405	71.37736	7.60275	0.1195
2	14.329	BB	0.2393	5.92522e4	4011.68945	99.2245
3	16.103	BB	0.0899	117.34345	19.86865	0.1965
4	16.388	BB	0.0855	35.97012	6.81934	0.0602
5	16.570	BB	0.0898	59.58337	9.96605	0.0998
6	17.216	BB	0.0722	55.76373	11.78810	0.0934
7	19.087	BB	0.0720	123.06547	26.56926	0.2061

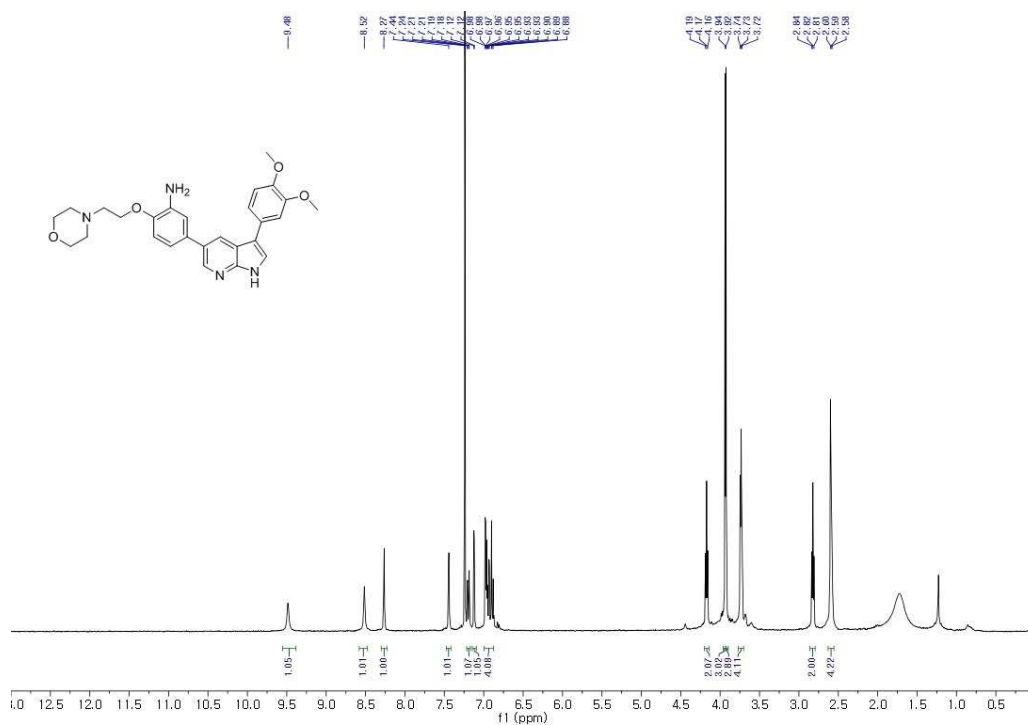
Totals : 5.97153e4 4094.30361

HPLC-Purity

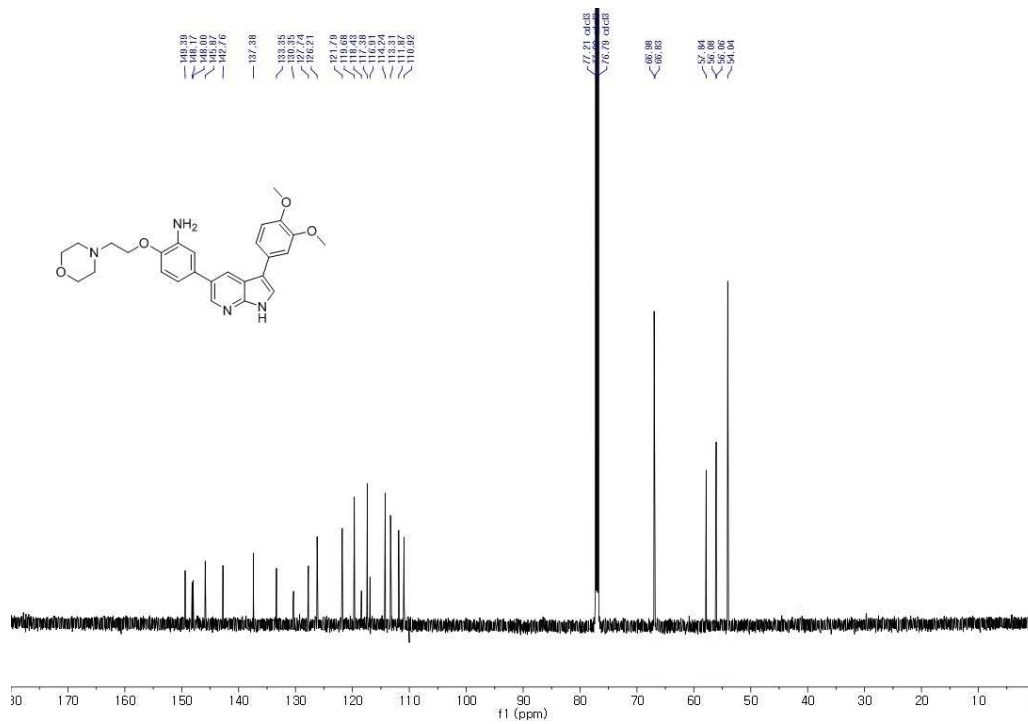


LR-MS

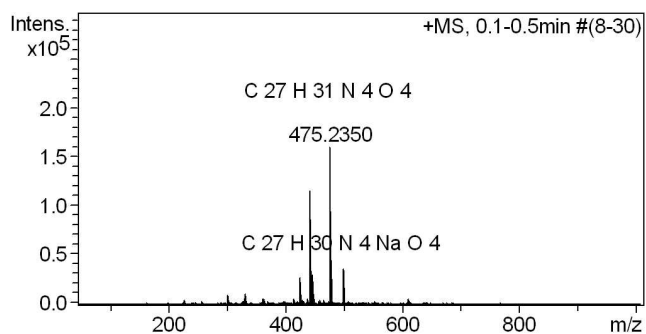
5-(3-(3,4-Dimethoxyphenyl)-1H-pyrrolo[2,3-b]pyridin-5-yl)-2-(2-morpholinoethoxy)aniline (40).



