

Supplementary Information

Microwave-Assisted One-pot Synthesis in Water of Carbonylpyrazolo[3,4-*b*]pyridine Derivatives Catalyzed By InCl_3 and Sonochemical Assisted Condensation with Aldehydes to obtain new Chalcone derivatives containing the Pyrazolopyridinic moiety

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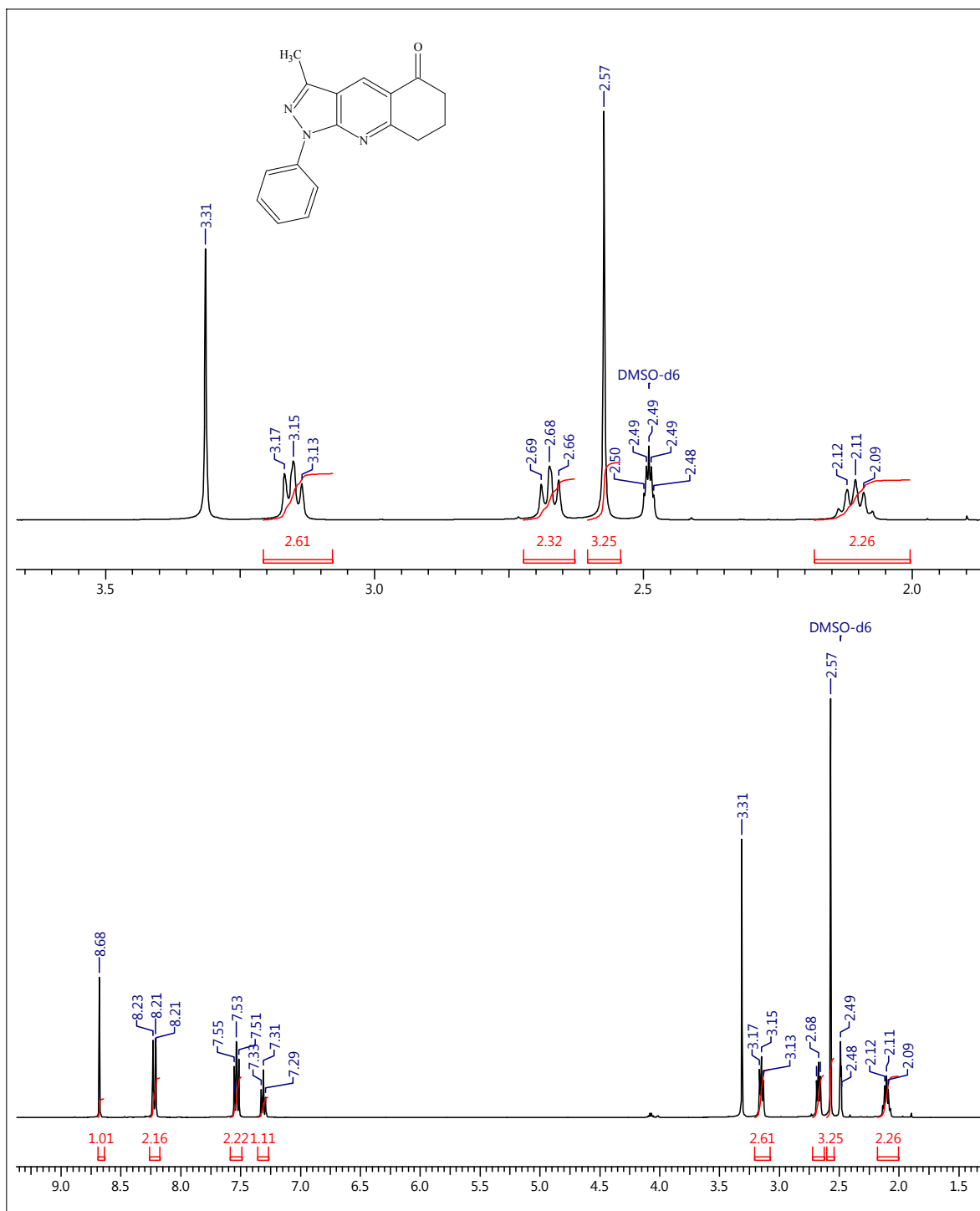


Fig. S1 ¹H-NMR spectra for 3-methyl-1-phenyl-7,8-dihydrocyclohexa[2,3-*e*]pyrazolo[3,4-*b*]pyridin-5(6*H*)-one (**4a**).

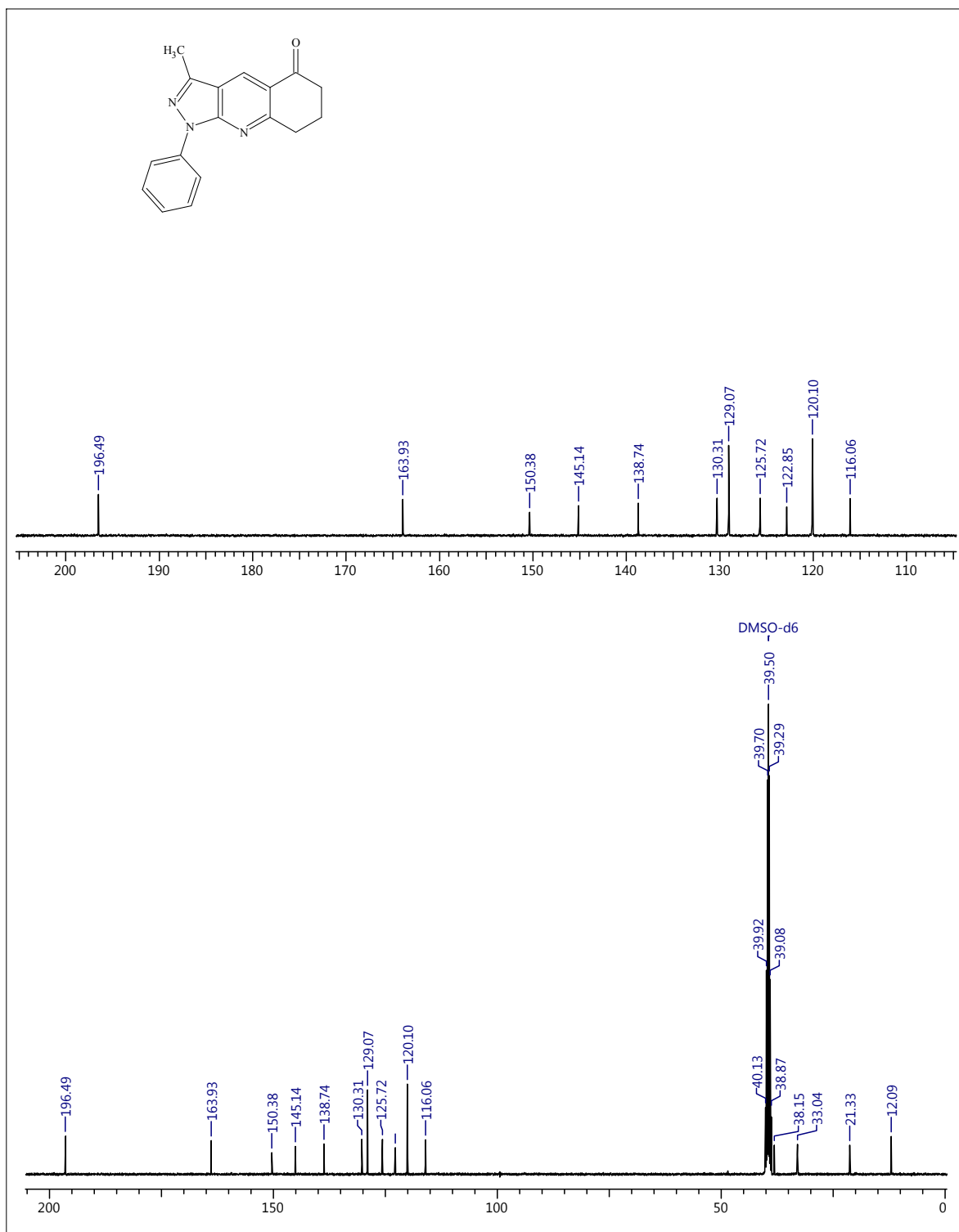


Fig. S2 ¹³C-NMR spectra for 3-methyl-1-phenyl-7,8-dihydrocyclohexa[2,3-e]pyrazolo[3,4-b]pyridin-5(6H)-one (4a).

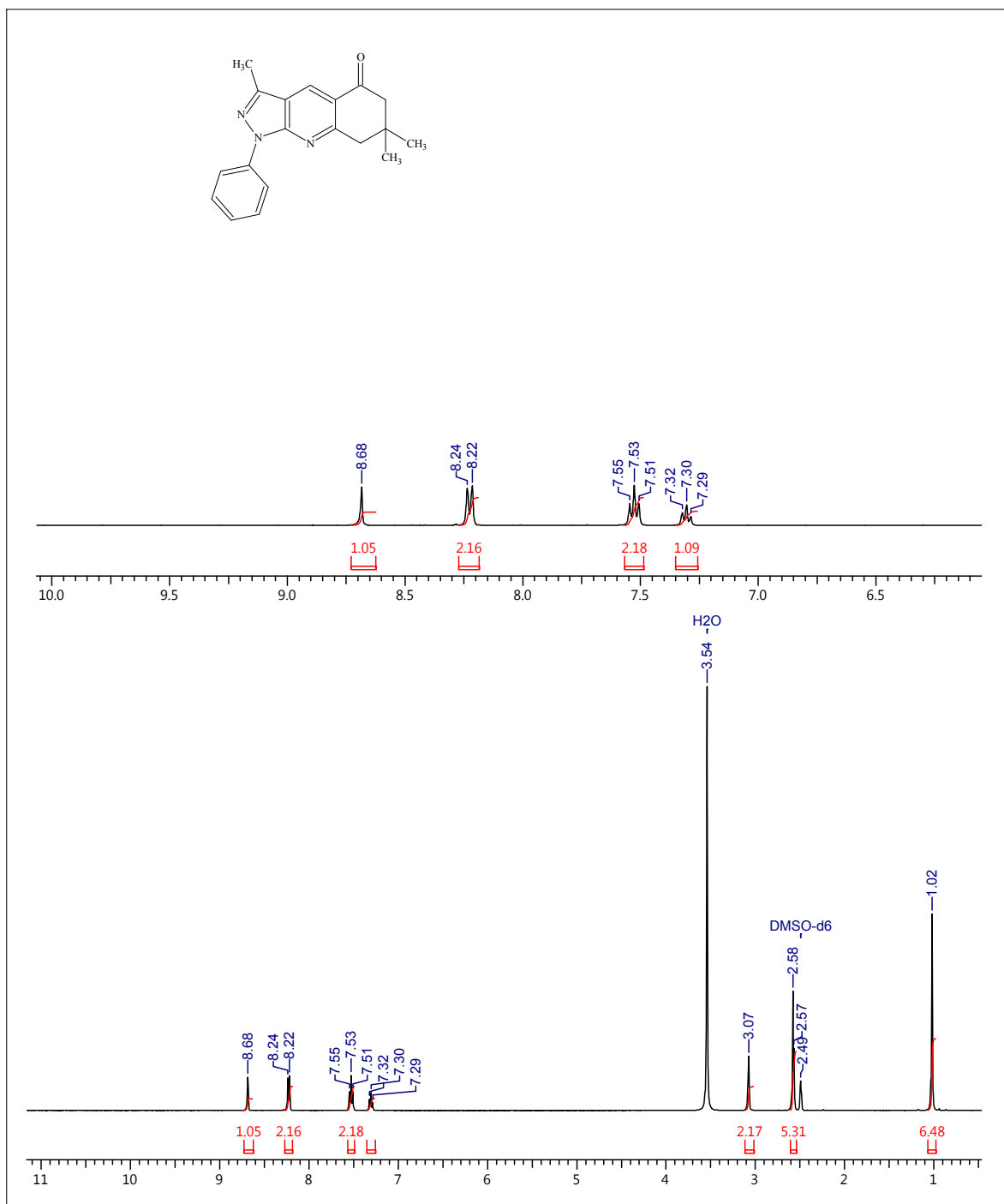


Fig. S3 ¹H-NMR spectra for 3,7,7-trimethyl-1-phenyl-7,8-dihydrocyclohexa[2,3-*e*]pyrazolo[3,4-*b*]pyridin-5(6*H*)-one (**4b**).

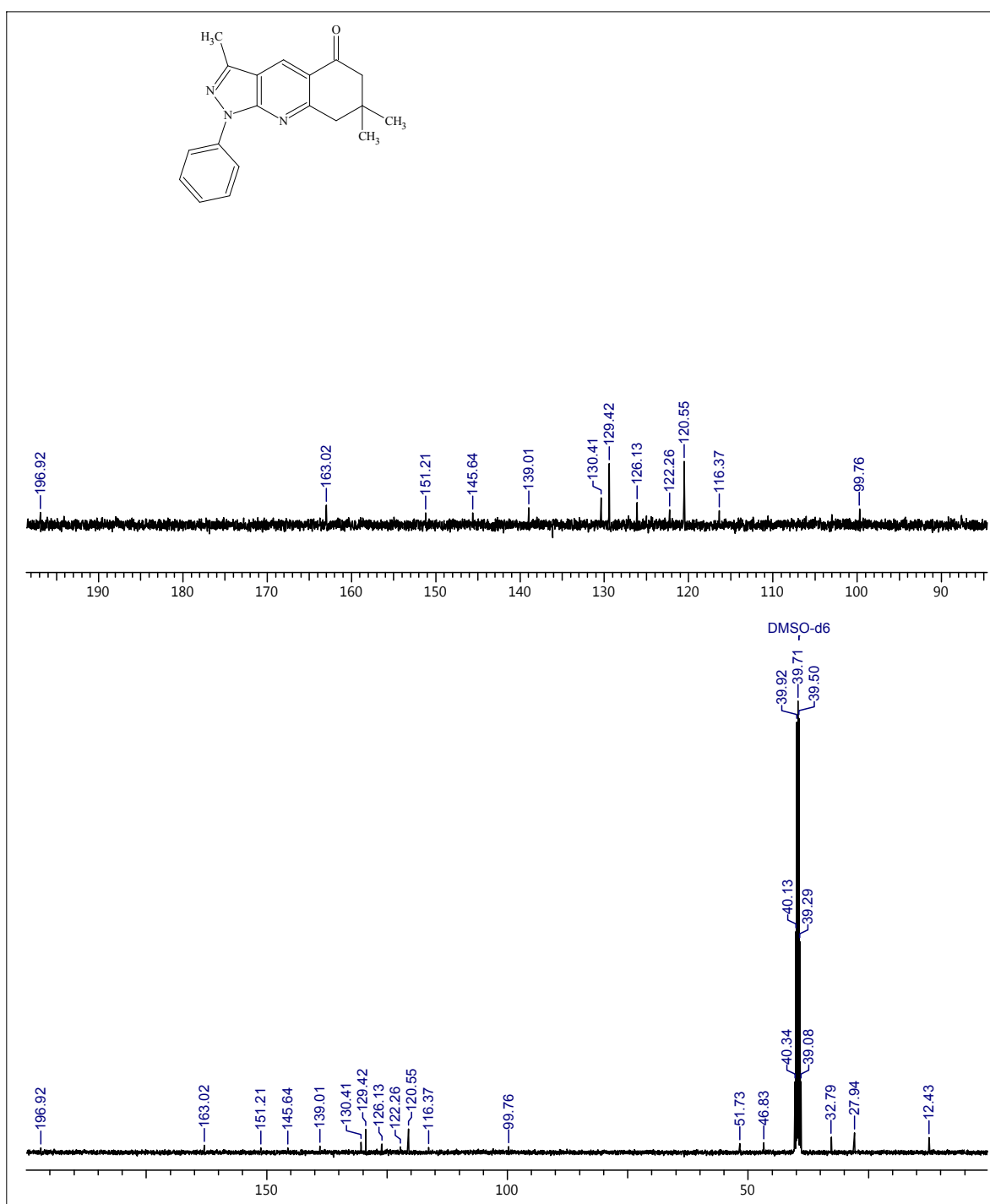


Fig. S4 ¹³C-NMR spectra for 3,7,7-trimethyl-1-phenyl-7,8-dihydrocyclohexa[2,3-e]pyrazolo[3,4-b]pyridin-5(6H)-one (4b).

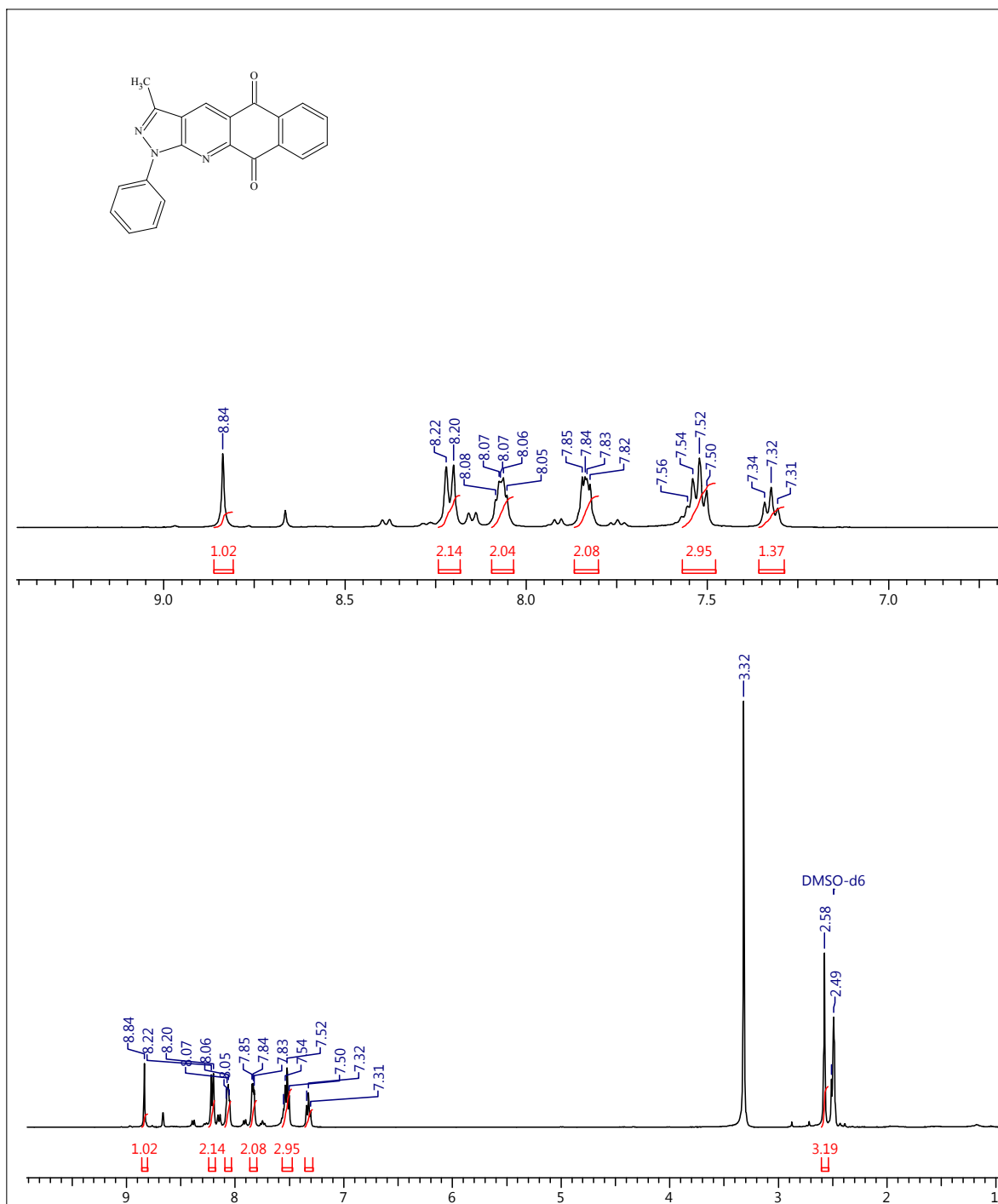


Fig. S5 ¹H-NMR spectra for 3-methyl-1-phenyl-1,2,3,4,10-bis(oxo)-5,6,7,8-tetrahydronaphtho[2,3-e]pyrazolo[3,4-b]pyridine (**4c**).

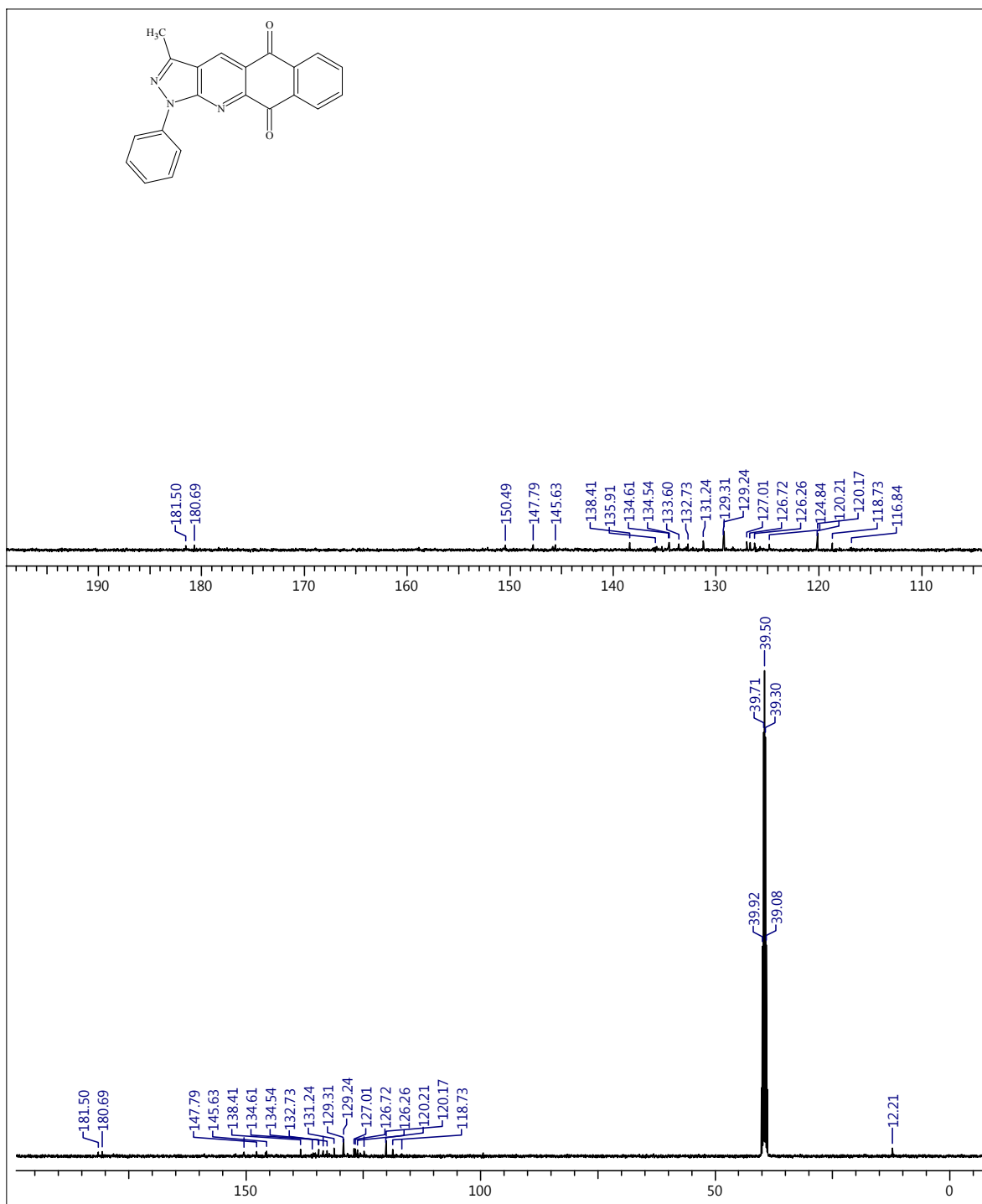


Fig. S6 ¹³C-NMR spectra for 3-methyl-1-phenylnaftalen[2,3-e]pyrazolo[3,4-b]pyridin-5,10-dione (**4c**).

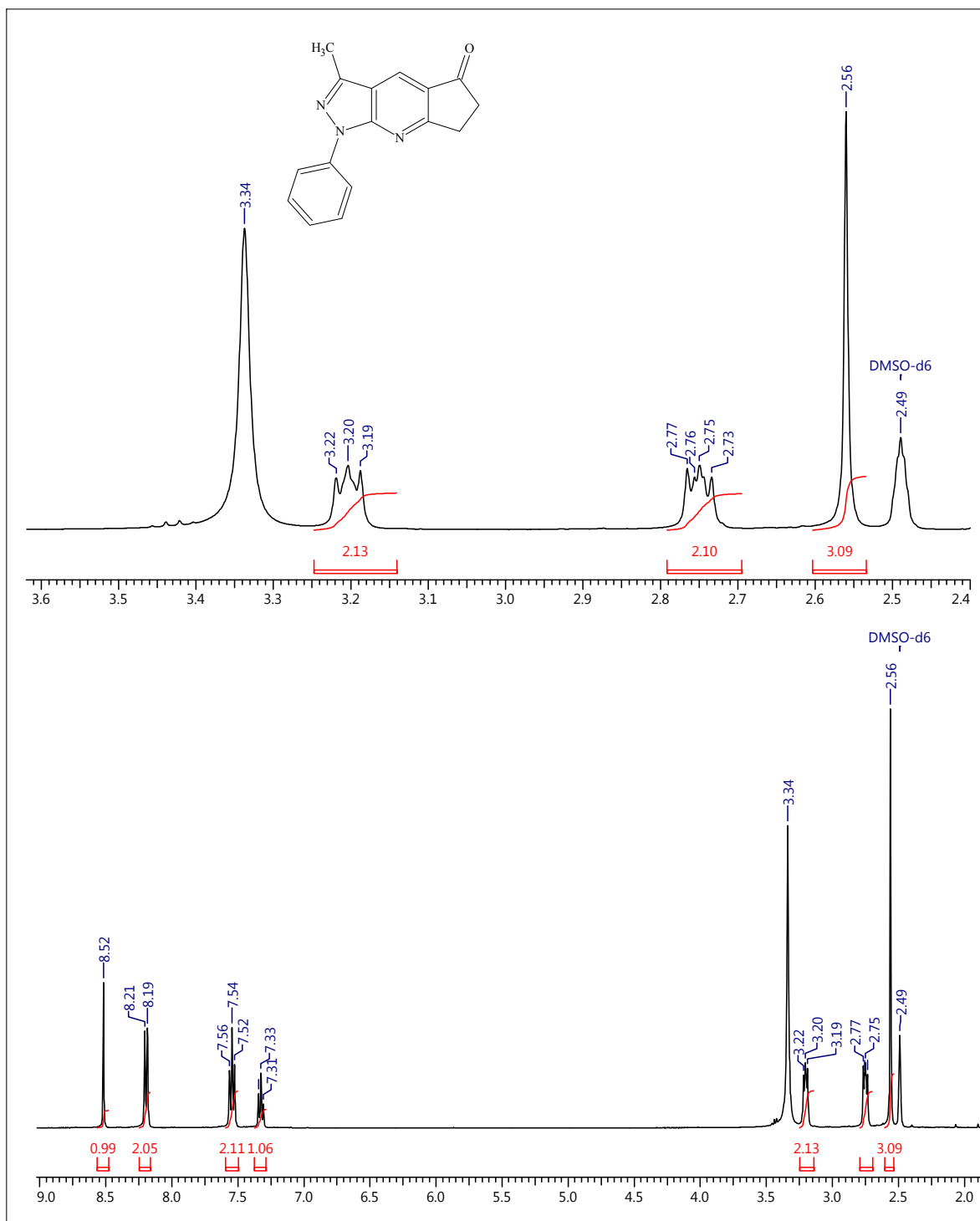


Fig. S7 ^1H -NMR spectra for 3-methyl-1-phenyl-6,7-dihydrocyclopenta[2,3-e]pyrazolo[3,4-b]pyridin-5(1H)-one (4d).

