

Supporting Information

Synthesis of Aza and Carbocyclic β -Carbolines for the Treatment of Alcohol Abuse. Regiospecific Solution to The Problem of 3,6- Disubstituted β - and Aza- β -carboline Specificity

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Milwaukee, WI 53201

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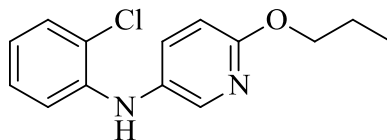
E-mail: capncook@uwm.edu

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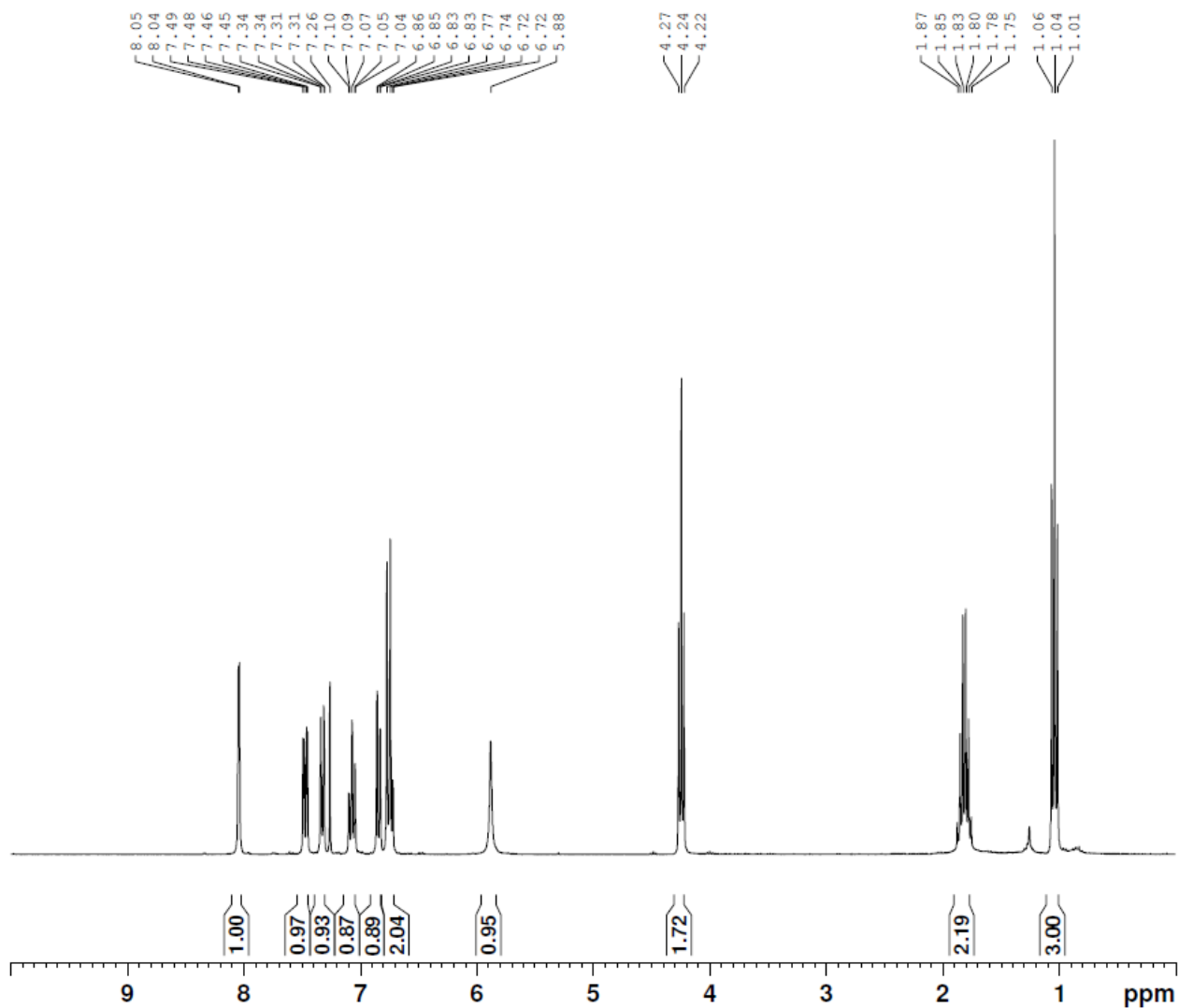
Copies of ^1H and ^{13}C NMR Spectra

N-(2-chlorophenyl)-6-propoxy-pyridin-3-amine

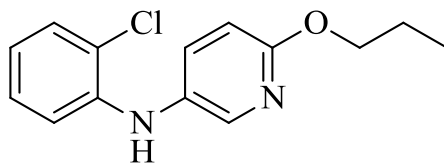


7a

^1H NMR (300 MHz, CDCl_3)

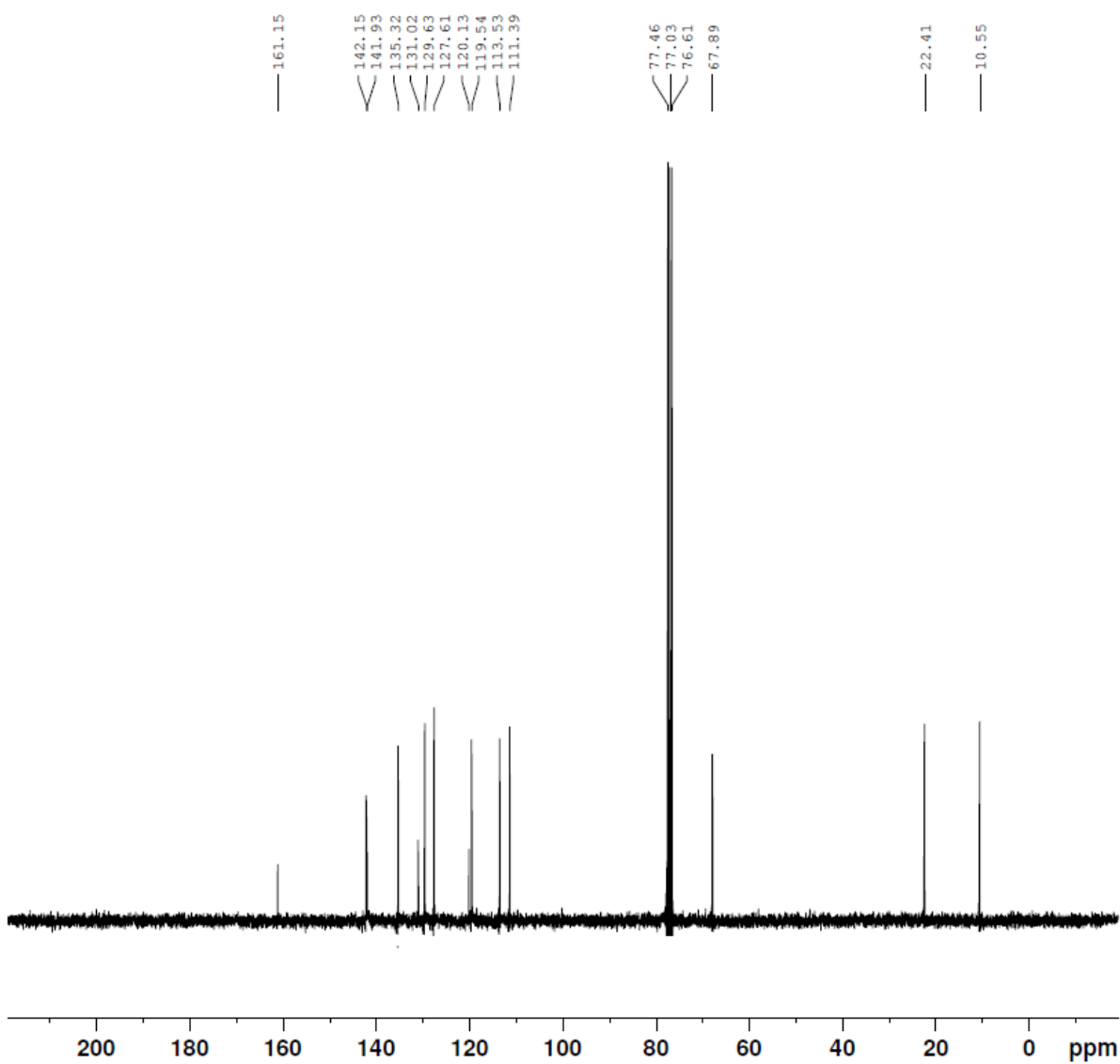


***N*-(2-chlorophenyl)-6-propoxypyridin-3-amine**

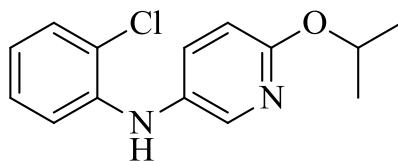


7a

¹³C NMR (75 MHz, CDCl₃)

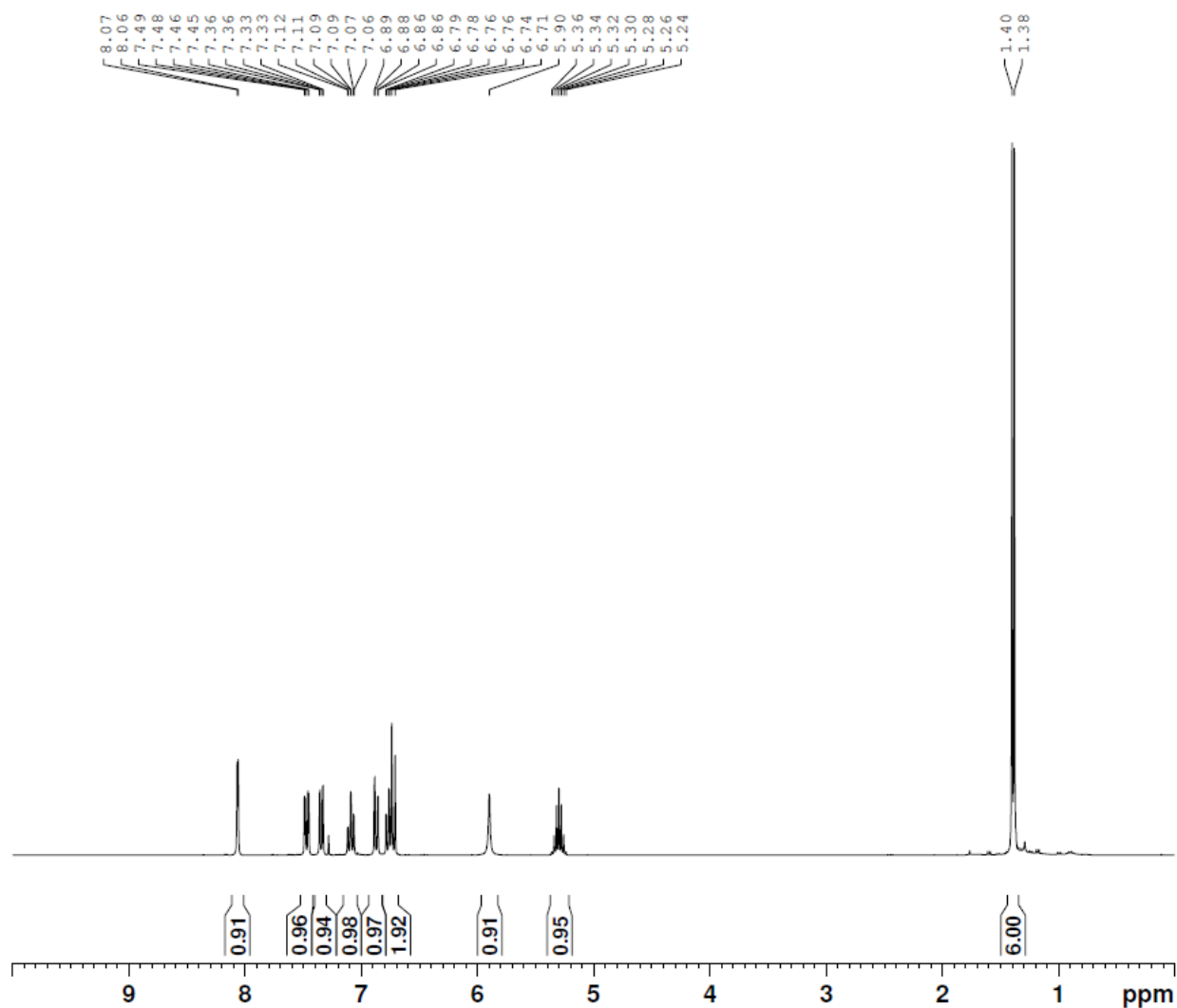


***N*-(2-chlorophenyl)-6-isopropoxy-pyridin-3-amine**

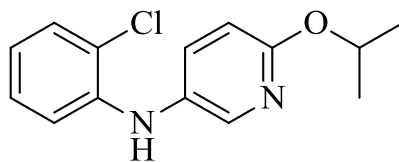


7b

¹H NMR (300 MHz, CDCl₃)

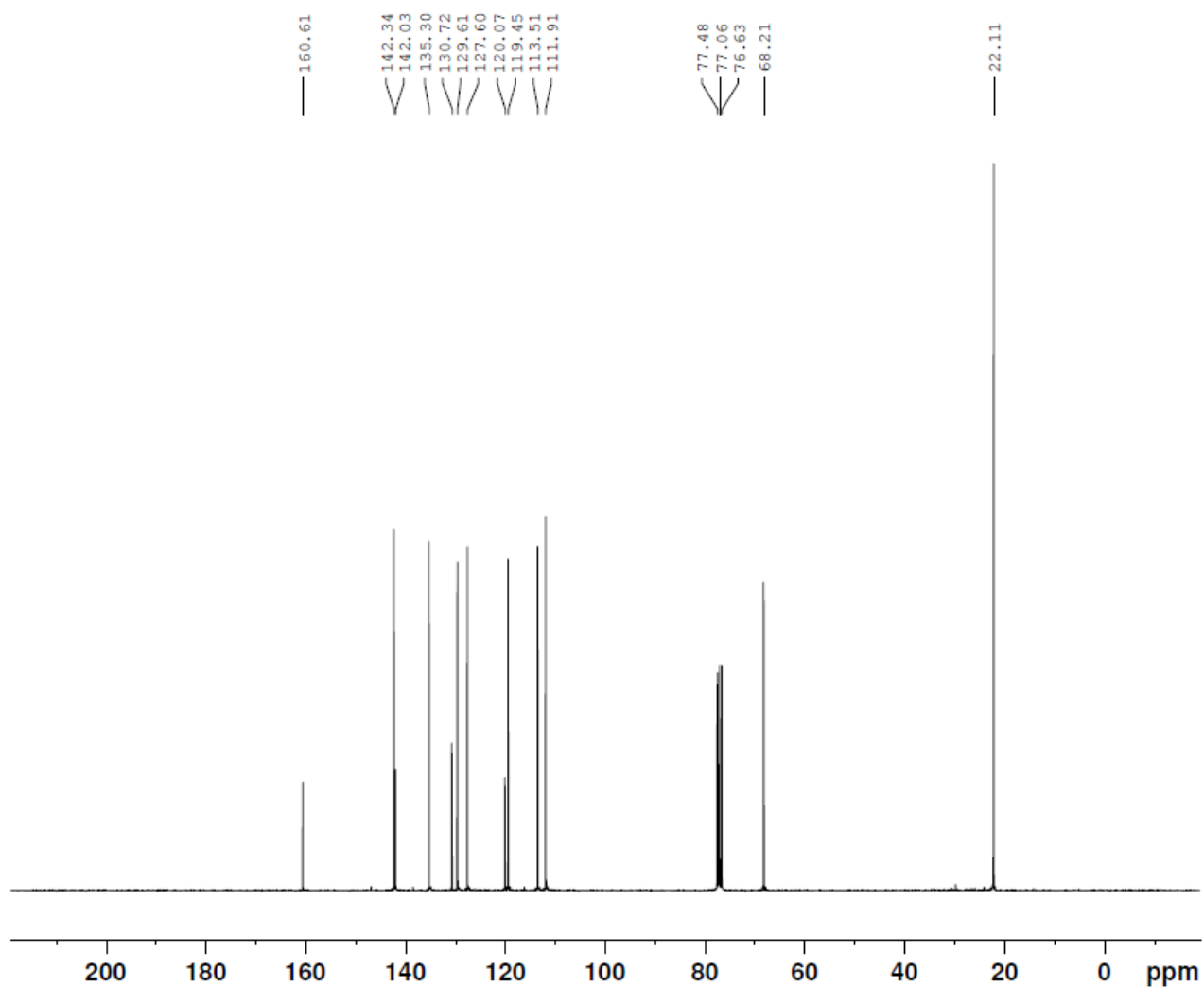


***N*-(2-chlorophenyl)-6-isopropoxy-pyridin-3-amine**

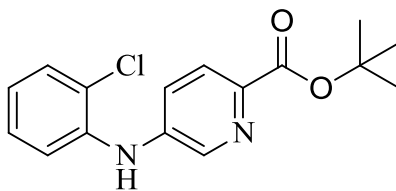


7b

^{13}C NMR (75 MHz, CDCl_3)

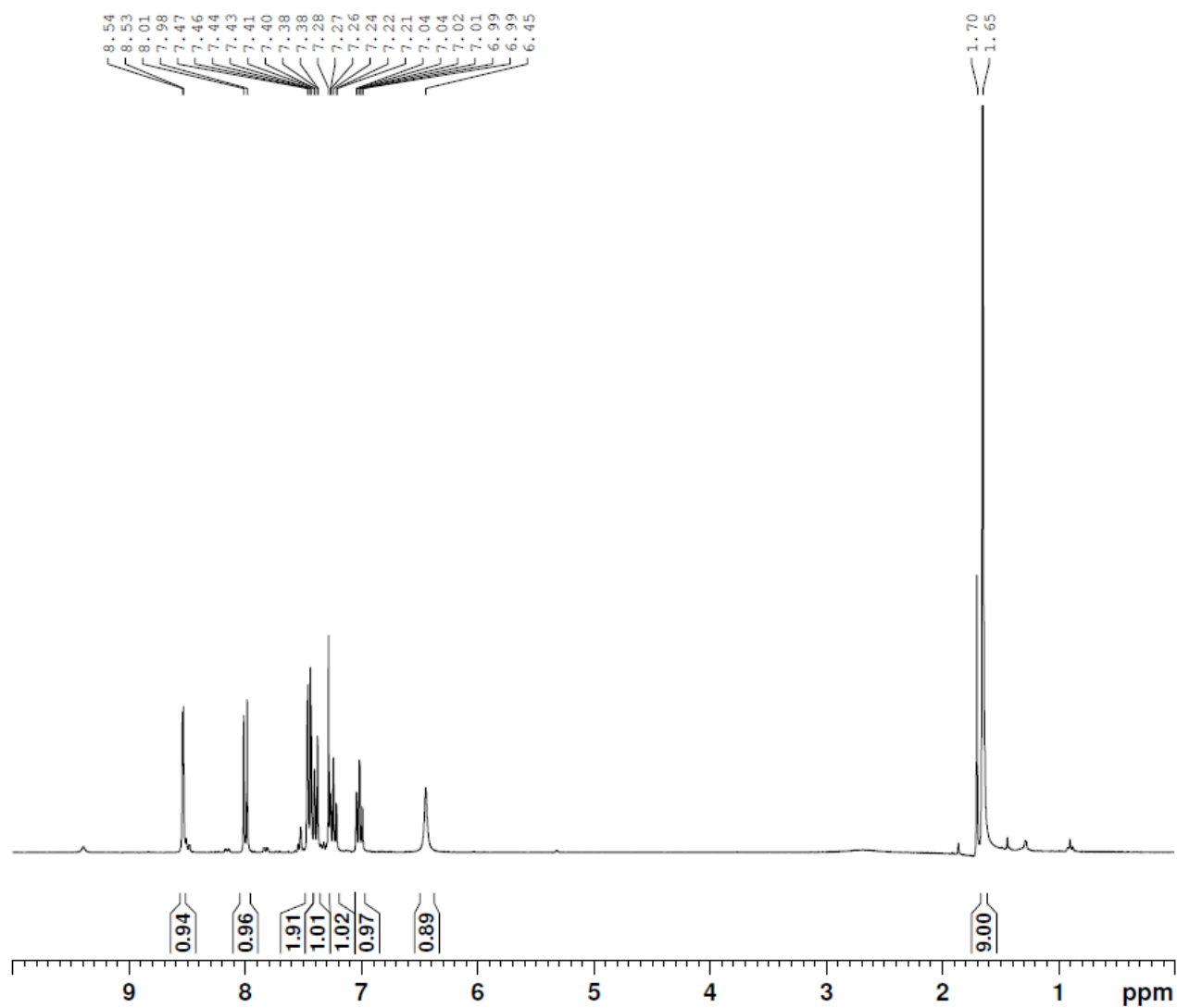


***tert*-butyl 5-((2-chlorophenyl)amino)picolinate**

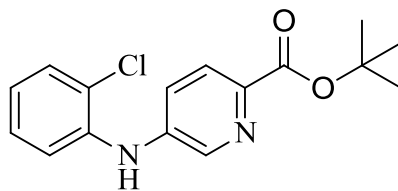


7c

$^1\text{H NMR}$ (300 MHz, CDCl_3)