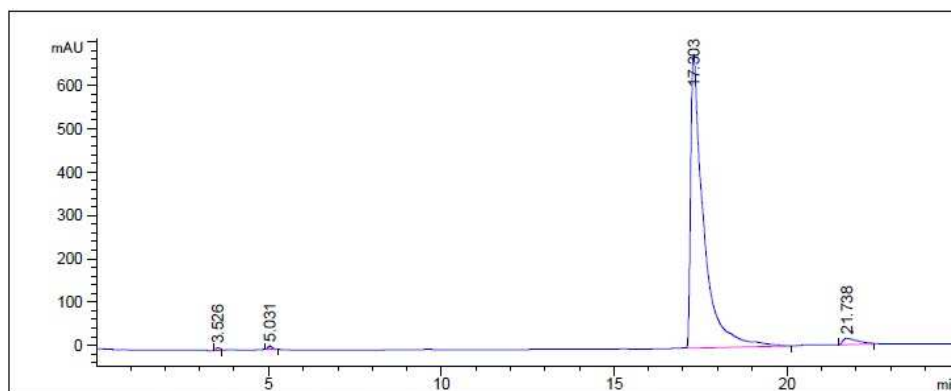
400MHz, ¹H NMR in Chloroform-d



150 MHz, ¹³C NMR in Chloroform-d



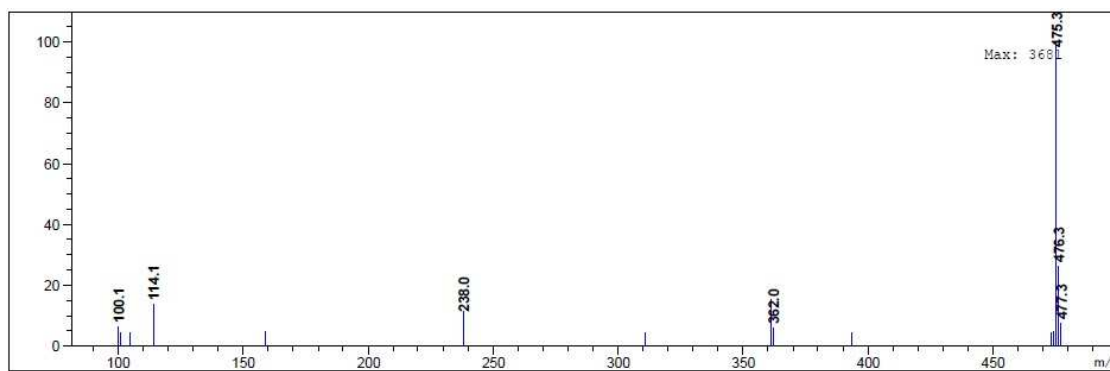
HR-MS



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	3.526	MM	0.1408	52.88729	6.26177	0.2914
2	5.031	MM T	0.1532	67.50575	7.34561	0.3720
3	17.303	MM T	0.4314	1.75860e4	679.41101	96.9077
4	21.738	MM	0.4927	440.76721	14.90879	2.4288