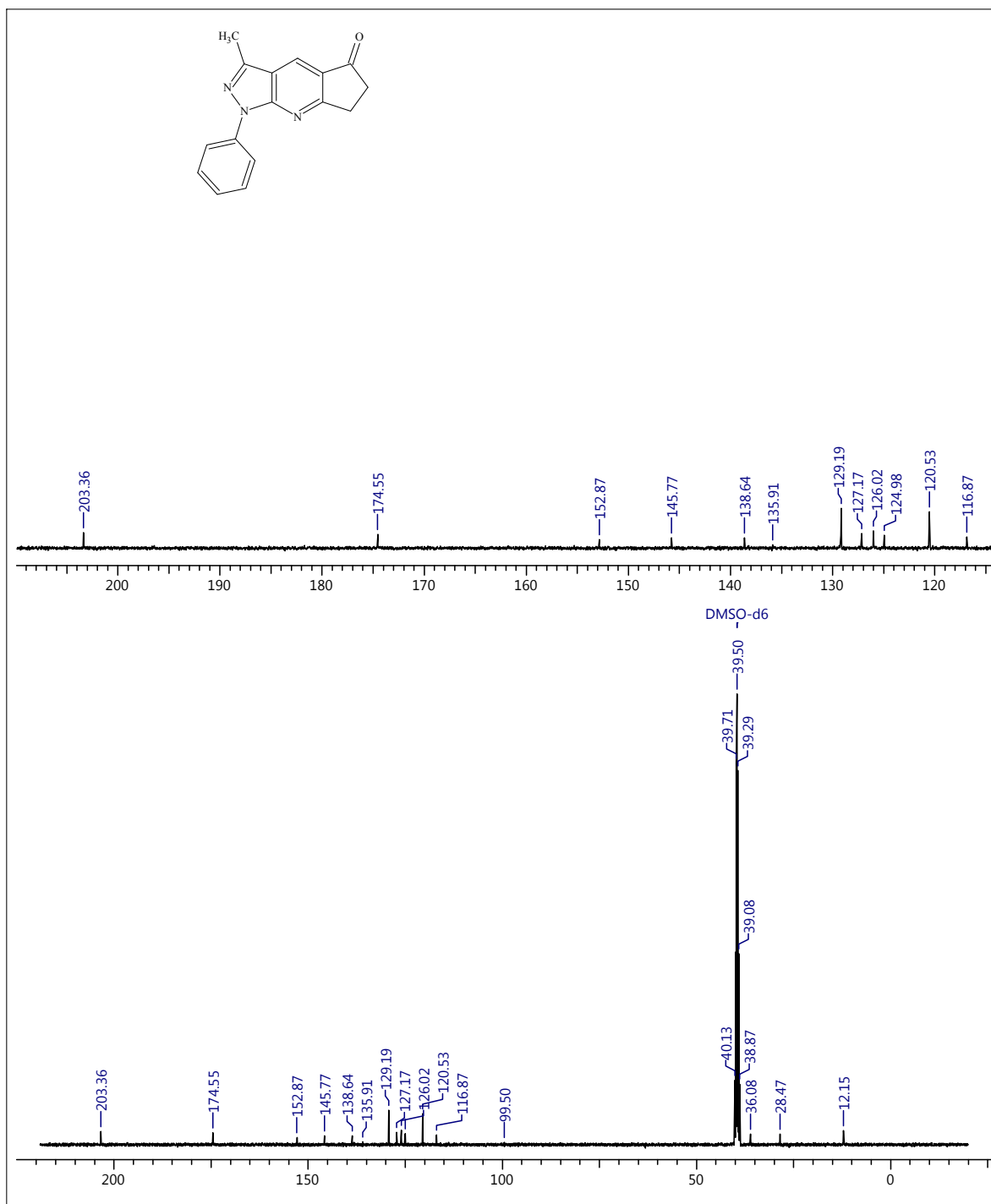


Fig. S8 ¹³C-NMR spectra for 3-methyl-1-phenyl-6,7-dihydrocyclopenta[2,3-e]pyrazolo[3,4-b]pyridin-5(1H)-one (**4d**).

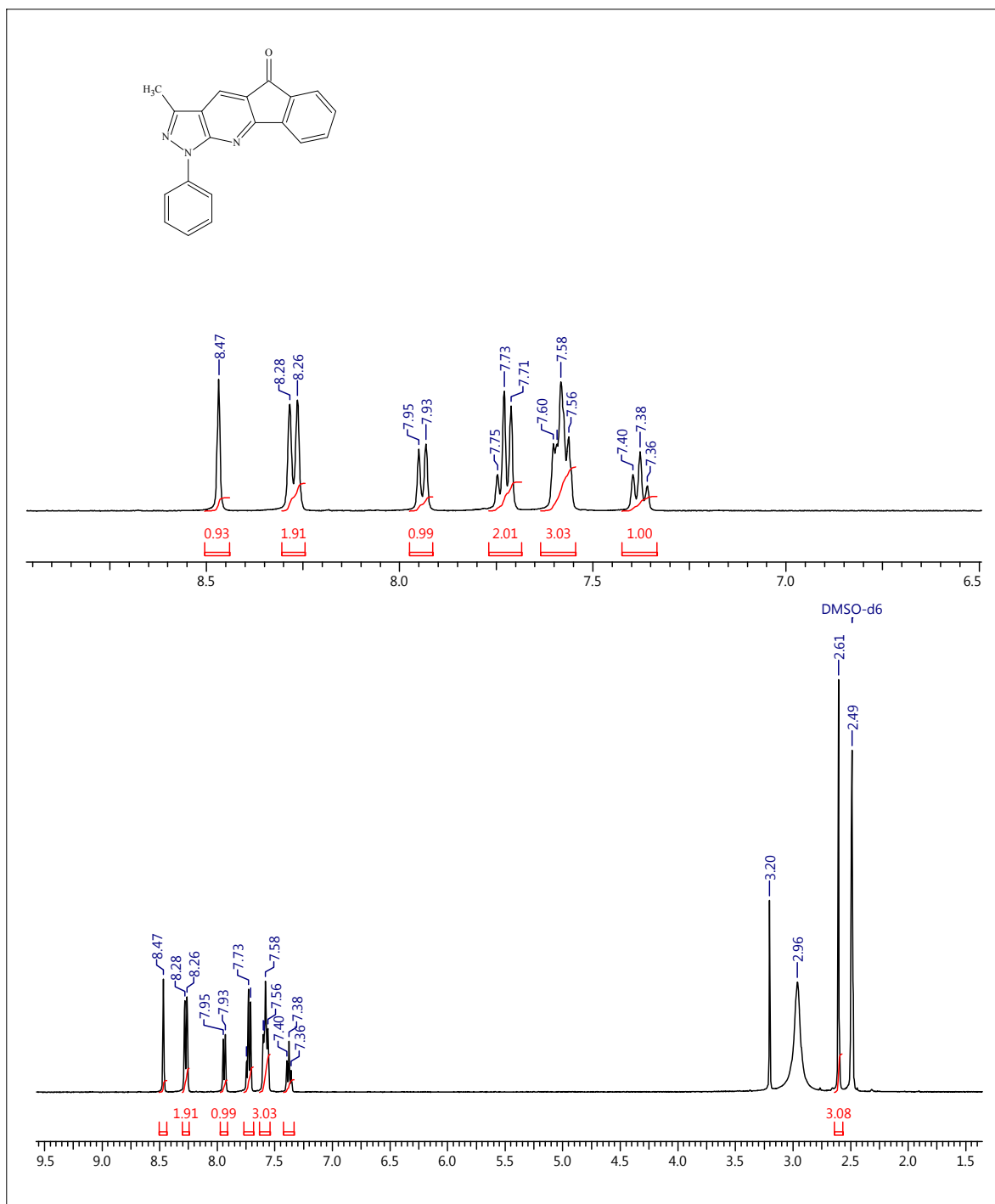


Fig. S9 ¹H-NMR spectra for 3-methyl-1-phenylindeno[2,3-e]pyrazolo[3,4-b]pyridin-5(1H)-one (**4e**).

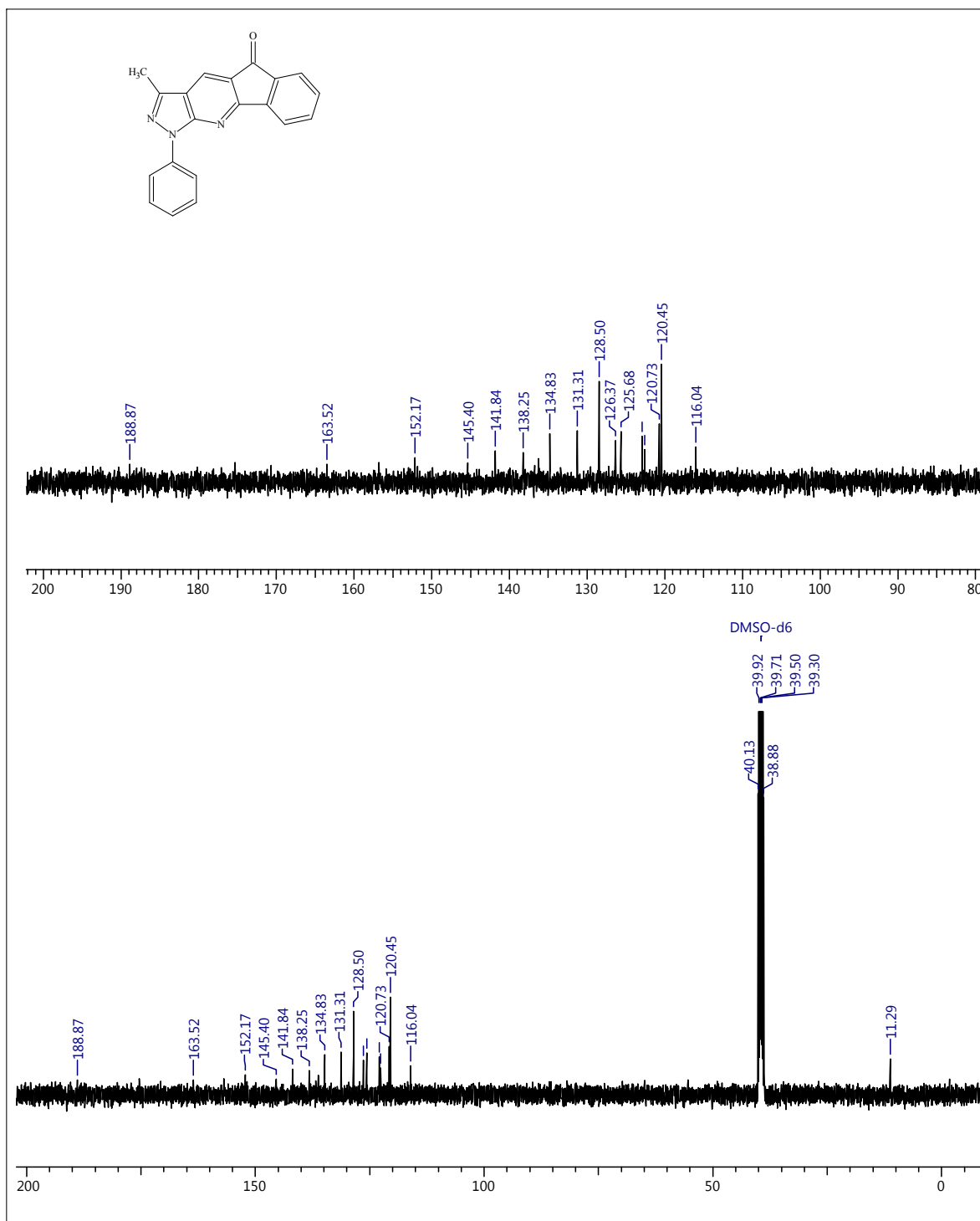


Fig. S10 ¹³C-NMR spectra for 3-methyl-1-phenylindeno[2,3-*e*]pyrazolo[3,4-*b*]pyridin-5(1*H*)-one (**4e**).

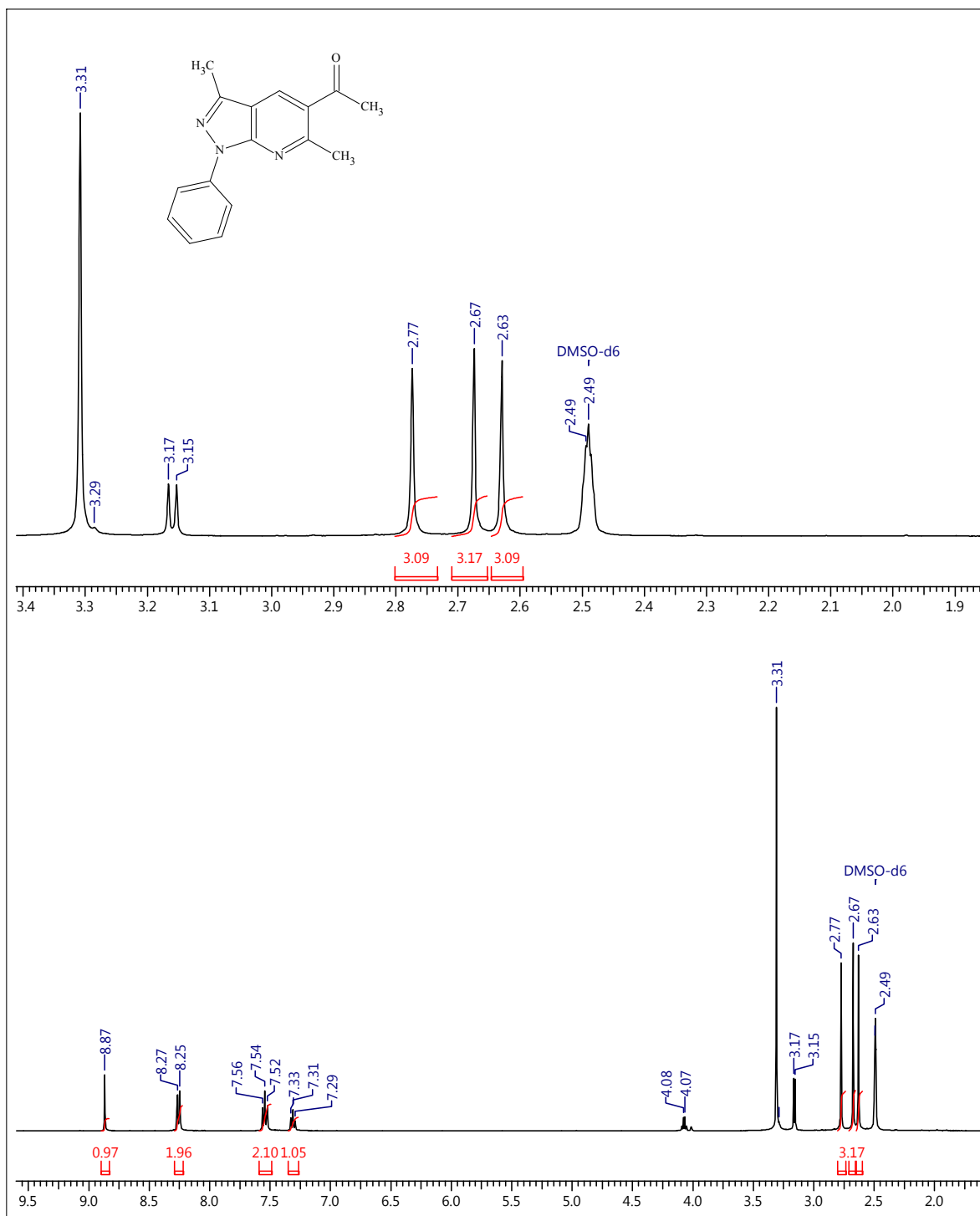


Fig. S11 ^1H -NMR spectra for 1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyridin-5-yl)ethanone (**4f**).

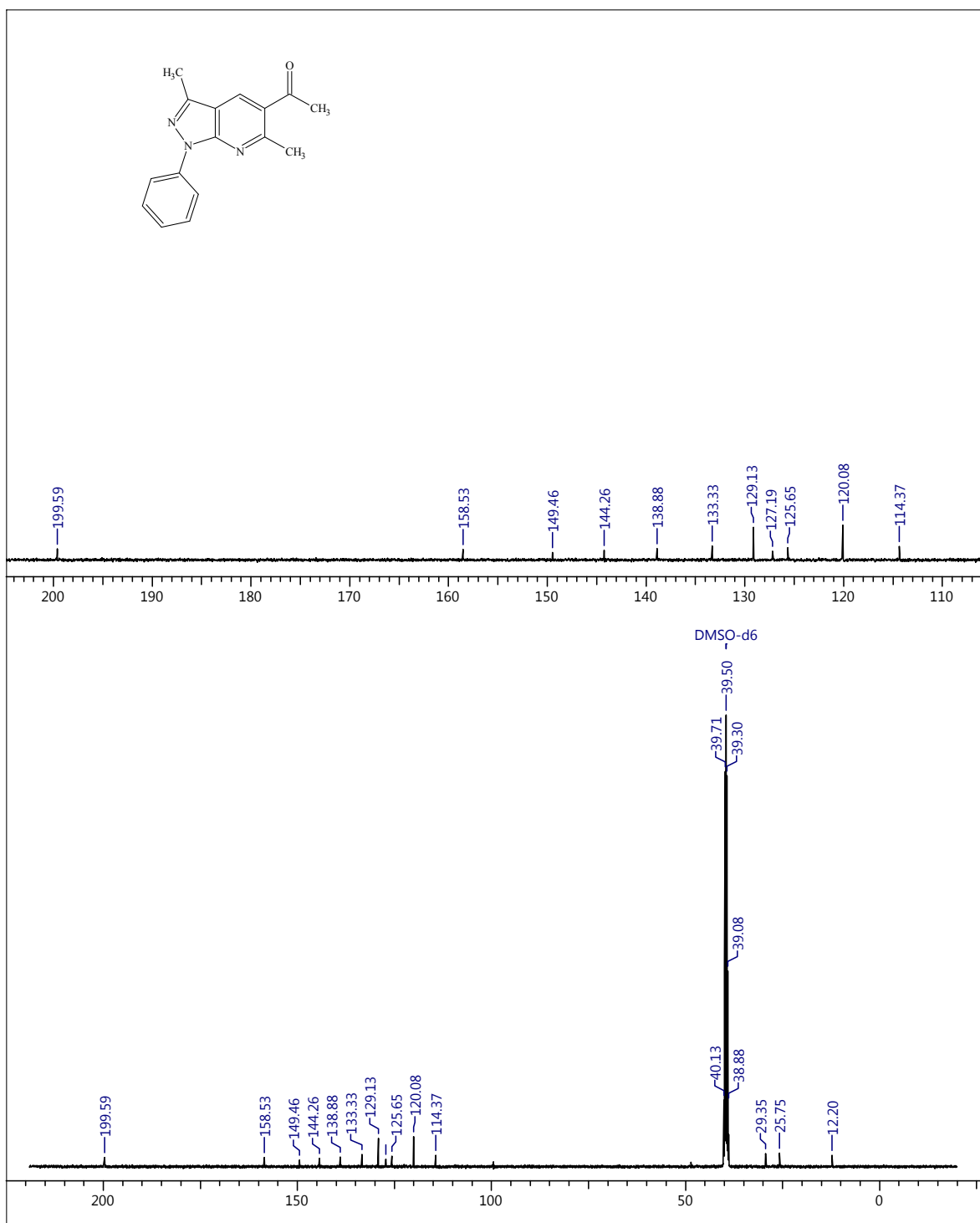


Fig. S12 ¹³C-NMR spectra for 1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyridin-5-yl)ethanone (**4f**).

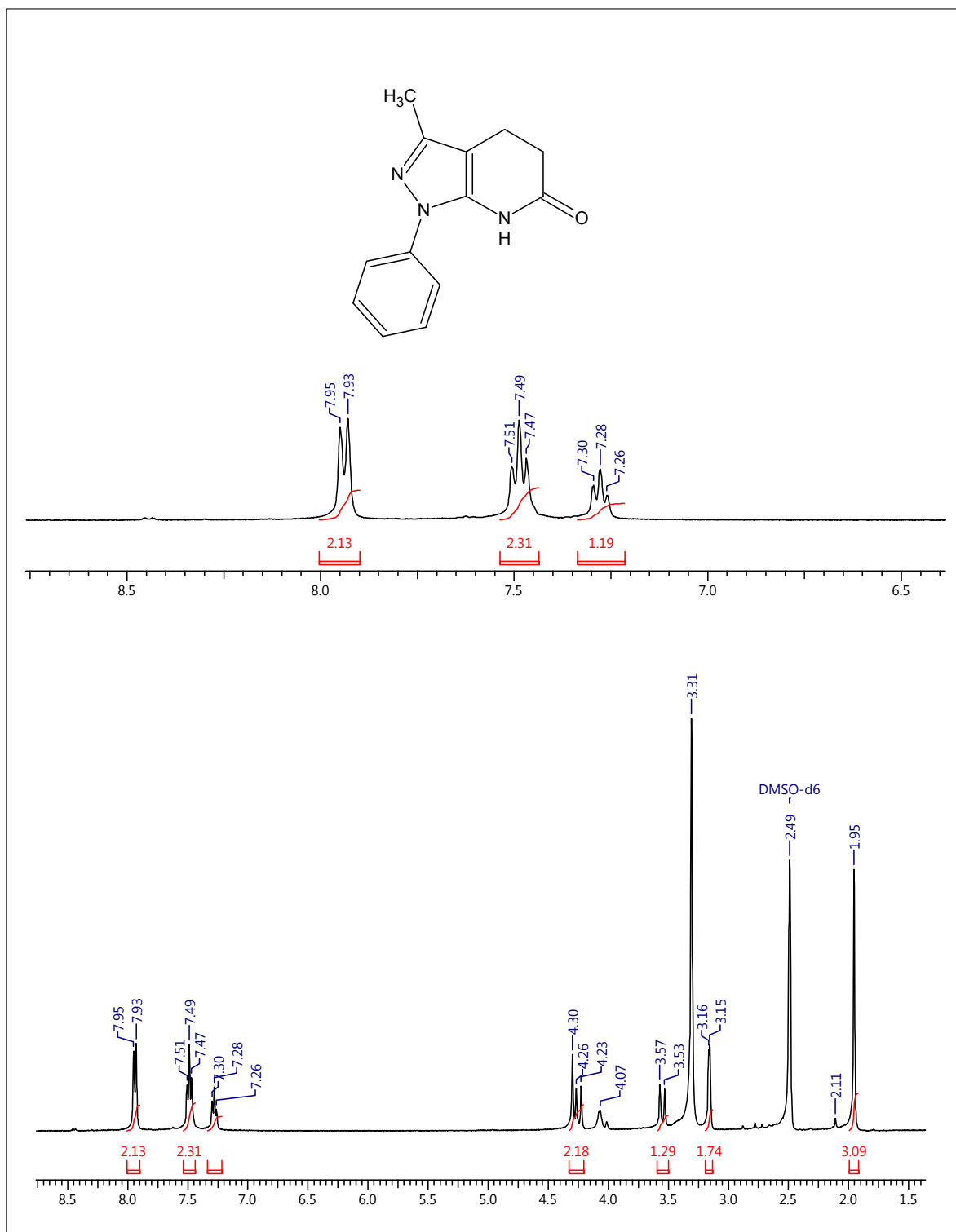


Fig. S13 ¹H-NMR spectra for 3-methyl-1-phenyl-4,5-dihydro-1H-pyrazol[3,4-*b*]pyridine (**4g**).

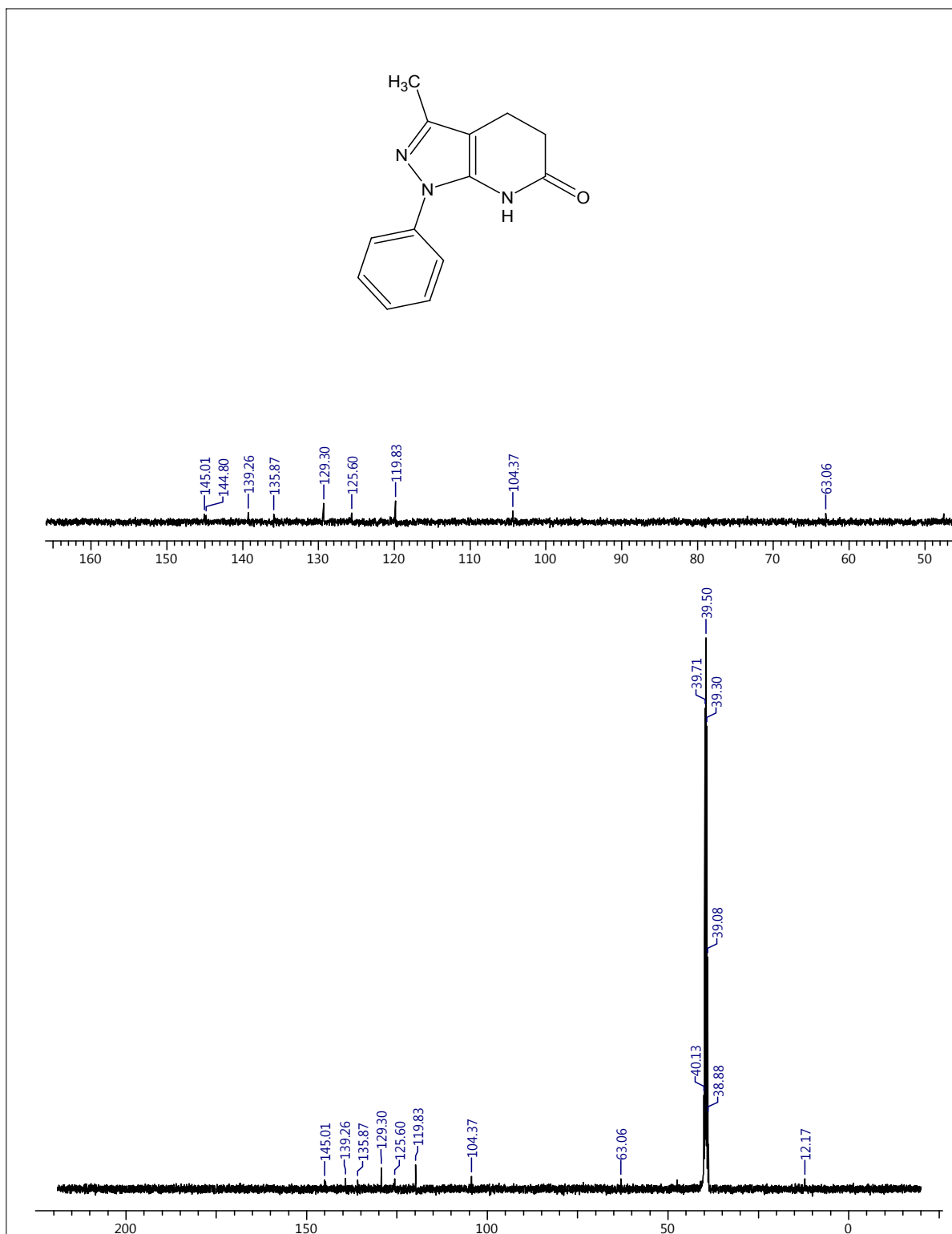


Fig. S14 ¹³C-NMR spectra for 3-methyl-1-phenyl-4,5-dihydro-1H-pyrazolo[3,4-b]pyridine (**4g**).