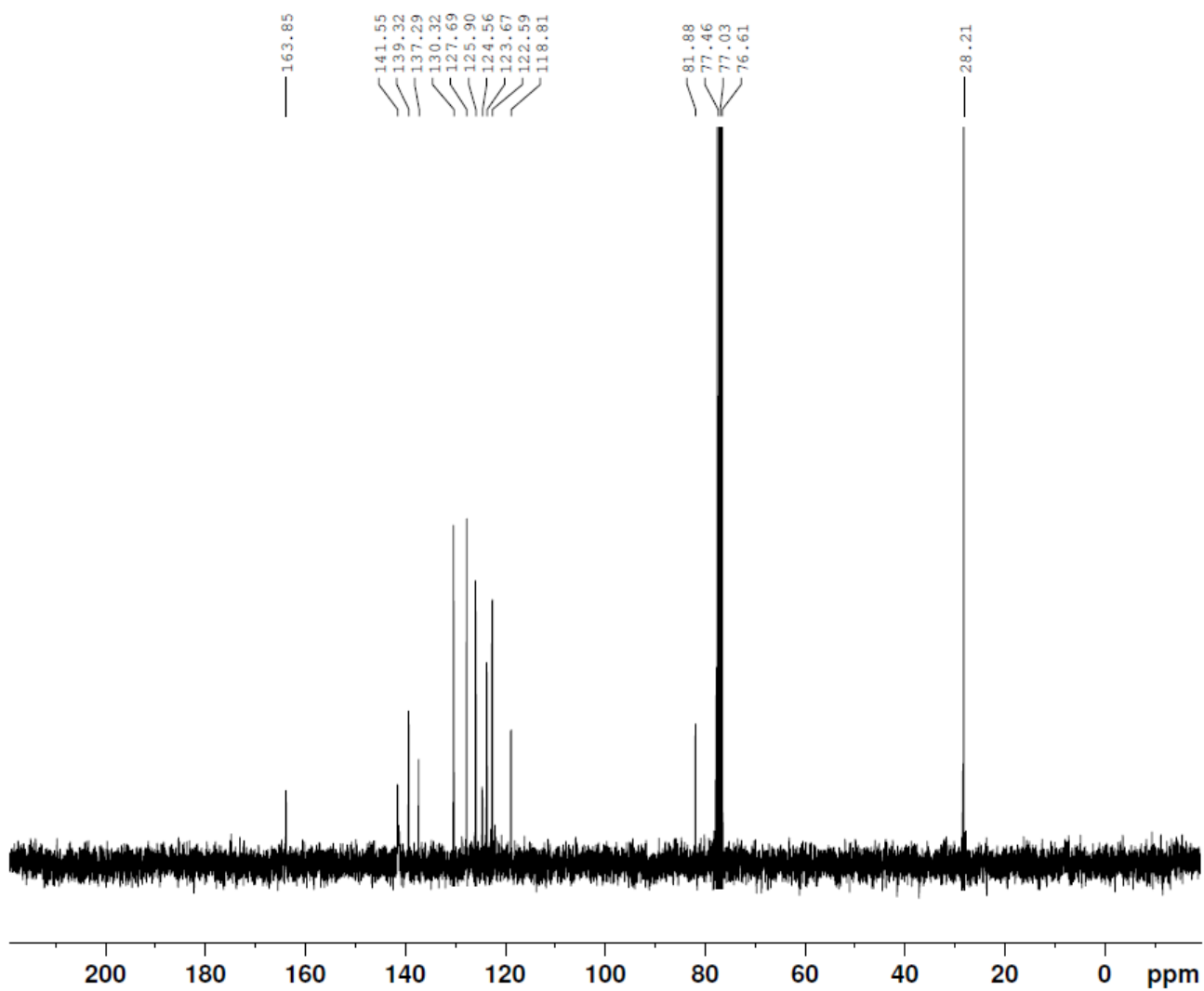


***tert*-butyl 5-((2-chlorophenyl)amino)picolinate**

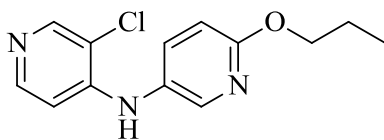


7c

^{13}C NMR (75 MHz, CDCl_3)

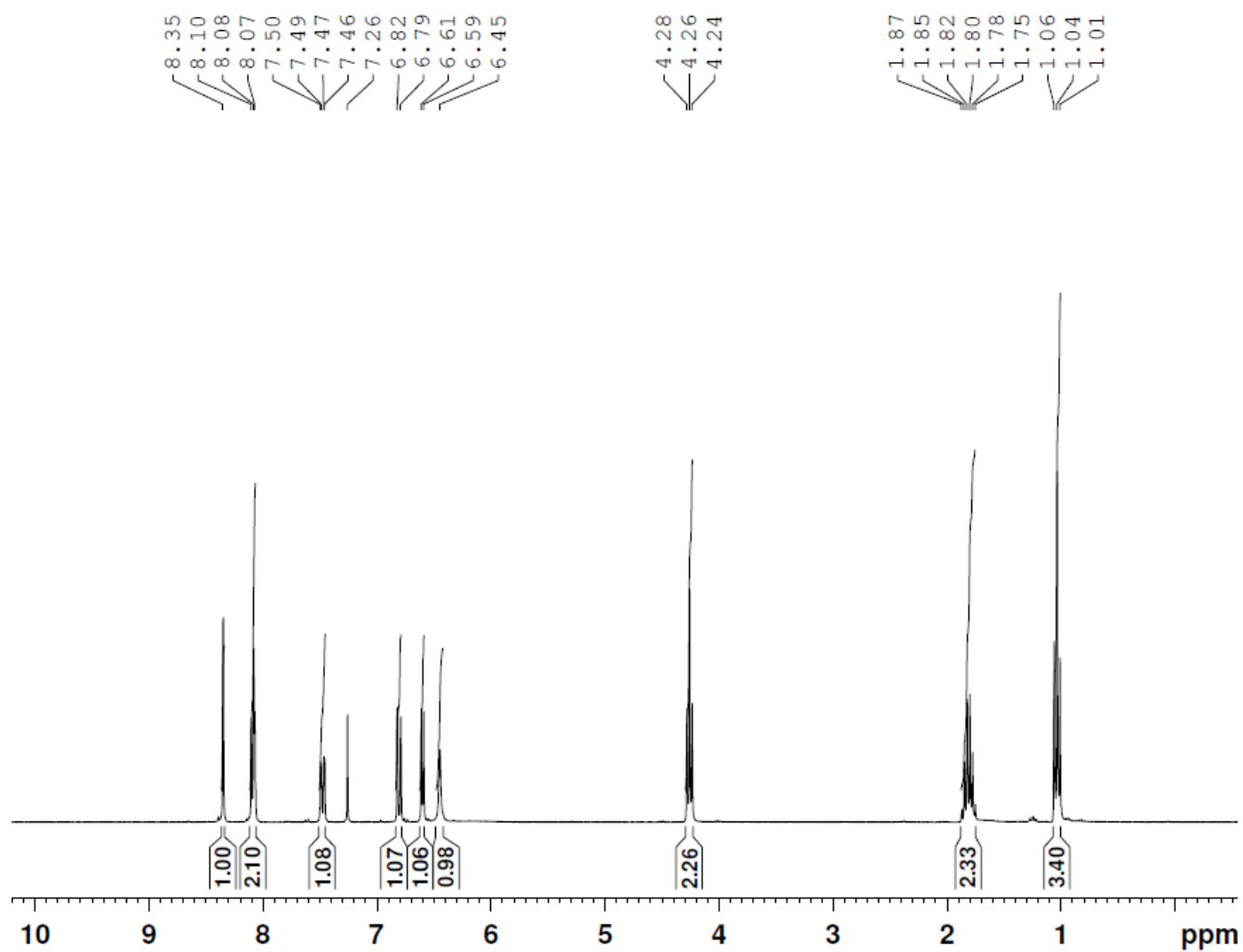


***N*-(3-chloropyridin-4-yl)-6-propoxy-pyridin-3-amine**



7d

^1H NMR (300 MHz, CDCl_3)

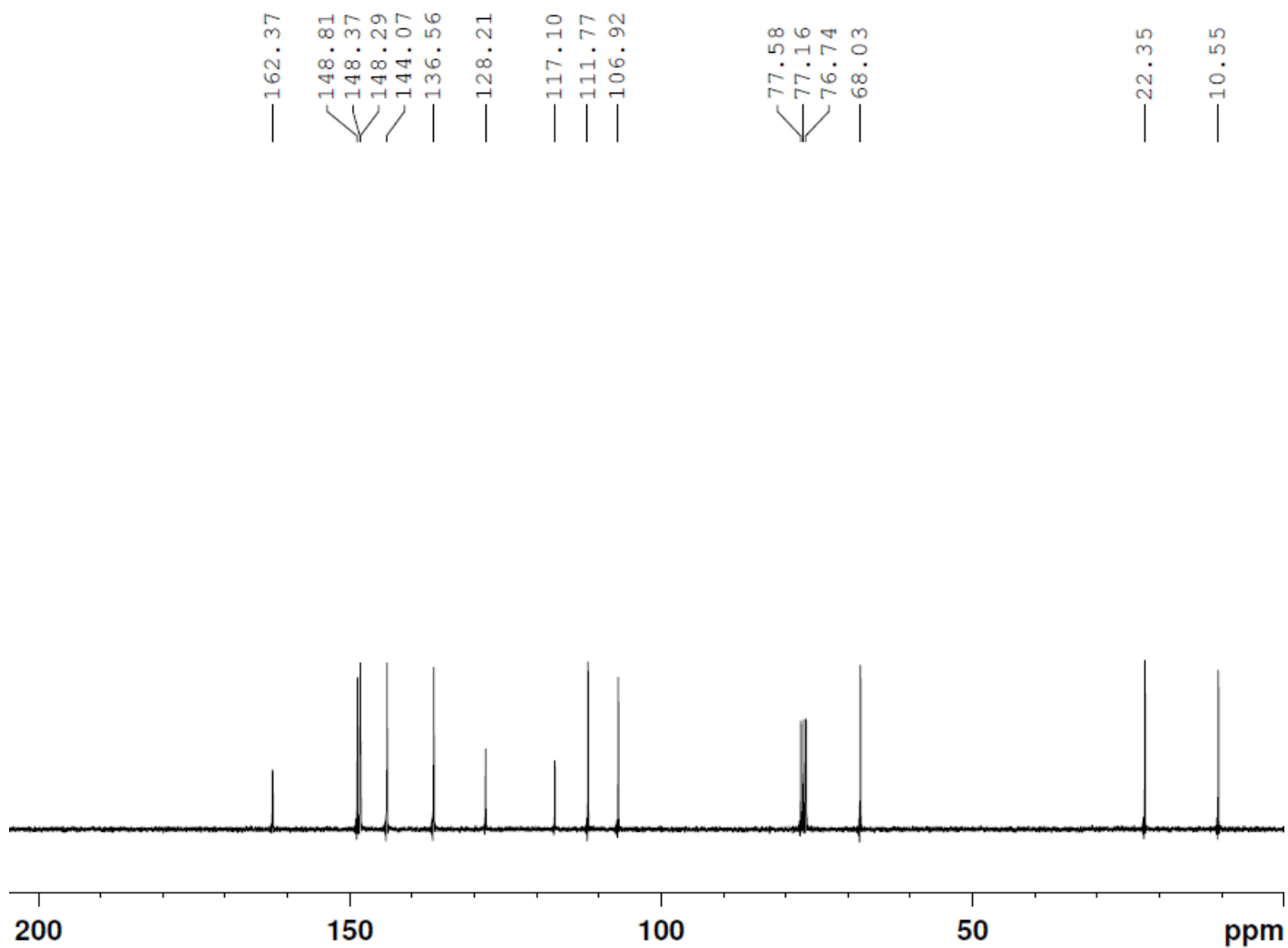


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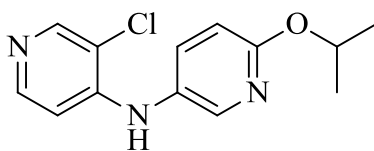


7d

^{13}C NMR (75 MHz, CDCl_3)

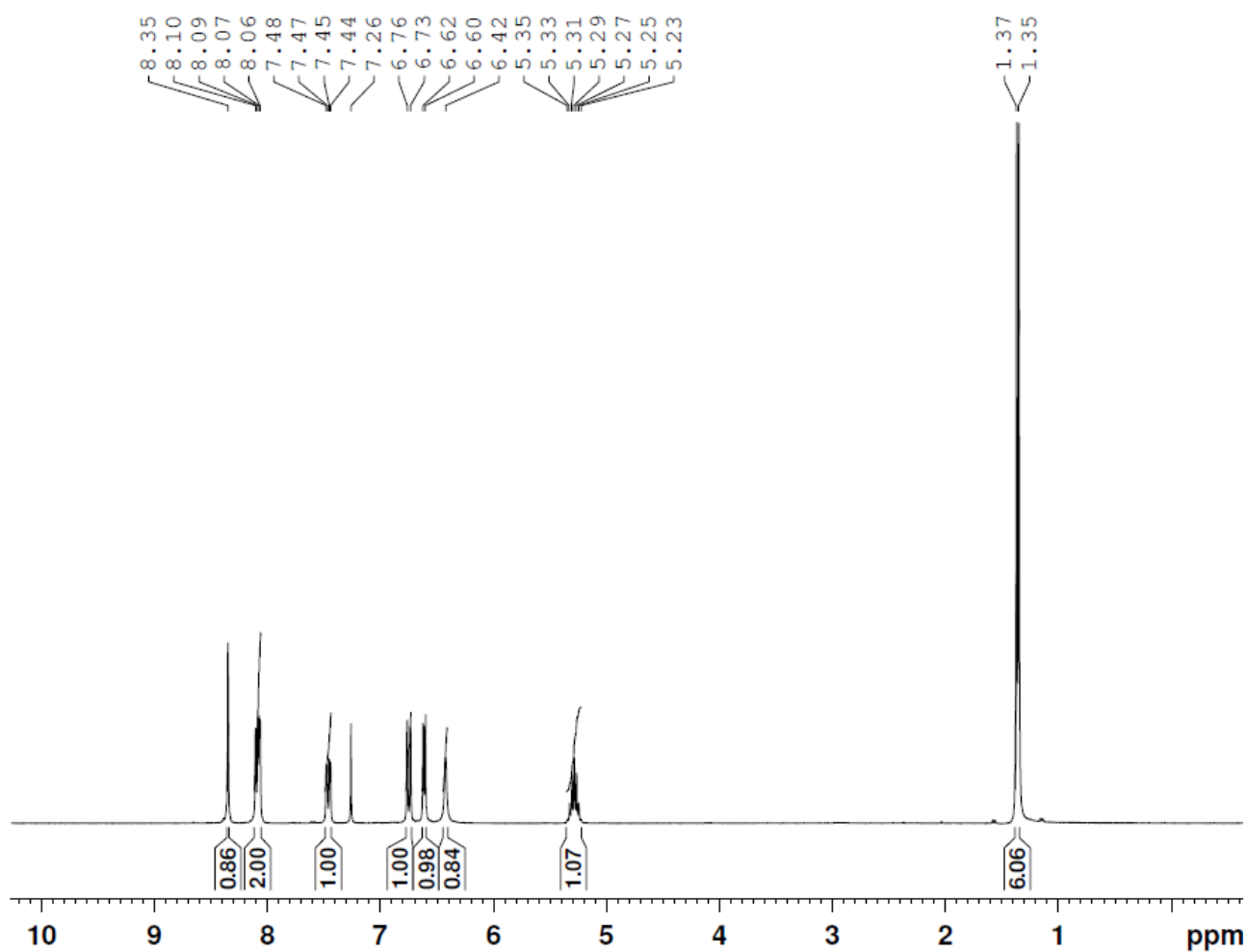


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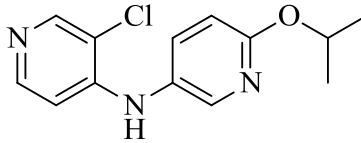


7e

¹H NMR (300 MHz, CDCl₃)

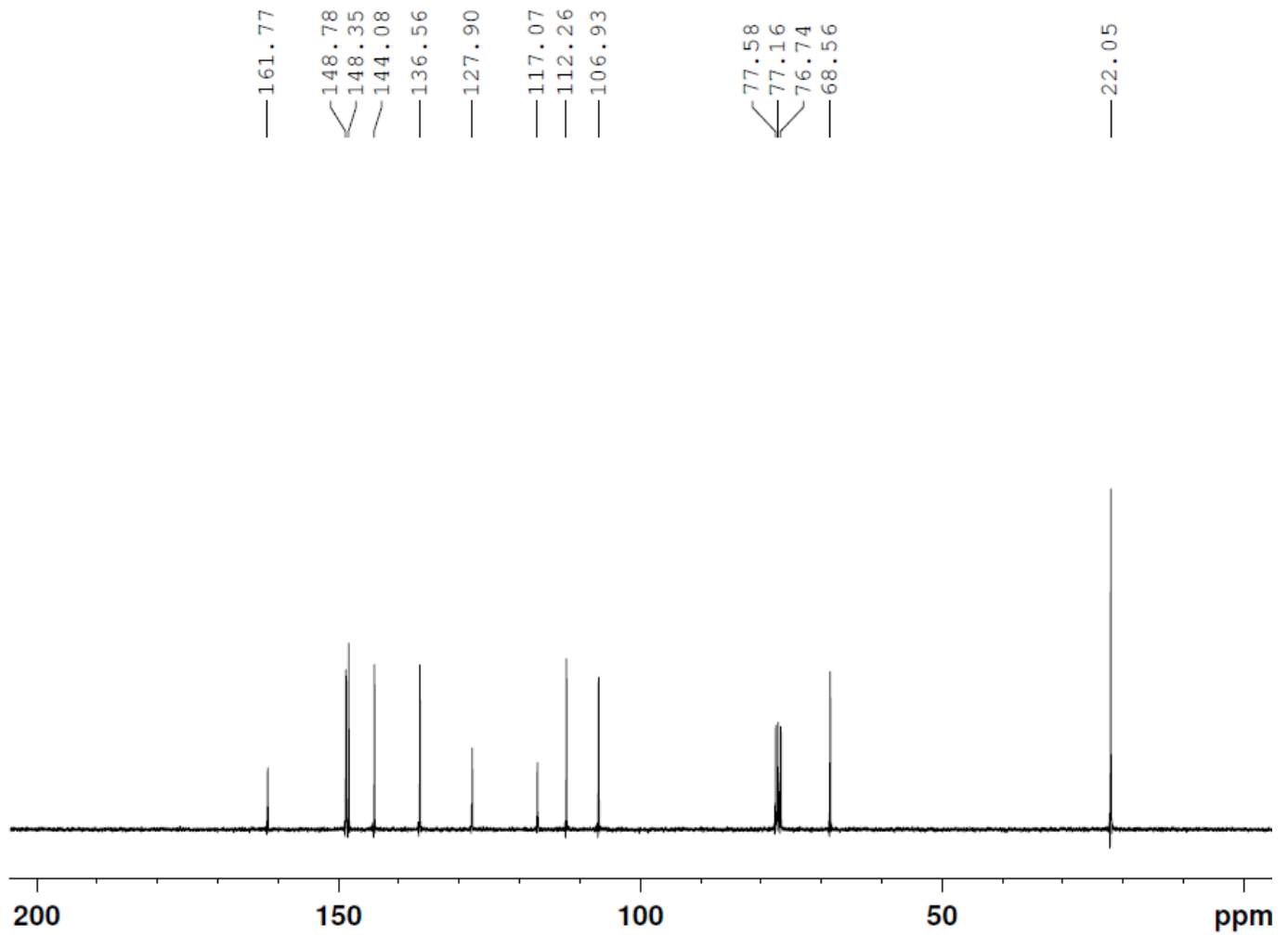


***N*-(3-chloropyridin-4-yl)-6-isopropoxy-pyridin-3-amine**

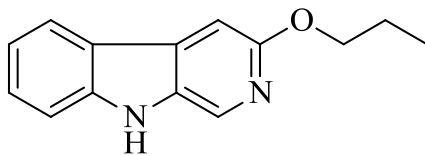


7e

^{13}C NMR (75 MHz, CDCl_3)

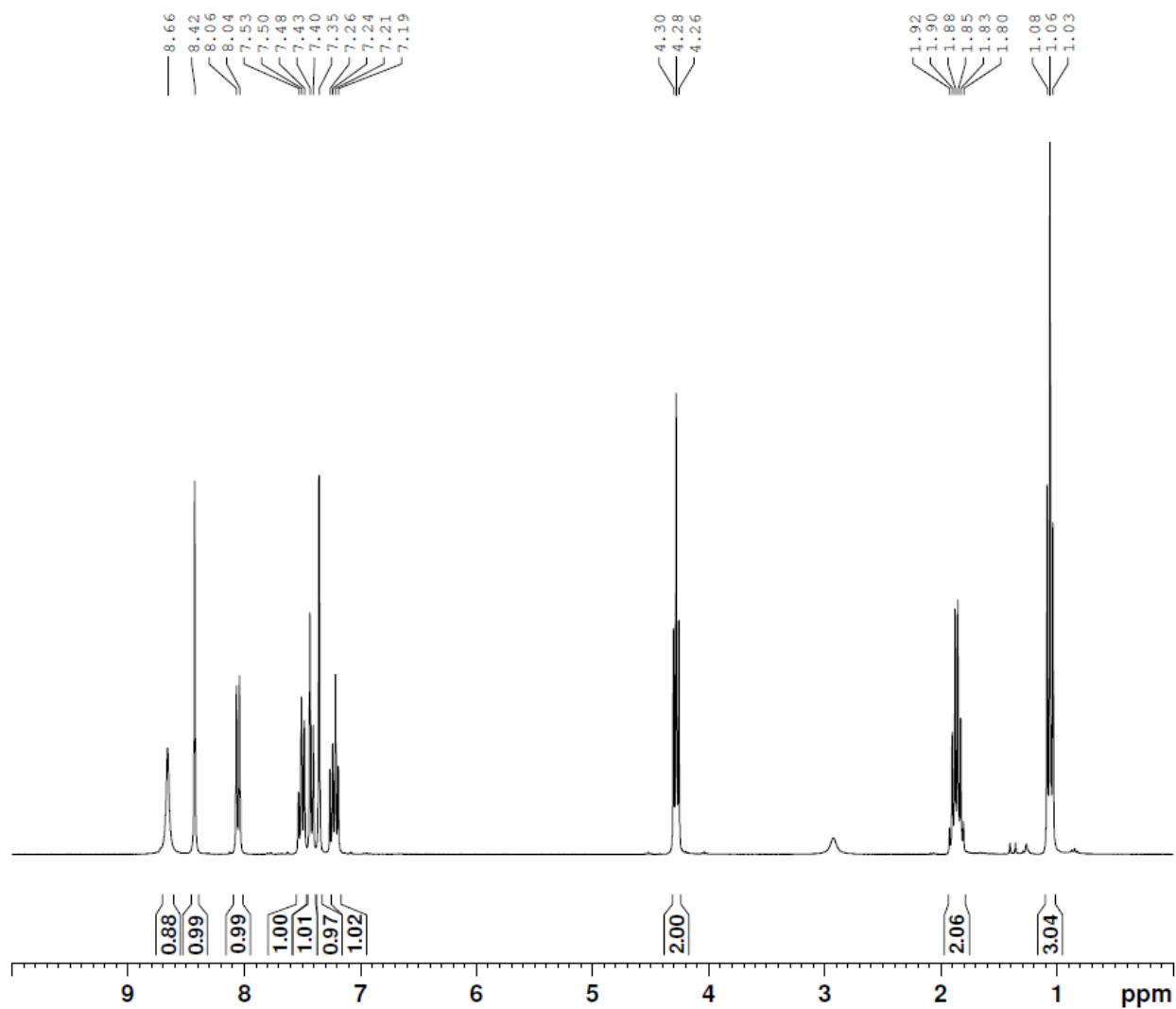


3-propoxy-9H-pyrido[3,4-b]indole

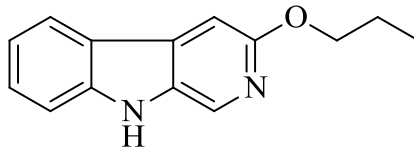


3-PBC (1)