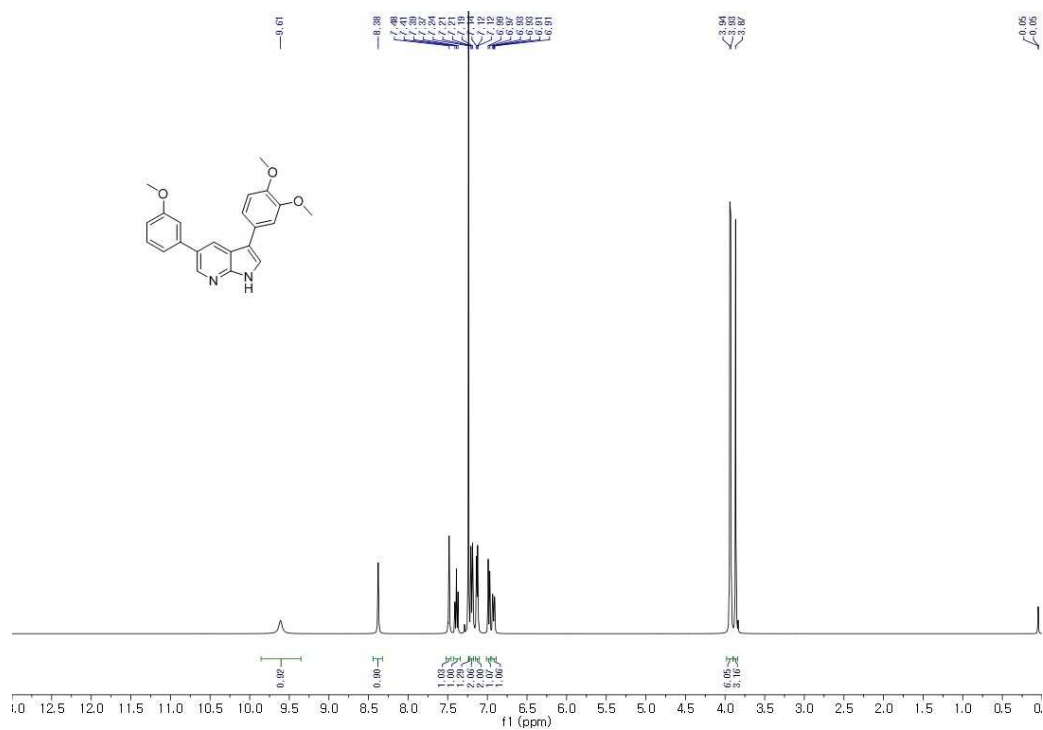
Totals : 1.81472e4 707.92719

HPLC-Purity

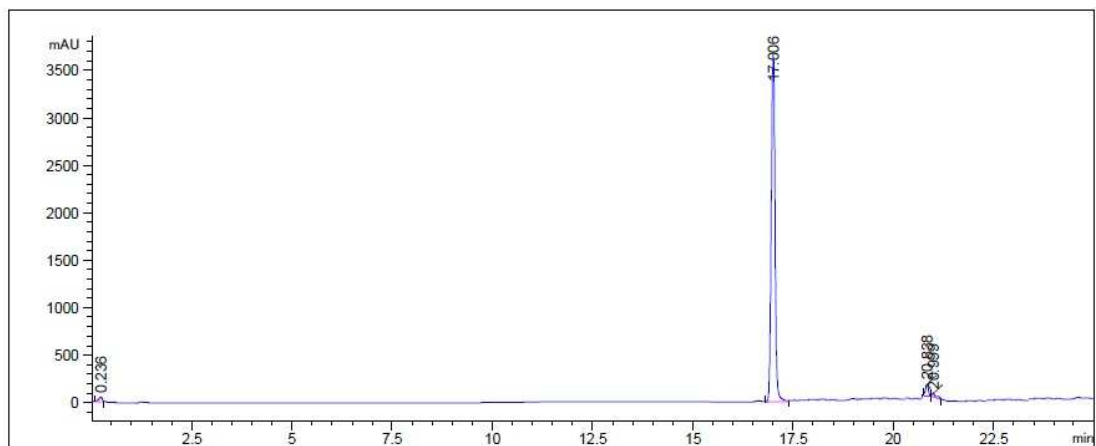


LR-MS

3-(3,4-Dimethoxyphenyl)-5-(3-methoxyphenyl)-1H-pyrrolo[2,3-b]pyridine (41).

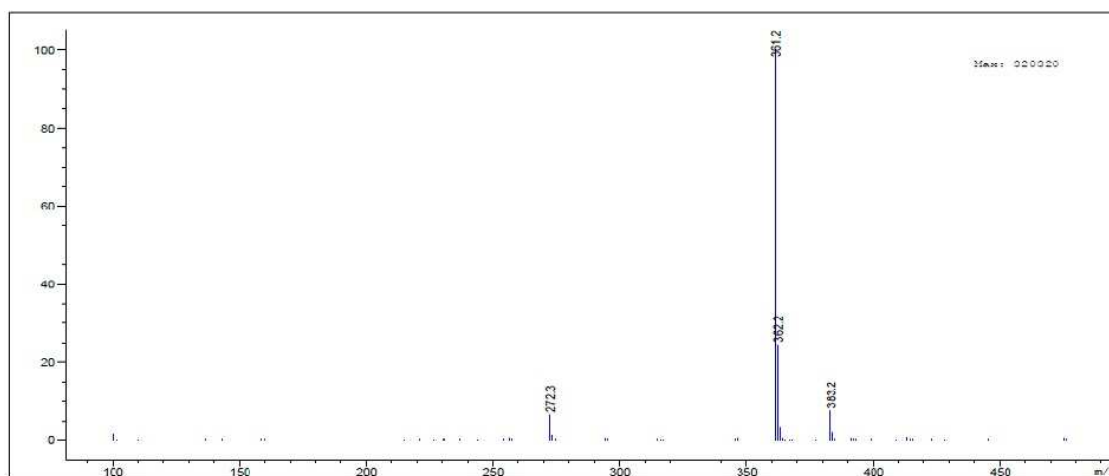


400MHz, ^1H NMR in Chloroform- d



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	0.236	VV	0.1019	332.13770	51.04029	1.3126
2	17.006	BV	0.1048	2.41125e4	3663.74072	95.2885
3	20.838	MM	0.0775	573.84784	123.48432	2.2677
4	20.999	MM	0.1236	286.25320	38.60036	1.1312
Totals :				2.53047e4	3876.86570	

HPLC-Purity



LR-MS