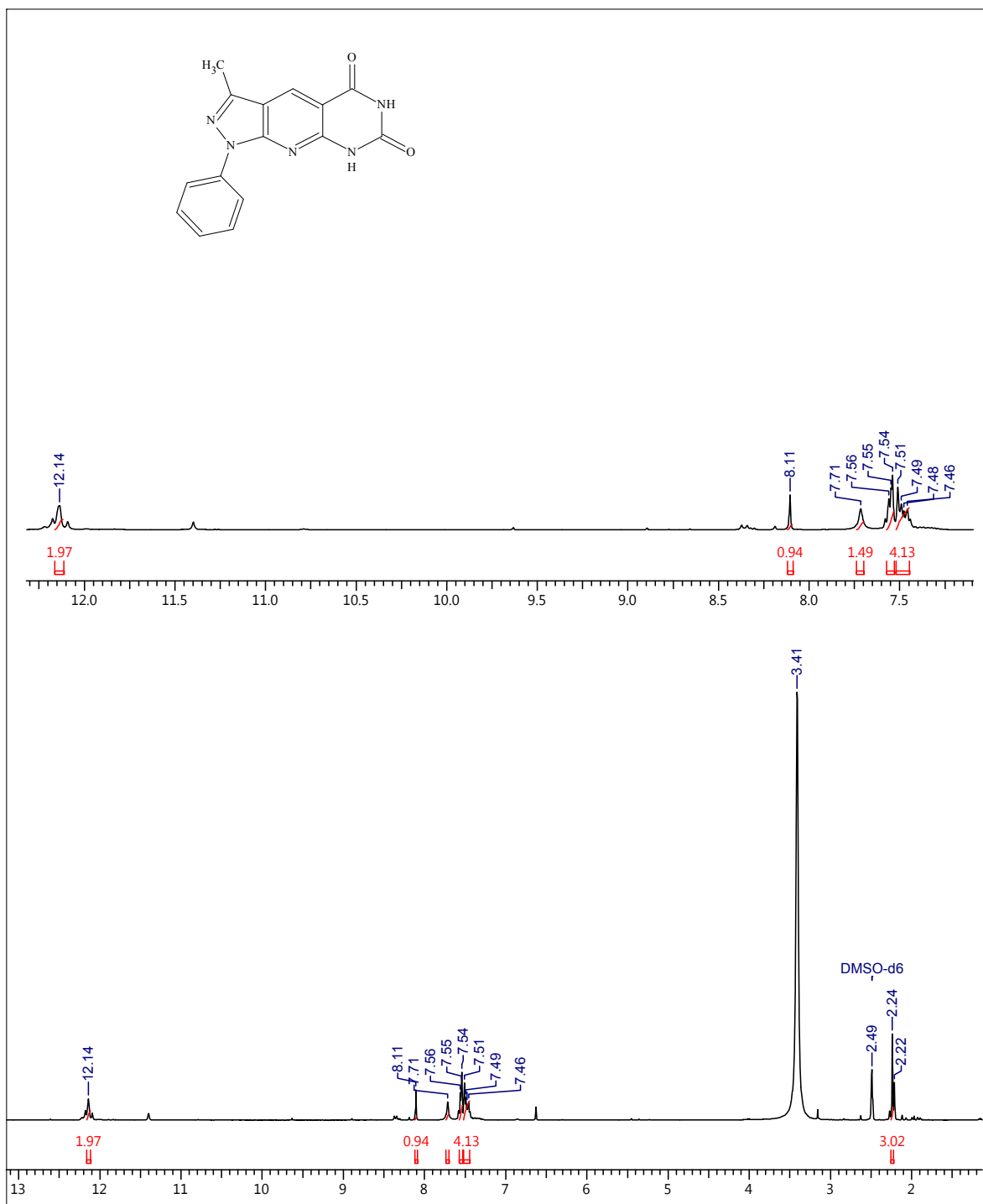


Fig. S15 ¹H-NMR spectra for 3-methyl-1-phenyl-1H-pyrazolo[4',3':5,6]pyrido[2,3-d]pyrimidine-5,7(6H,8H)-dione (**4h**)

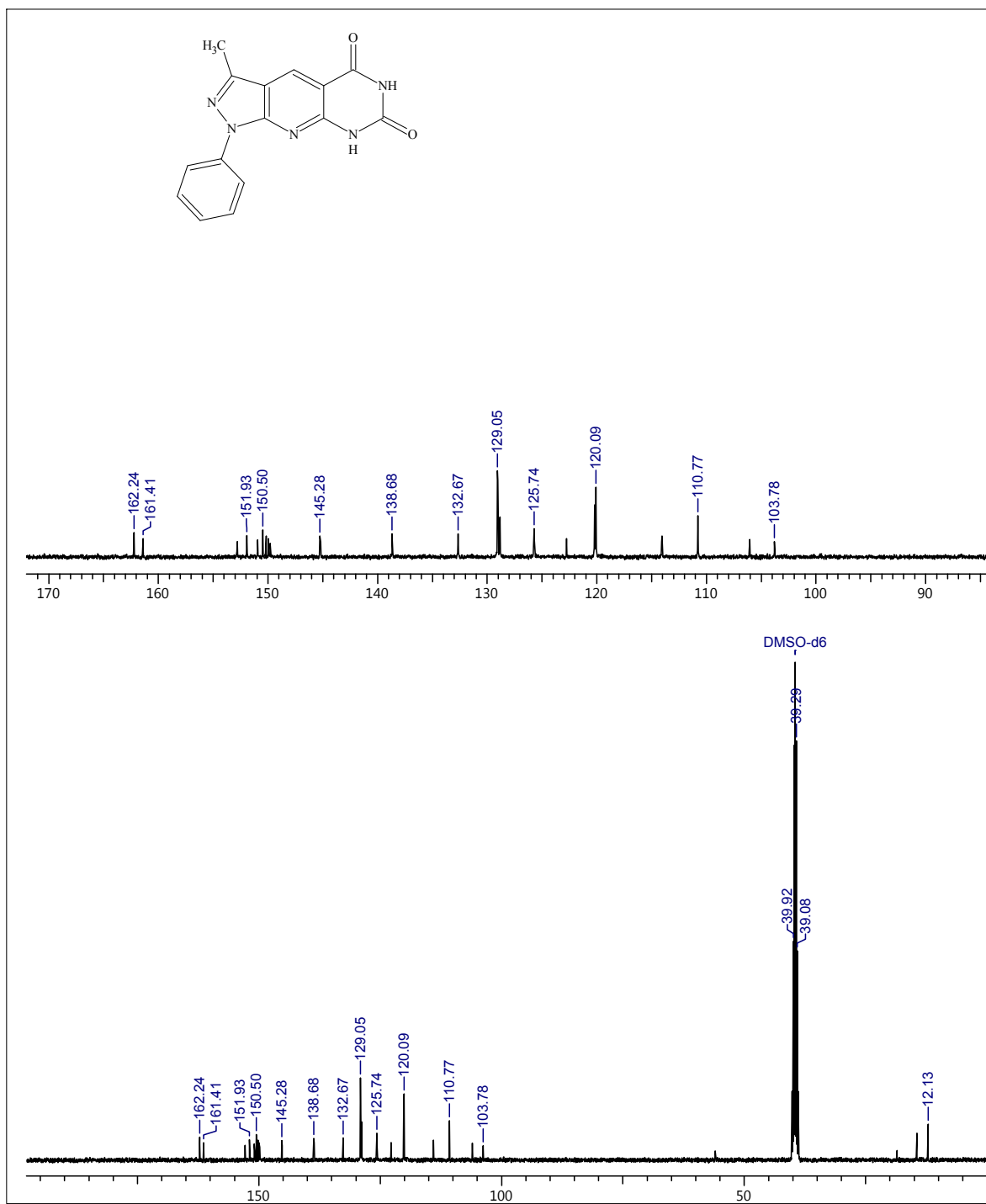


Fig. S16 ¹³C-NMR spectra for 3-methyl-1-phenyl-1H-pyrazolo[4',3':5,6]pyrido[2,3-d]pyrimidine-5,7(6H,8H)-dione (**4h**)

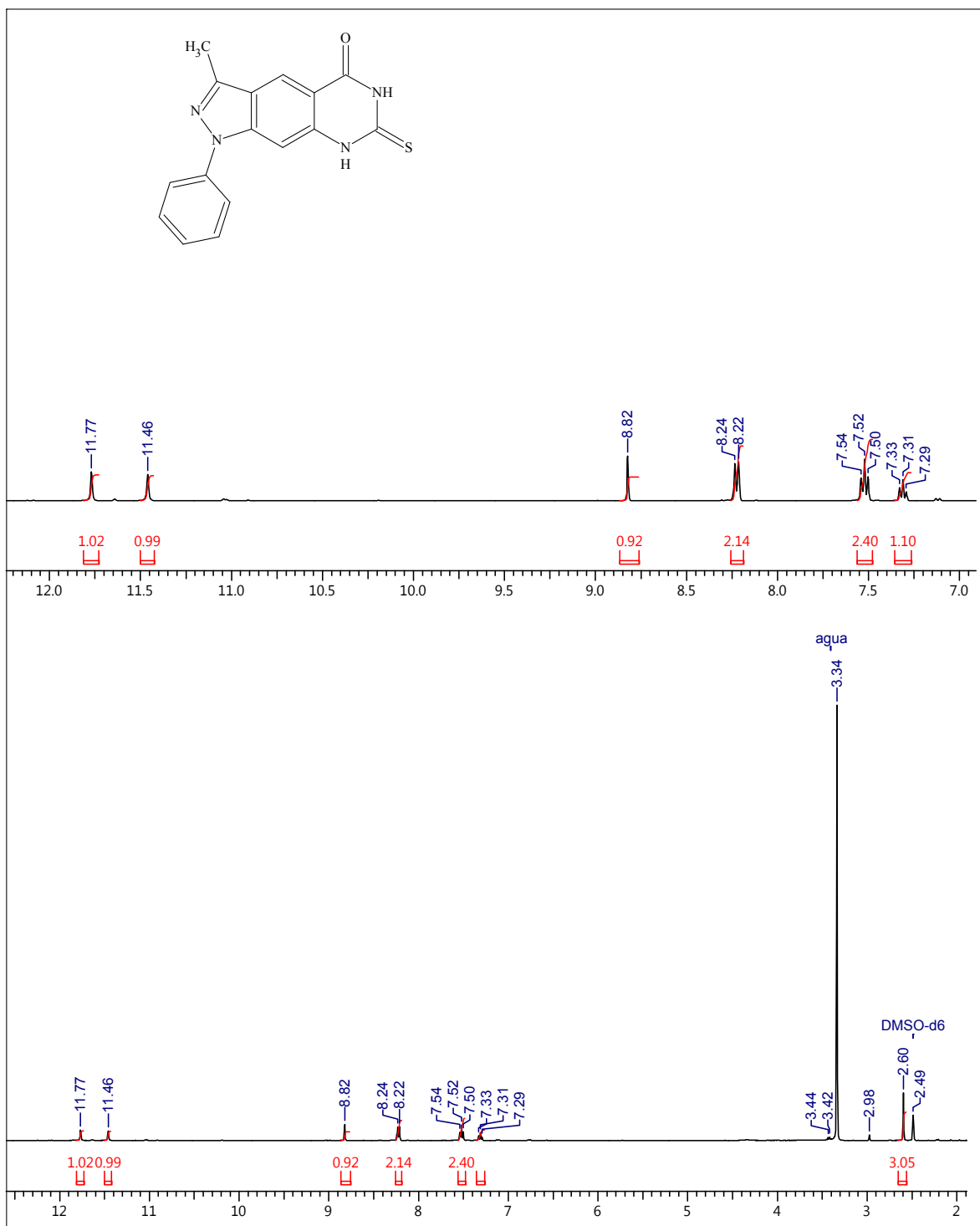


Fig. S17 ¹H-NMR spectra for 3-methyl-1-phenyl-7-sulfanylidene-1,6,7,8-tetrahydro-5H-pyrazolo[4',3':5,6]pyrido[2,3-d]pyrimidin-5-one (**4i**)

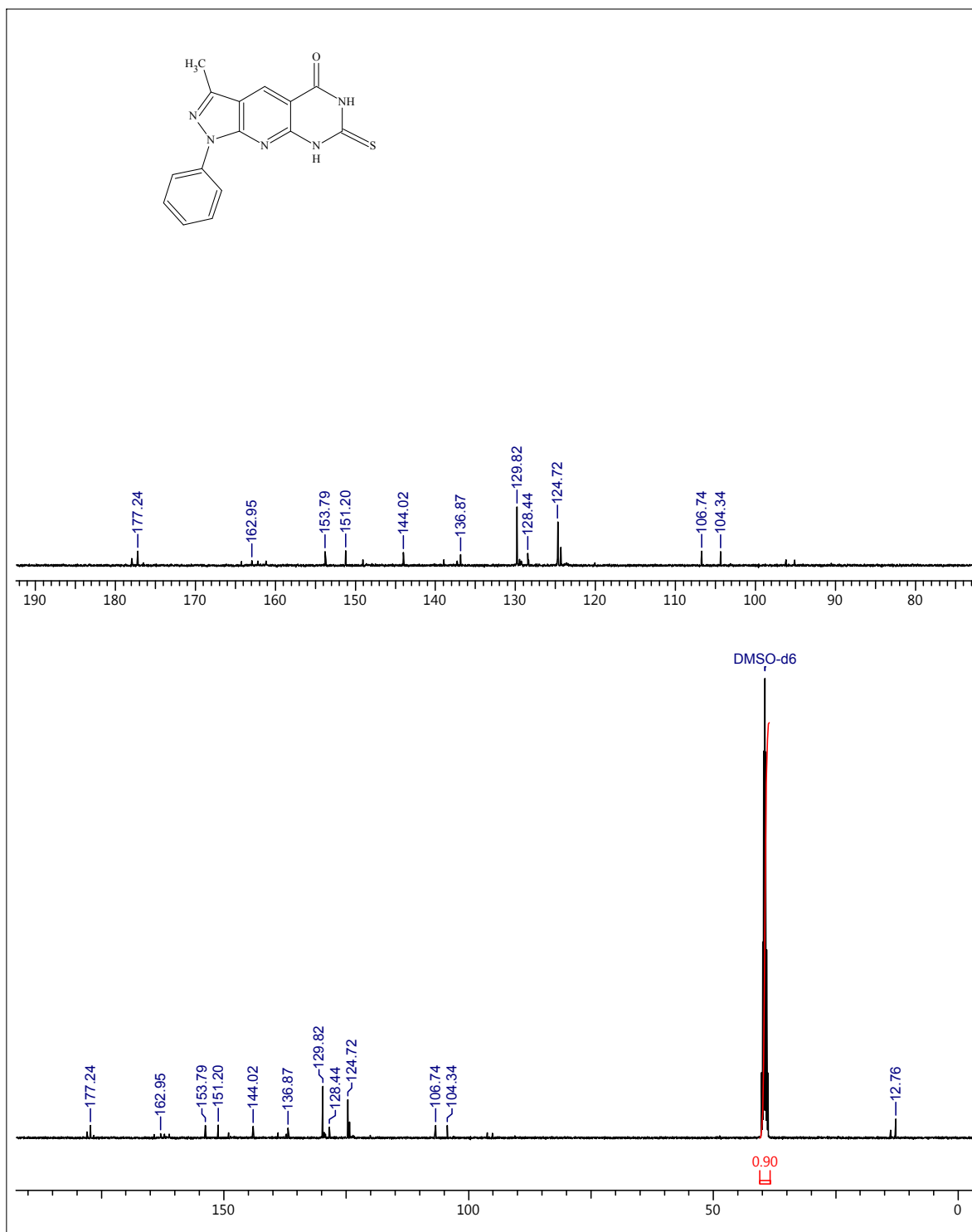


Fig. S18 ^{13}C -NMR spectra for 3-methyl-1-phenyl-7-sulfanylidene-1,6,7,8-tetrahydro-5H-pyrazolo[4',3':5,6]pyrido[2,3-d]pyrimidin-5-one (**4i**)

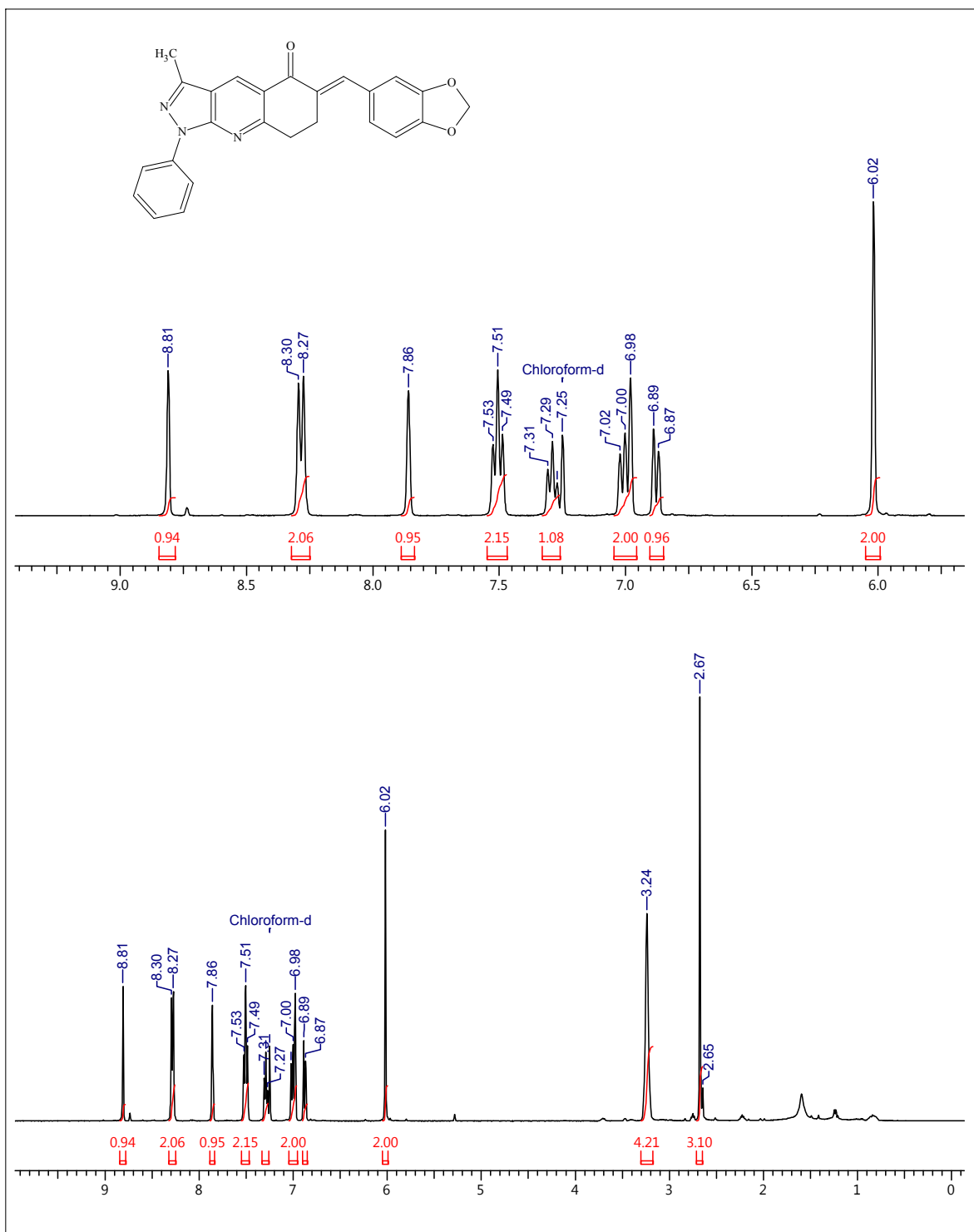


Fig. S19 ¹H-NMR spectra for *(E)*-6-((benzo[d][1,3]dioxol-5-yl)methylene)-7,8-dihydro-3-methyl-1-phenyl-1H-pyrazolo[3,4-*b*]quinolin-5(6H)-one (**6a**)

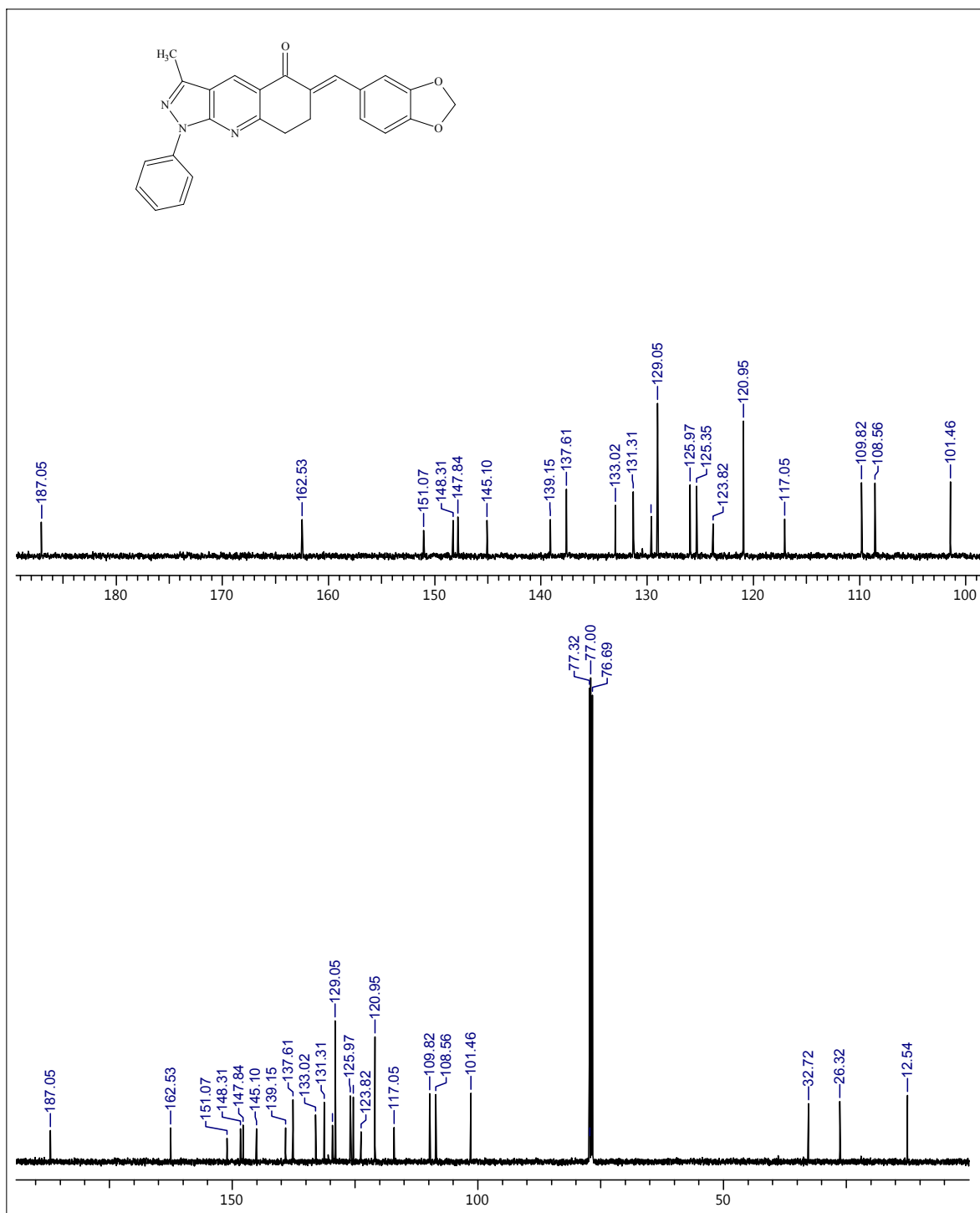


Fig. S20 ¹³C-NMR spectra for *(E)*-6-((benzo[d][1,3]dioxol-5-yl)methylene)-7,8-dihydro-3-methyl-1-phenyl-1H-pyrazolo[3,4-*b*]quinolin-5(6H)-one (**6a**)

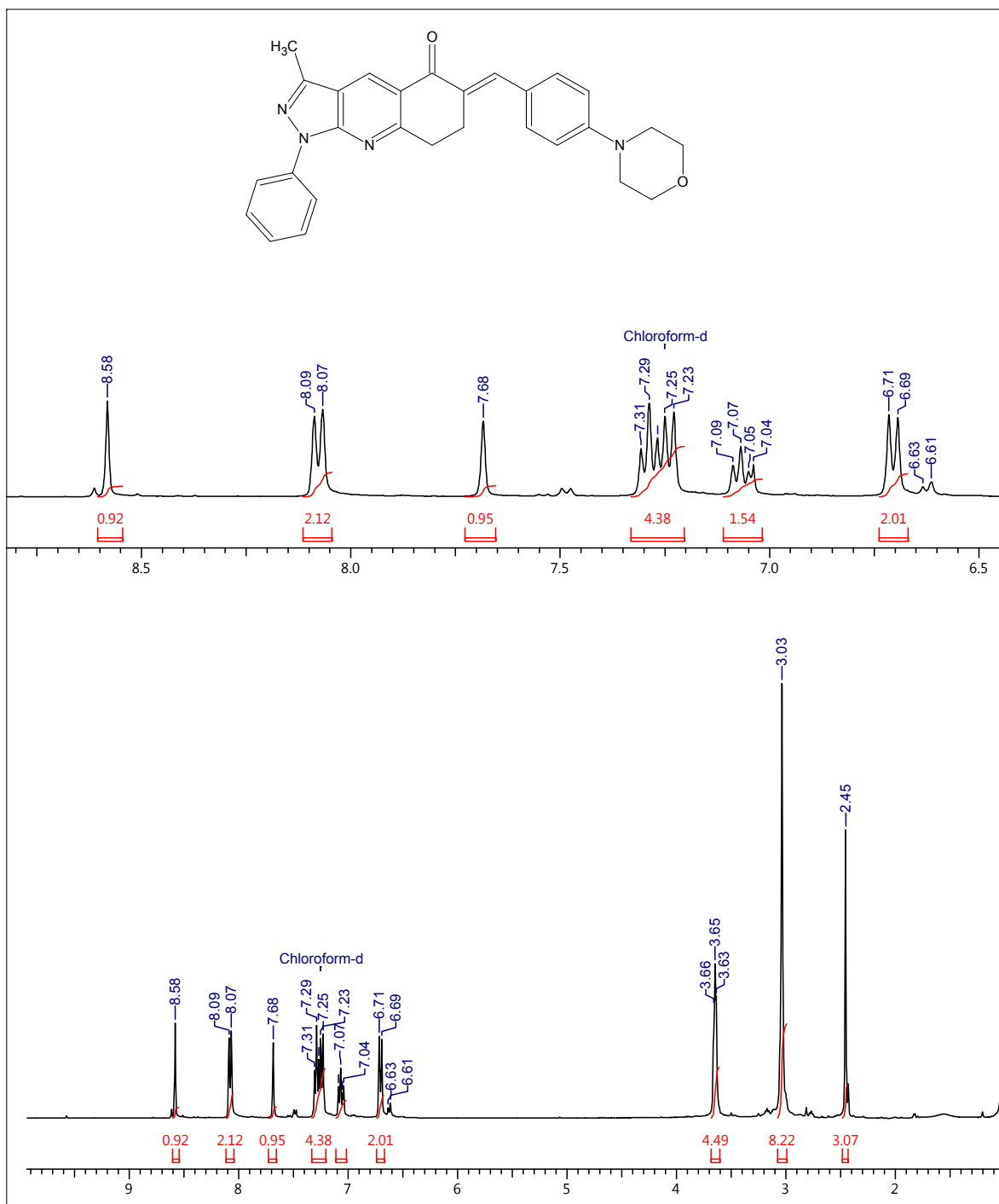


Fig. S21 ¹H-NMR spectra for *(E)*-6-(4-morpholinobenzylidene)-7,8-dihydro-3-methyl-1-phenyl-1H-pyrazolo[3,4-*b*]quinolin-5(6H)-one (**6b**)