^1H NMR (300 MHz, CDCl_3)

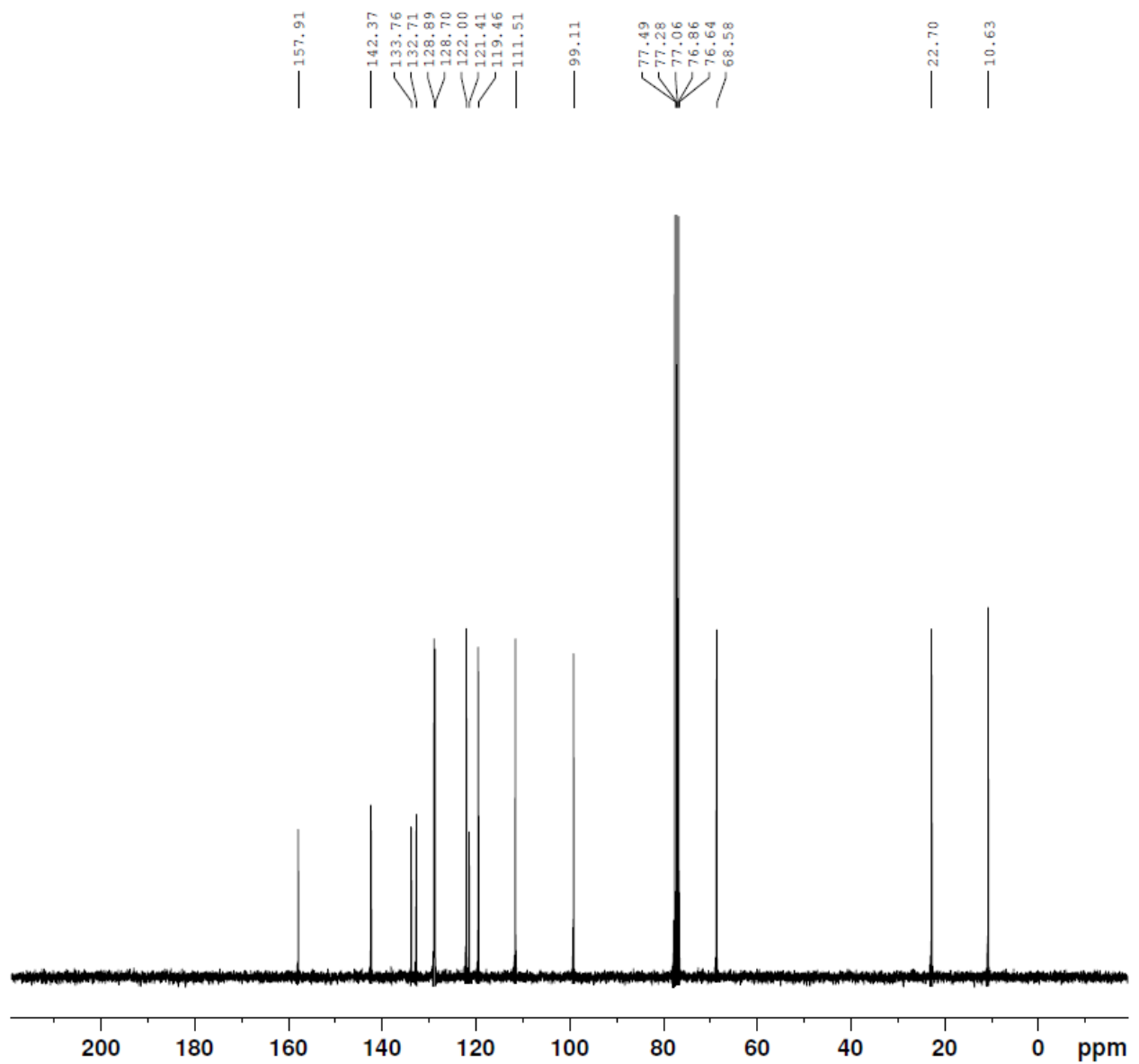


3-propoxy-9H-pyrido[3,4-b]indole

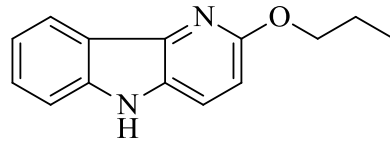


3-PBC (1)

^{13}C NMR (75 MHz, CDCl_3)

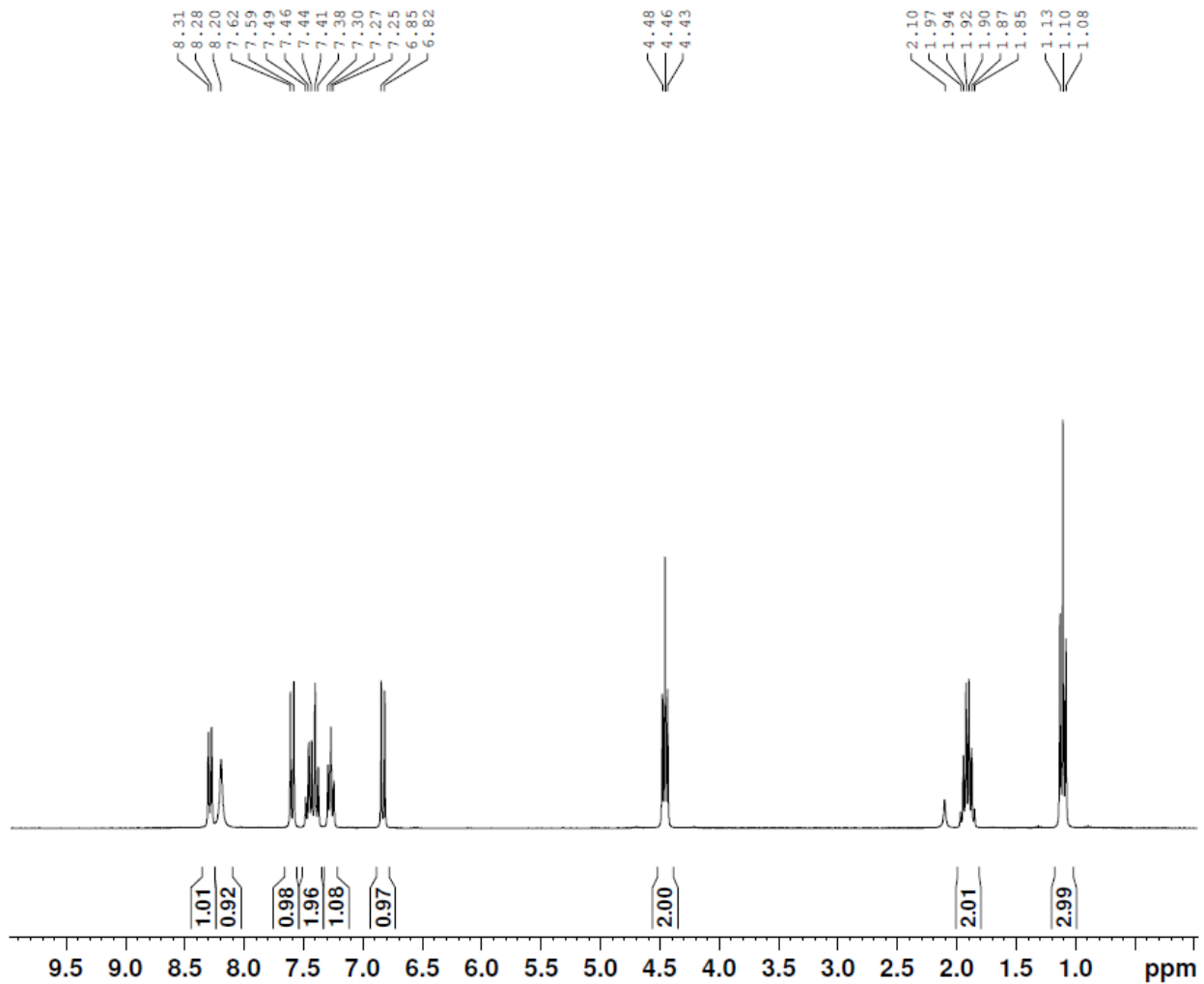


2-propoxy-5H-pyrido[3,2-b]indole

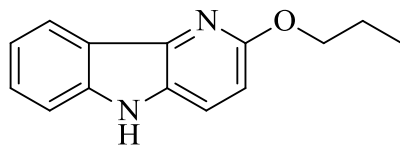


9a

^1H NMR (300 MHz, CDCl_3)

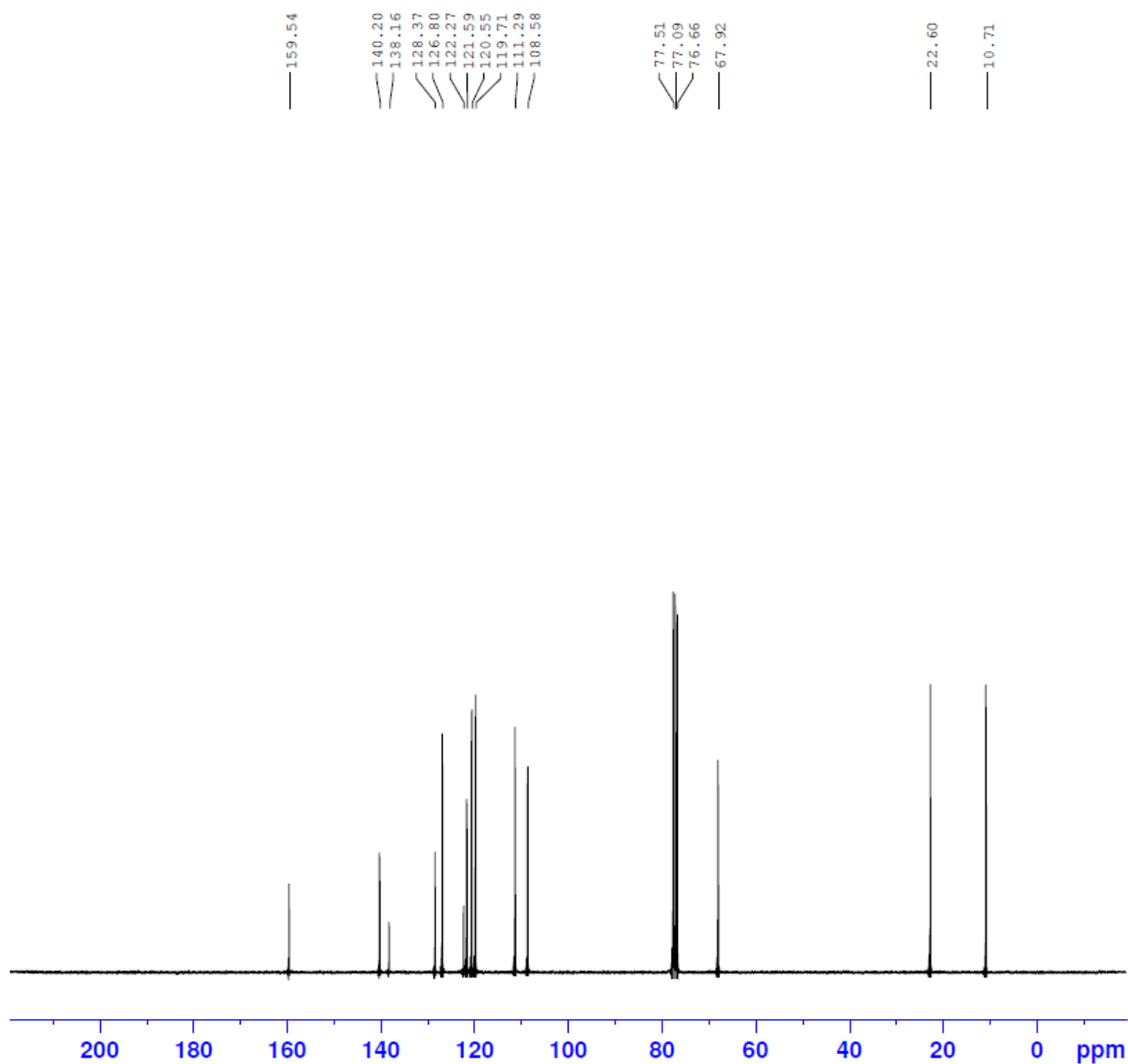


2-propoxy-5H-pyrido[3,2-b]indole

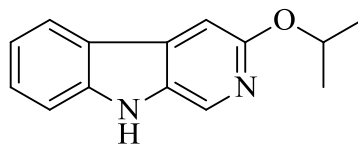


9a

^{13}C NMR (75 MHz, CDCl_3)

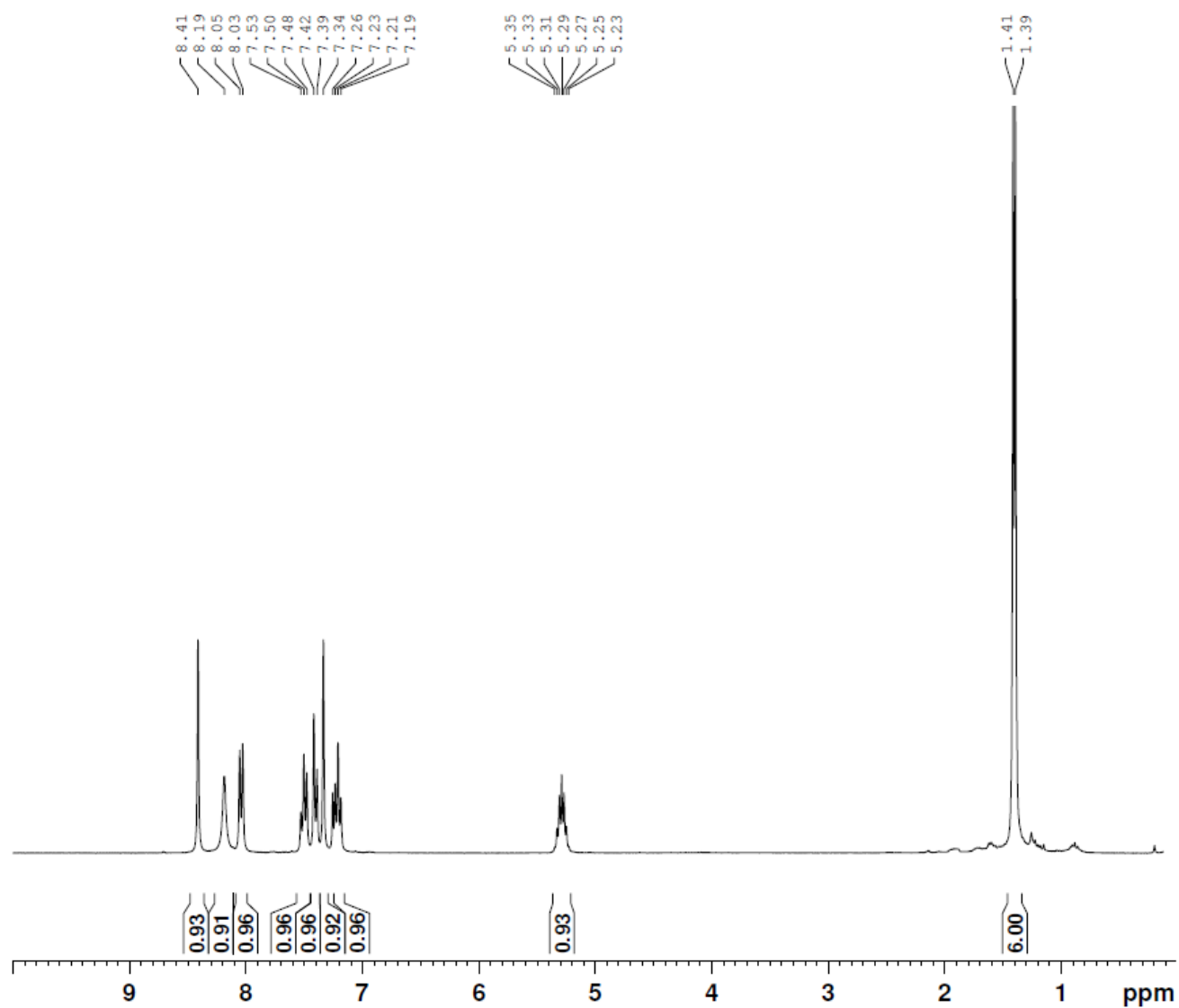


3-isopropoxy-9H-pyrido[3,4-b]indole

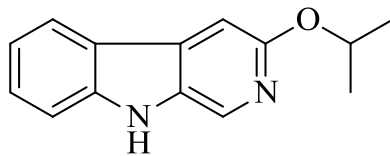


3-ISOPBC (2)

^1H NMR (300 MHz, CDCl_3)

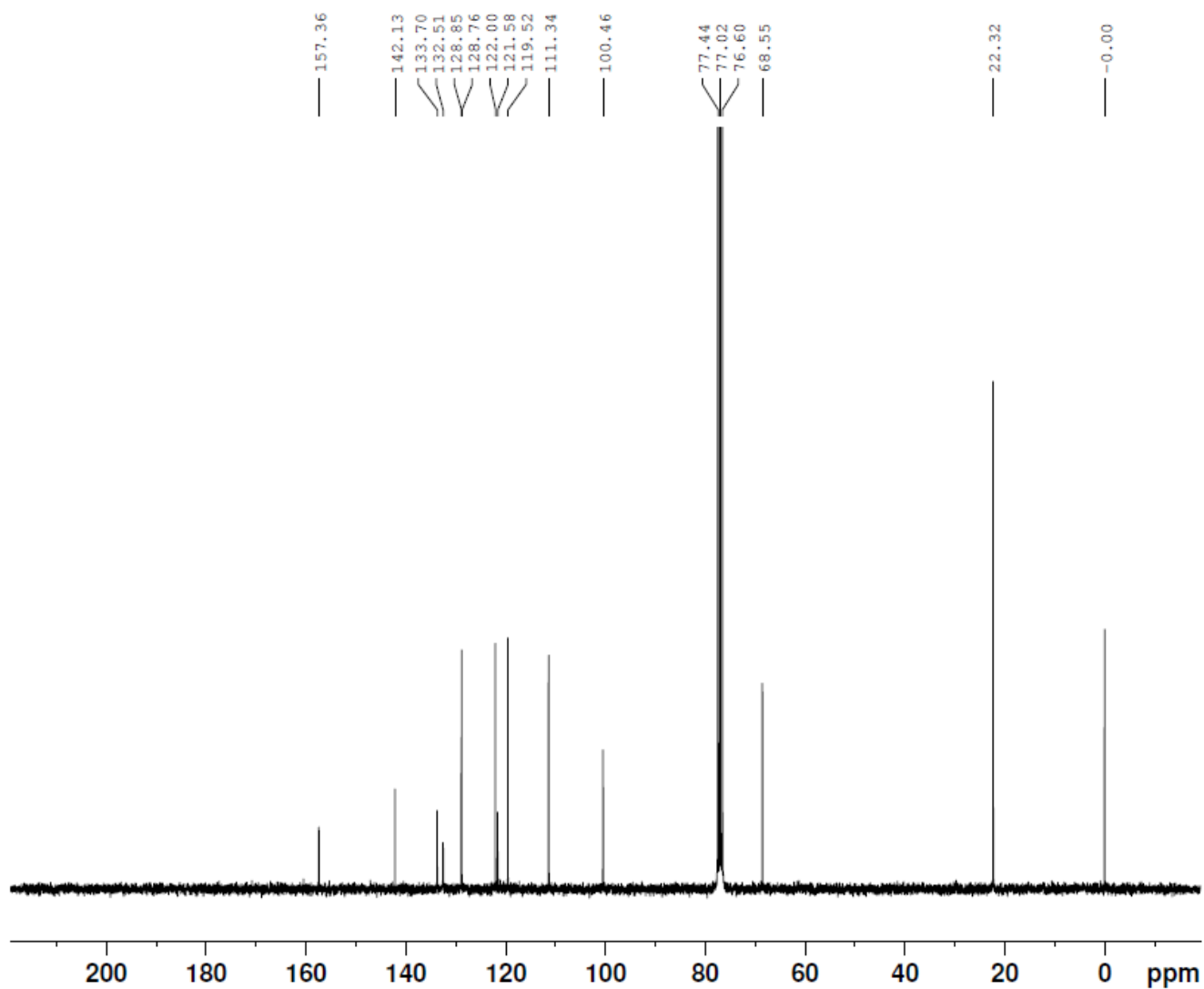


3-isopropoxy-9*H*-pyrido[3,4-*b*]indole

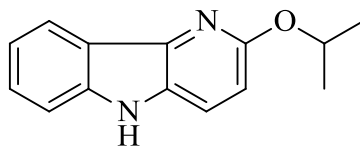


3-ISOPBC (2)

^{13}C NMR (75 MHz, CDCl_3)