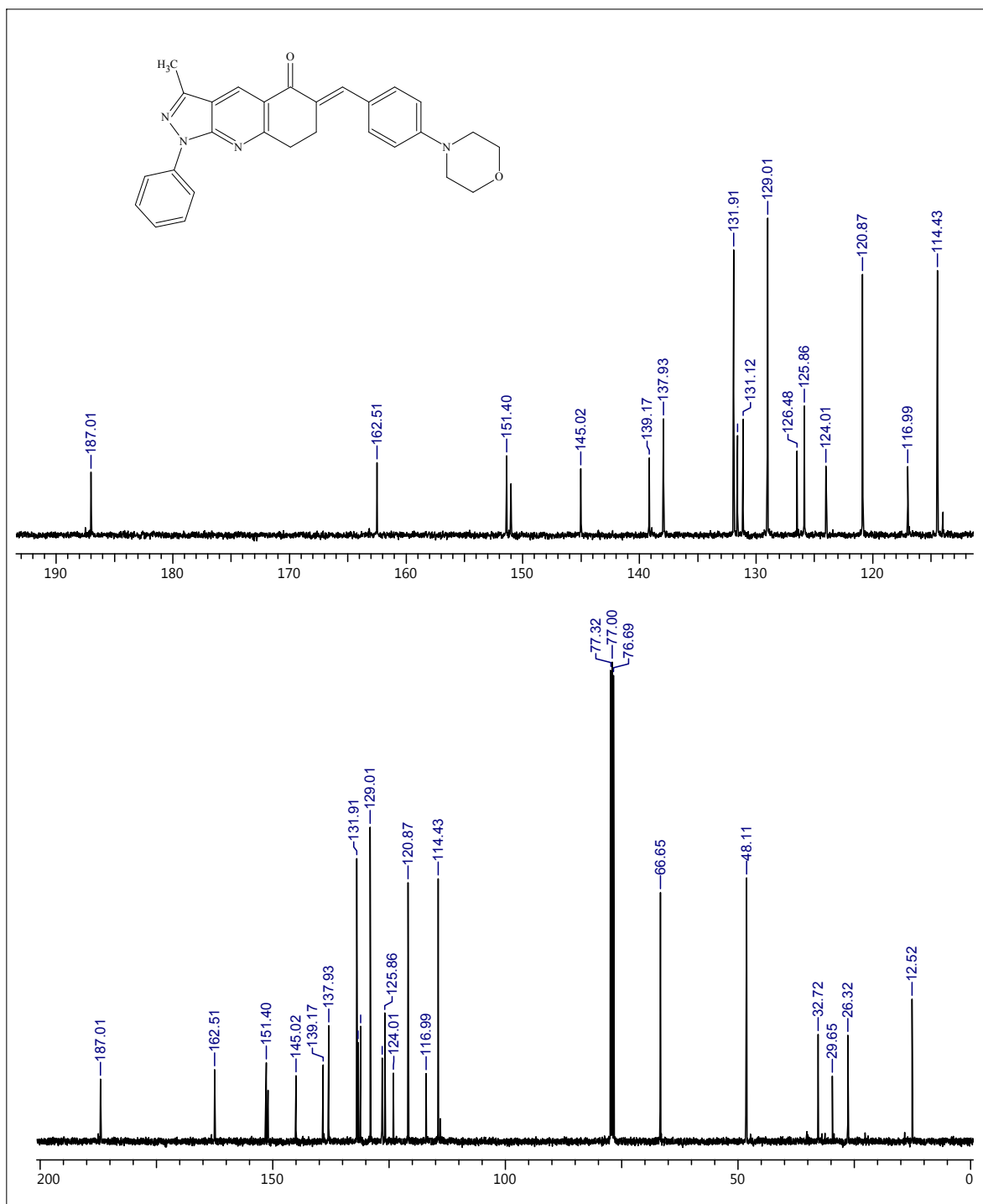


Fig. S22 ¹³C-NMR spectra for (E)-6-(4-morpholinobenzylidene)-7,8-dihydro-3-methyl-1-phenyl-1H-pyrazolo[3,4-b]quinolin-5(6H)-one (**6b**)

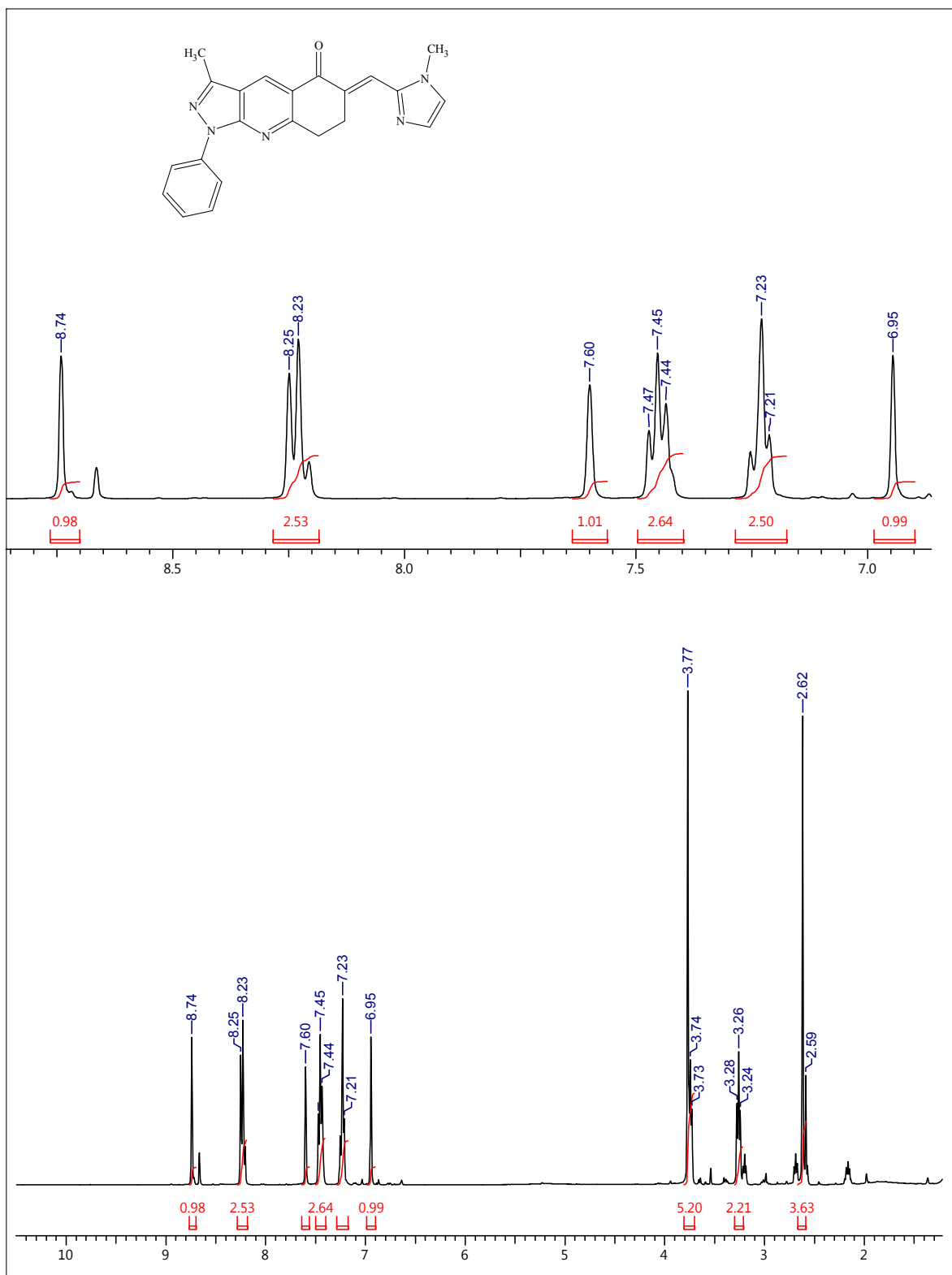


Fig. ^1H -NMR spectra for (E)-7,8-dihydro-3-methyl-6-((1-methyl-1H-imidazol-2-yl)methylene)-1-phenyl-1H-pyrazolo[3,4-b]quinolin-5(6H)-one (**6c**)

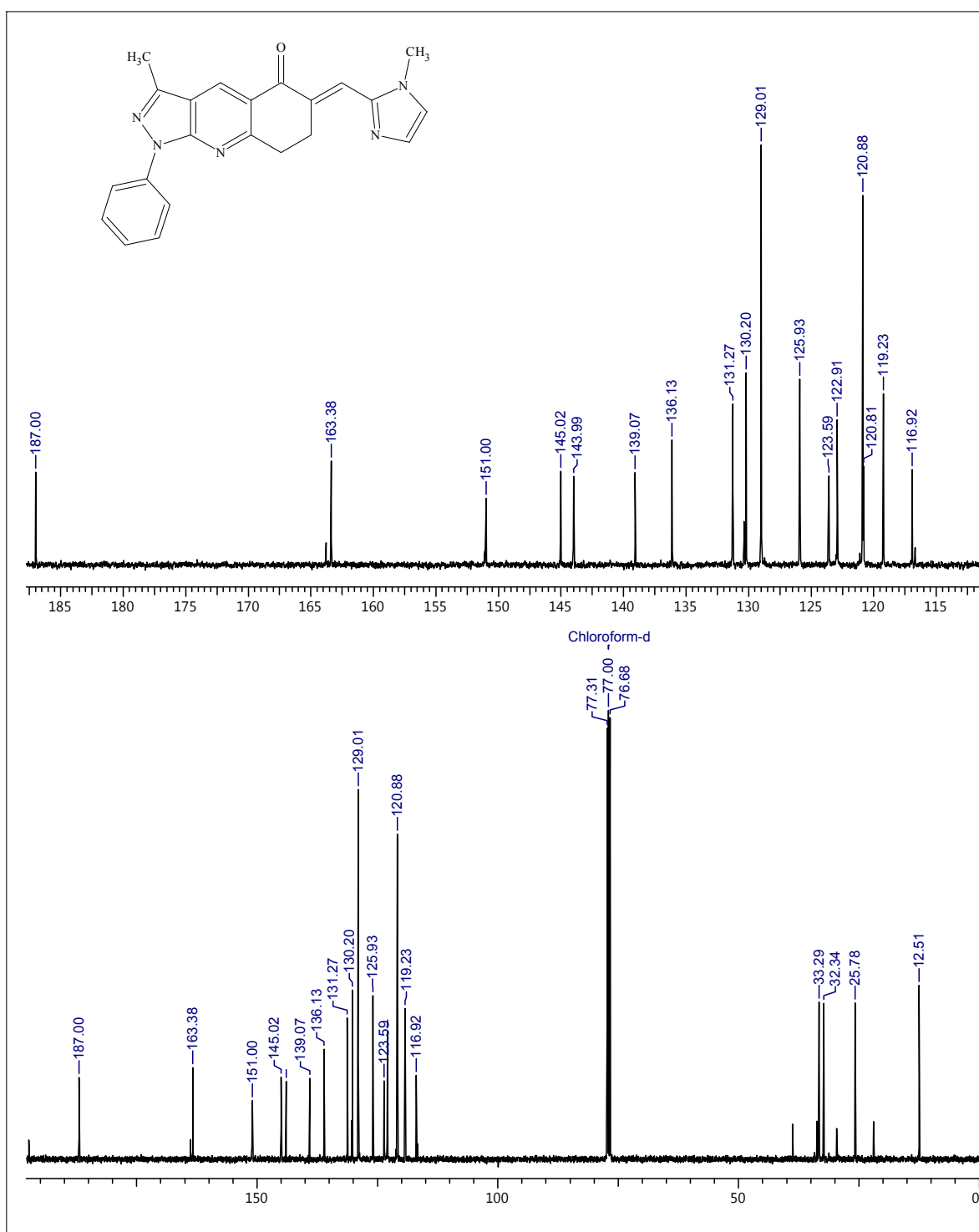


Fig. S24 ¹³C-NMR spectra for *(E)*-7,8-dihydro-3-methyl-6-((1-methyl-1H-imidazol-2-yl)methylene)-1-phenyl-1H-pyrazolo[3,4-*b*]quinolin-5(6H)-one (**6c**)

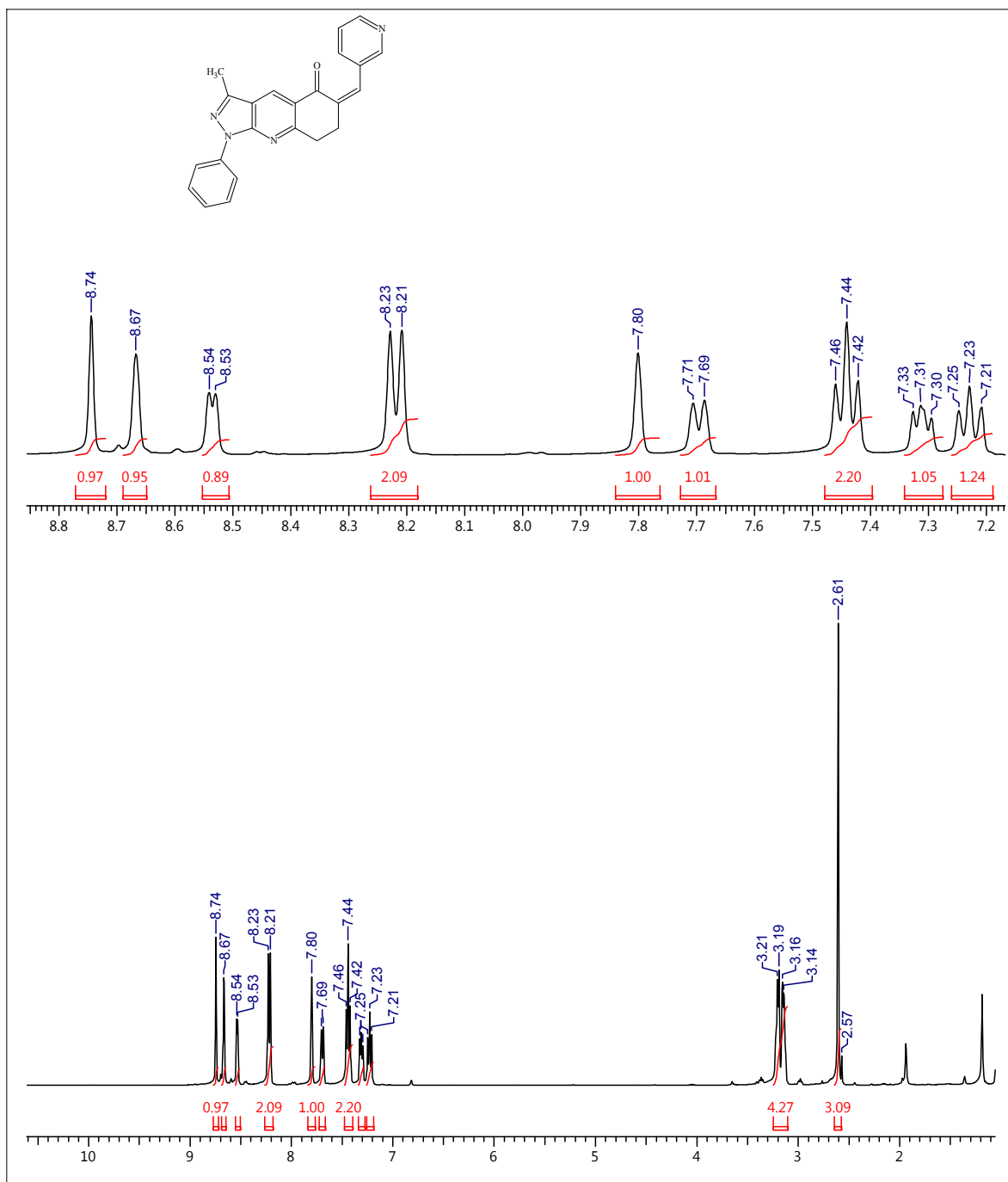


Fig. S25 ^1H -NMR spectra for (E)-7,8-dihydro-3-methyl-1-phenyl-6-((pyridin-3-yl)methylene)-1H-pyrazolo[3,4-b]quinolin-5(6H)-one (**6d**)

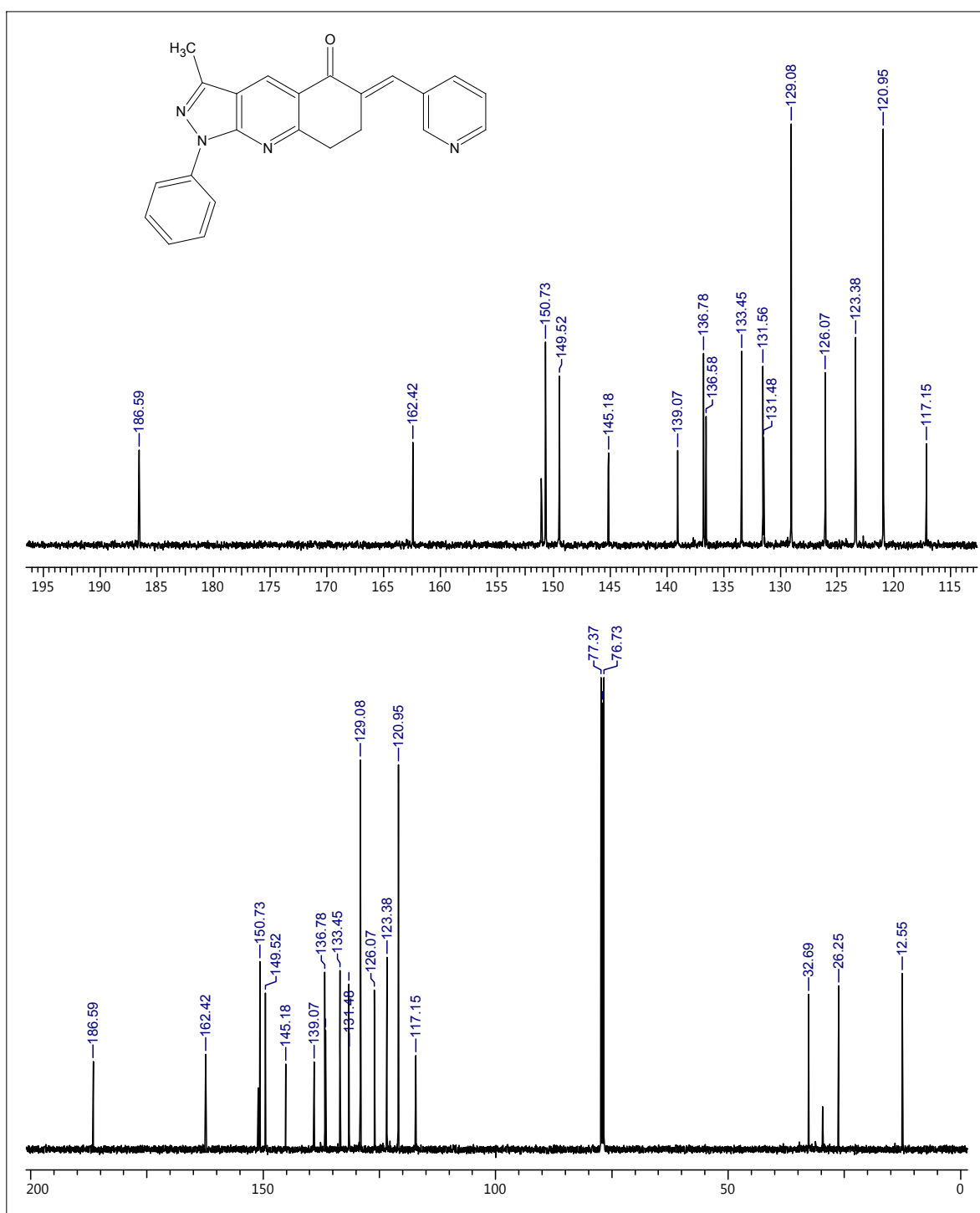


Fig. S26 ¹³C-NMR spectra for (E)-7,8-dihydro-3-methyl-1-phenyl-6-((pyridin-3-yl)methylene)-1H-pyrazolo[3,4-b]quinolin-5(6H)-one (**6d**)

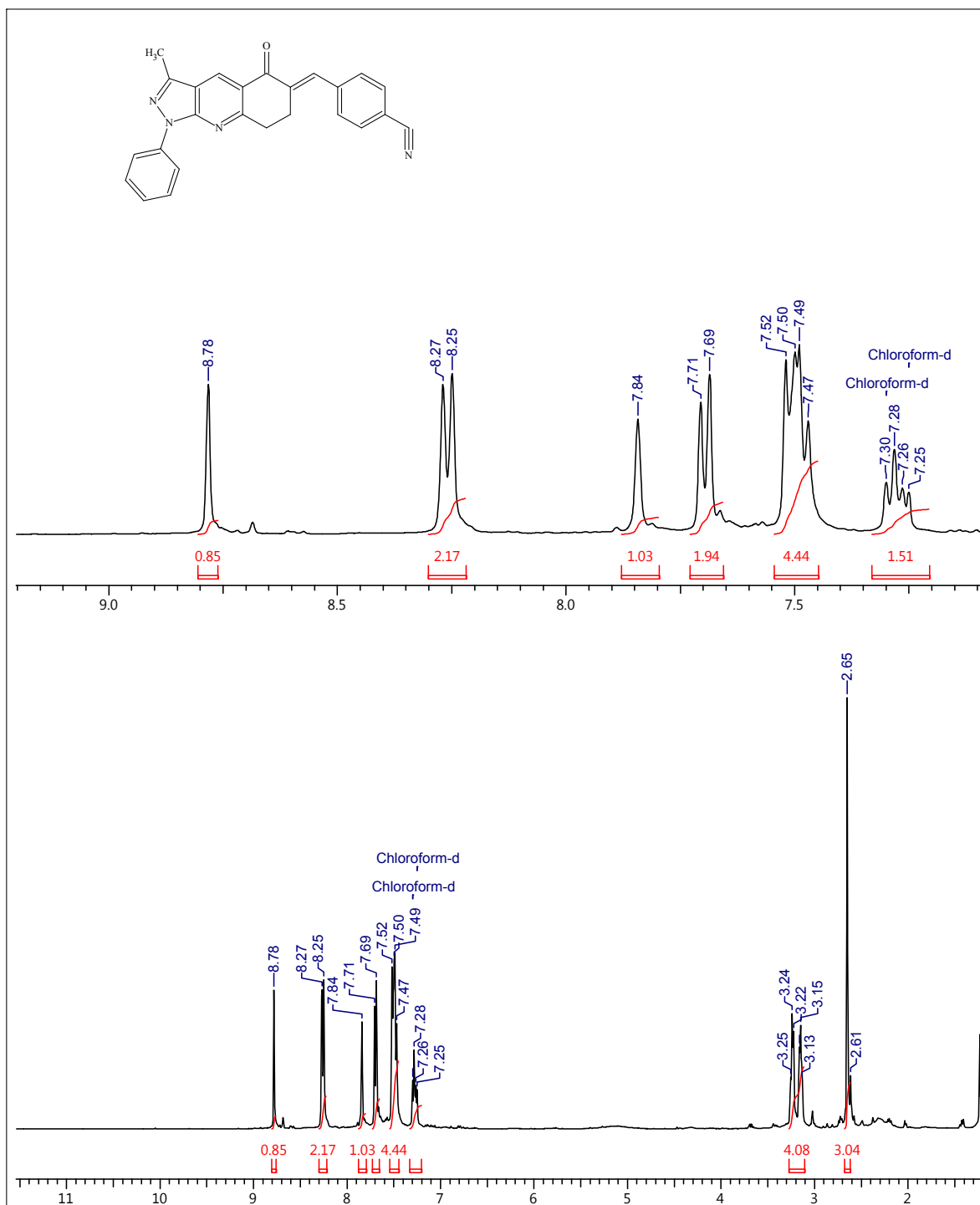


Fig. ¹H-NMR spectra of 4-((E)-(7,8-dihydro-3-methyl-5-oxo-1-phenyl-1H-pyrazolo[3,4-b]quinolin-6(5H)-ylidene)methyl)benzonitrile (**6e**)

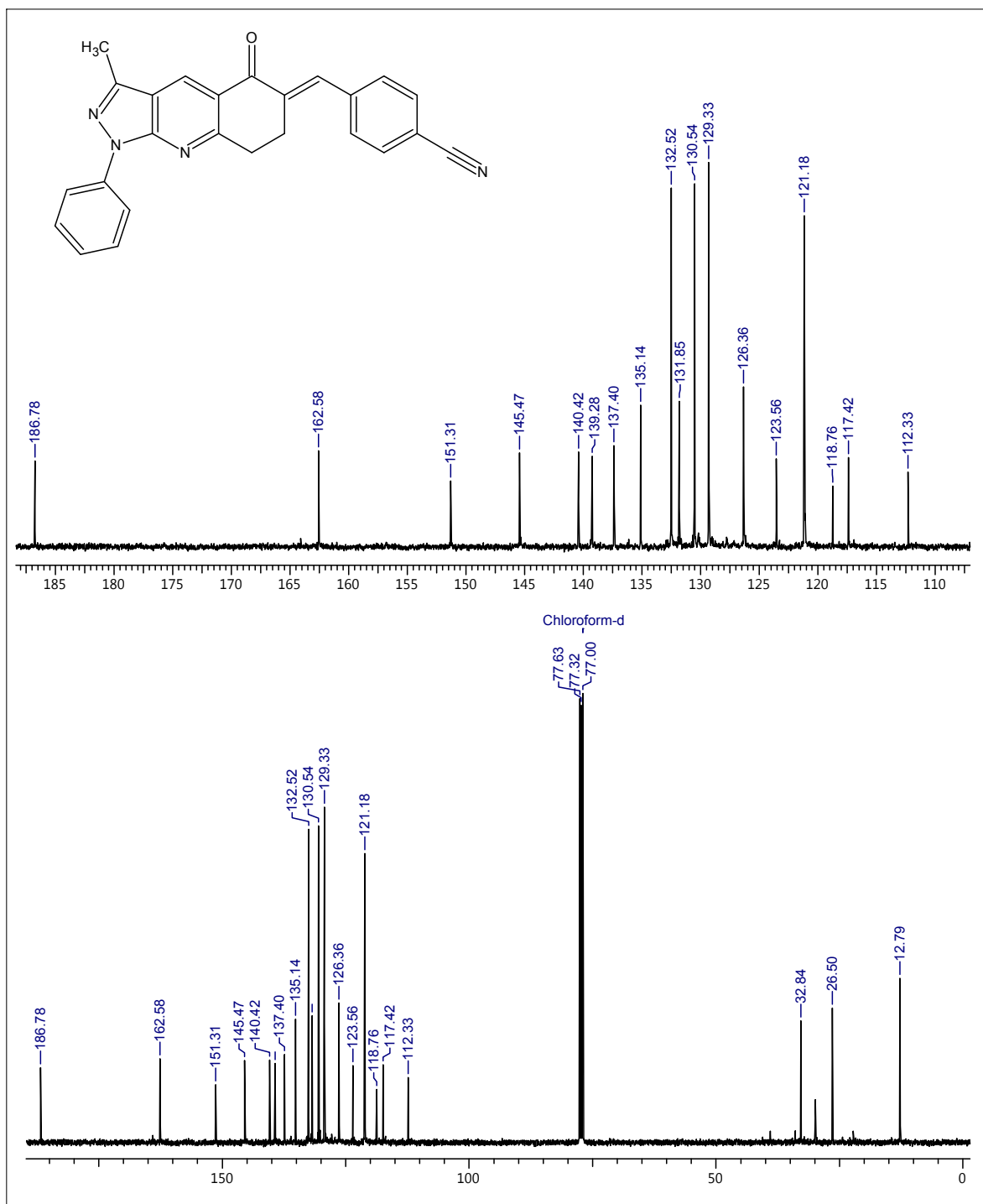


Fig. S28 ^{13}C -NMR spectra for 4-((E)-(7,8-dihydro-3-methyl-5-oxo-1-phenyl-1H-pyrazolo[3,4-*b*]quinolin-6(5H)-ylidene)methyl)benzonitrile (**6e**)

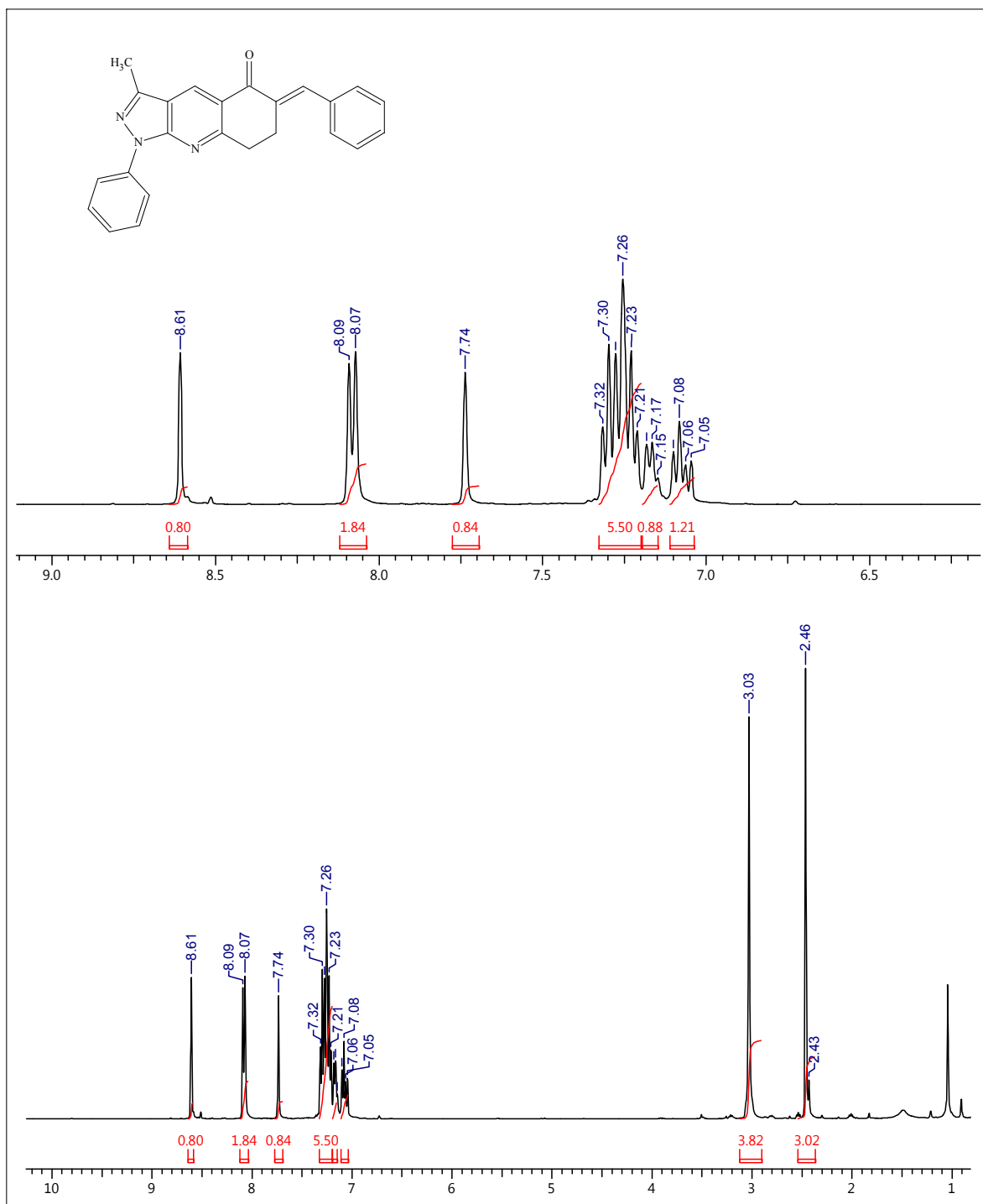


Fig. S29 ¹H-NMR spectra for (E)-6-benzylidene-7,8-dihydro-3-methyl-1-phenyl-1H-pyrazolo[3,4-b]quinolin-5(6H)-one (**6f**)

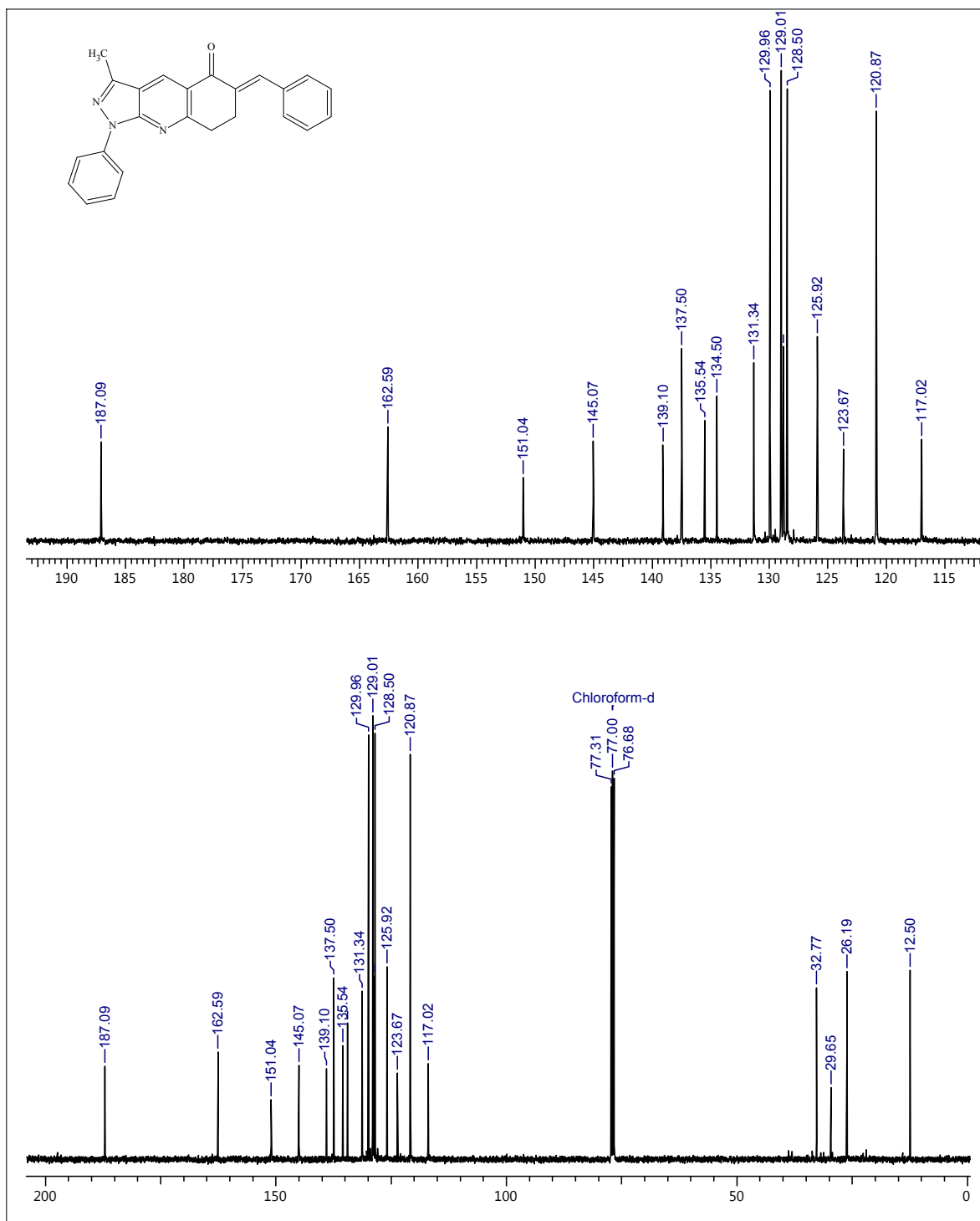


Fig. S30 ¹³C-NMR spectra for (E)-6-benzylidene-7,8-dihydro-3-methyl-1-phenyl-1H-pyrazolo[3,4-*b*]quinolin-5(6H)-one (**6f**)

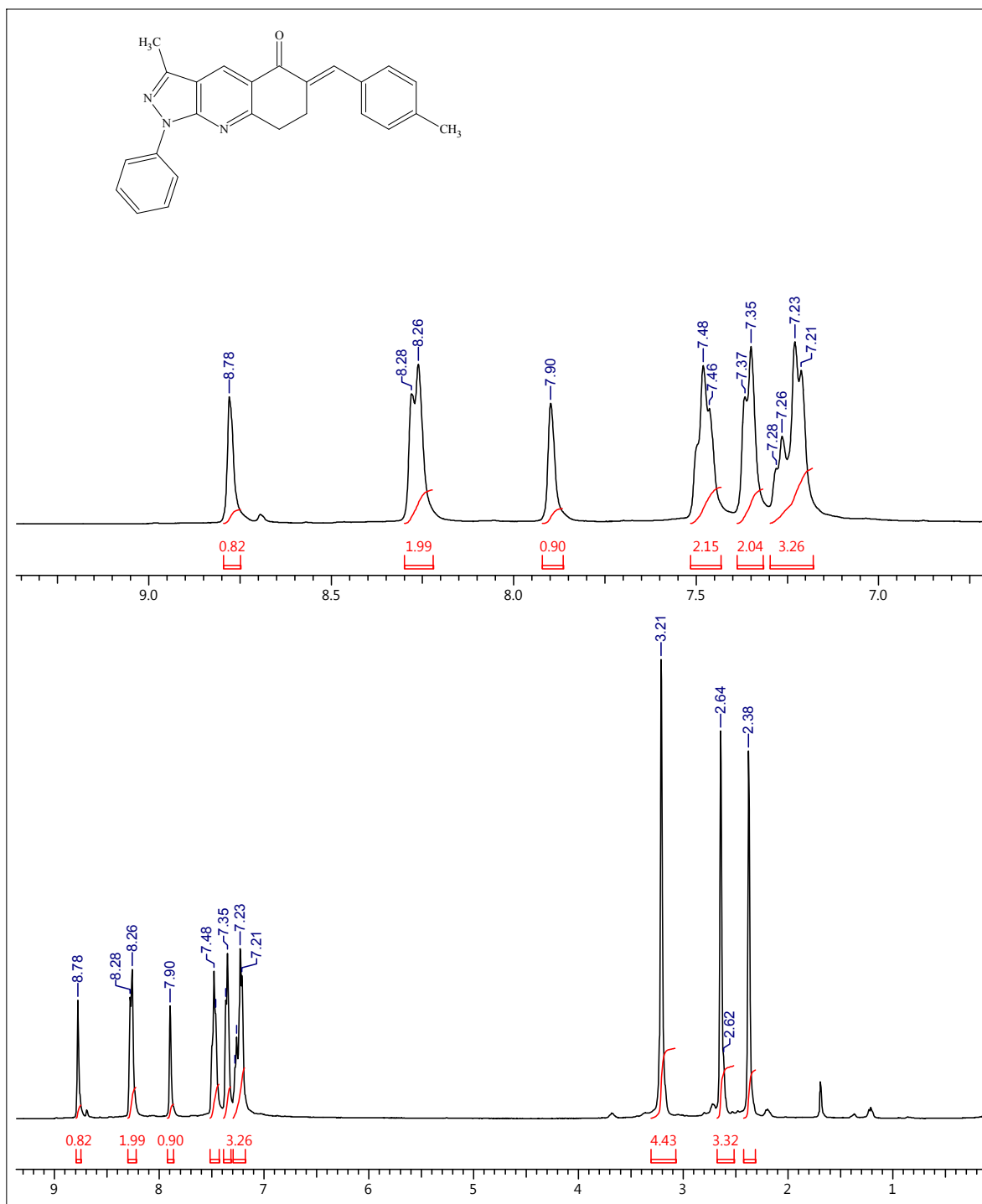


Fig. S31 ^1H -NMR spectra for (E)-3-methyl-6-(4-methylbenzylidene)-1-phenyl-1,6,7,8-tetrahydro-5H-pyrazolo[3,4-b]quinolin-5-one (**6g**)

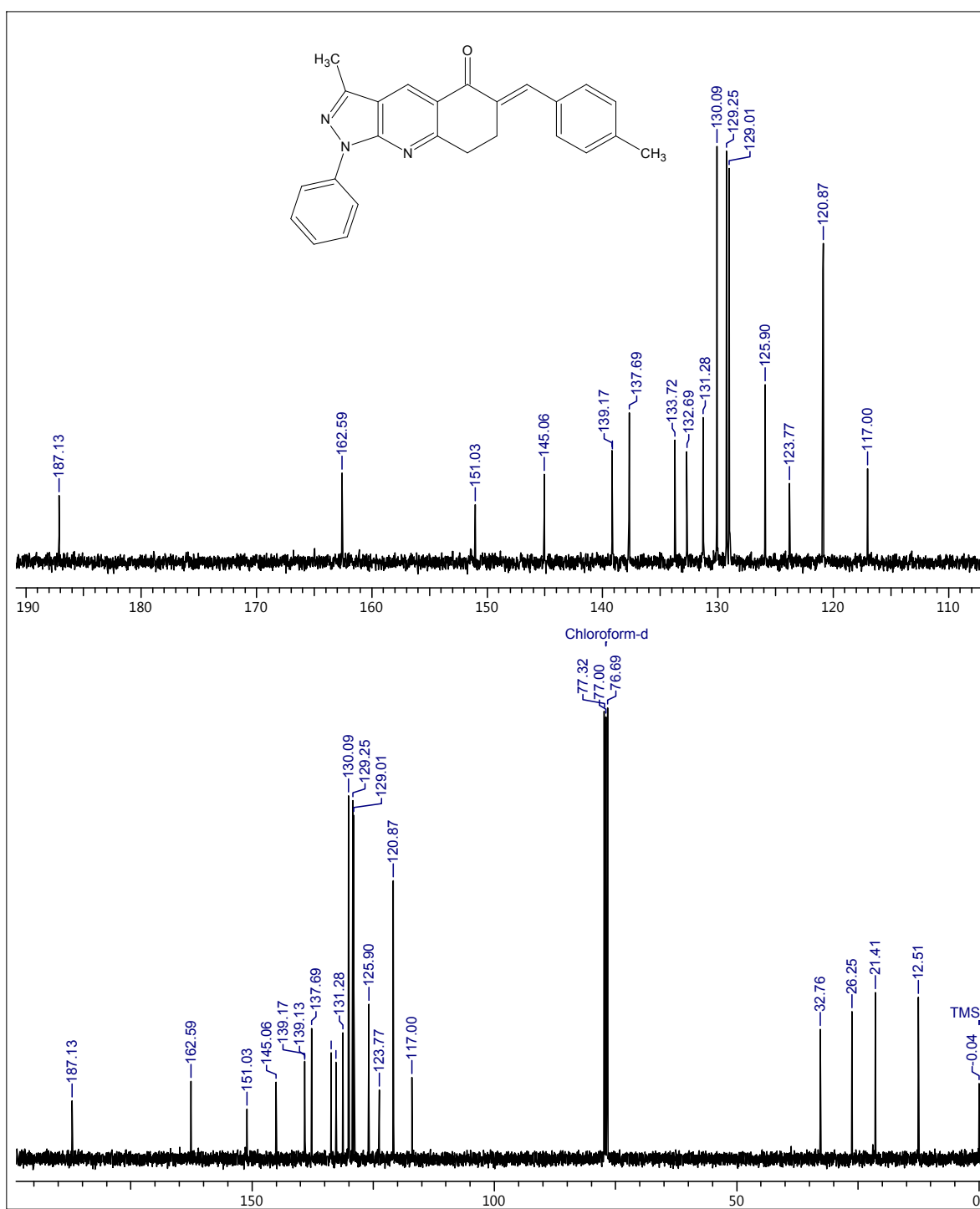


Fig. S32 ^{13}C -NMR spectra for *(E)*-3-methyl-6-(4-methylbenzylidene)-1-phenyl-1,6,7,8-tetrahydro-5H-pyrazolo[3,4-b]quinolin-5-one (**6g**)

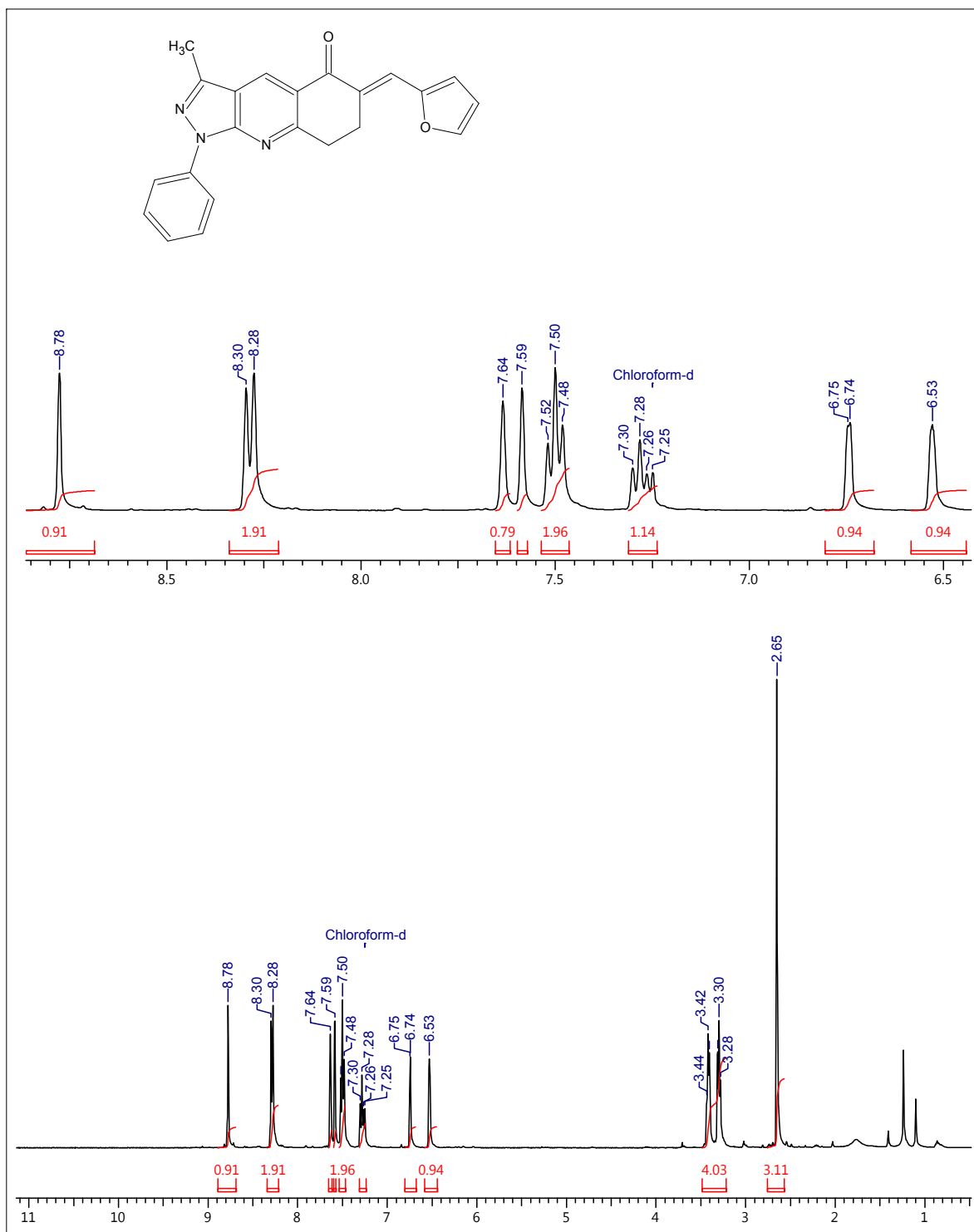


Fig. S33 ¹H-NMR spectra of (E)-6-((furan-2-yl)methylene)-7,8-dihydro-3-methyl-1-phenyl-1H-pyrazolo[3,4-b]quinolin-5(6H)-one (6h)

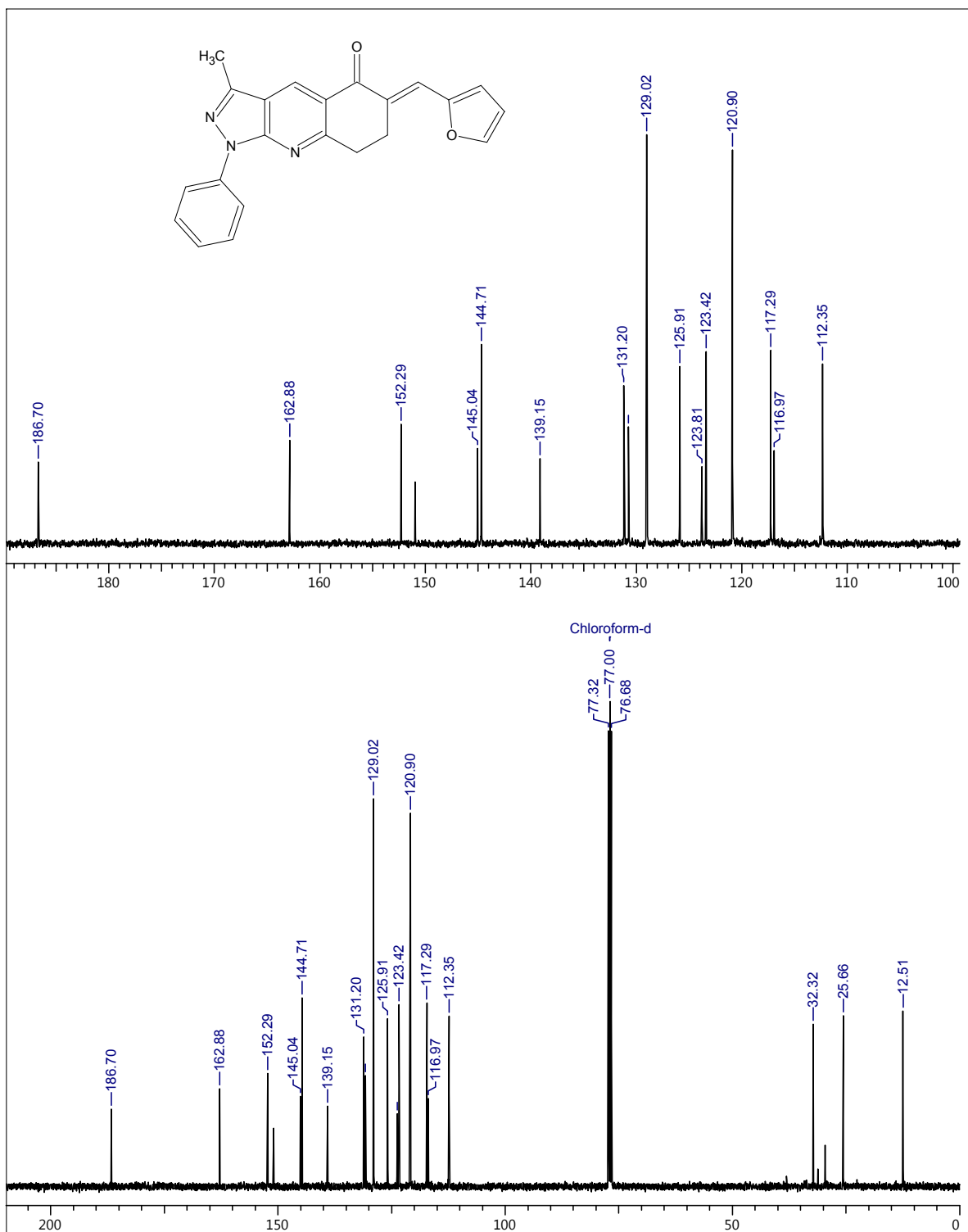


Fig. S34 ^{13}C -NMR spectra for (E)-6-((furan-2-yl)methylene)-7,8-dihydro-3-methyl-1-phenyl-1H-pyrazolo[3,4-b]quinolin-5(6H)-one (**6h**)

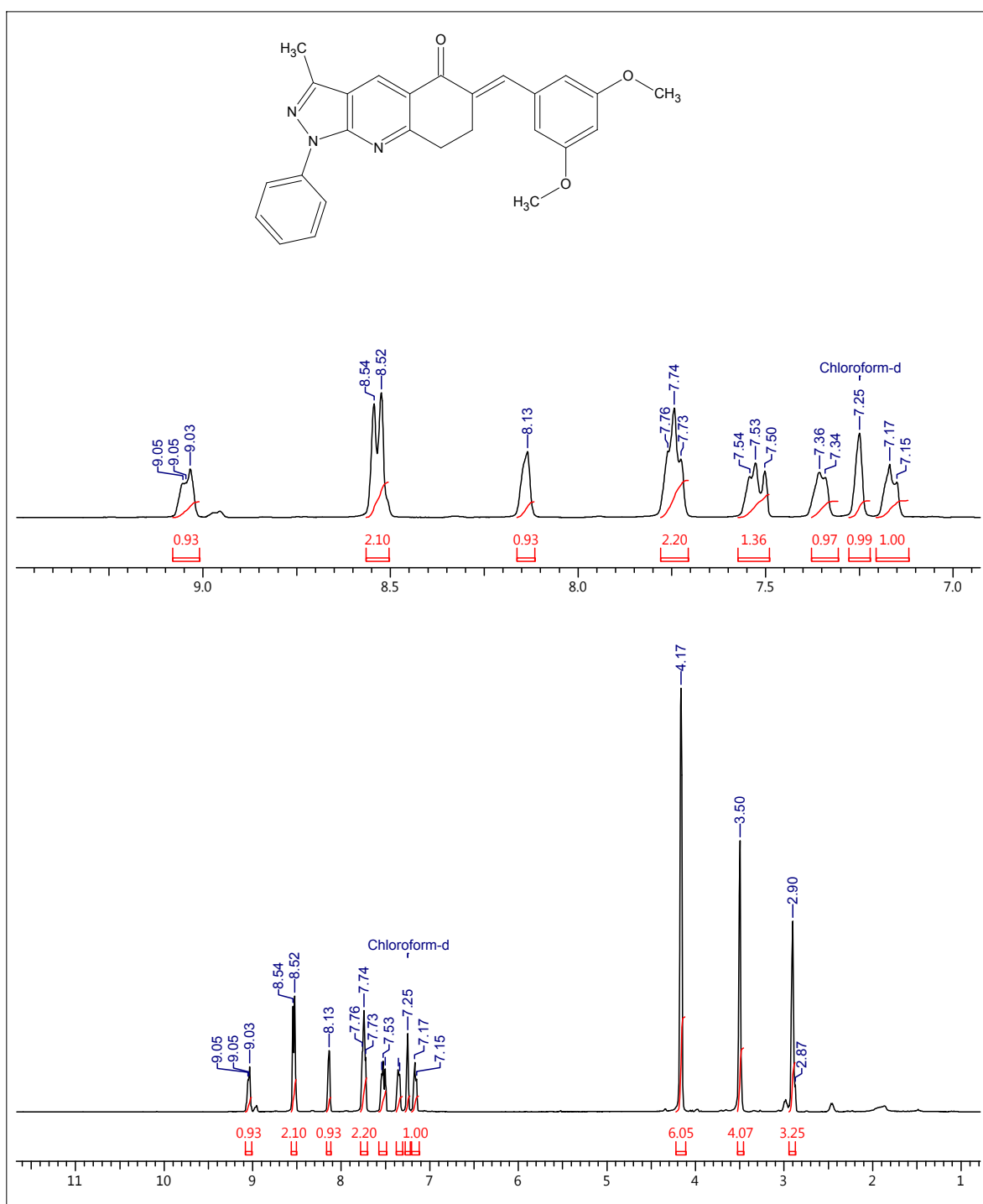


Fig. S35 ^1H -NMR spectra for *(E)*-6-(3,5-dimethoxybenzylidene)-3-methyl-1-phenyl-1,6,7,8-tetrahydro-5H-pyrazolo[3,4-b]quinolin-5-one (**6i**)

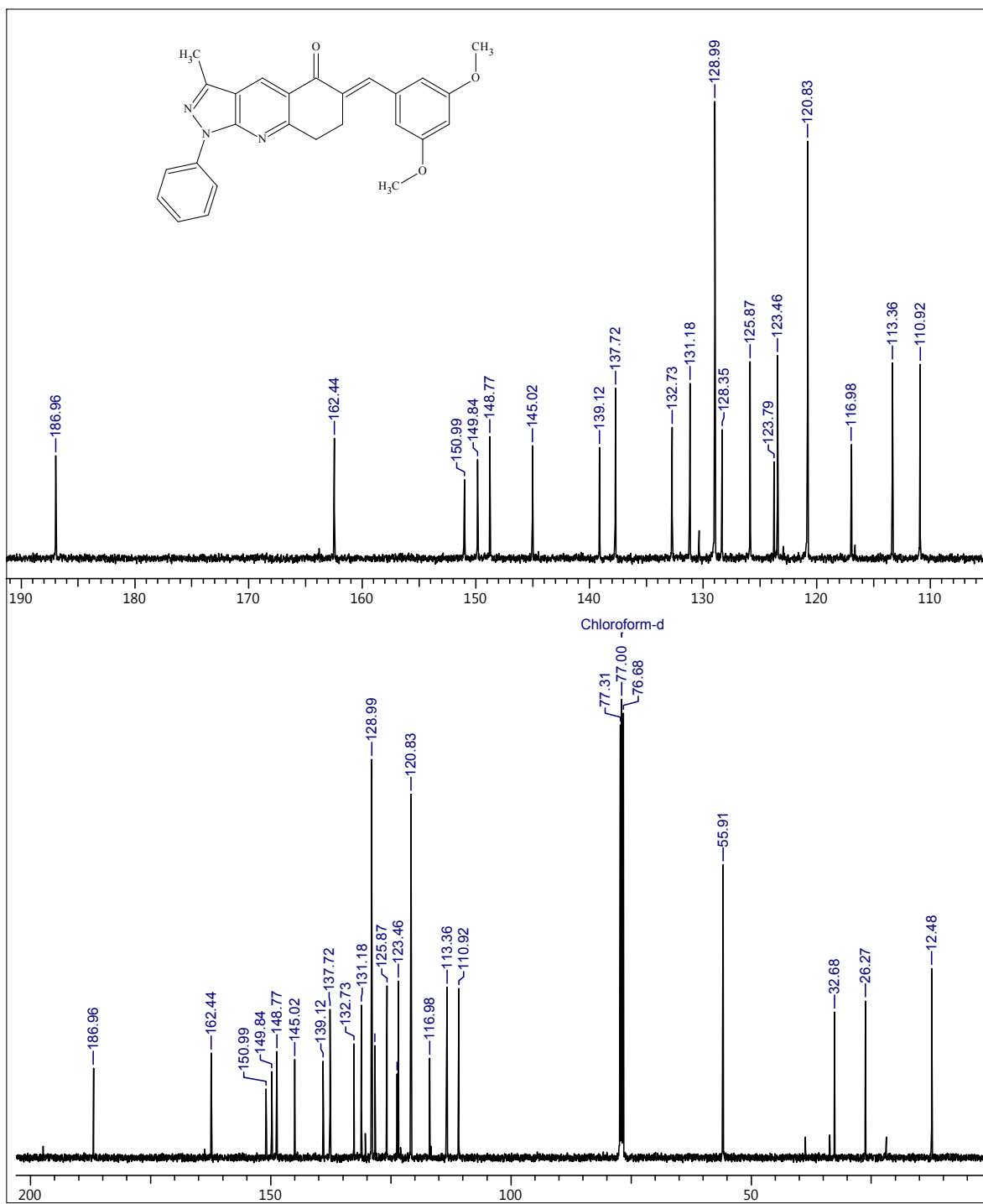


Fig. S36 ¹³C-NMR Spectra for (E)-6-(3,5-dimethoxybenzylidene)-3-methyl-1-phenyl-1,6,7,8-tetrahydro-5H-pyrazolo[3,4-b]quinolin-5-one (**6i**)