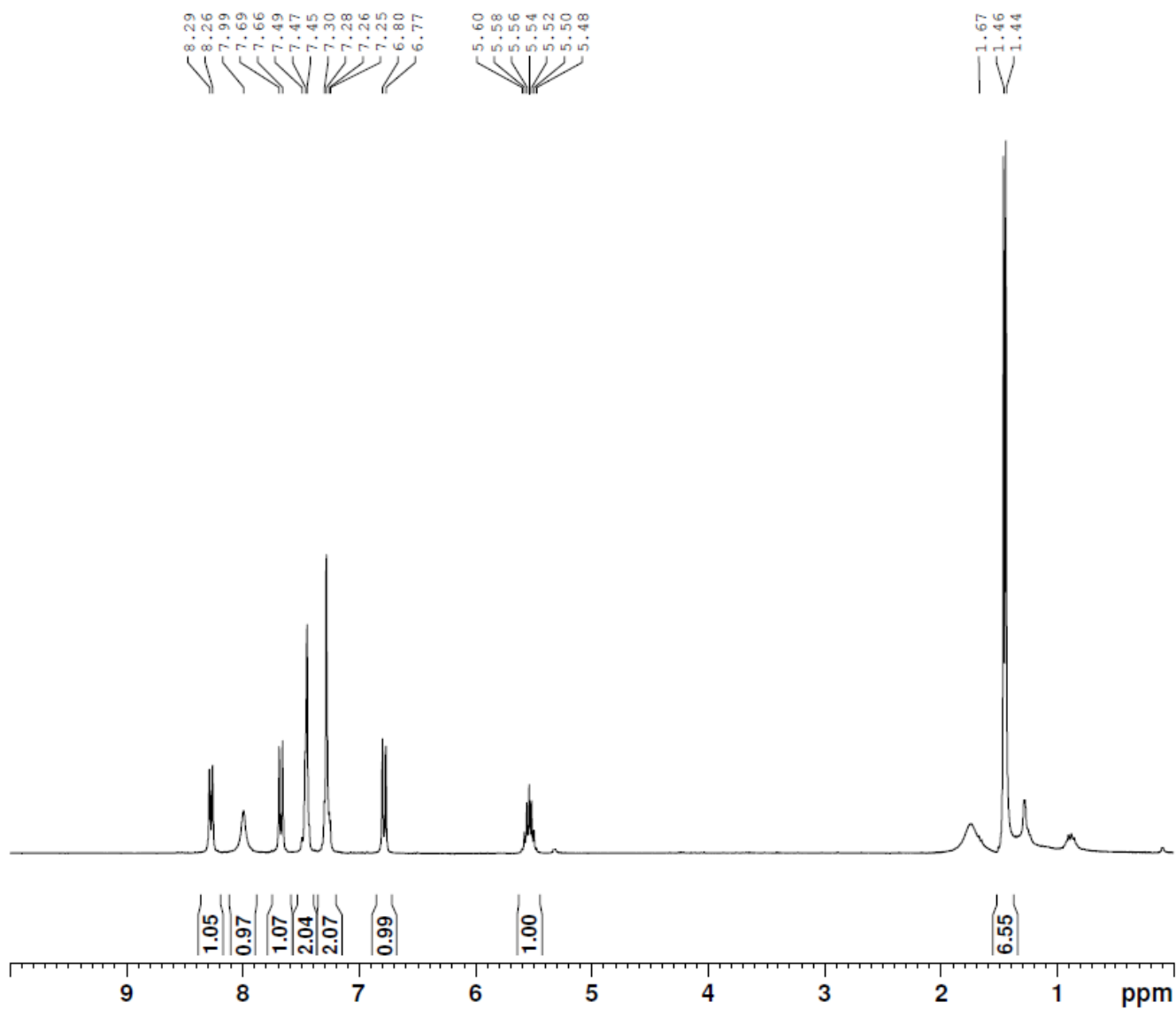


2-isopropoxy-5H-pyrido[3,2-b]indole

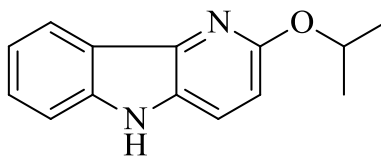


9b

^1H NMR (300 MHz, CDCl_3)

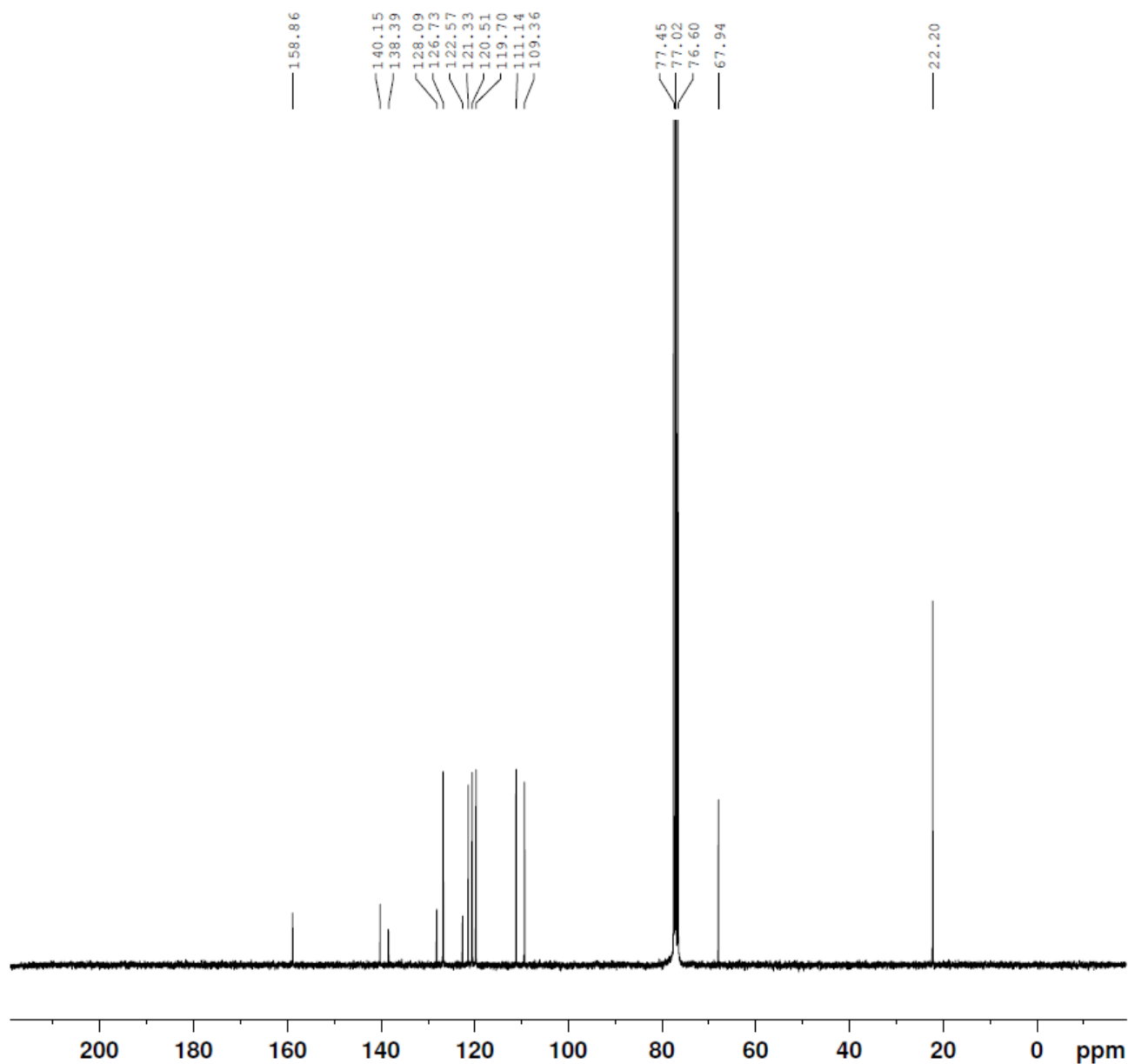


2-isopropoxy-5*H*-pyrido[3,2-*b*]indole

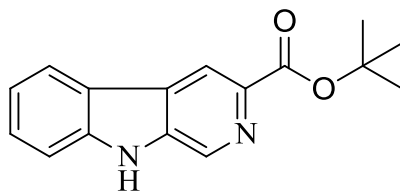


9b

^{13}C NMR (75 MHz, CDCl_3)

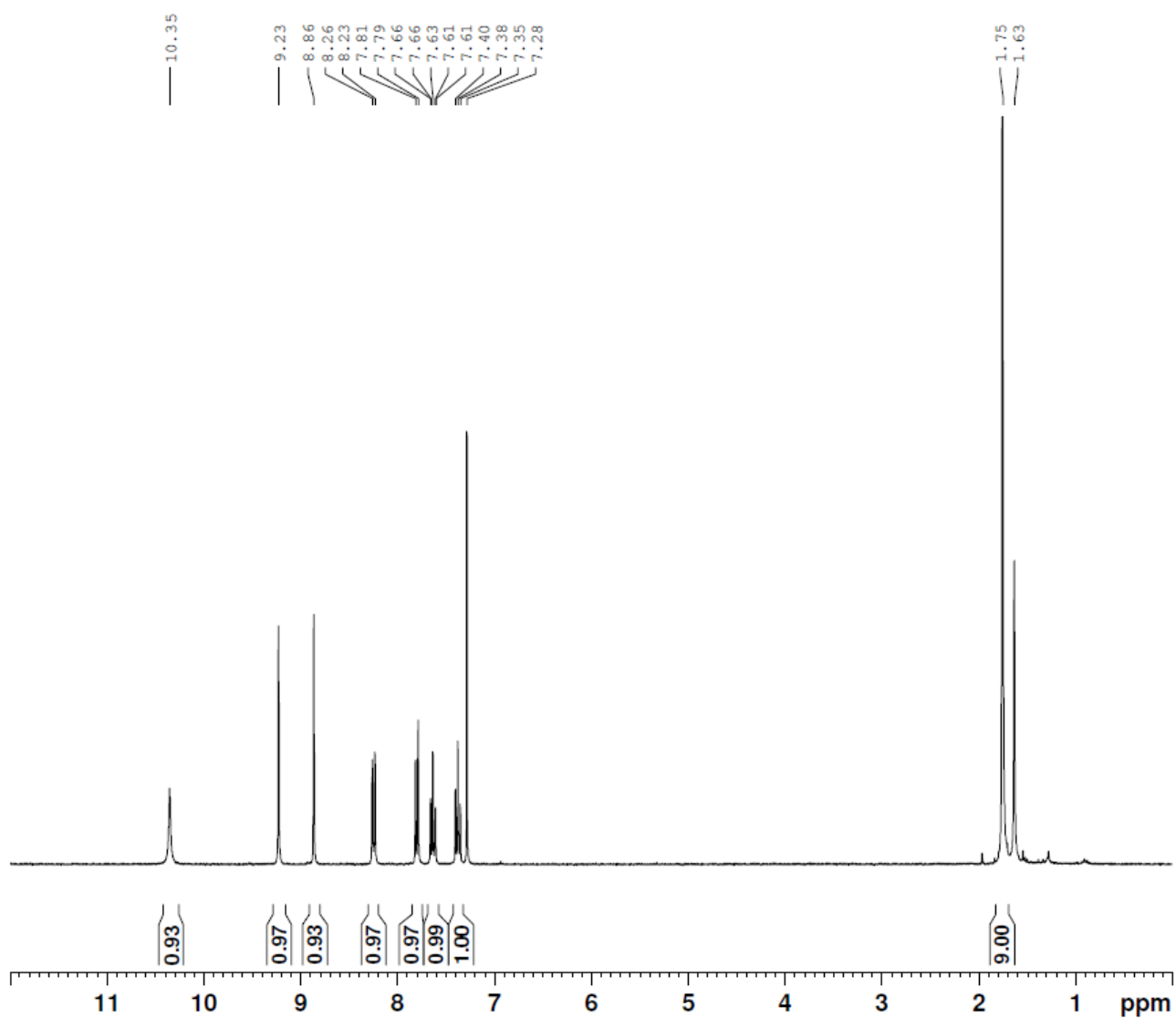


***tert*-butyl 9*H*-pyrido[3,4-*b*]indole-3-carboxylate**

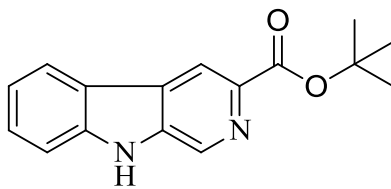


β CCT (3)

$^1\text{H NMR}$ (300 MHz, CDCl_3)

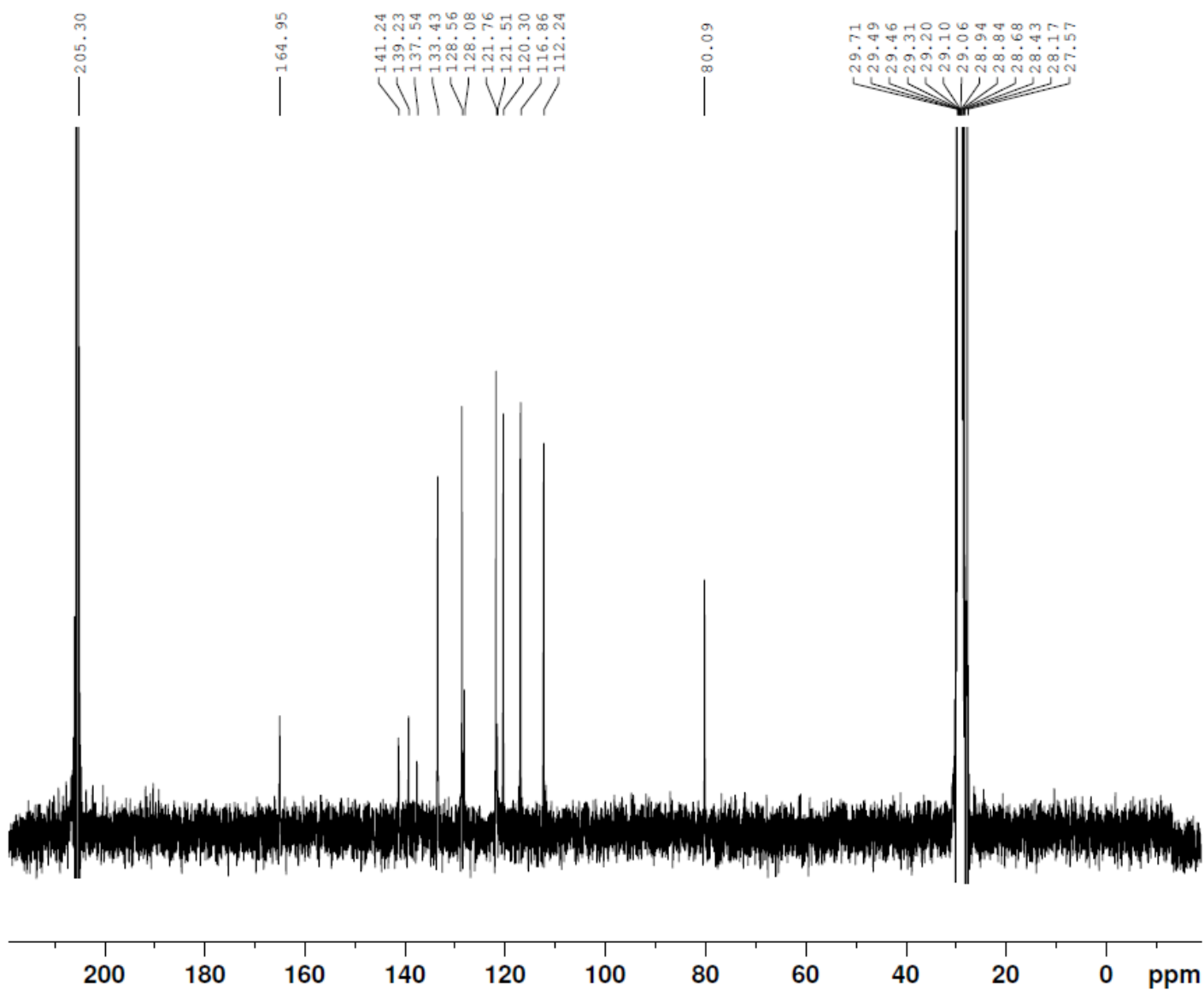


tert-butyl 9*H*-pyrido[3,4-*b*]indole-3-carboxylate

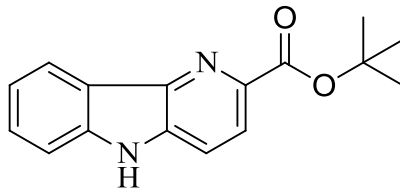


β CCT (3)

^{13}C NMR (75 MHz, $(\text{CD}_3)_2\text{CO}$)

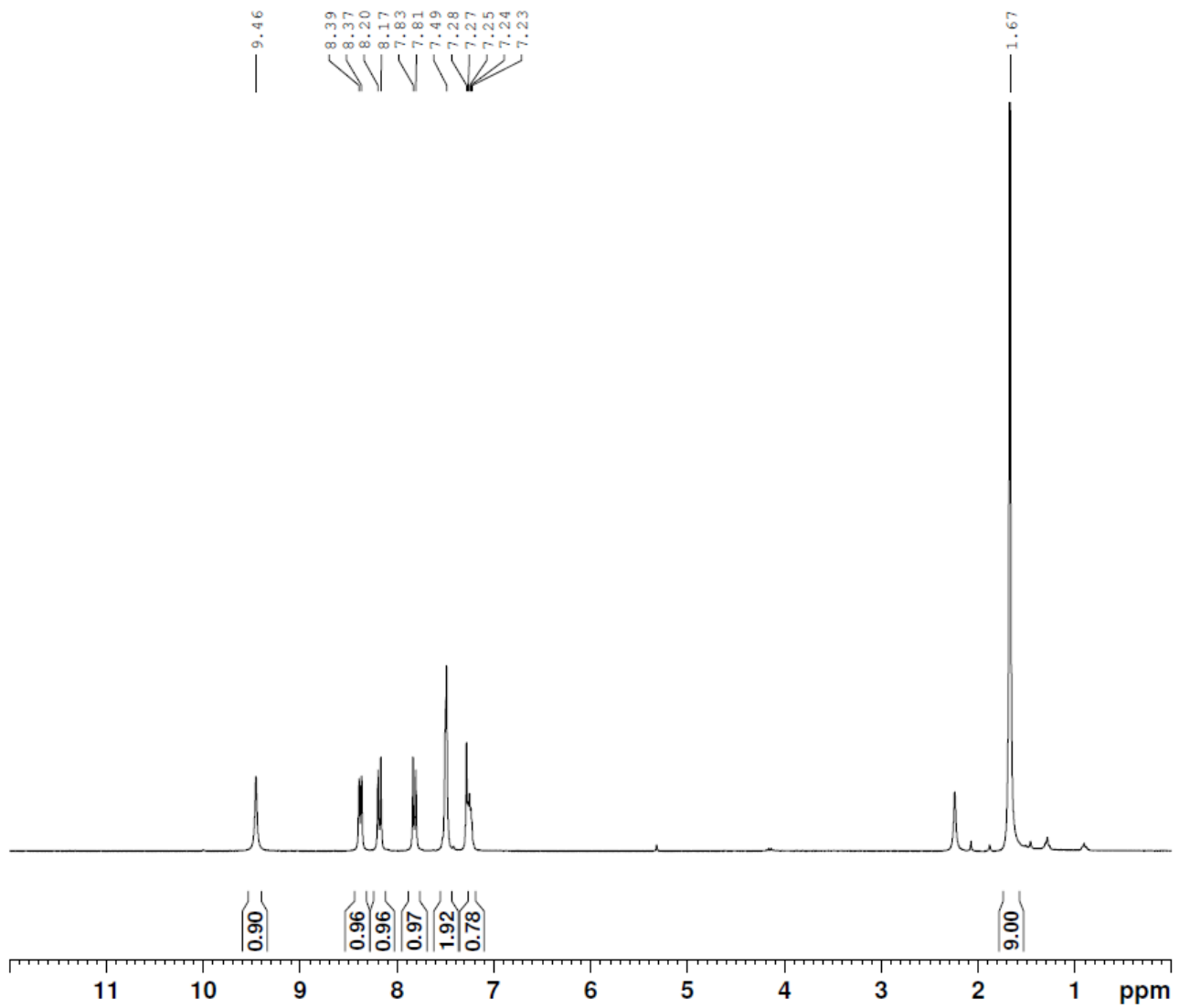


***tert*-butyl 5*H*-pyrido[3,2-*b*]indole-2-carboxylate**

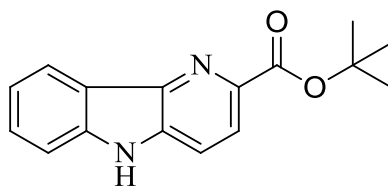


βCCT (3)

¹H NMR (300 MHz, CDCl₃)

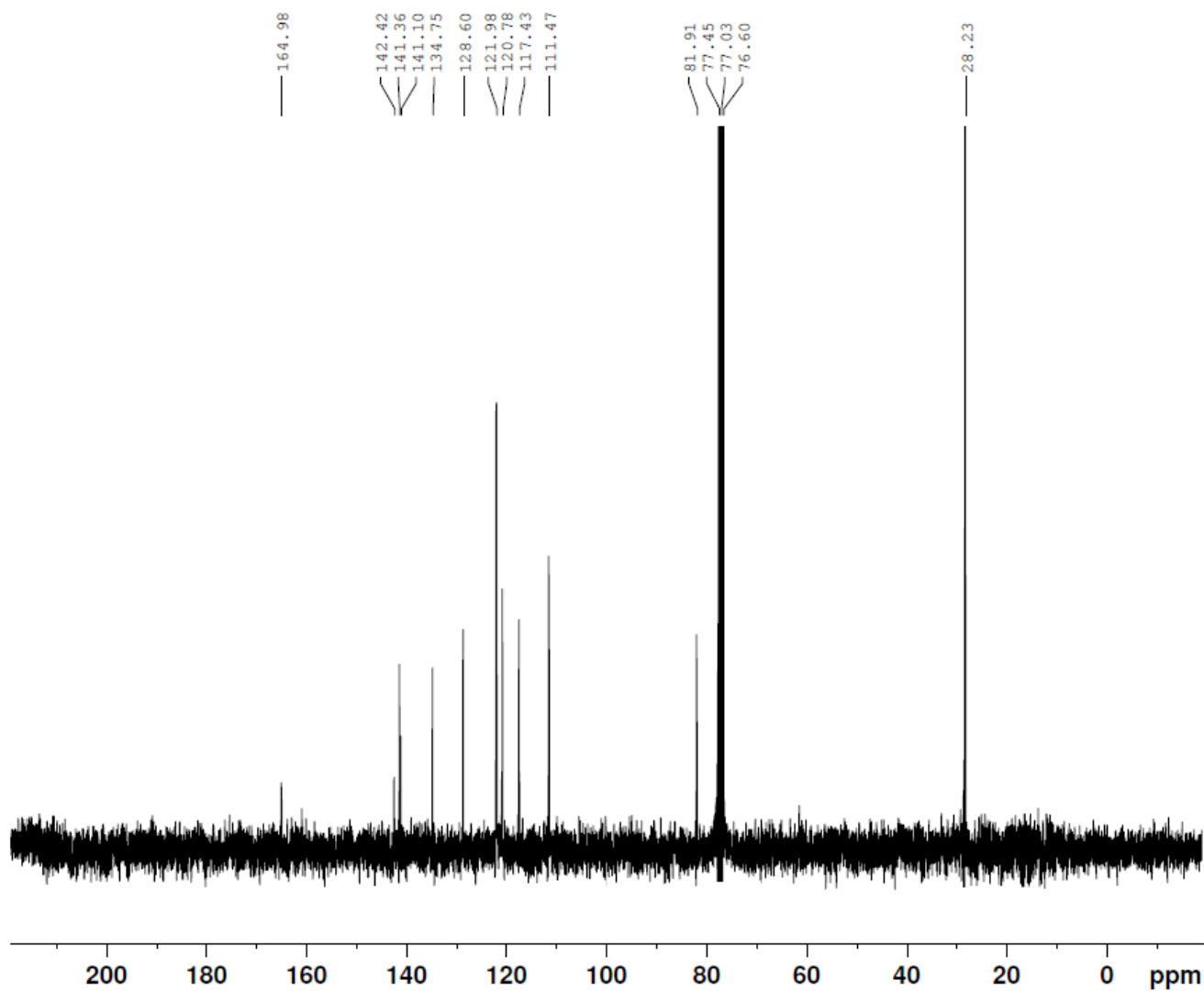


tert-butyl 5*H*-pyrido[3,2-*b*]indole-2-carboxylate

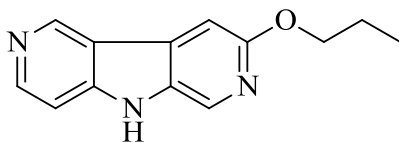


β CCT (3)