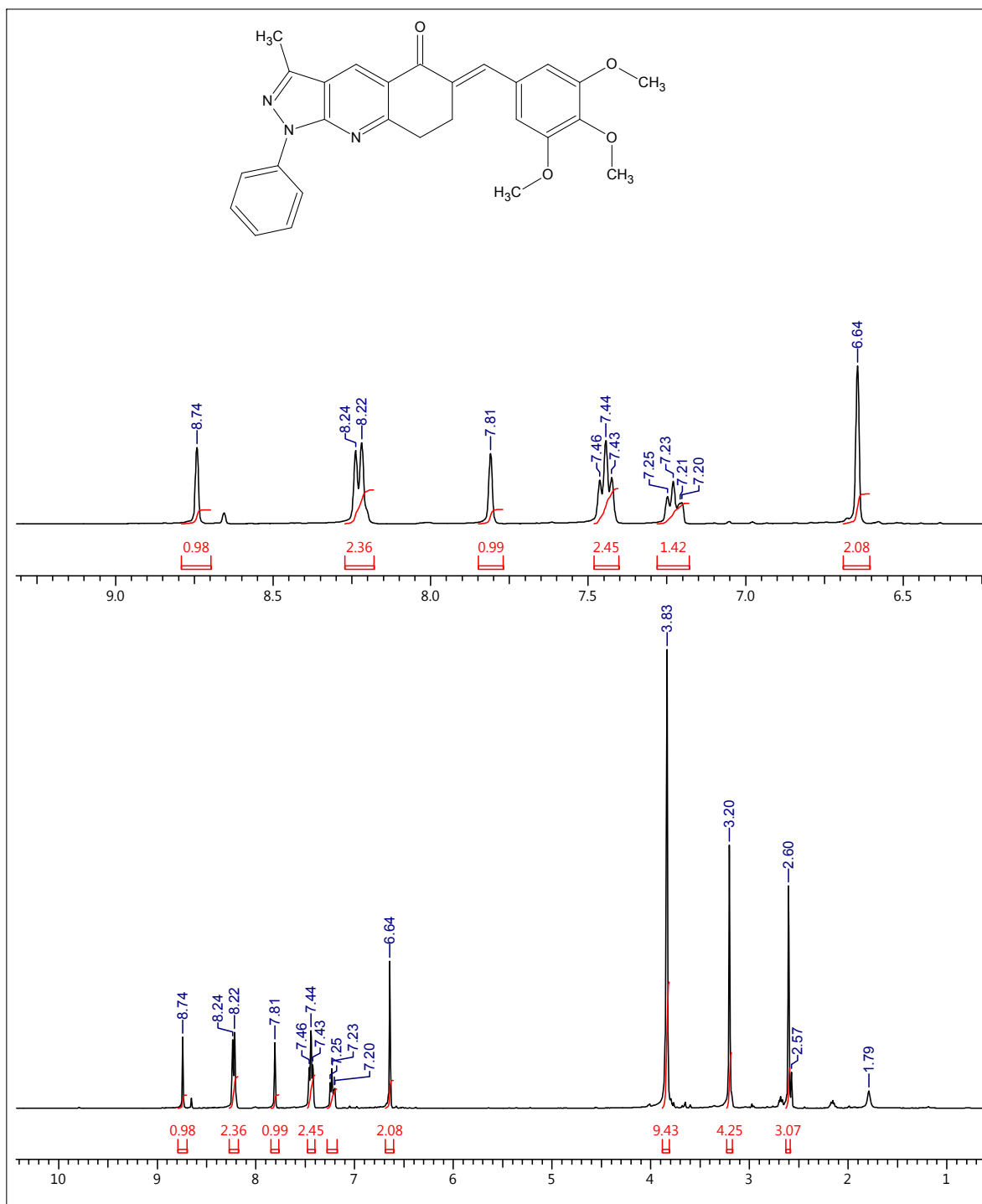


Fig. S37 ^1H -NMR spectra for *(E)*-3-methyl-1-phenyl-6-(3,4,5-trimethoxybenzylidene)-1,6,7,8-tetrahydro-5H-pyrazolo[3,4-b]quinolin-5-one (**6j**)

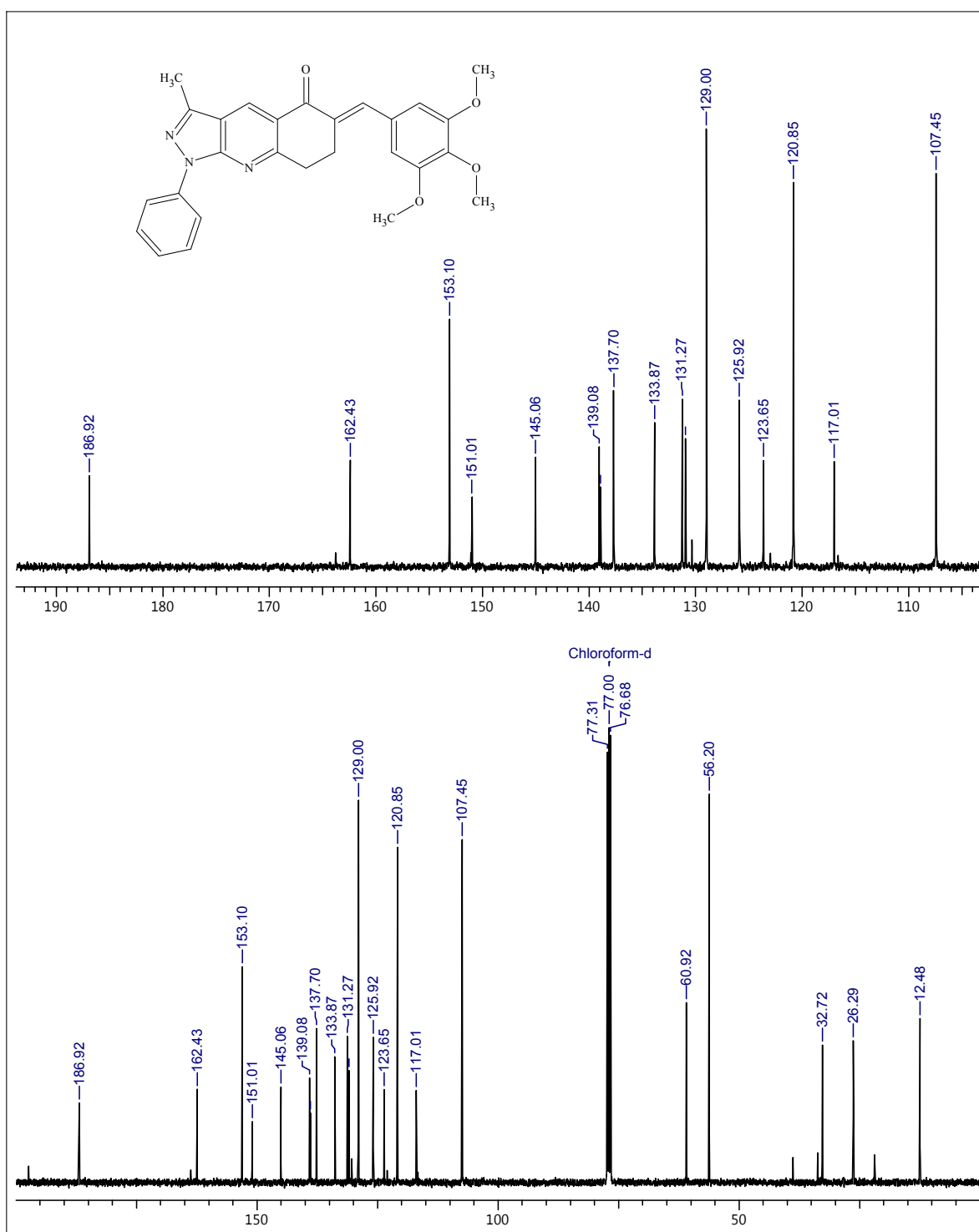


Fig. S38 ^{13}C -NMR spectra for (E)-3-methyl-1-phenyl-6-(3,4,5-trimethoxybenzylidene)-1,6,7,8-tetrahydro-5H-pyrazolo[3,4-b]quinolin-5-one (**6j**)

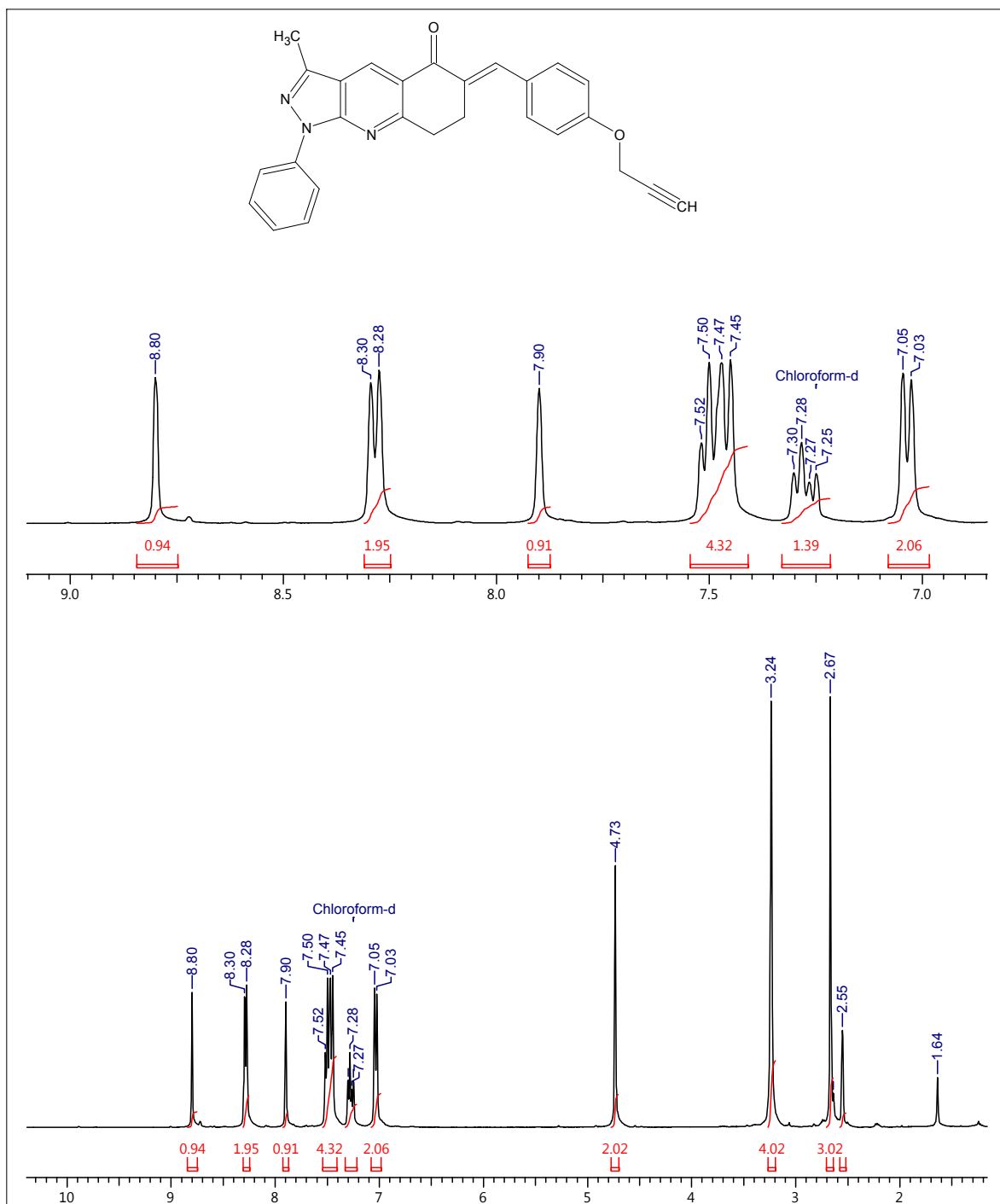


Fig. S39 ¹H-NMR spectra for *(E)*-3-methyl-1-phenyl-6-(4-(prop-2-yn-1-yloxy)benzylidene)-1,6,7,8-tetrahydro-5H-pyrazolo[3,4-b]quinolin-5-one (**6k**)

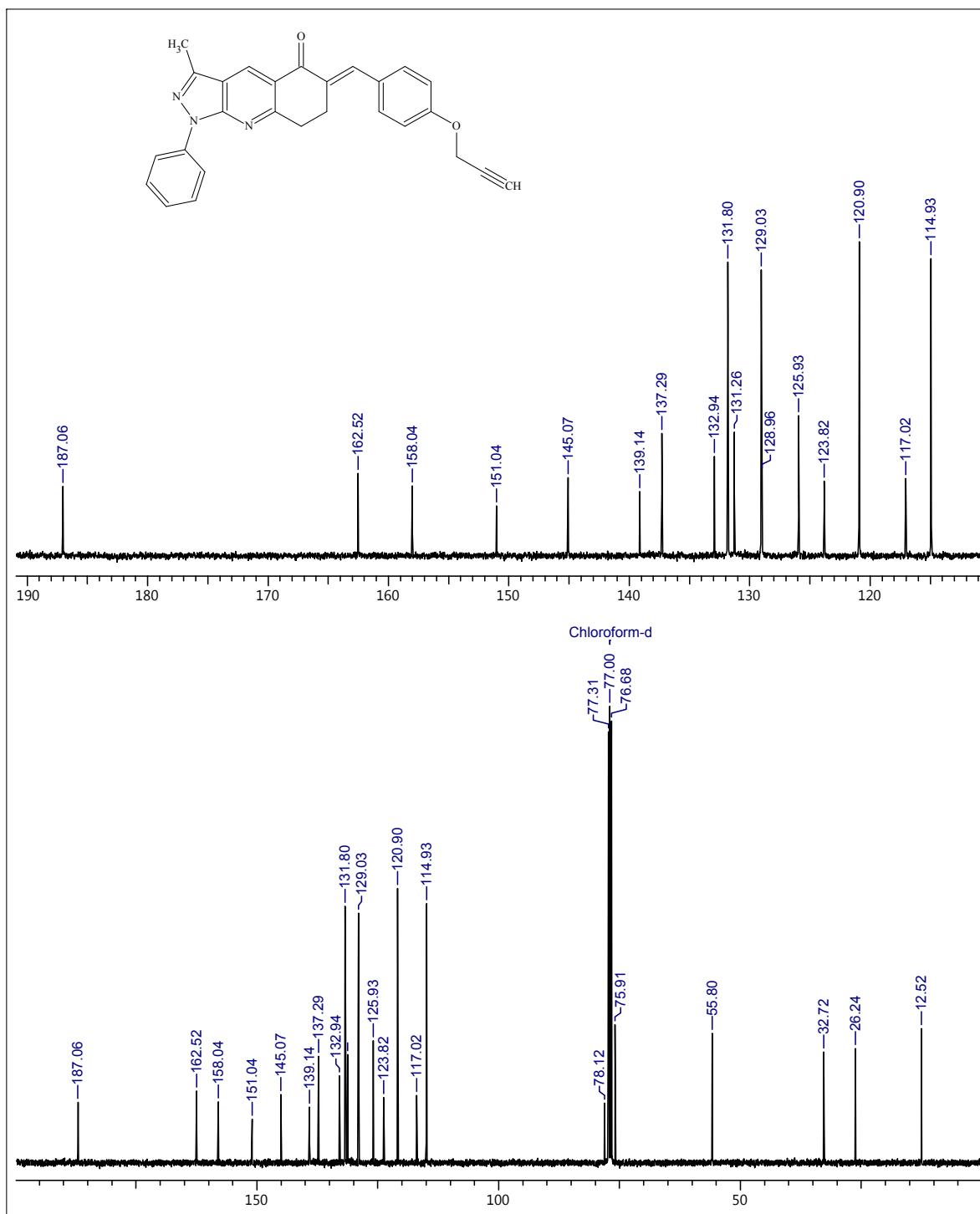


Fig. S40 ¹³C-NMR spectra for *(E)*-3-methyl-1-phenyl-6-(4-(prop-2-yn-1-yloxy)benzylidene)-1,6,7,8-tetrahydro-5H-pyrazolo[3,4-b]quinolin-5-one (**6k**)

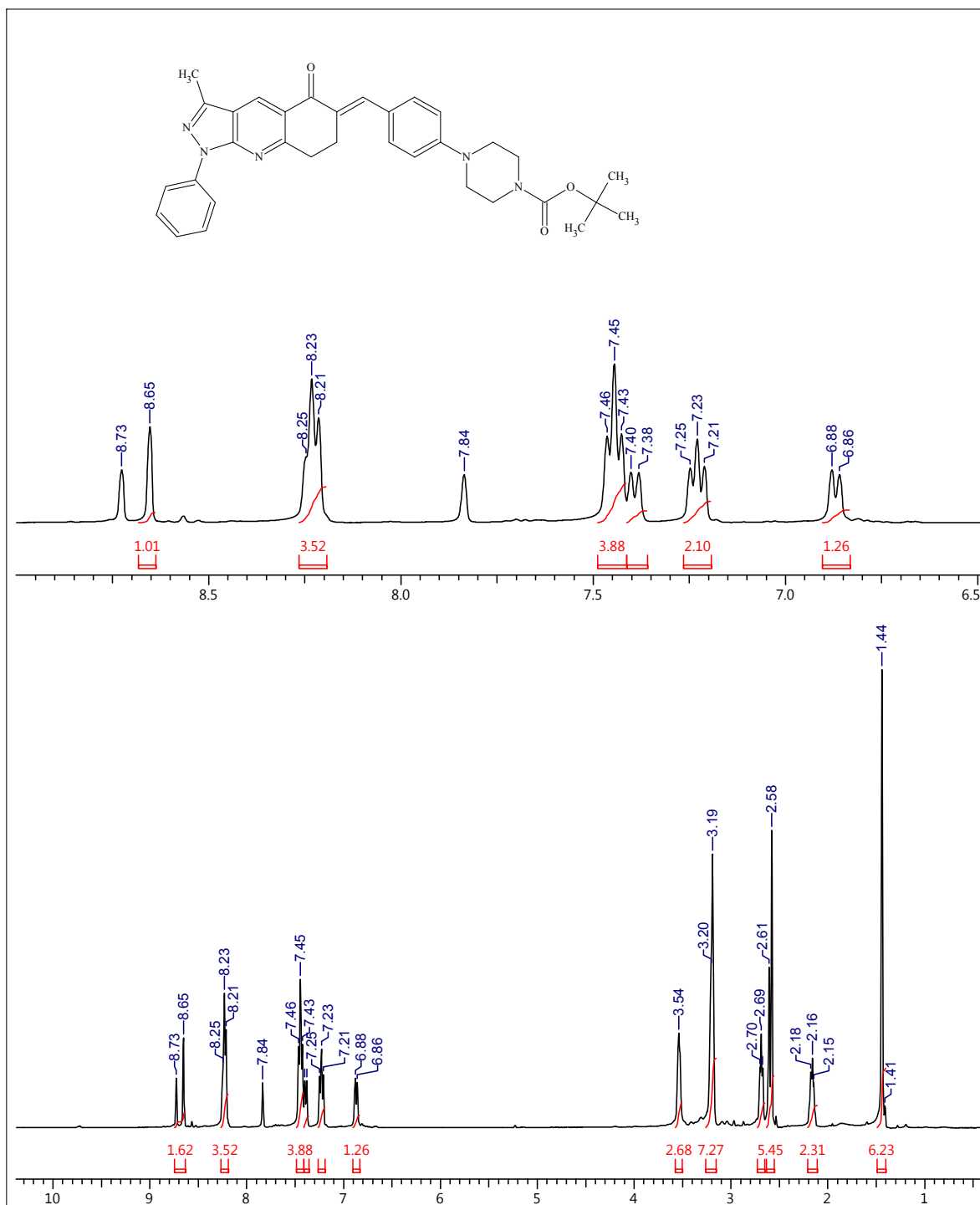


Fig. S41 ^1H -NMR spectra of tert-butyl(*E*)-4-(4-((3-methyl-5-oxo-1-phenyl-1,5,7,8-tetrahydro-6H-pyrazolo[3,4-*b*]quinolin-6-ylidene)methyl)phenyl)piperazine-1-carboxylate (**6I**)

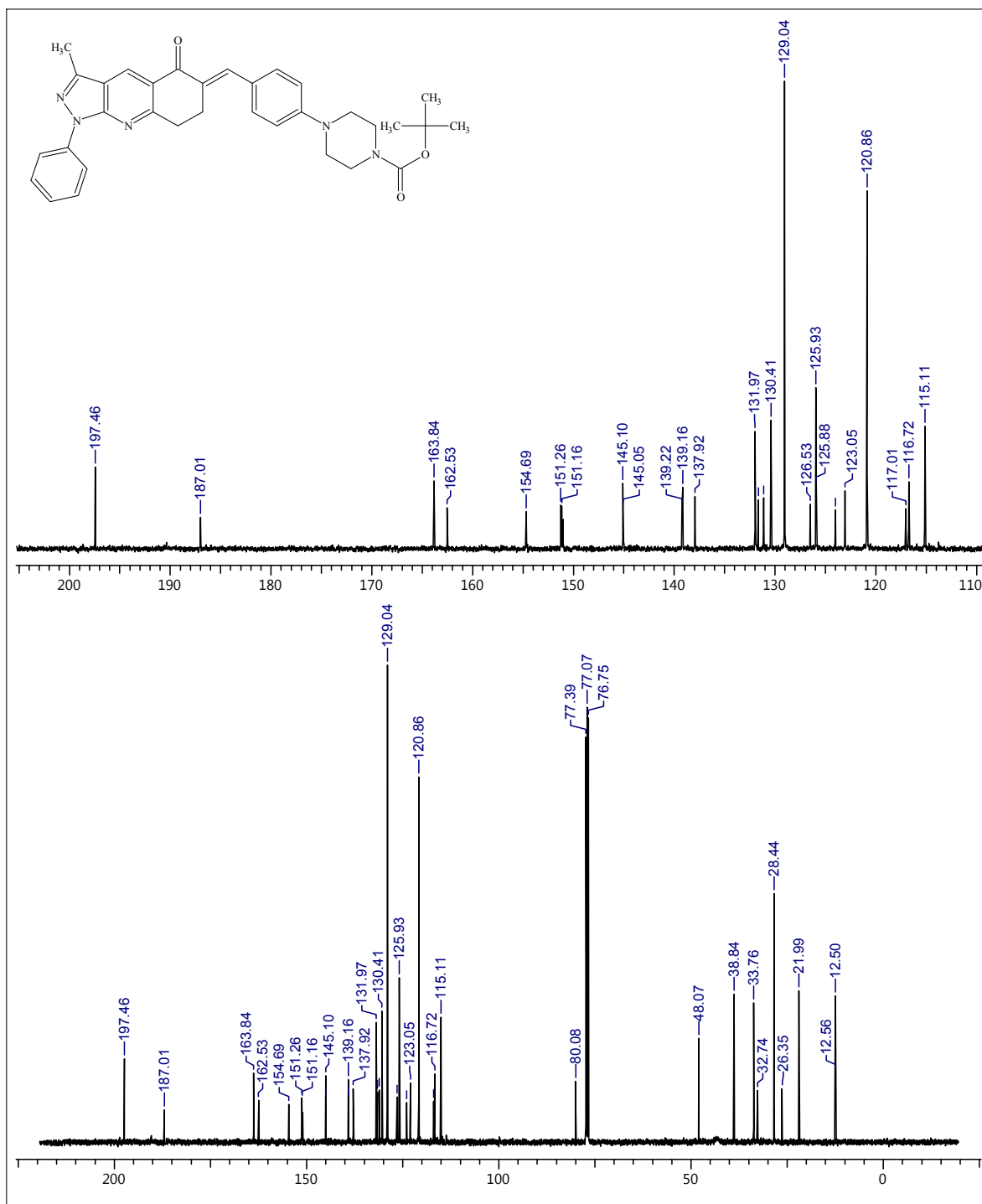


Fig. S42 ^{13}C -NMR spectra of tert-butyl(4-(4-((3-methyl-5-oxo-1-phenyl-1,5,7,8-tetrahydro-6H-pyrazolo[3,4-b]quinolin-6-ylidene)methyl)phenyl)piperazine-1-carboxylate (**6I**)

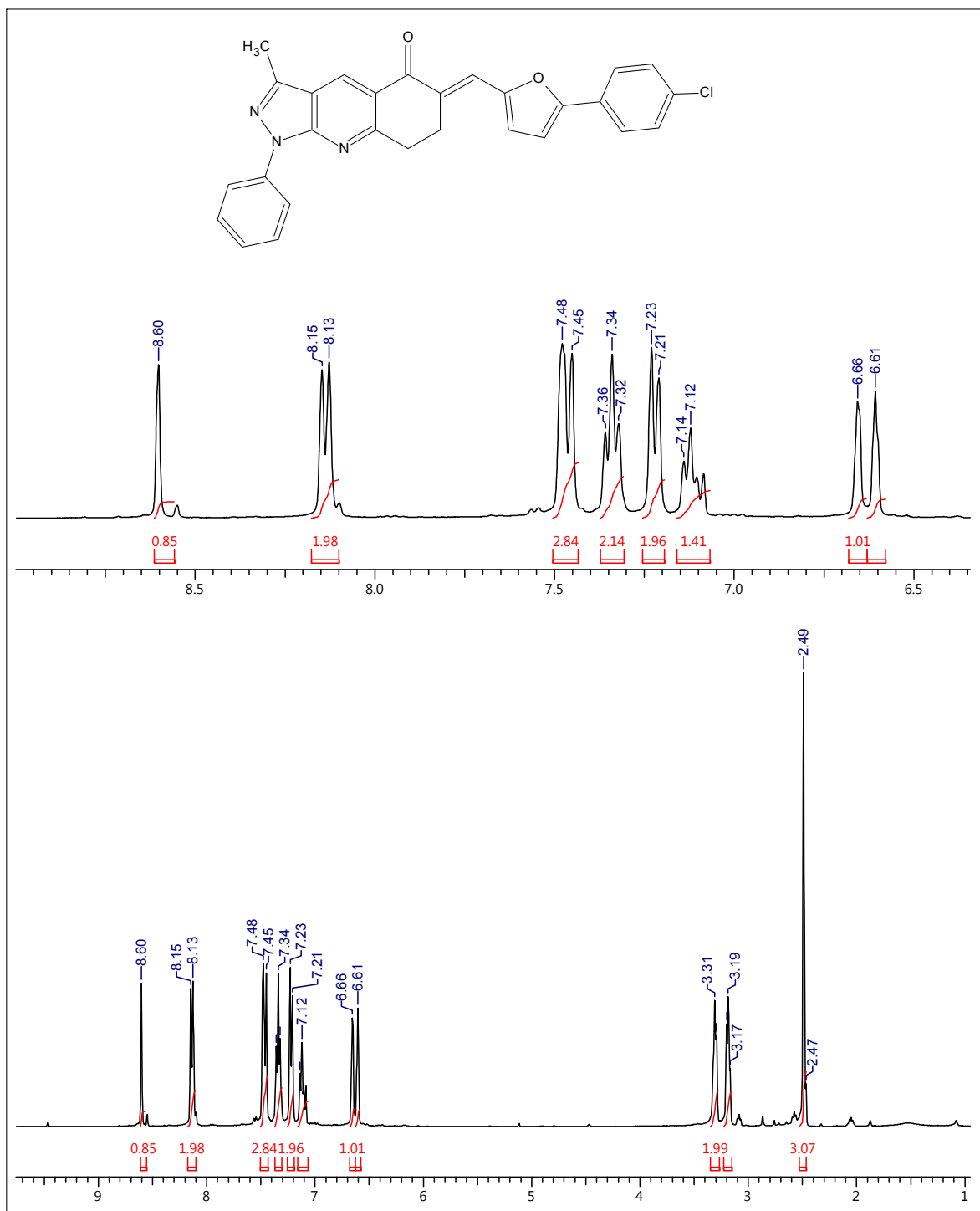


Fig. S43 ^1H -NMR spectra for *(E)*-6-((5-(4-chlorophenyl)furan-2-yl)methylene)-3-methyl-1-phenyl-1,6,7,8-tetrahydro-5H-pyrazolo[3,4-b]quinolin-5-one (**6m**)

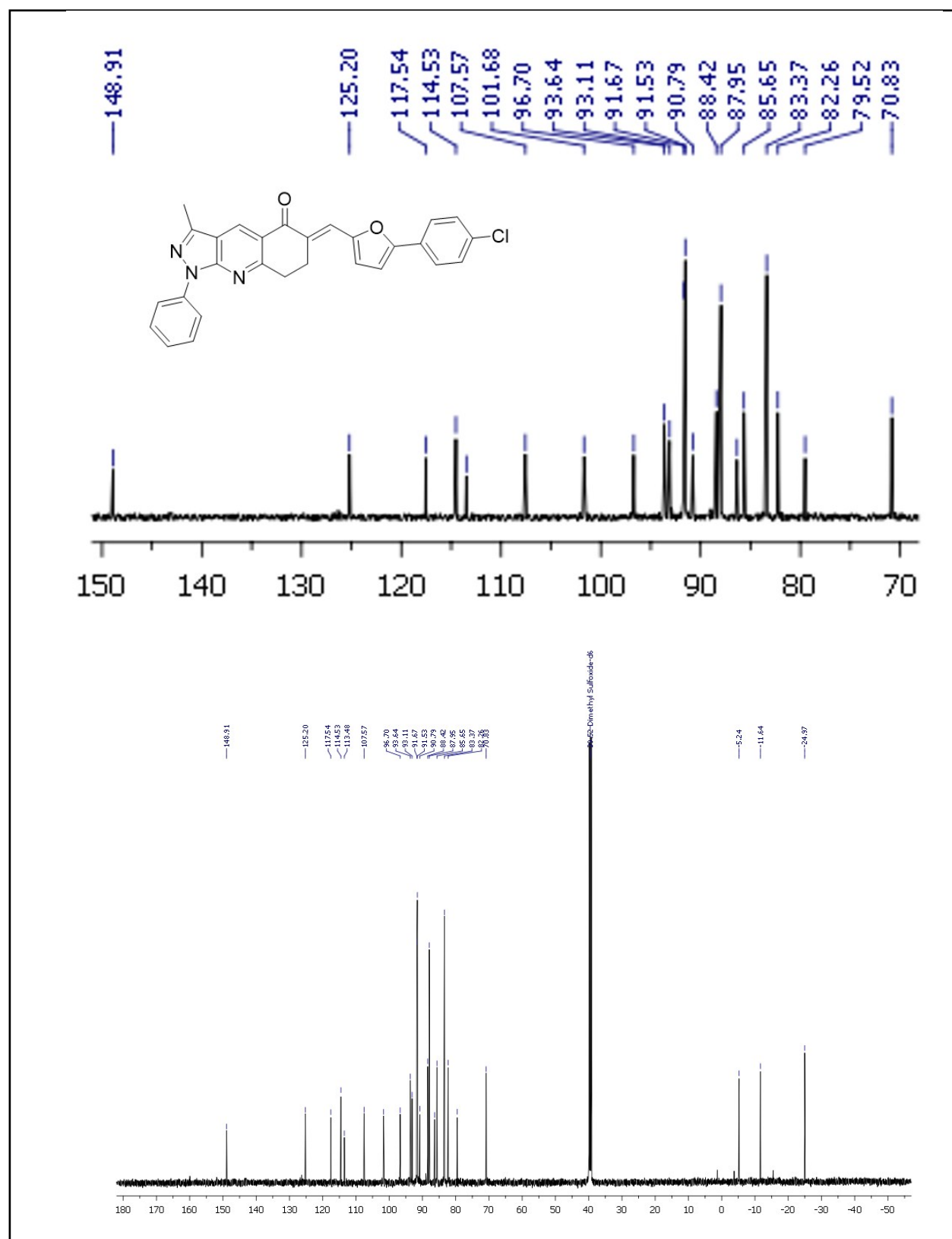


Fig. S44 ¹³C-NMR spectra for *(E)*-6-((5-(4-chlorophenyl)furan-2-yl)methylene)-3-methyl-1-phenyl-1,6,7,8-tetrahydro-5H-pyrazolo[3,4-b]quinolin-5-one (**6m**)

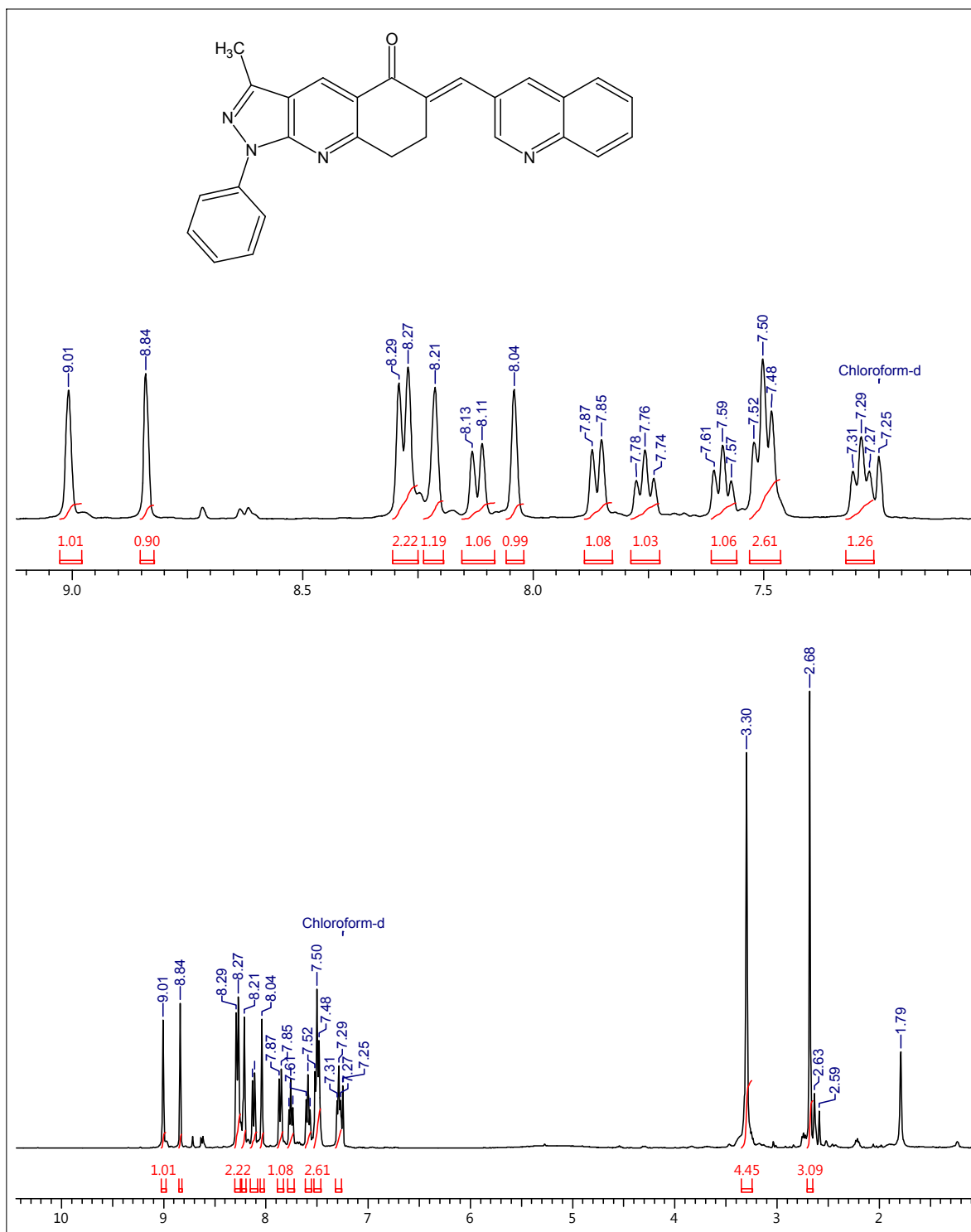


Fig. S45 ^1H -NMR spectra for (E)-3-methyl-1-phenyl-6-(quinolin-3-ylmethylene)-1,6,7,8-tetrahydro-5H-pyrazolo[3,4-b]quinolin-5-one (**6n**)

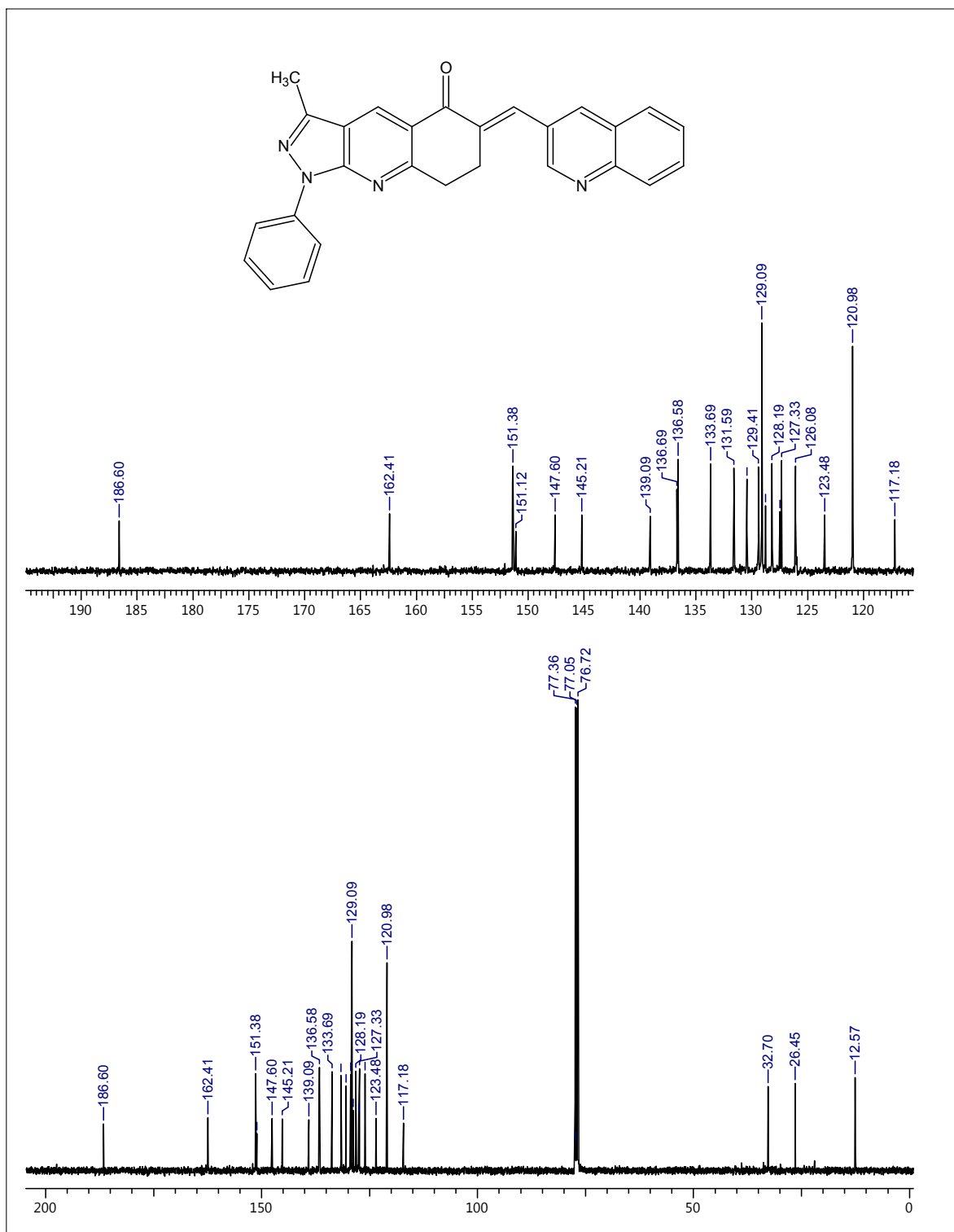


Fig. S46 ¹³C-NMR spectra for (E)-3-methyl-1-phenyl-6-(quinolin-3-ylmethylene)-1,6,7,8-tetrahydro-5H-pyrazolo[3,4-b]quinolin-5-one (**6n**)

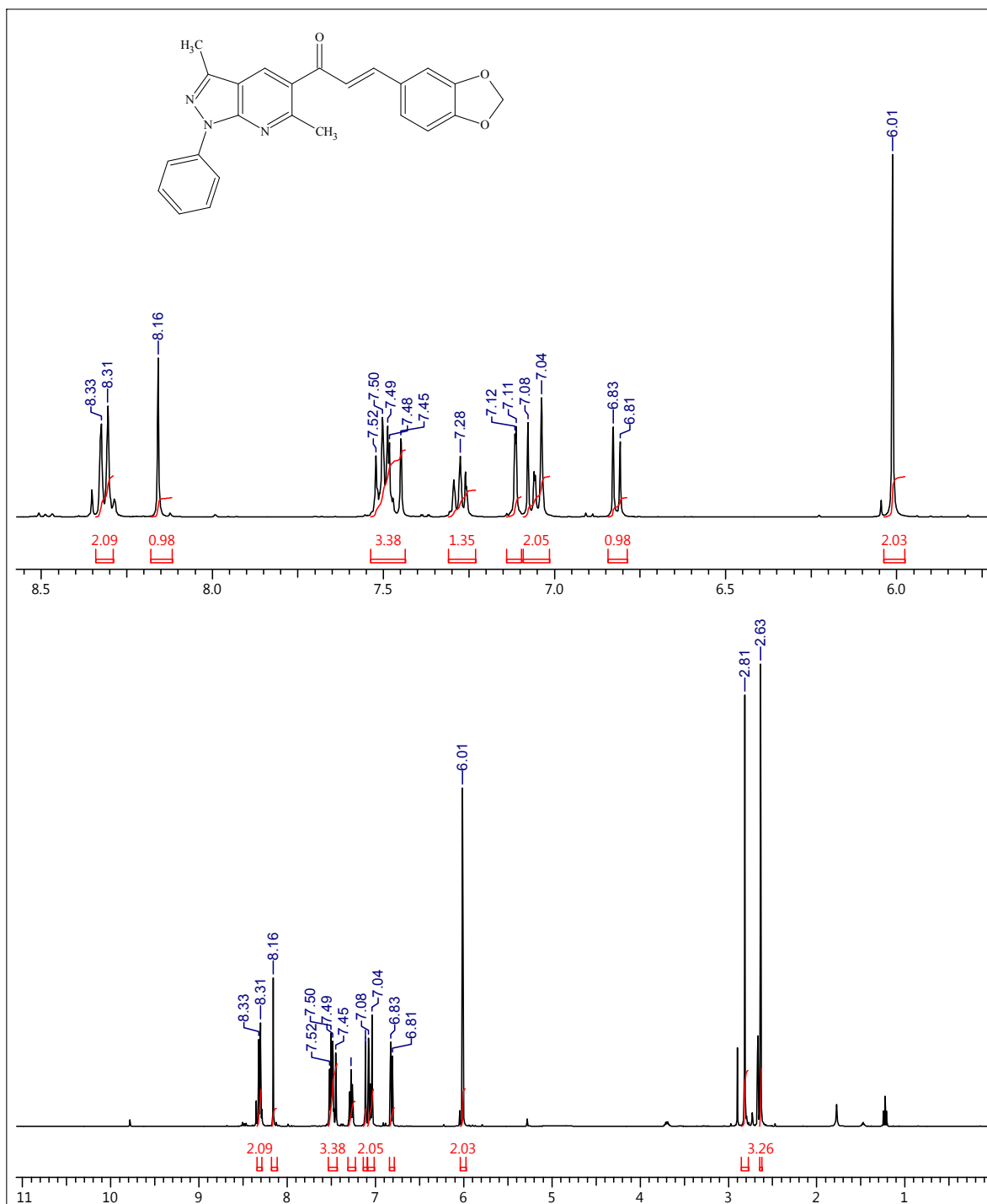


Fig. S47 ^1H -NMR spectra for (E)-3-(benzo[d][1,3]dioxol-5-yl)-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyridin-5-yl)prop-2-en-1-one (**6h**)

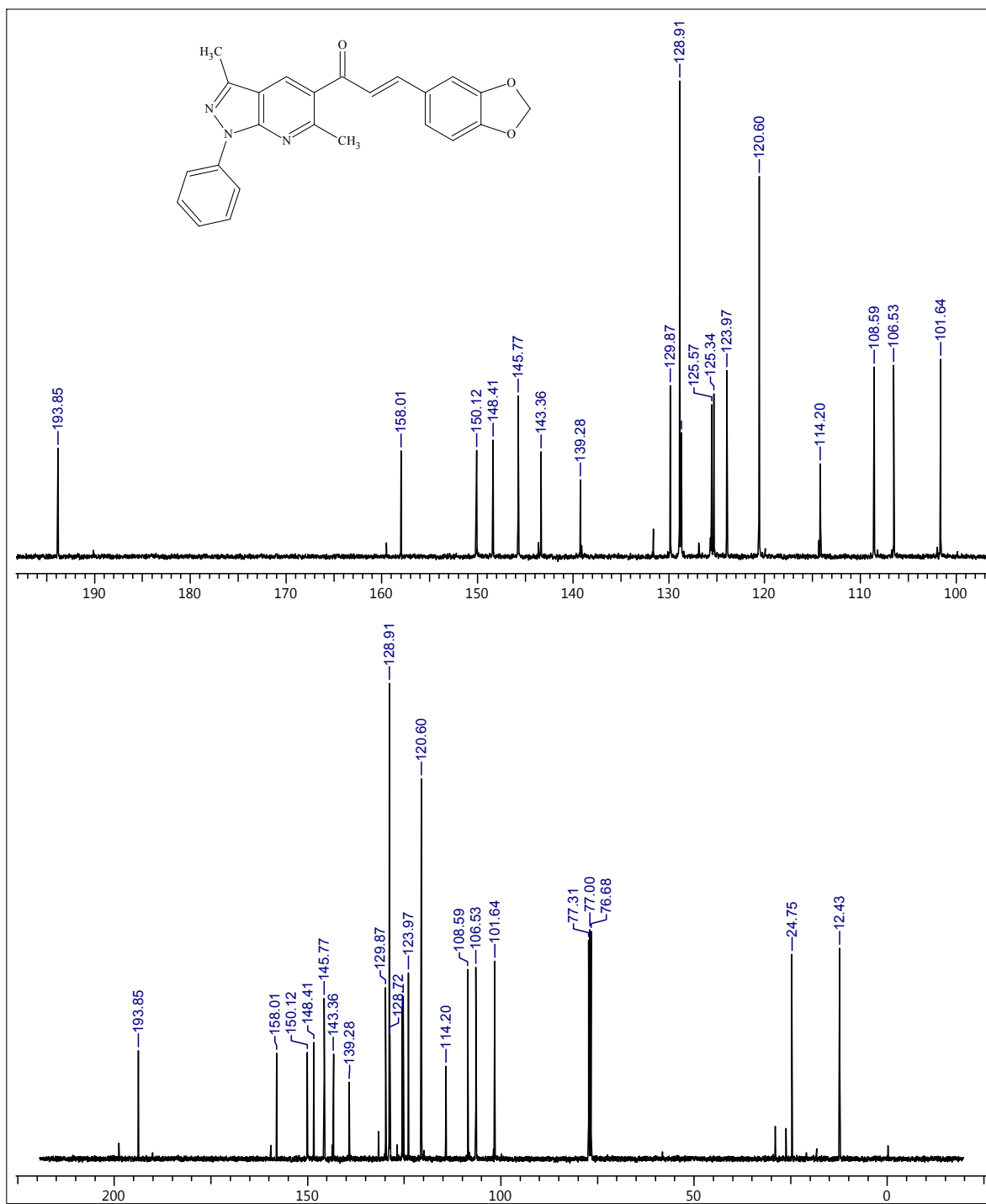


Fig. S48 ^{13}C -NMR spectra for (E)-3-(benzo[d][1,3]dioxol-5-yl)-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyridin-5-yl)prop-2-en-1-one (**6h**)

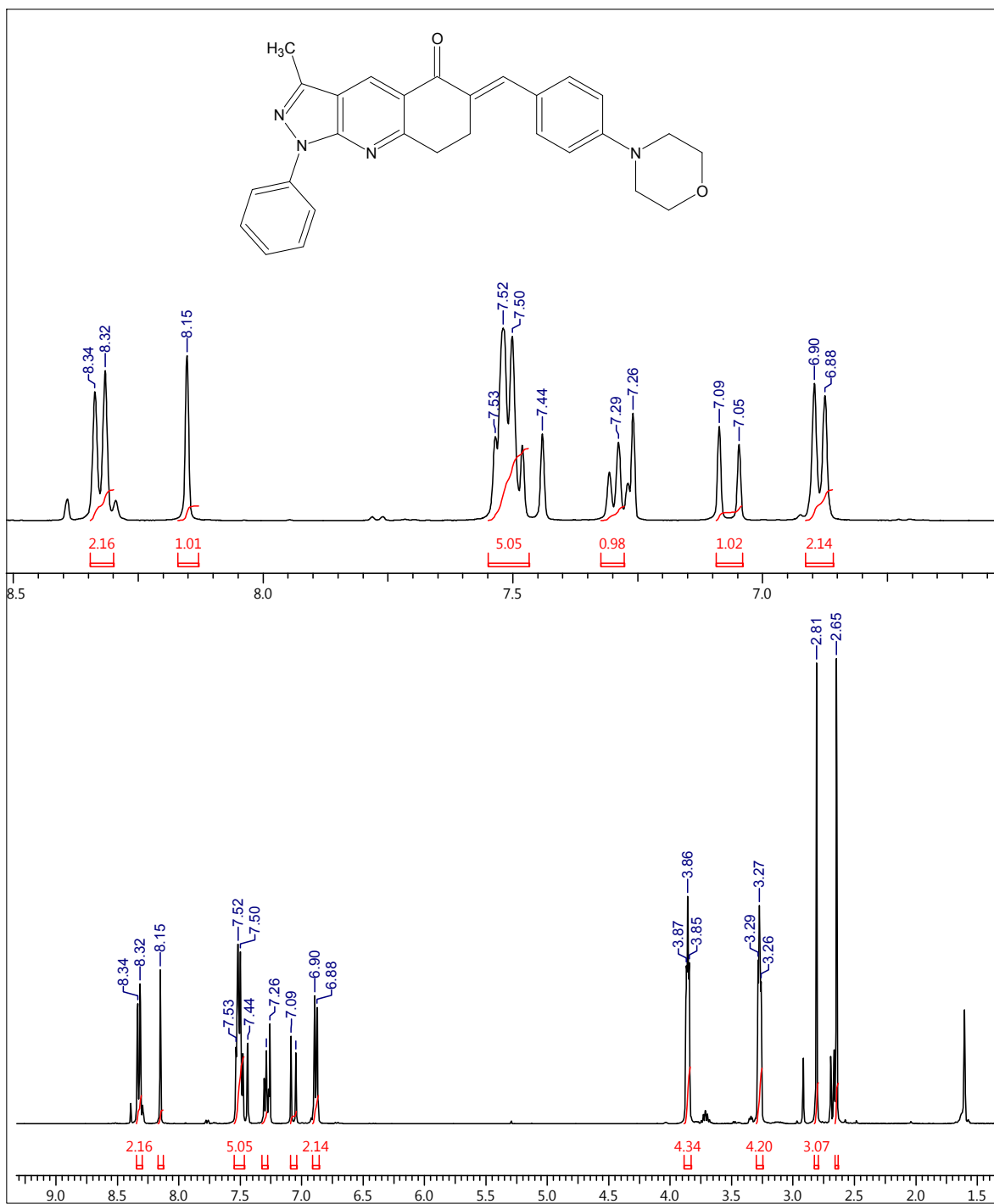


Fig. S49 ^1H -NMR spectra for (E)-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyridin-5-yl)-3-(4-morpholinophenyl)prop-2-en-1-one (**6i**)

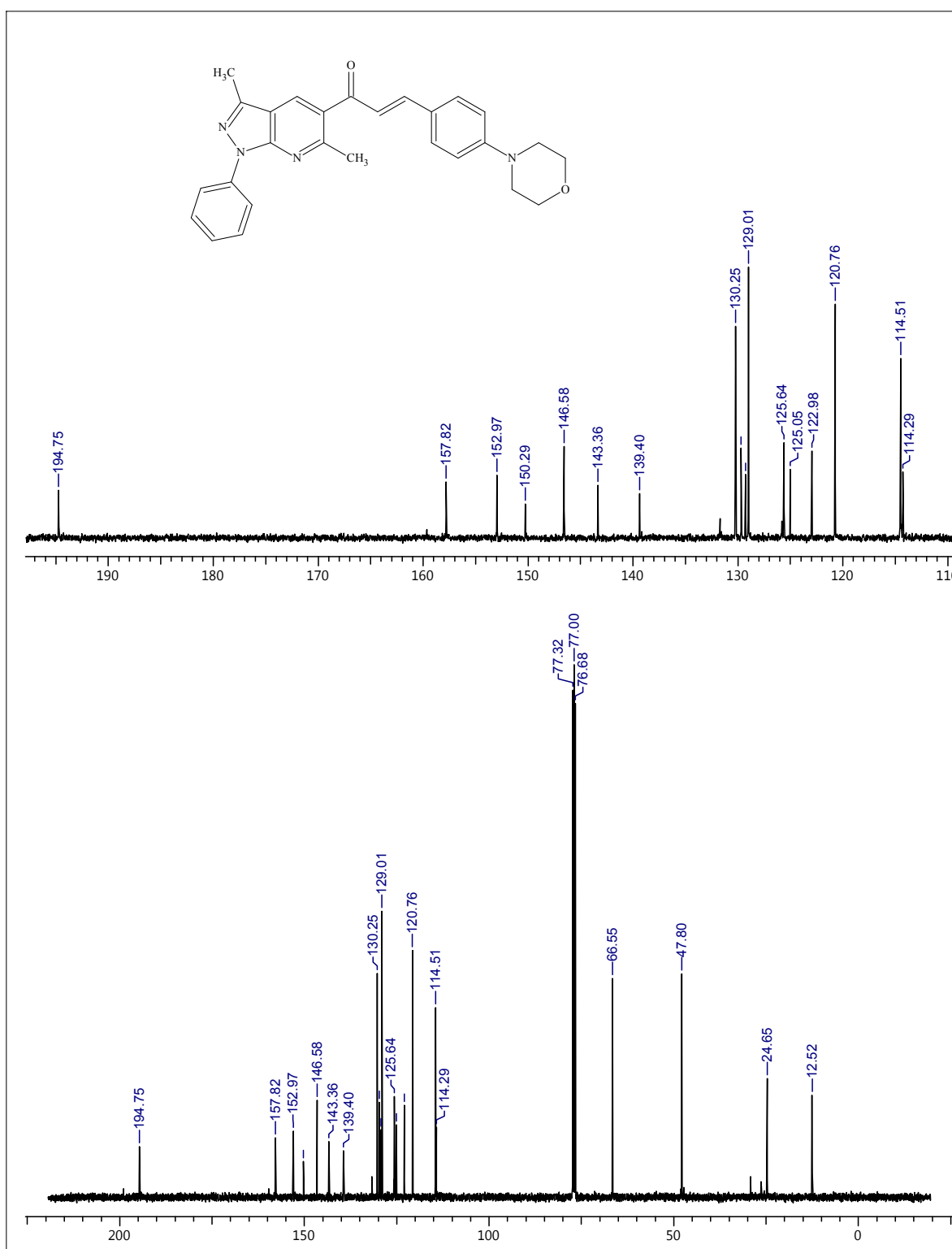


Fig. S50 ¹³C-NMR spectra for (E)-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyridin-5-yl)-3-(4-morpholinophenyl)prop-2-en-1-one (**6i**)