^{13}C NMR (75 MHz, CDCl_3)

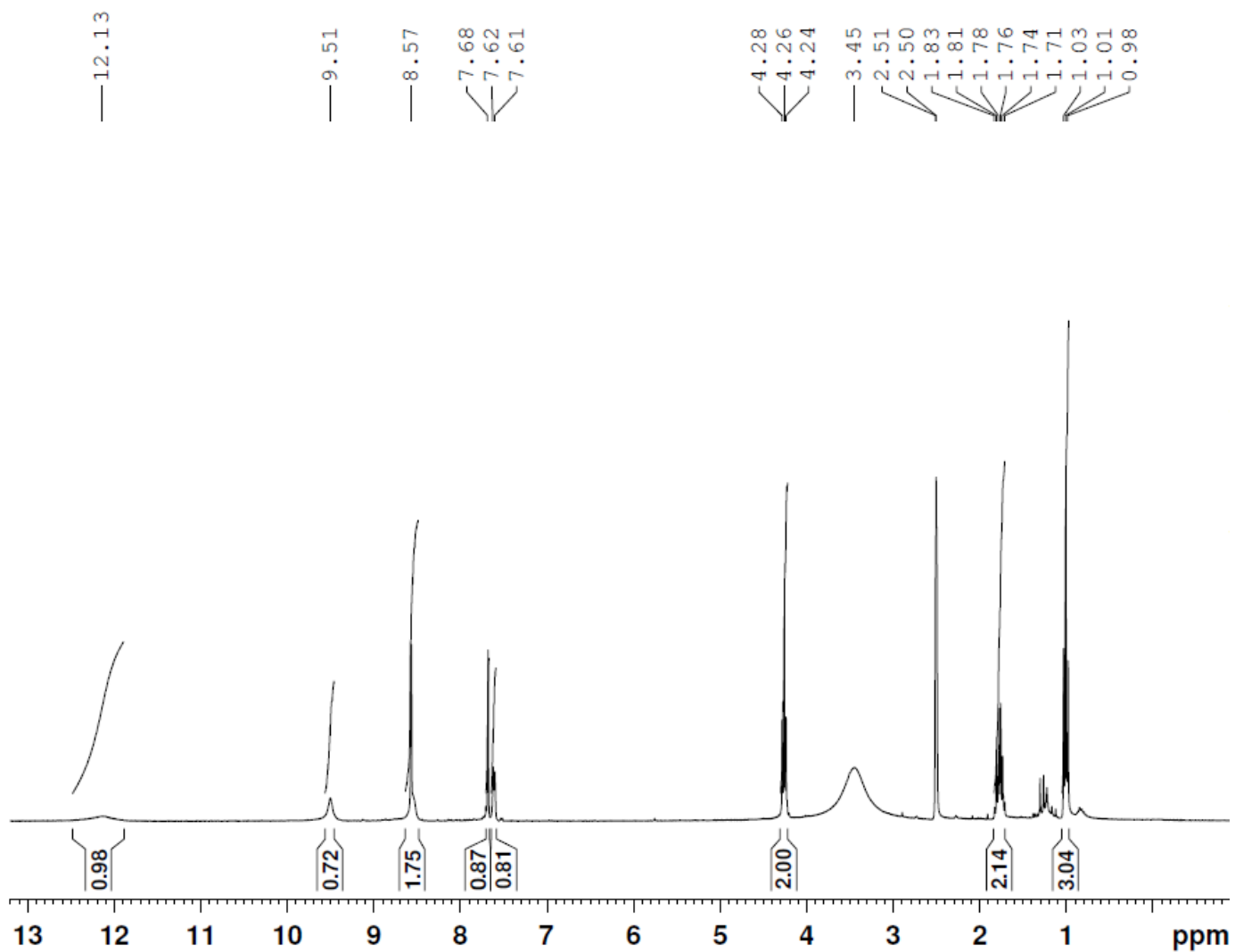


8-propoxy-5H-pyrrolo[2,3-c:4,5-c']dipyridine

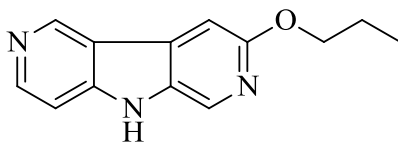


AZA-3-PBC (4)

¹H NMR (300 MHz, (CD₃)₂SO)

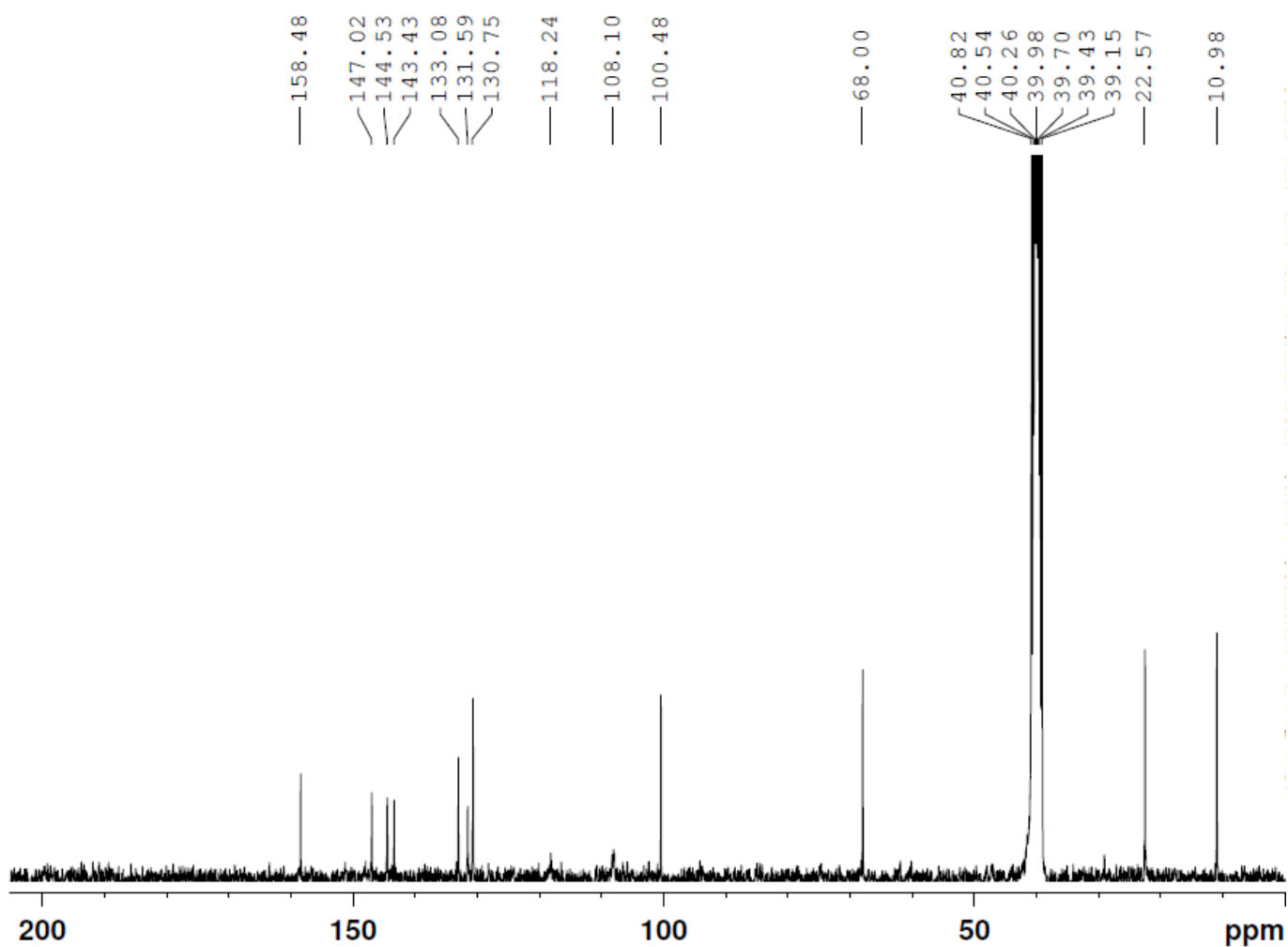


8-propoxy-5H-pyrrolo[2,3-c:4,5-c']dipyridine

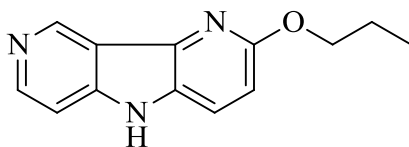


AZA-3-PBC (4)

^{13}C NMR (75 MHz, $(\text{CD}_3)_2\text{SO}$)

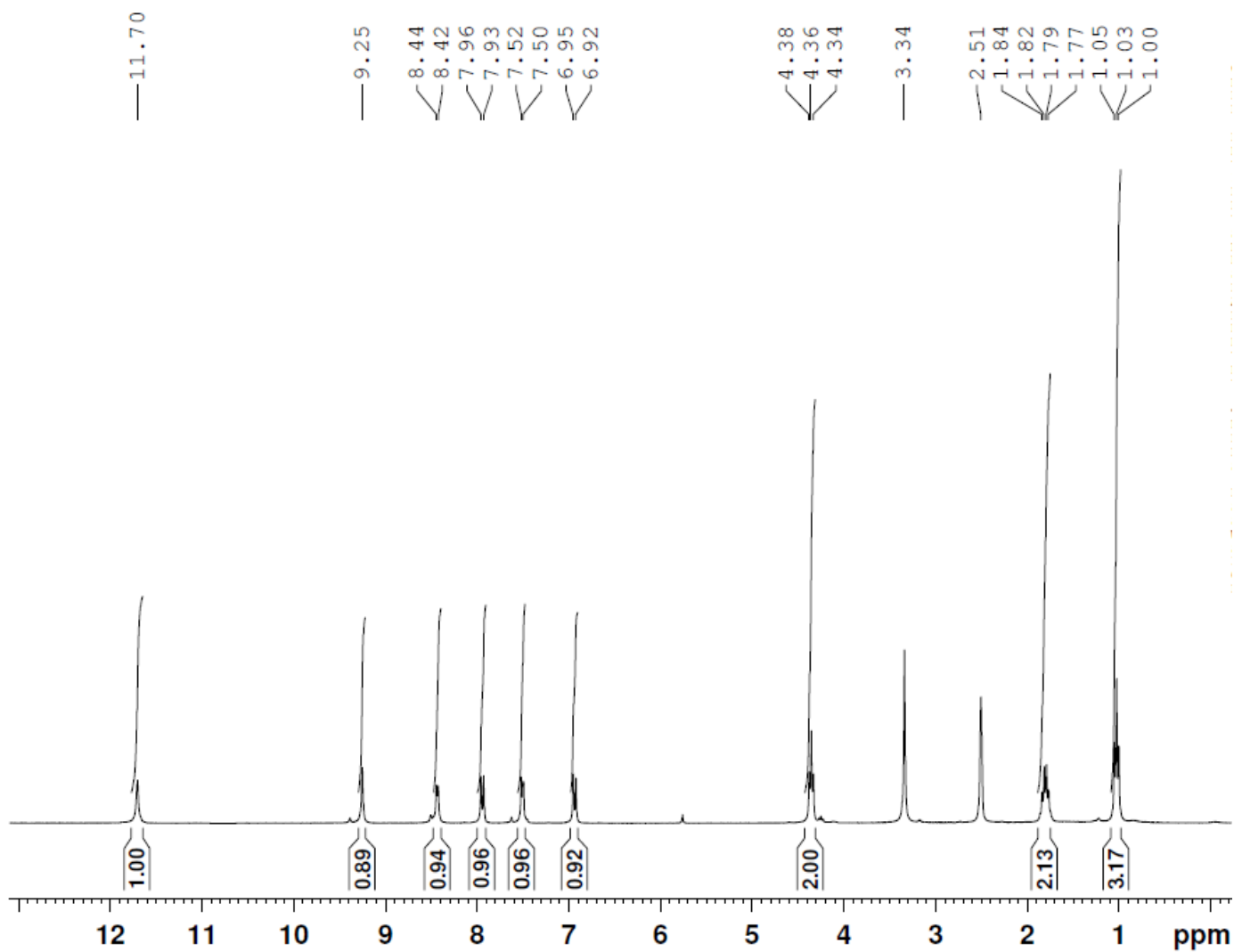


2-propoxy-5H-pyrrolo[3,2-b:4,5-c']dipyridine

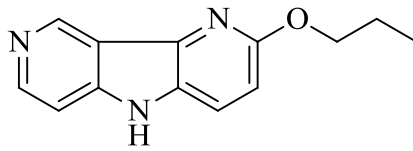


9d

$^1\text{H NMR}$ (300 MHz, $(\text{CD}_3)_2\text{SO}$)

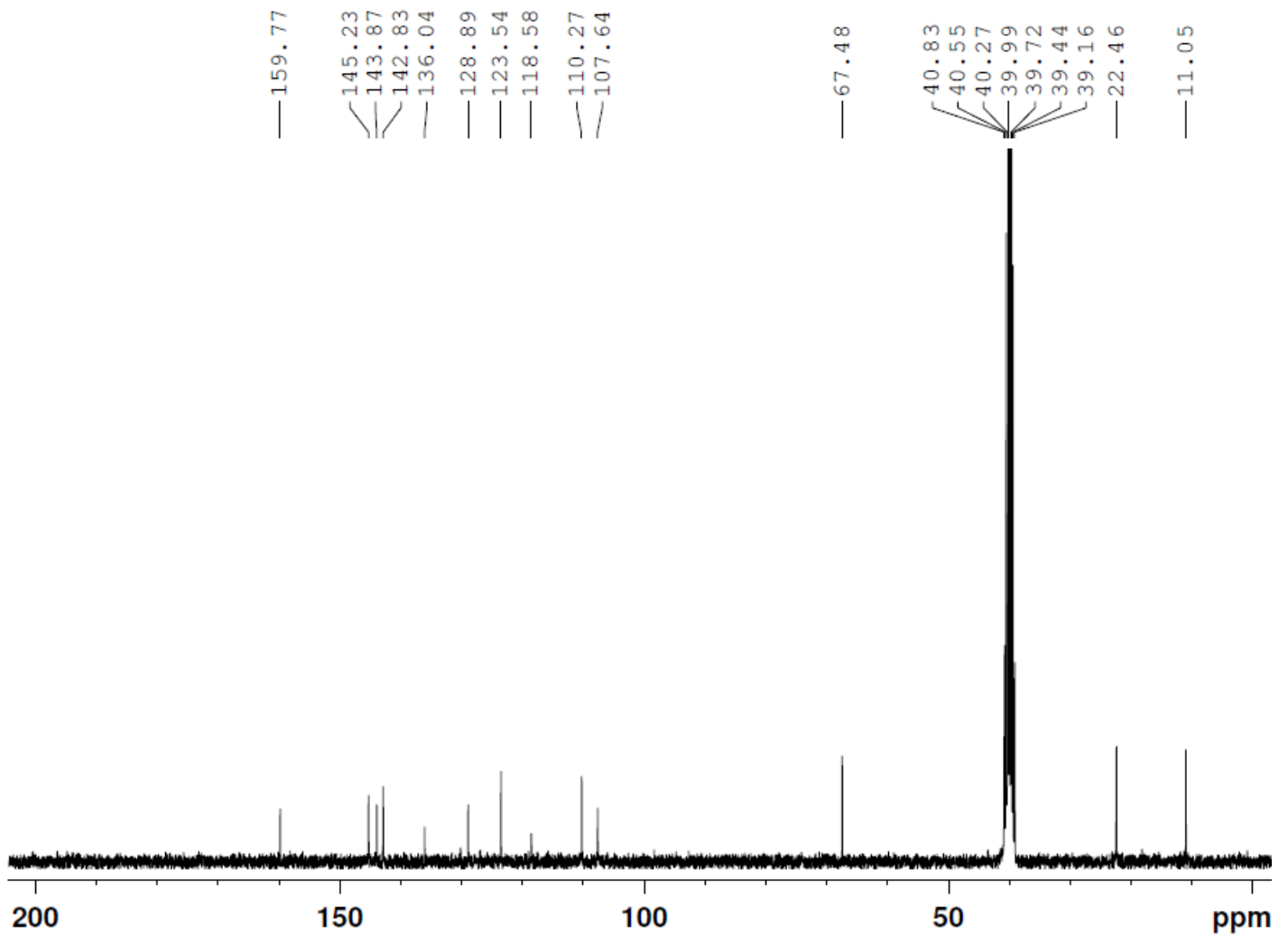


2-propoxy-5*H*-pyrrolo[3,2-*b*:4,5-*c'*]dipyridine

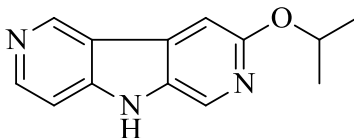


9d

^{13}C NMR (75 MHz, $(\text{CD}_3)_2\text{SO}$)

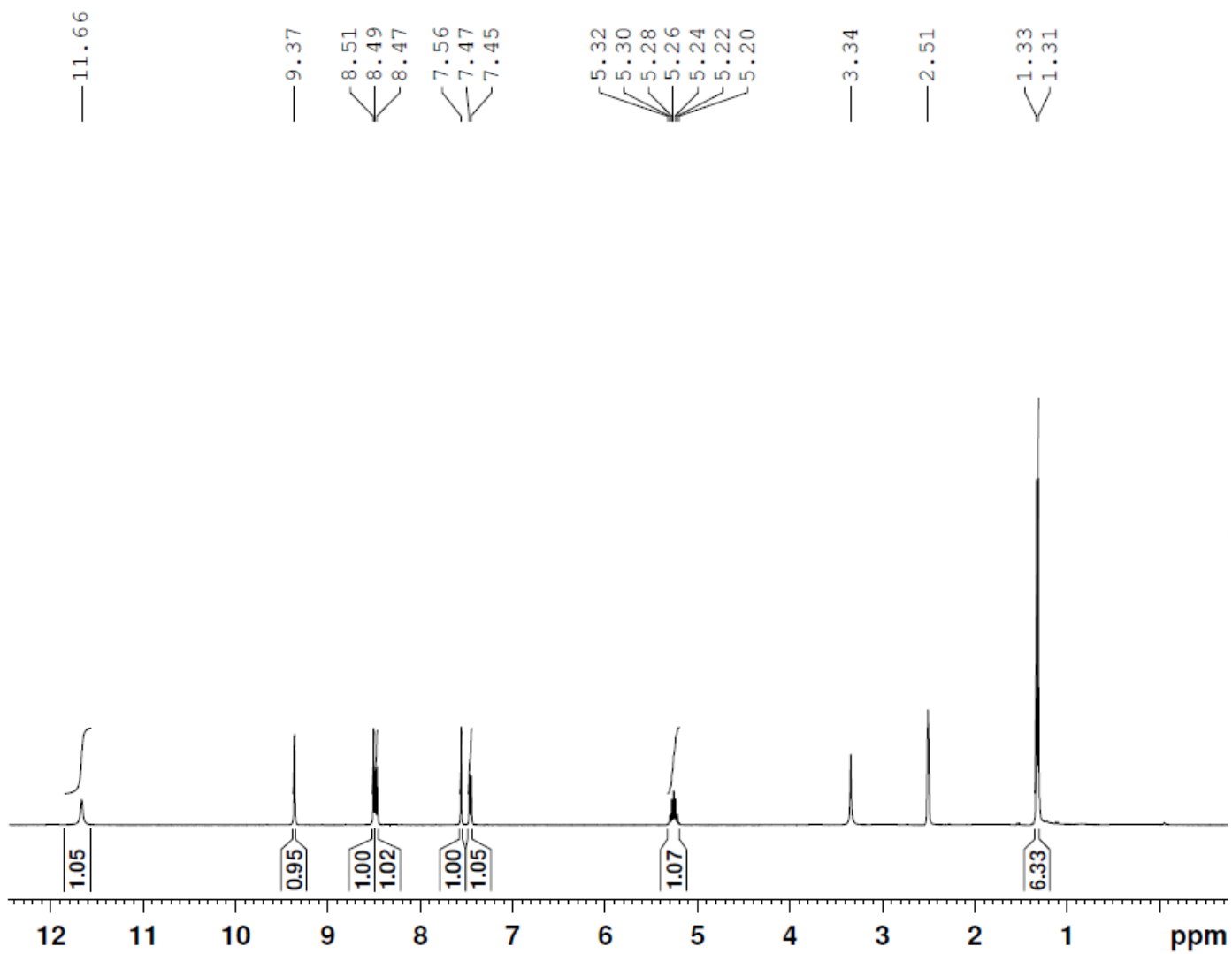


8-isopropoxy-5H-pyrrolo[2,3-c:4,5-c']dipyridine

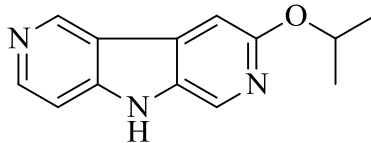


AZA-3-ISOPBC (5)

^1H NMR (300 MHz, $(\text{CD}_3)_2\text{SO}$)

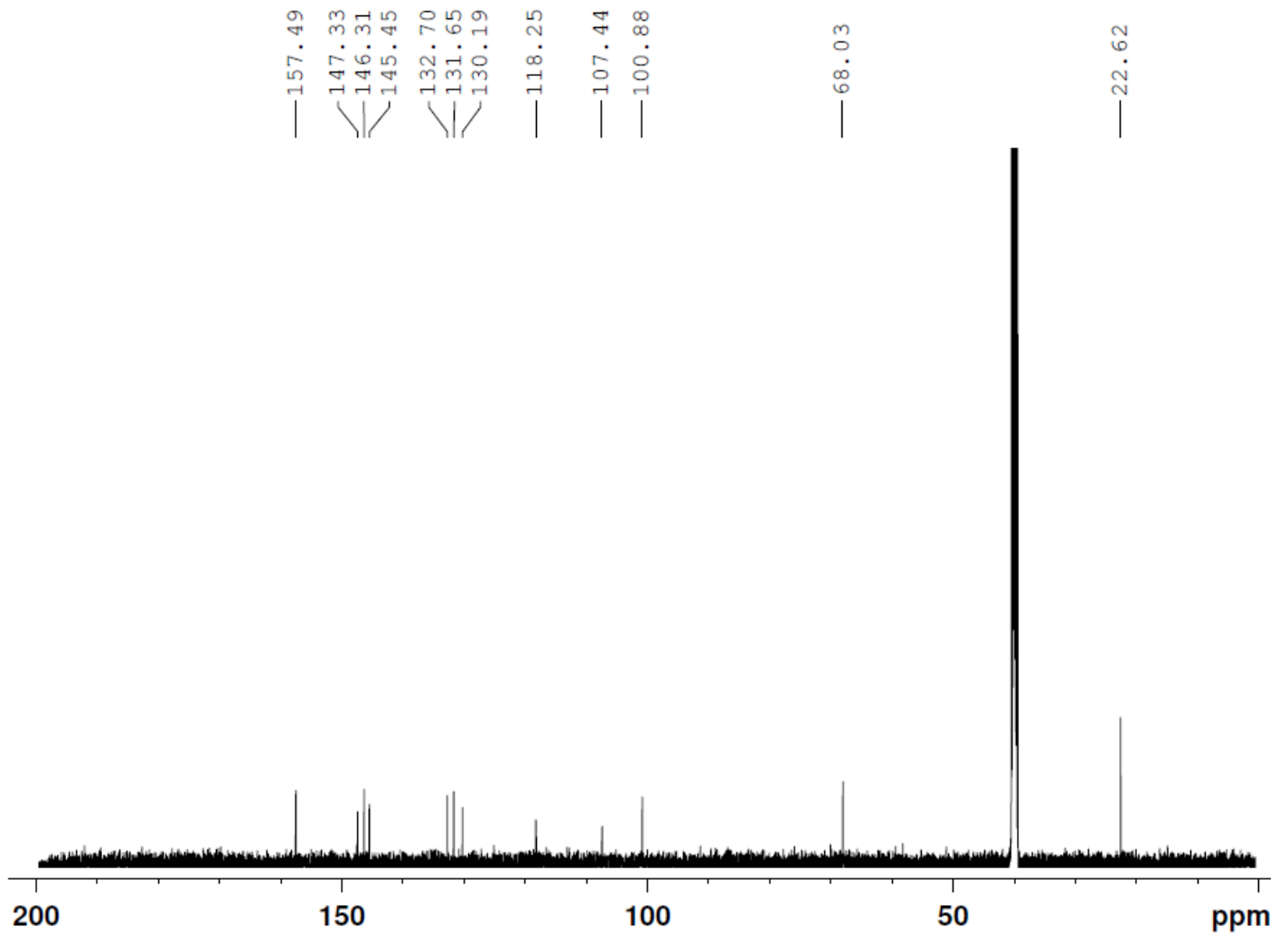


8-isopropoxy-5H-pyrrolo[2,3-c:4,5-c']dipyridine

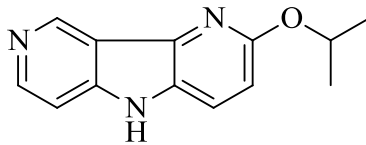


AZA-3-ISOPBC (5)

^{13}C NMR (125 MHz, $(\text{CD}_3)_2\text{SO}$)

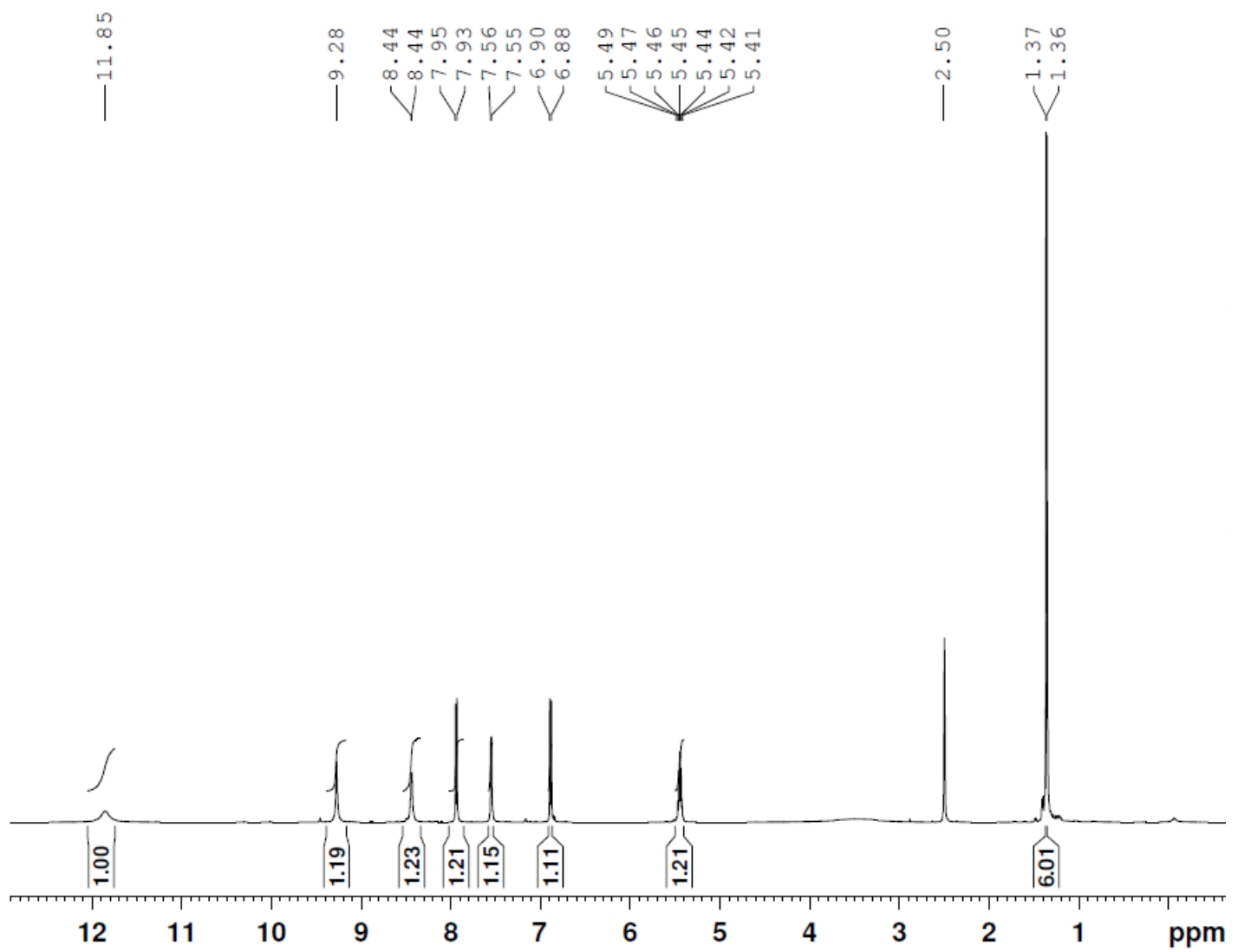


2-isopropoxy-5*H*-pyrrolo[3,2-*b*:4,5-*c'*]dipyridine

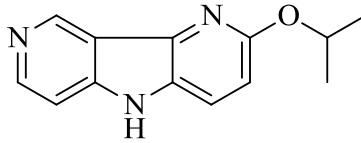


9e

¹H NMR (500 MHz, (CD₃)₂SO)

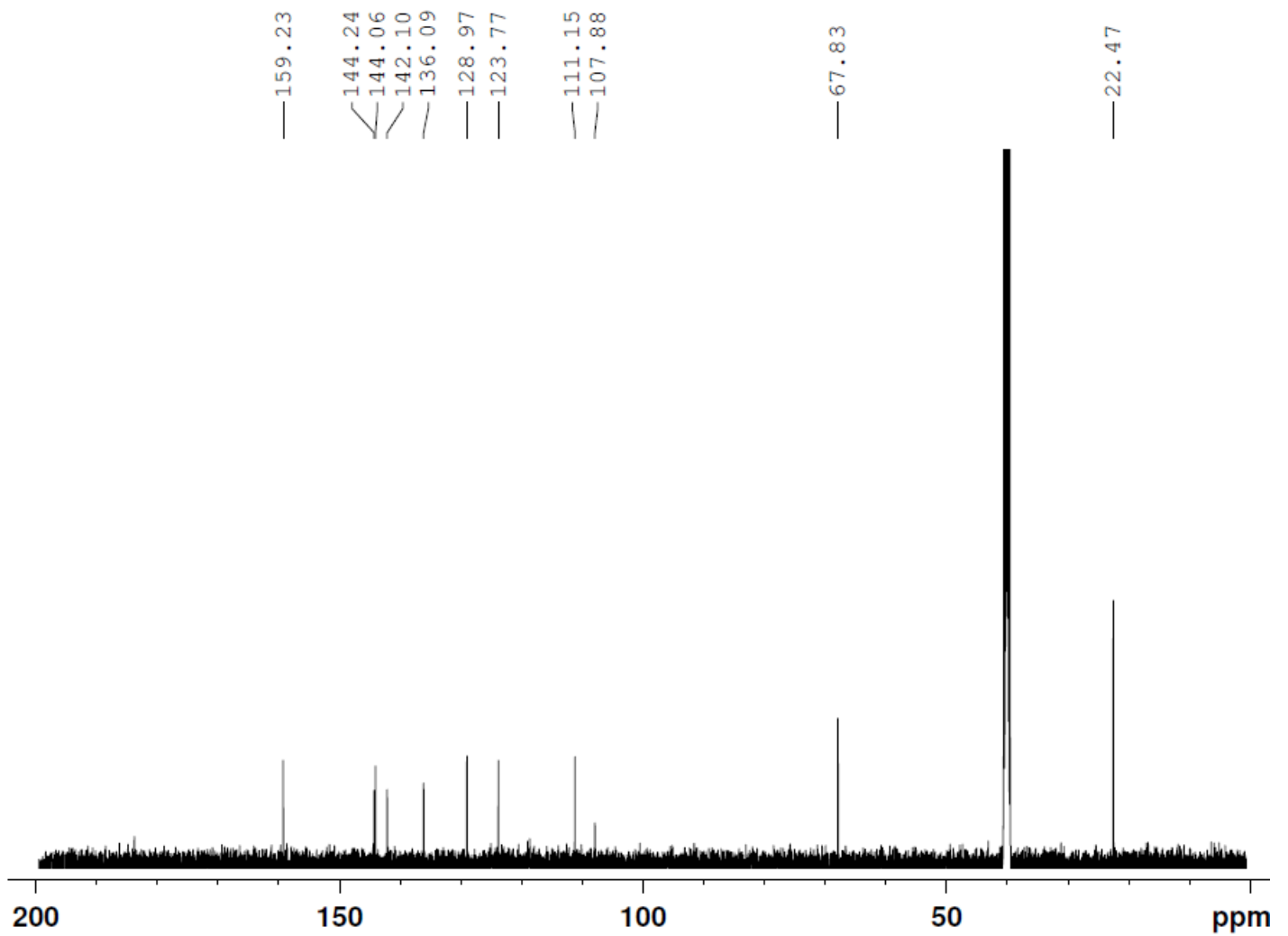


2-isopropoxy-5H-pyrrolo[3,2-b:4,5-c']dipyridine

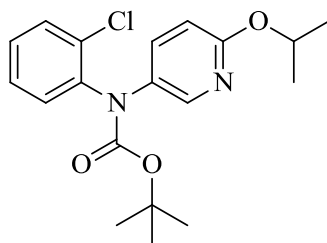


9e

^{13}C NMR (125 MHz, $(\text{CD}_3)_2\text{SO}$)

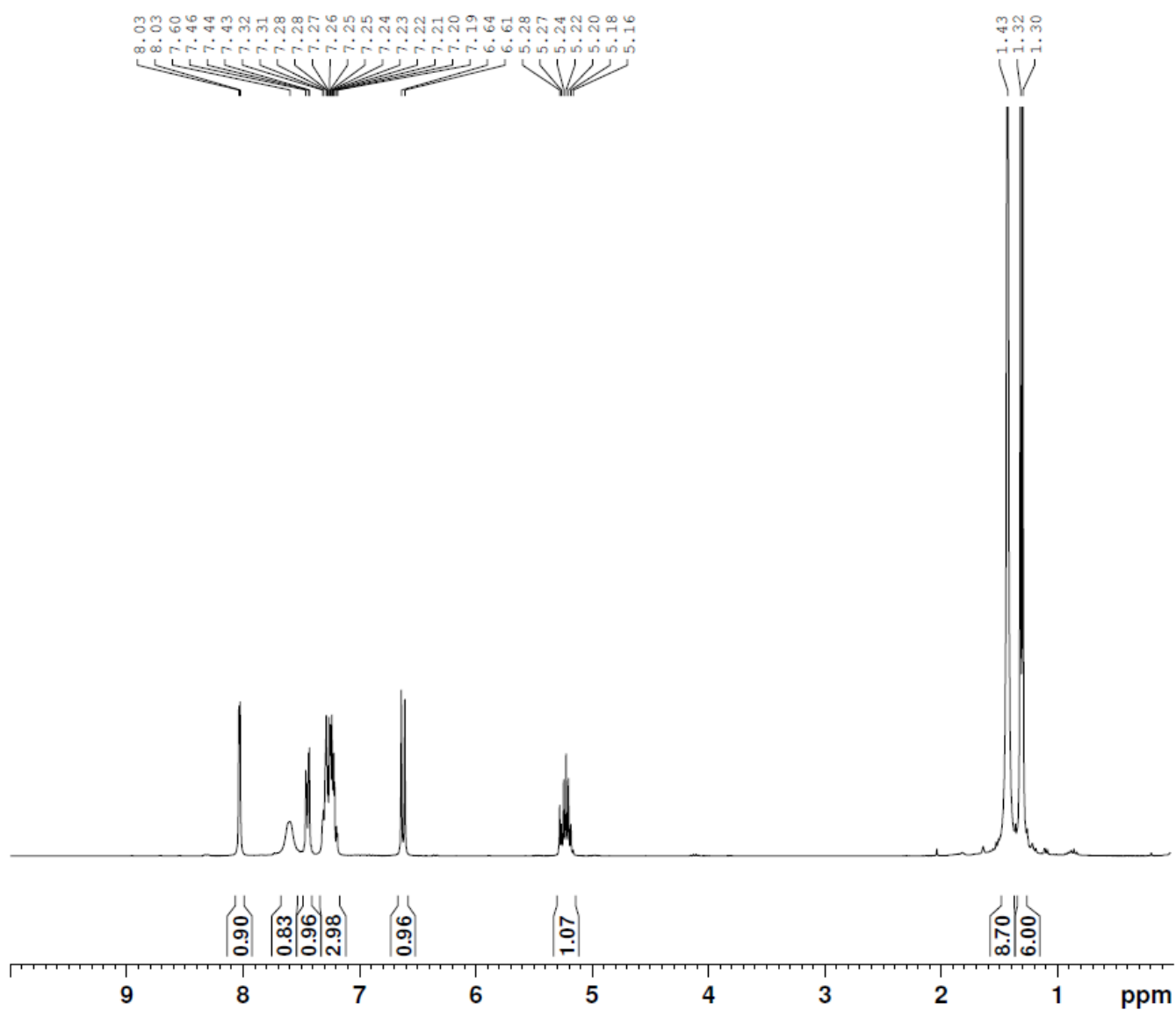


***tert*-butyl (2-chlorophenyl)(6-isopropoxy-pyridin-3-yl)carbamate**

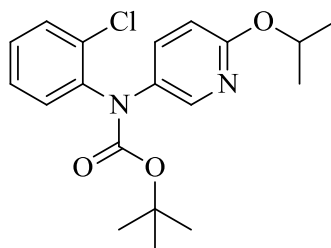


10

^1H NMR (300 MHz, CDCl_3)

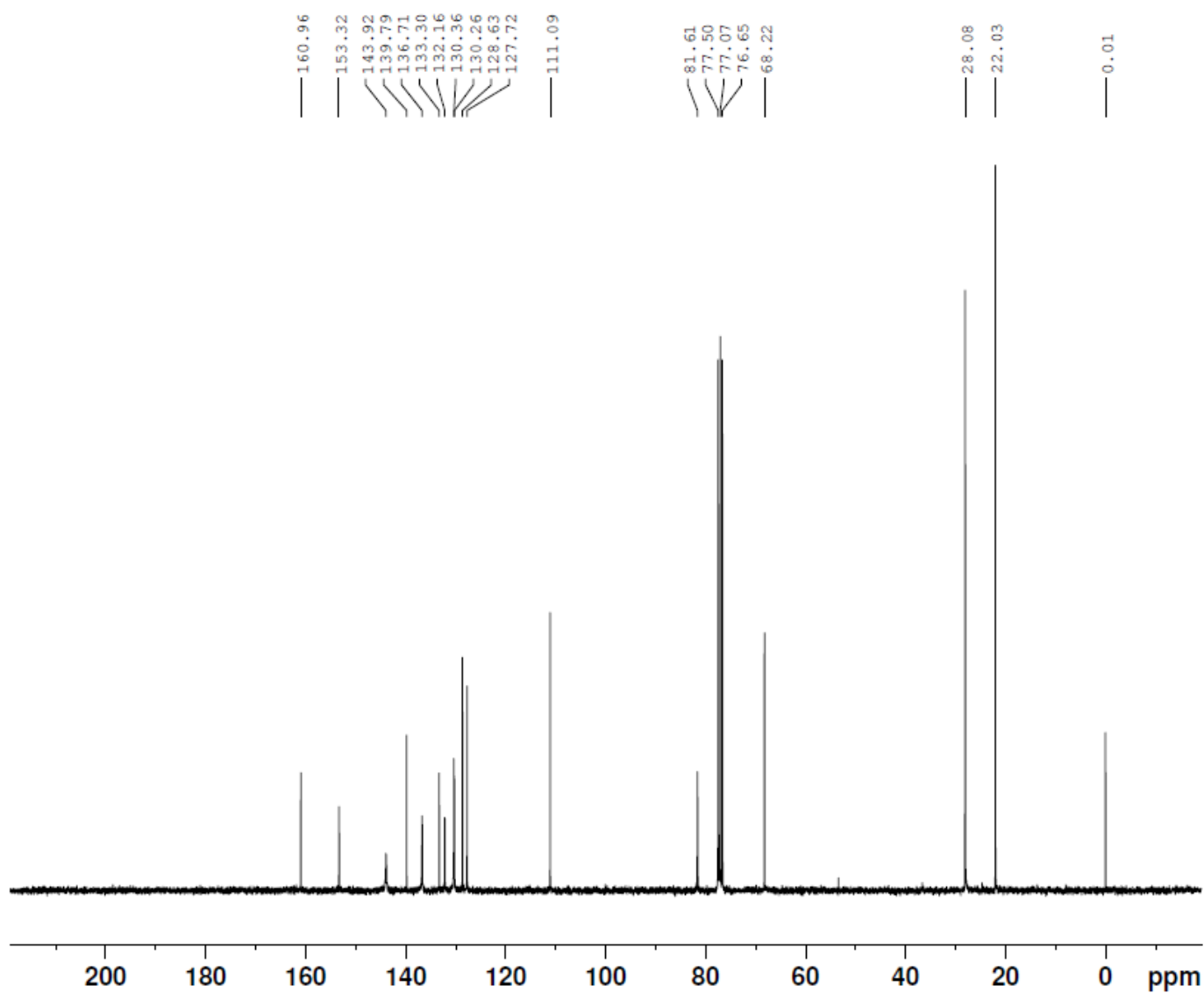


tert-butyl (2-chlorophenyl)(6-isopropoxy-pyridin-3-yl)carbamate

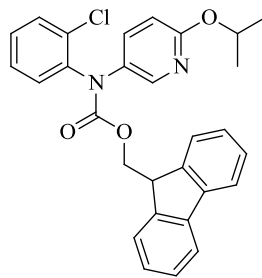


10

^{13}C NMR (75 MHz, CDCl_3)

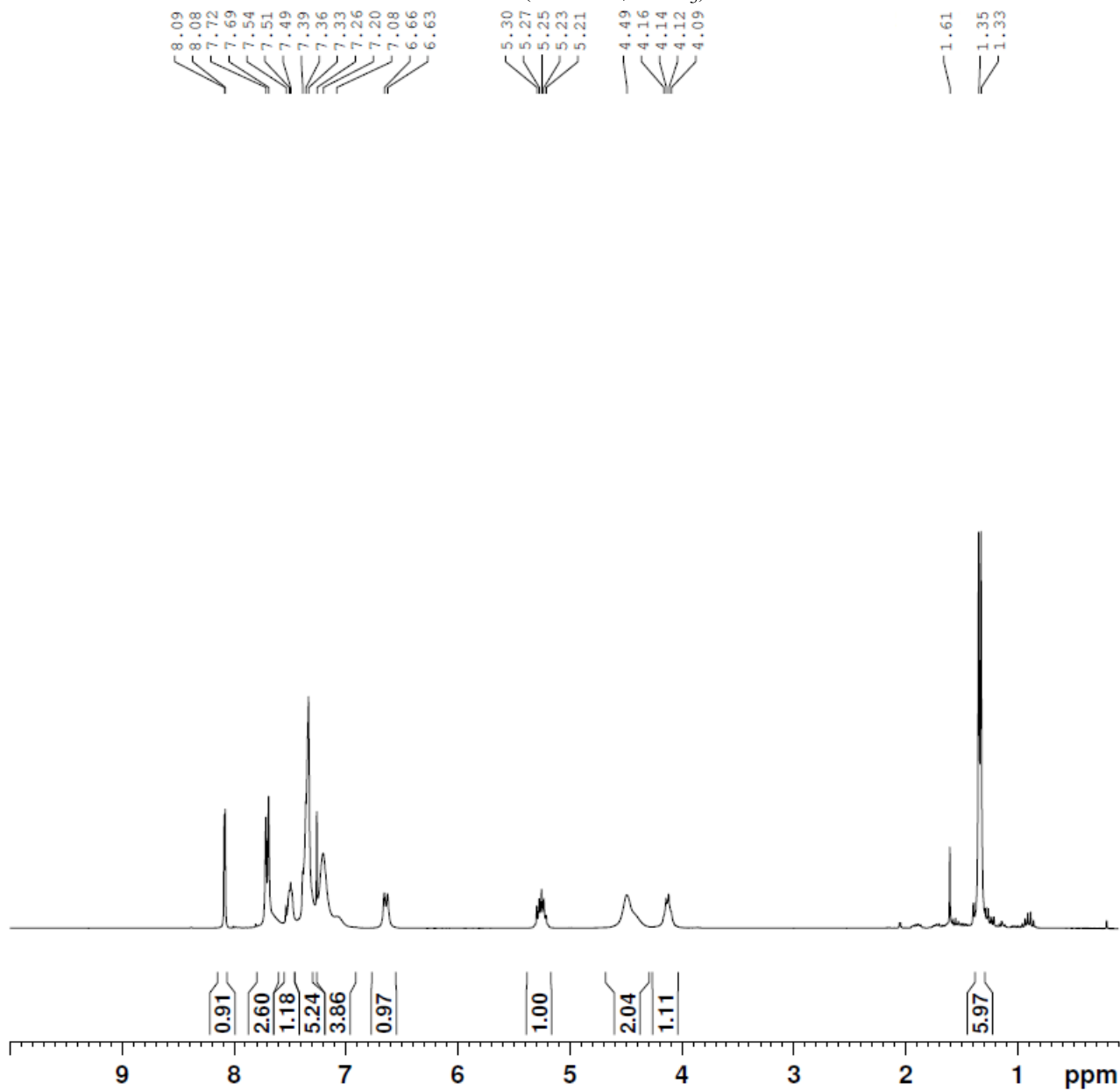


(9H-fluoren-9-yl)methyl (2-chlorophenyl)(6-isopropoxy-pyridin-3-yl)carbamate

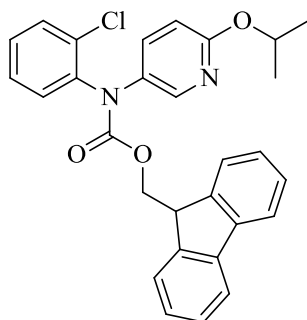


11

¹H NMR (300 MHz, CDCl₃)

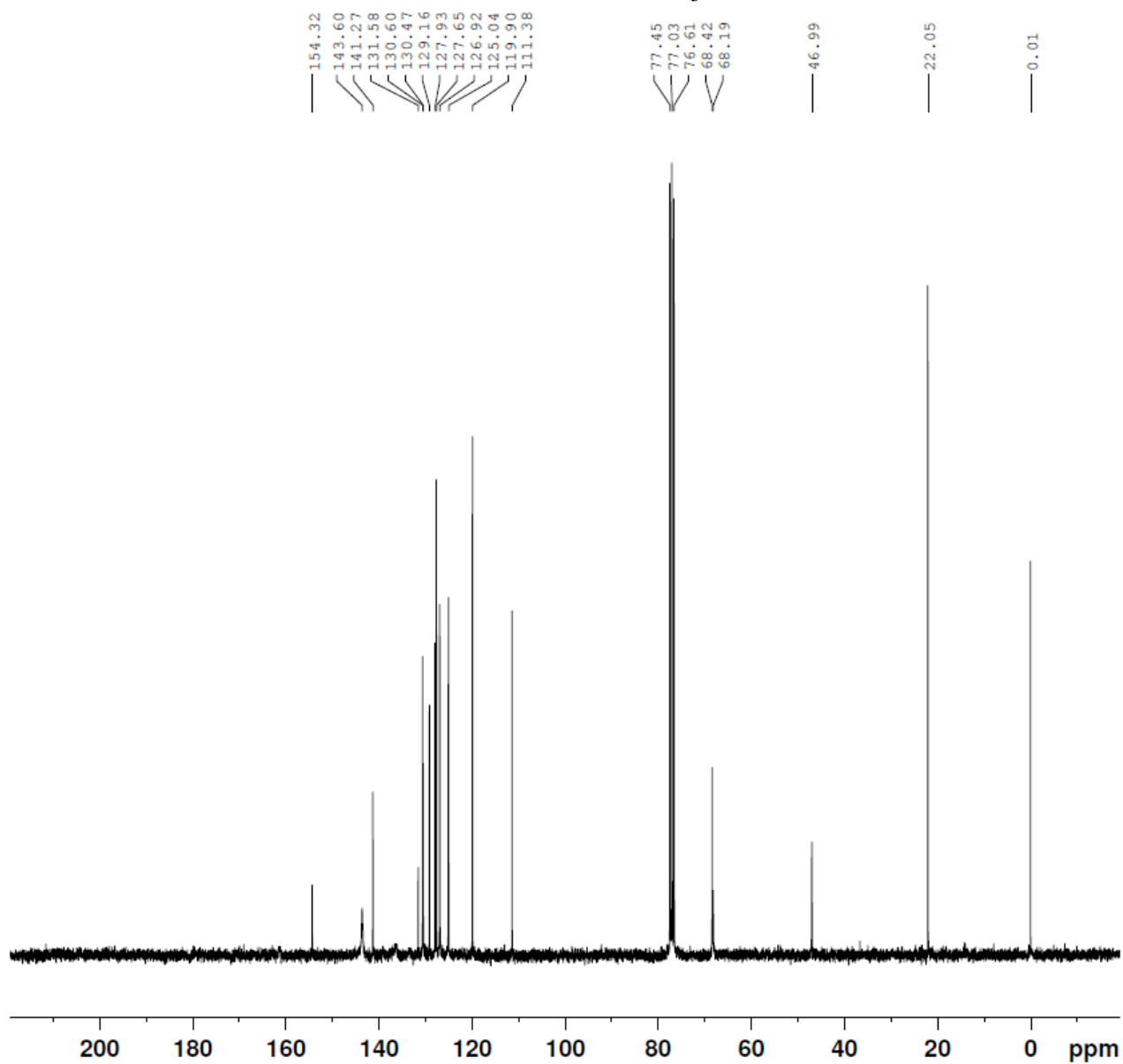


(9H-fluoren-9-yl)methyl (2-chlorophenyl)(6-isopropoxy)pyridin-3-yl)carbamate

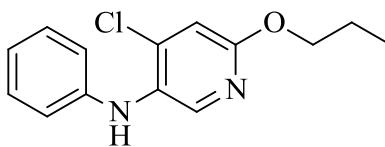


11

^{13}C NMR (75 MHz, CDCl_3)

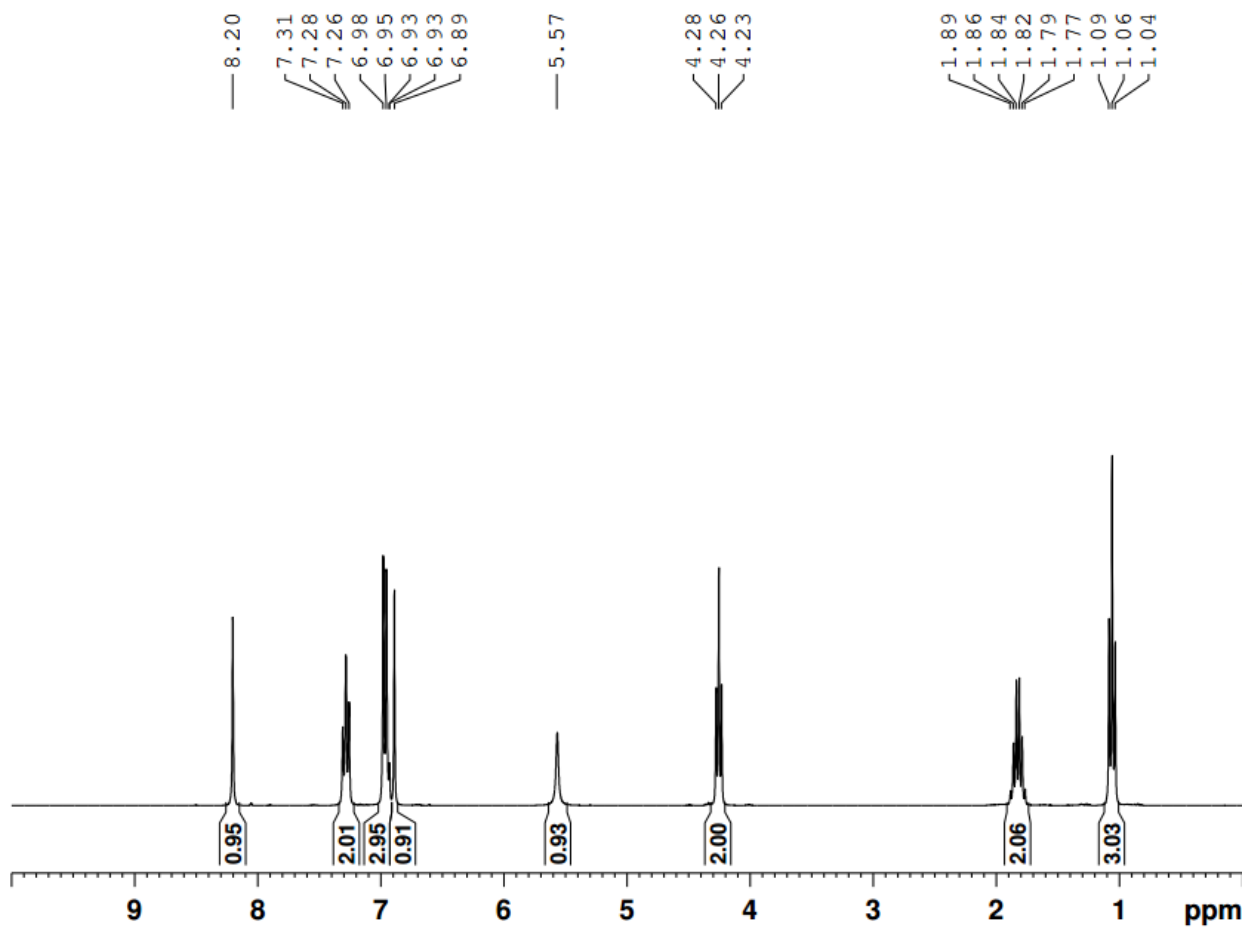


4-chloro-*N*-phenyl-6-propoxy-pyridin-3-amine

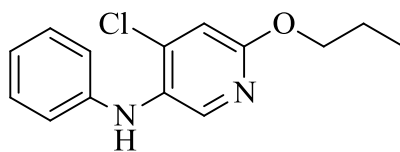


15

¹H NMR (300 MHz, CDCl₃)

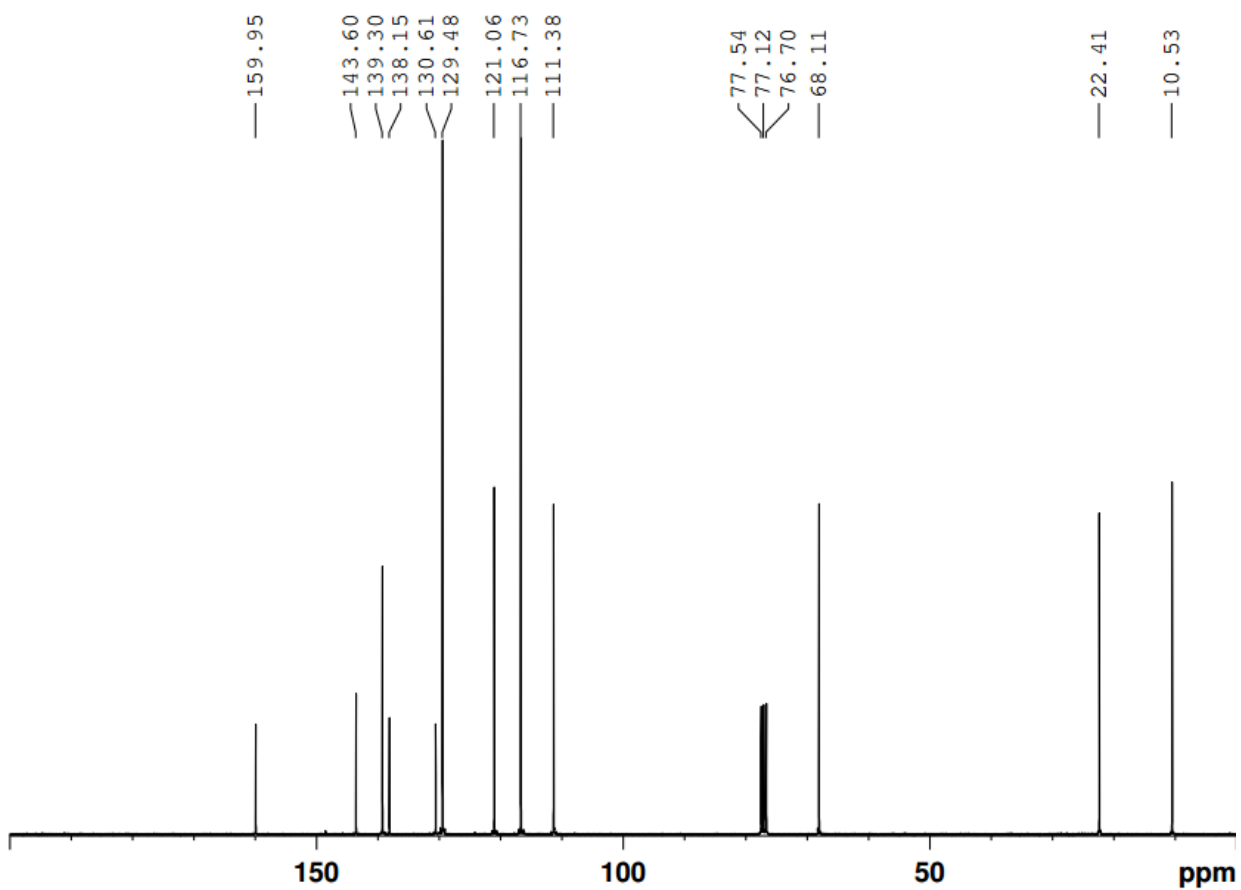


4-chloro-*N*-phenyl-6-propoxy-pyridin-3-amine



15

¹³C NMR (75 MHz, CDCl₃)

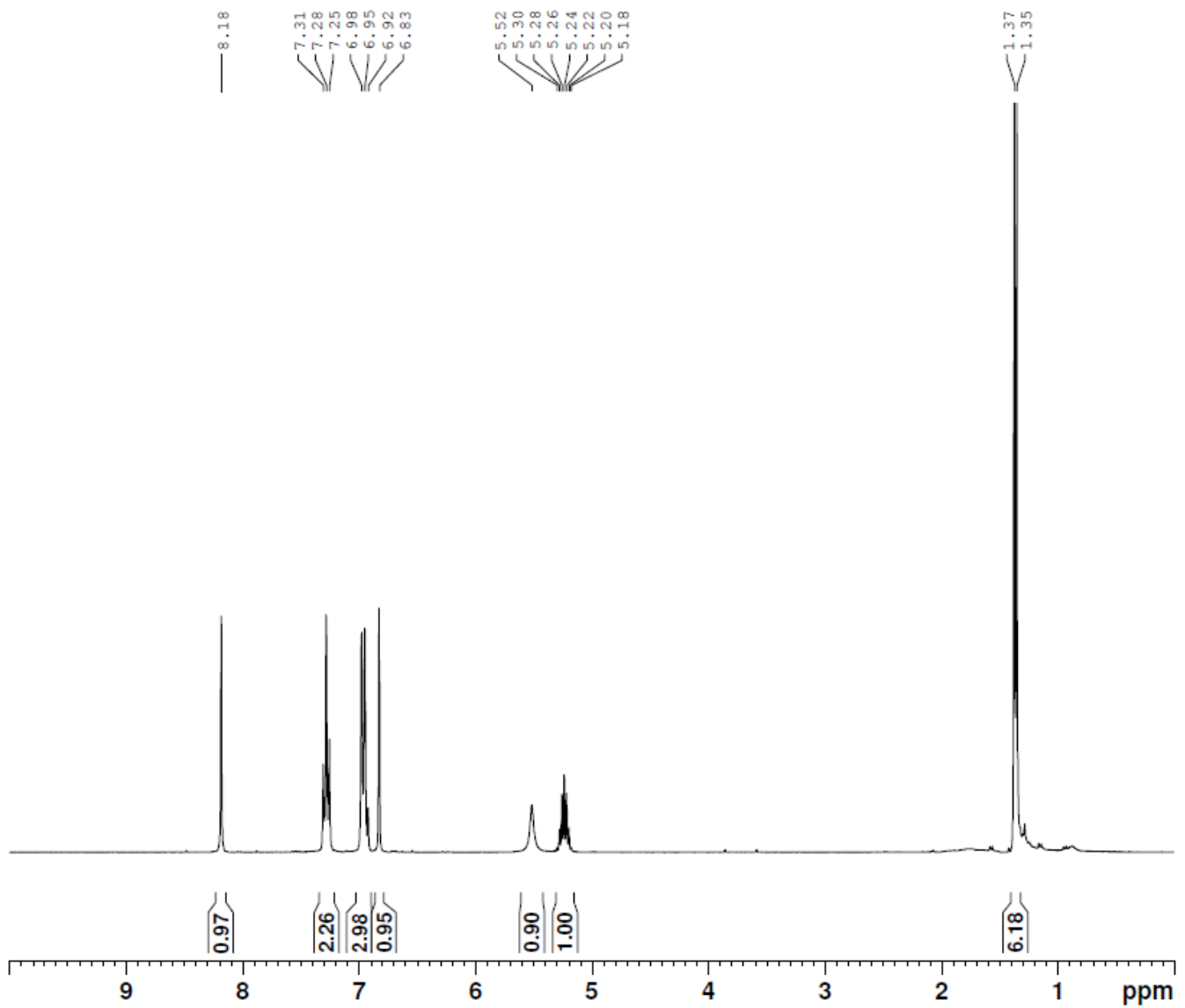


4-chloro-6-isopropoxy-N-phenylpyridin-3-amine

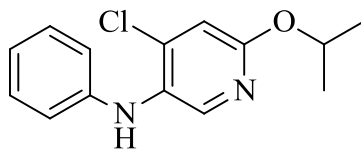


16

^1H NMR (300 MHz, CDCl_3)

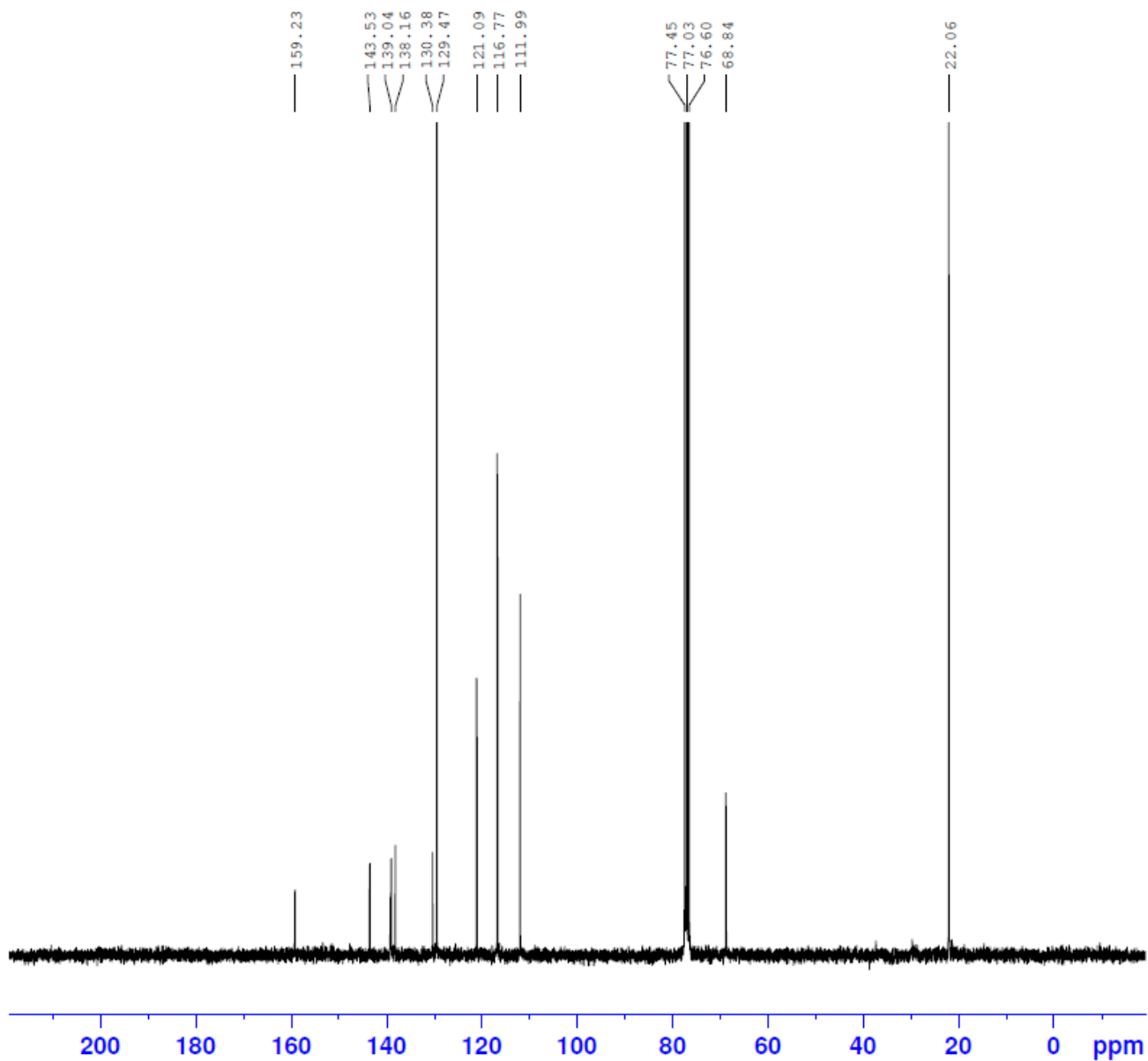


4-chloro-6-isopropoxy-N-phenylpyridin-3-amine

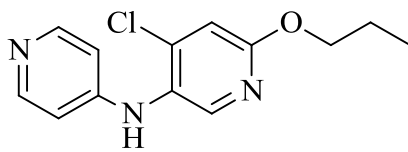


16

^{13}C NMR (75 MHz, CDCl_3)

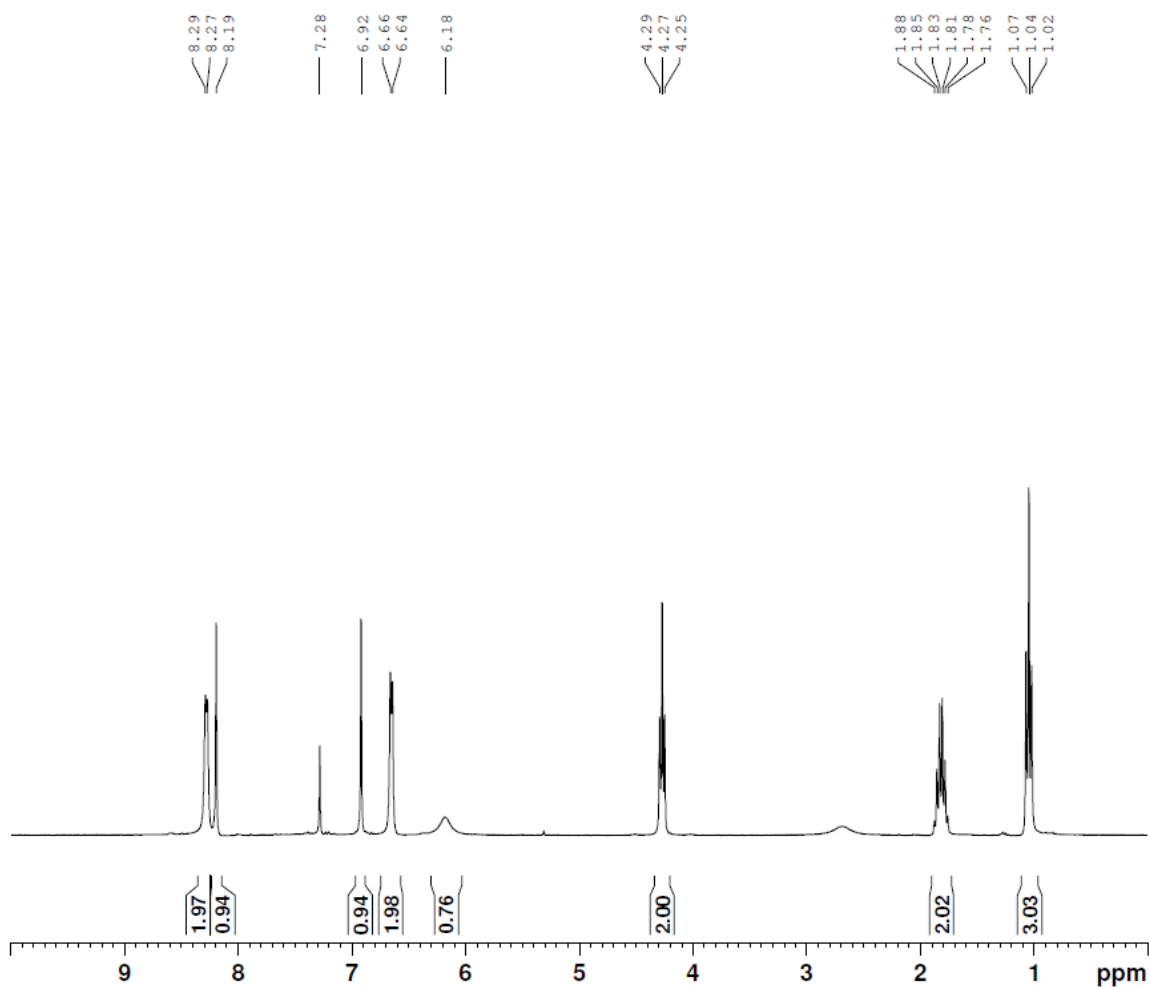


4-chloro-6-propoxy-N-(pyridin-4-yl)pyridin-3-amine

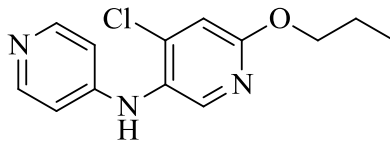


17

^1H NMR (300 MHz, CDCl_3)

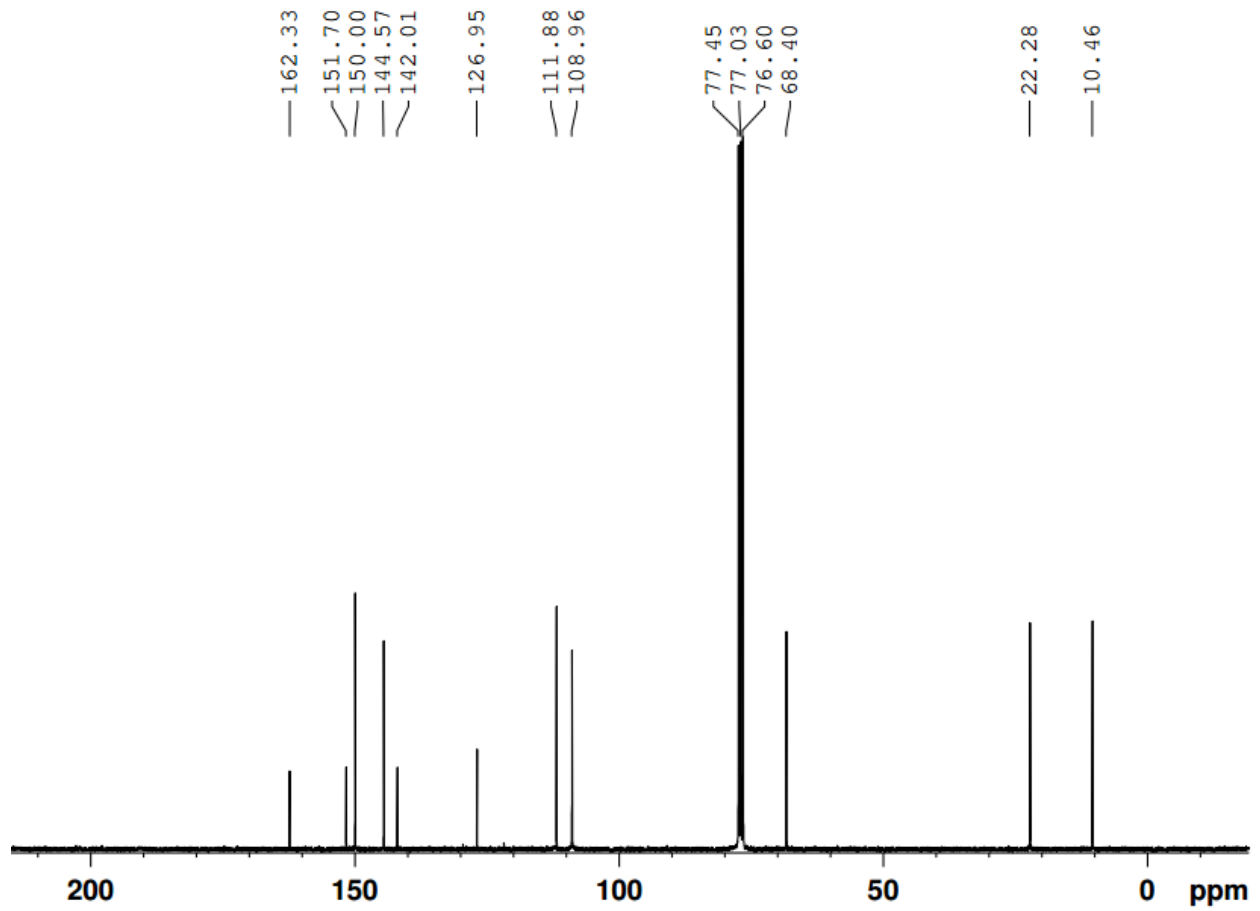


4-chloro-6-propoxy-N-(pyridin-4-yl)pyridin-3-amine

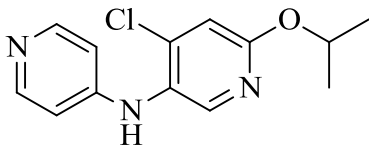


17

^{13}C NMR (75 MHz, CDCl_3)

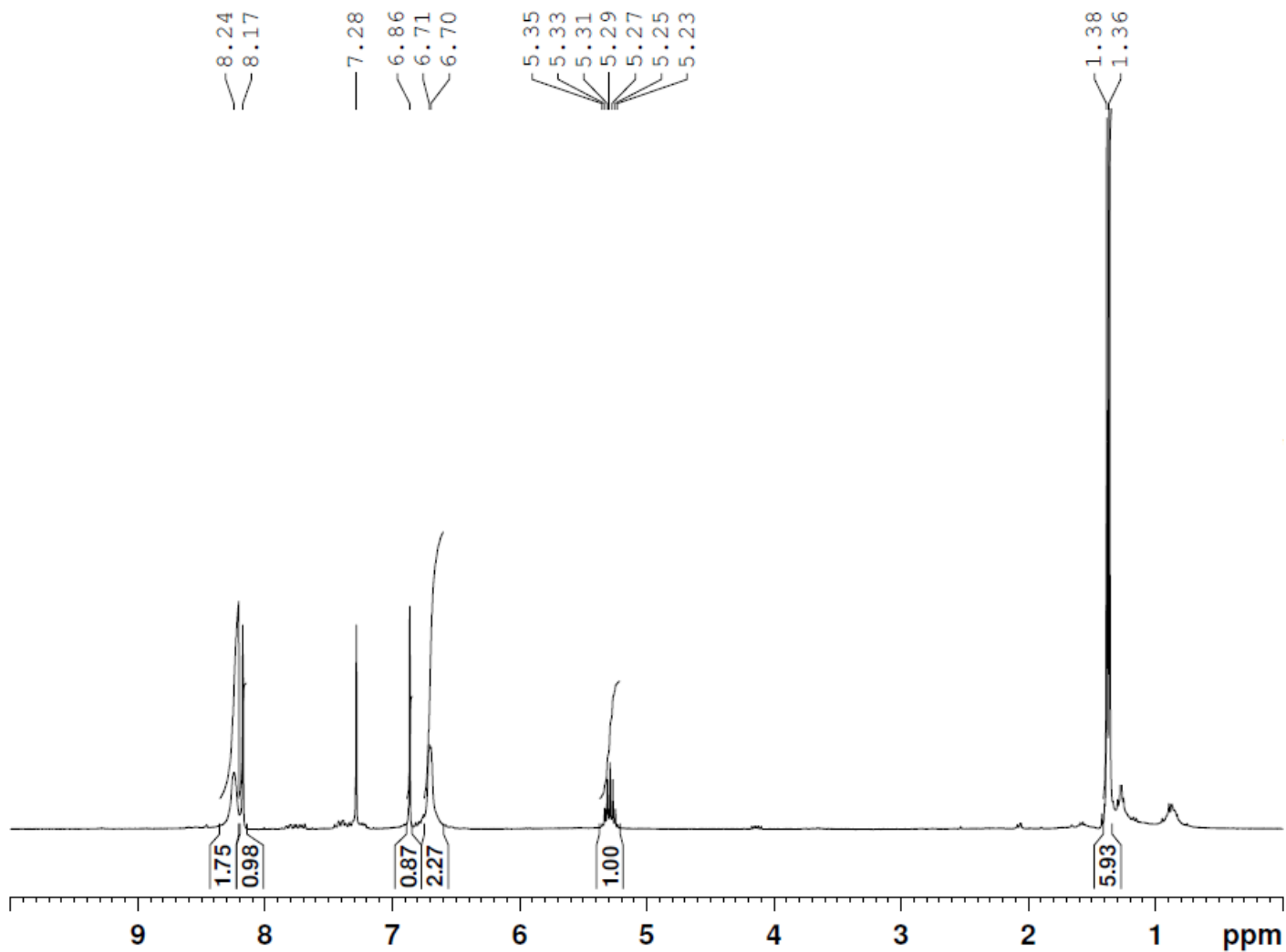


4-chloro-6-isopropoxy-N-(pyridin-4-yl)pyridin-3-amine

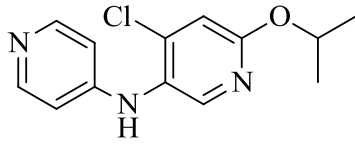


18

¹H NMR (300 MHz, CDCl₃)

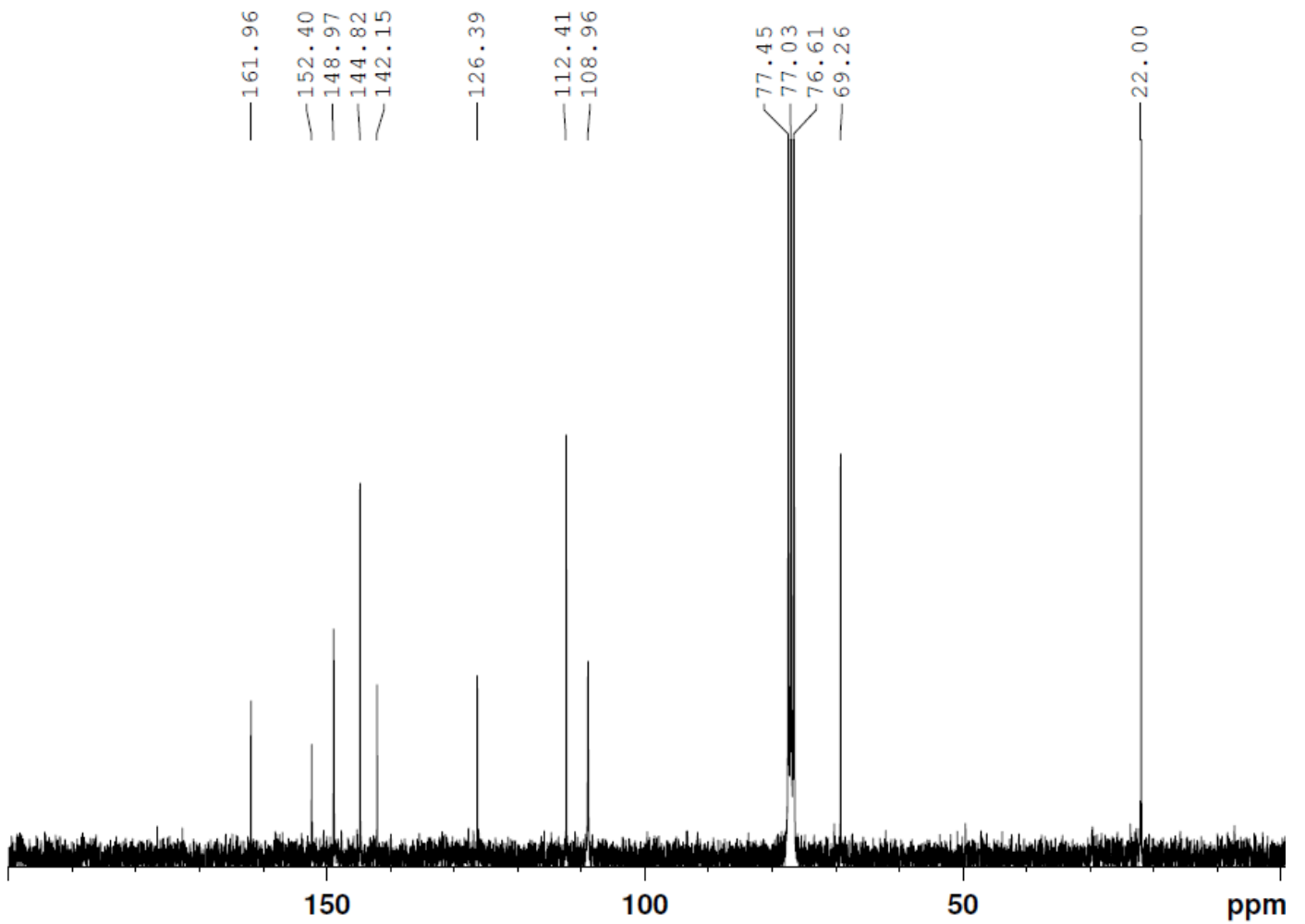


4-chloro-6-isopropoxy-N-(pyridin-4-yl)pyridin-3-amine



18

^{13}C NMR (75 MHz, CDCl_3)



X-ray Structural Analysis for 3-ISOPBC (2)

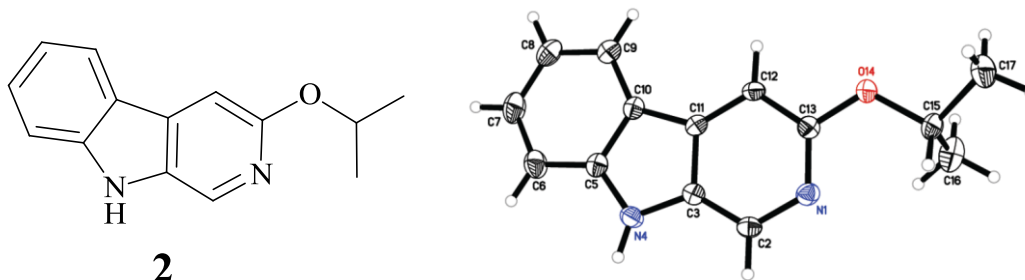


Figure S1: Results of the X-ray diffraction study on 3-isopropoxy-9*H*-pyrido[3,4-*b*]indole (**2**) showing one of the two molecules in the asymmetric unit. Displacement ellipsoids are at the 50% level (β -carboline numbering not followed)

Crystal Data for compound **2**. The 0.682 x 0.479 x 0.253 mm³ crystal was monoclinic in space group $P 2_1$ with unit cell dimensions $a = 9.1046(2)$ Å, $b = 10.2134(2)$ Å, $c = 19.7287(5)$ Å, and $\beta = 90.6870(10)^\circ$. Data were 99.1% complete to 29.15° θ . CCDC 1040832 contains the supplementary crystallographic data for this paper. These data can be obtained free of charge from The Cambridge Crystallographic Data Centre via www.ccdc.cam.ac.uk/data_request/cif

X-ray Structural Analysis for 3

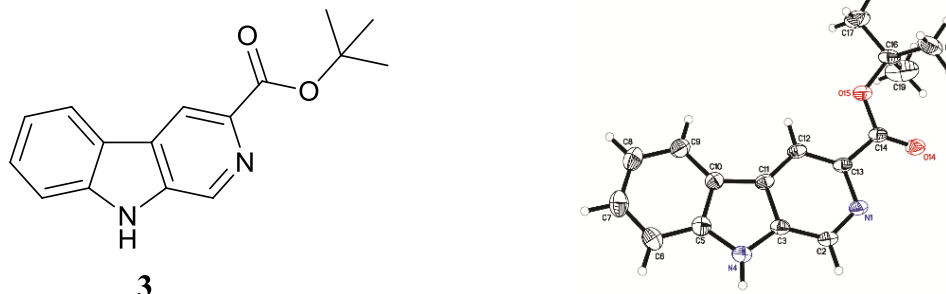


Figure S2: Results of the X-ray diffraction study on *tert*-Butyl 9H-pyrido[3,4-*b*]indole-3-carboxylate (**3**) showing one of the two molecules in the asymmetric unit. Displacement ellipsoids are at the 50% level, solvent has been omitted for clarity (β -carboline numbering not followed)

Crystal Data for compound **3**. The 0.416 x 0.374 x 0.277 mm³ crystal was monoclinic in space group C 2/c with unit cell dimensions $a = 16.0850(12)$ Å, $b = 15.4499(15)$ Å, $c = 25.045(2)$ Å, and $\beta = 101.694(4)^\circ$. Data were 99.9% complete to 29.17° θ . CCDC 1044936 contains the supplementary crystallographic data for this paper. These data can be obtained free of charge from The Cambridge Crystallographic Data Centre via www.ccdc.cam.ac.uk/data_request/cif

X-ray Structural Analysis for 9a

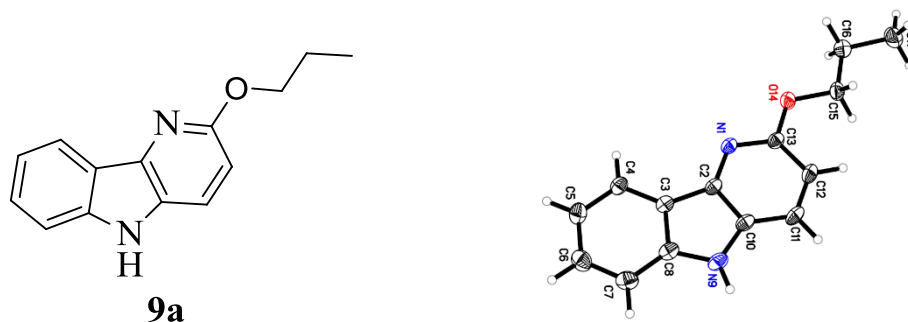


Figure S3: Results of the X-ray diffraction study on 2-propoxy-5*H*-pyrido[3,2-*b*]indole (**9a**) showing one of the two molecules in the asymmetric unit. Displacement ellipsoids are at the 50% level (β -carboline numbering not followed)

Crystal Data for compound **9a**. The 0.554 x 0.459 x 0.204 mm³ crystal was orthorhombic in space group $P 2_12_12_1$ with unit cell dimensions $a = 14.2584(5)$ Å, $b = 14.3343(5)$ Å, $c = 11.7845(4)$ Å, and $\beta = 90^\circ$. Data were 99.8% complete to 29.165° θ . CCDC 1040833 contains the supplementary crystallographic data for this paper. These data can be obtained free of charge from The Cambridge Crystallographic Data Centre via www.ccdc.cam.ac.uk/data_request/cif

X-ray Structural Analysis for 9d

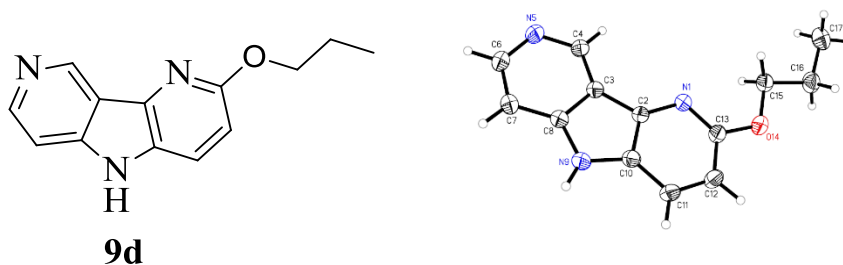


Figure S4: Results of the X-ray diffraction study on 2-propoxy-5*H*-pyrrolo[3,2-*b*:4,5*c'*]dipyridine (**9d**) showing the contents of the asymmetric unit. Displacement ellipsoids are at the 50% level. (β -carboline numbering not followed)

Crystal Data for compound **9d**. The 0.46 x 0.08 x 0.02 mm³ crystal was orthorhombic in space group *F dd2* with unit cell dimensions $a = 22.476(2)$ Å, $b = 49.142(4)$ Å, $c = 4.1392(4)$ Å, and $\beta = 90^\circ$. Data were 97.2% complete to 68.03° θ . CCDC 1040831 contains the supplementary crystallographic data for this paper. These data can be obtained free of charge from The Cambridge Crystallographic Data Centre via www.ccdc.cam.ac.uk/data_request/cif