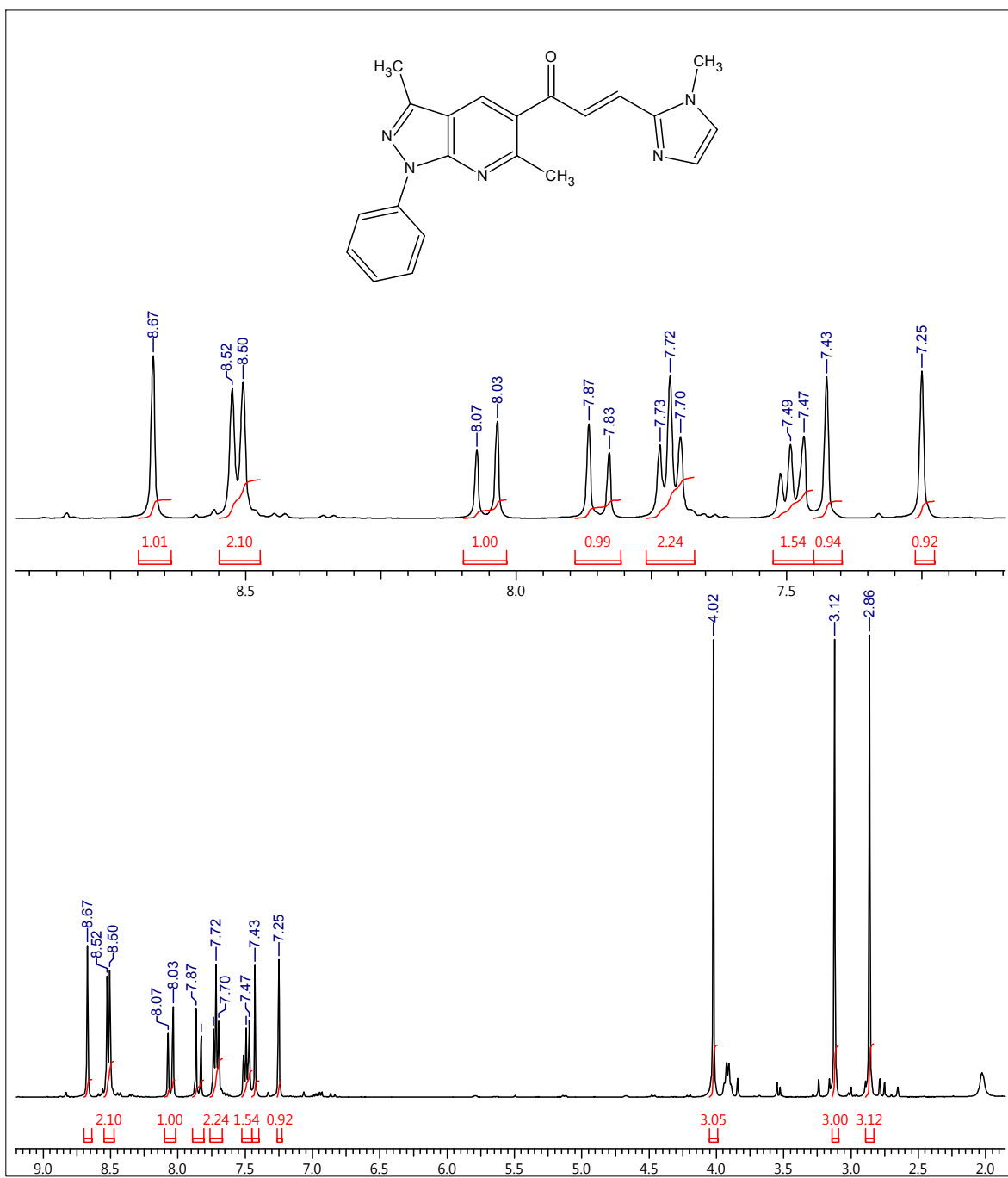


Fig. S51 ^1H -NMR spectra of *(E)*-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyridin-5-yl)-3-(1-methyl-1H-imidazol-2-yl)prop-2-en-1-one (**6j**)

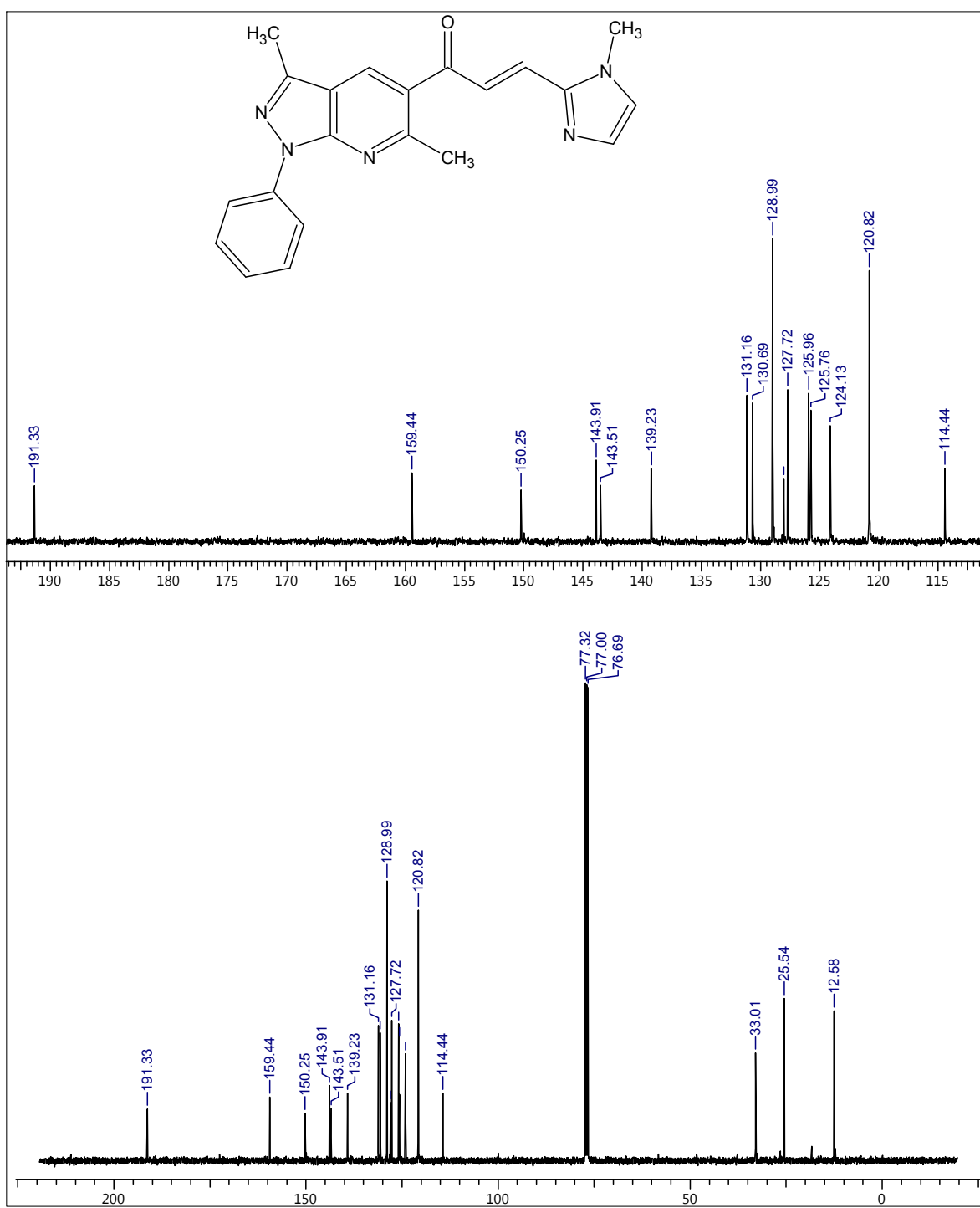


Fig. S52 ¹³C-NMR spectra for (E)-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyridin-5-yl)-3-(1-methyl-1H-imidazol-2-yl)prop-2-en-1-one (6j)

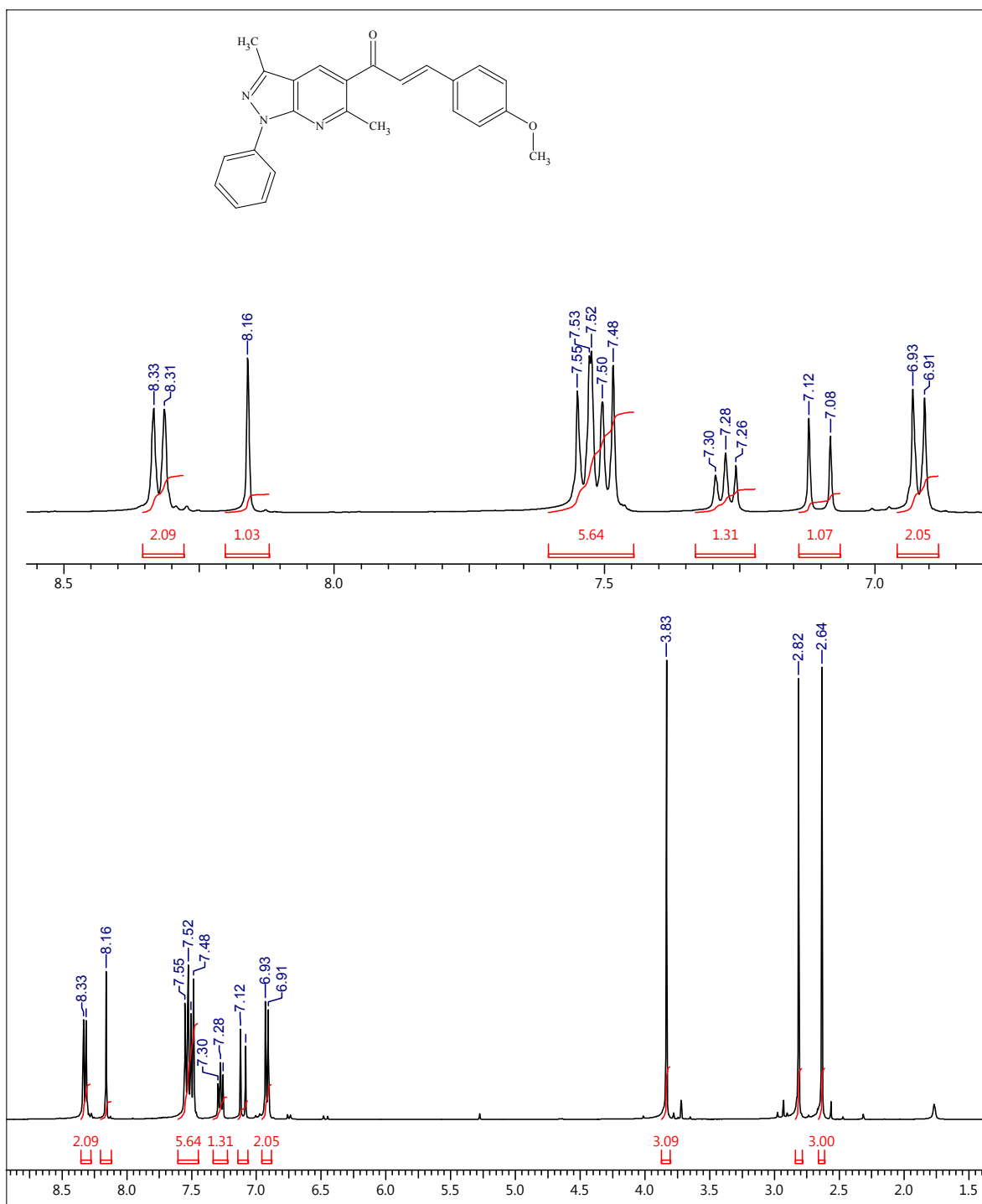


Fig. S53 ^1H -NMR spectra for *(E)*-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyridin-5-yl)-3-(4-methoxyphenyl)prop-2-en-1-one (**6k**)

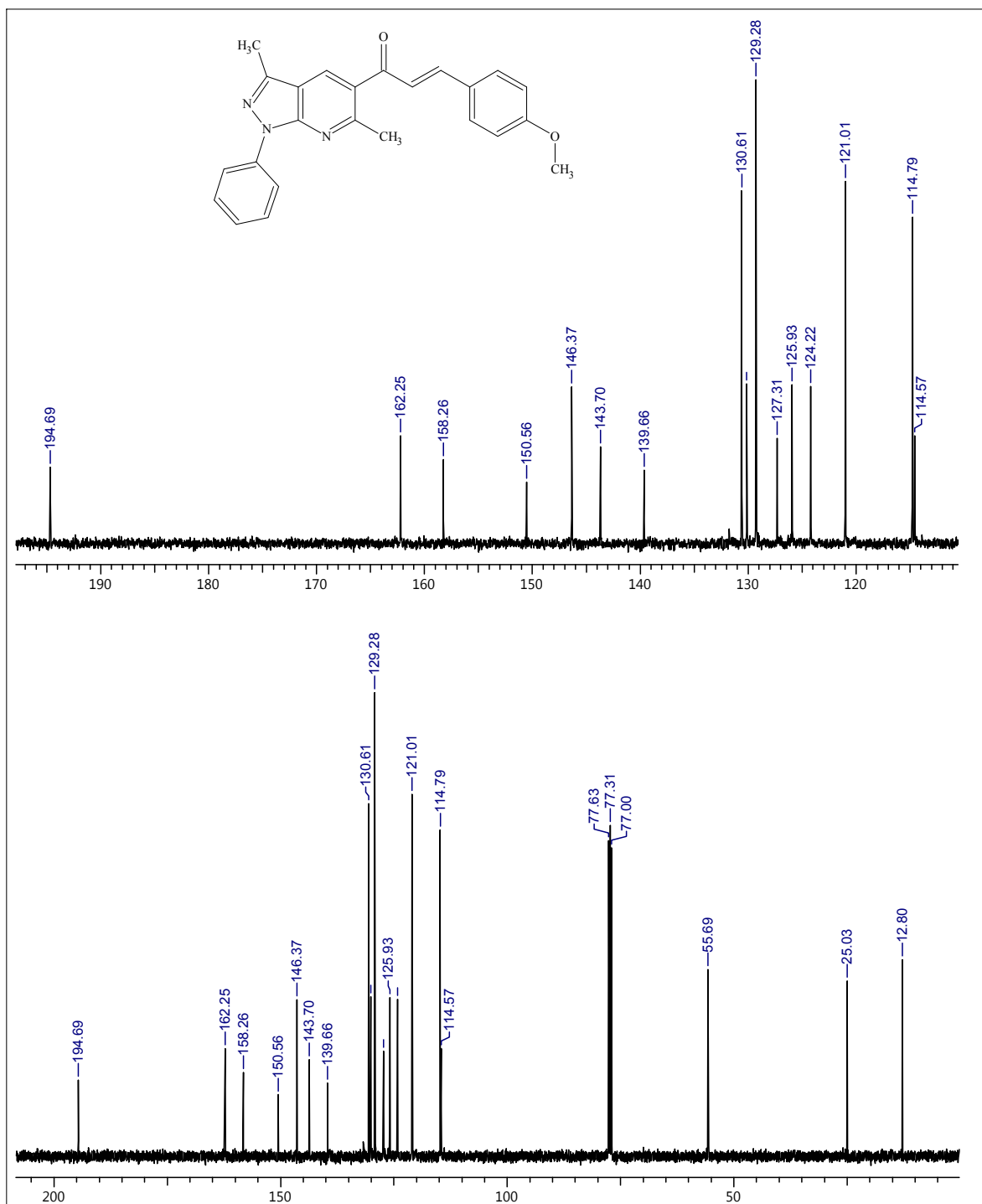


Fig. S54 ^{13}C -NMR spectra for (E)-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyridin-5-yl)-3-(4-methoxyphenyl)prop-2-en-1-one (**6k**)

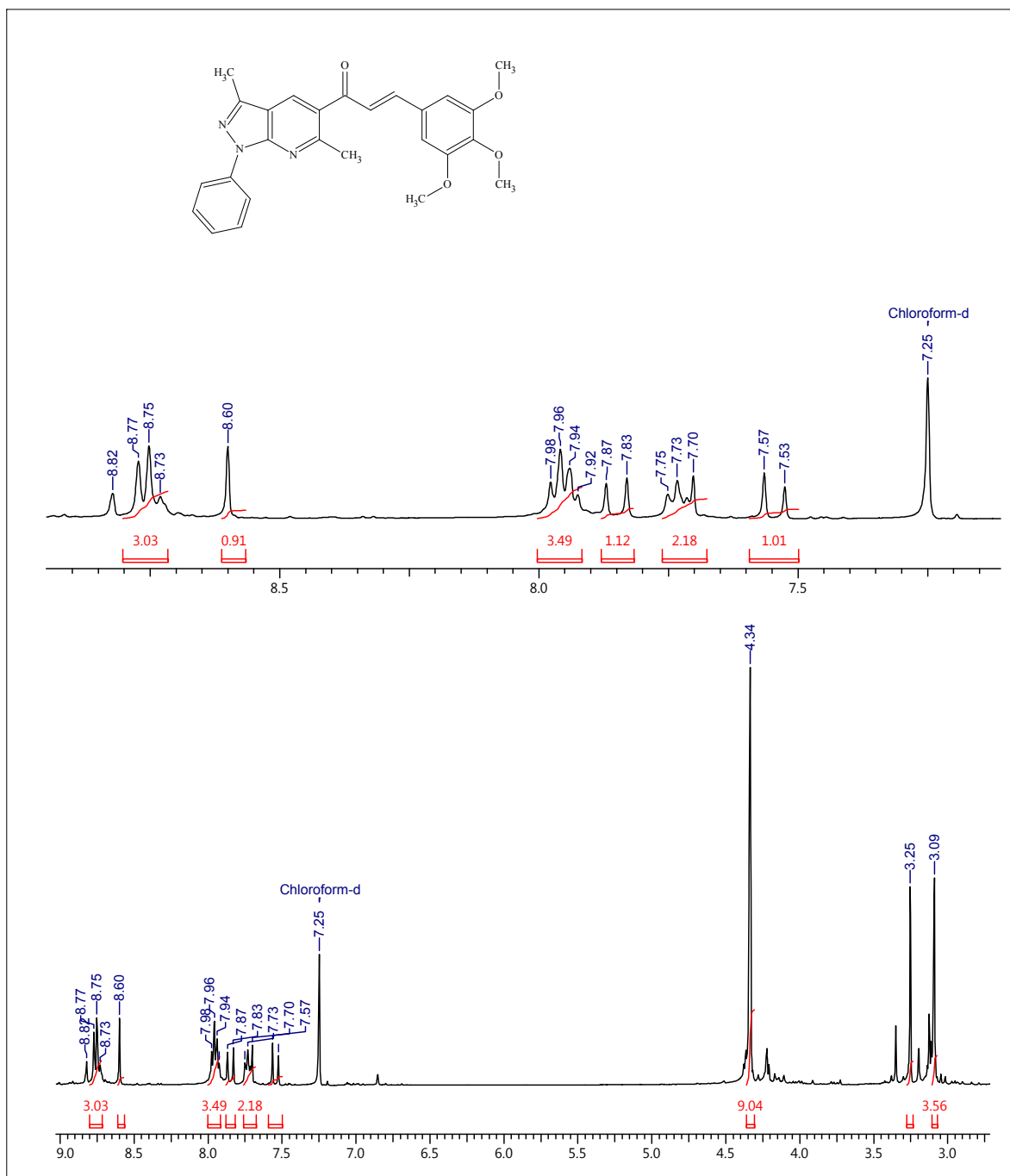


Fig. S55 ^1H -NMR spectra for *(E)*-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyridin-5-yl)-3-(3,4,5-trimethoxyphenyl)prop-2-en-1-one (**6l**)

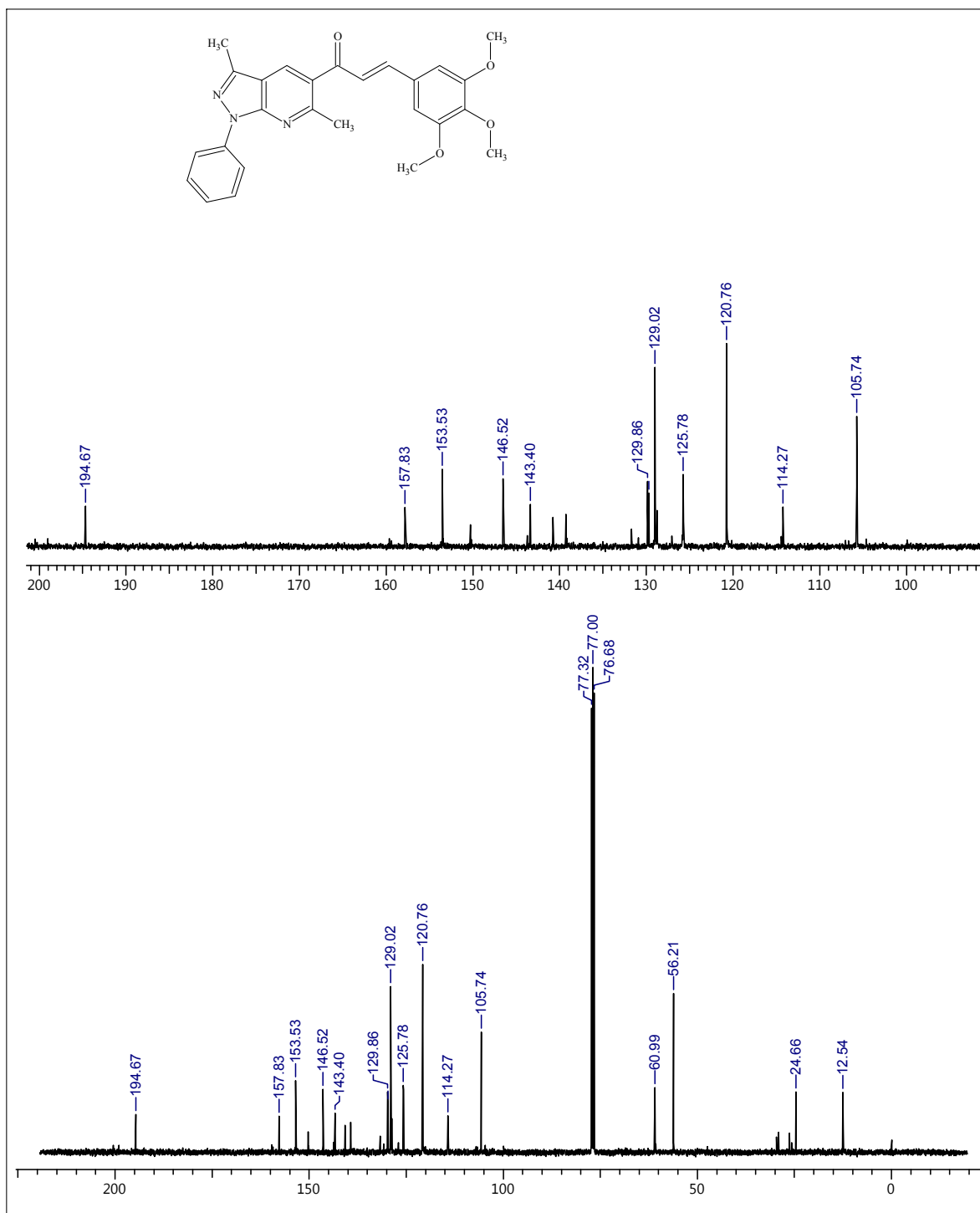


Fig. S56 ¹³C-NMR spectra for (E)-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyridin-5-yl)-3-(3,4,5-trimethoxyphenyl)prop-2-en-1-one (**6l**)

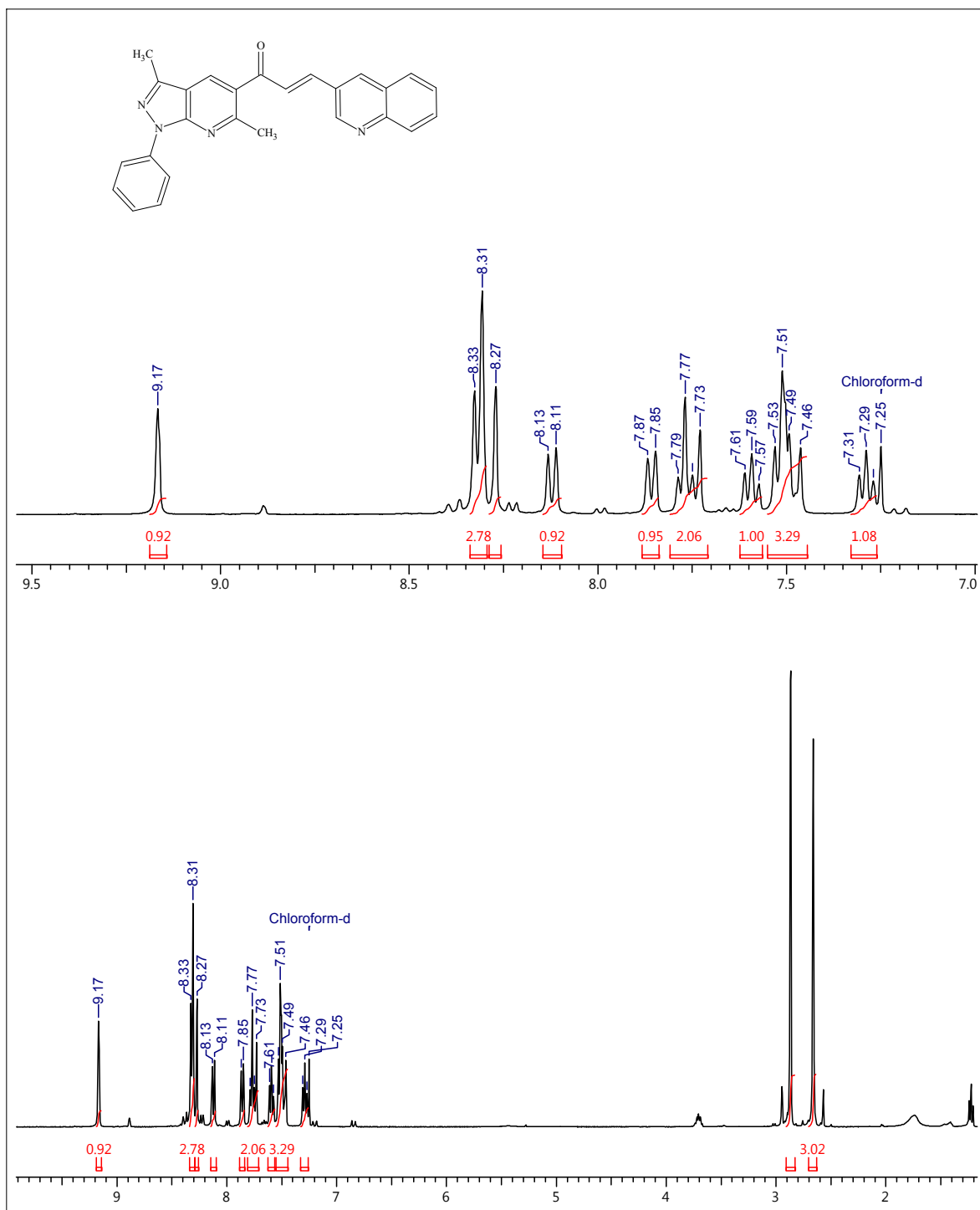


Fig. S57 ¹H-NMR spectra for (E)-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyridin-5-yl)-3-(quinolin-3-yl)prop-2-en-1-one (6m)

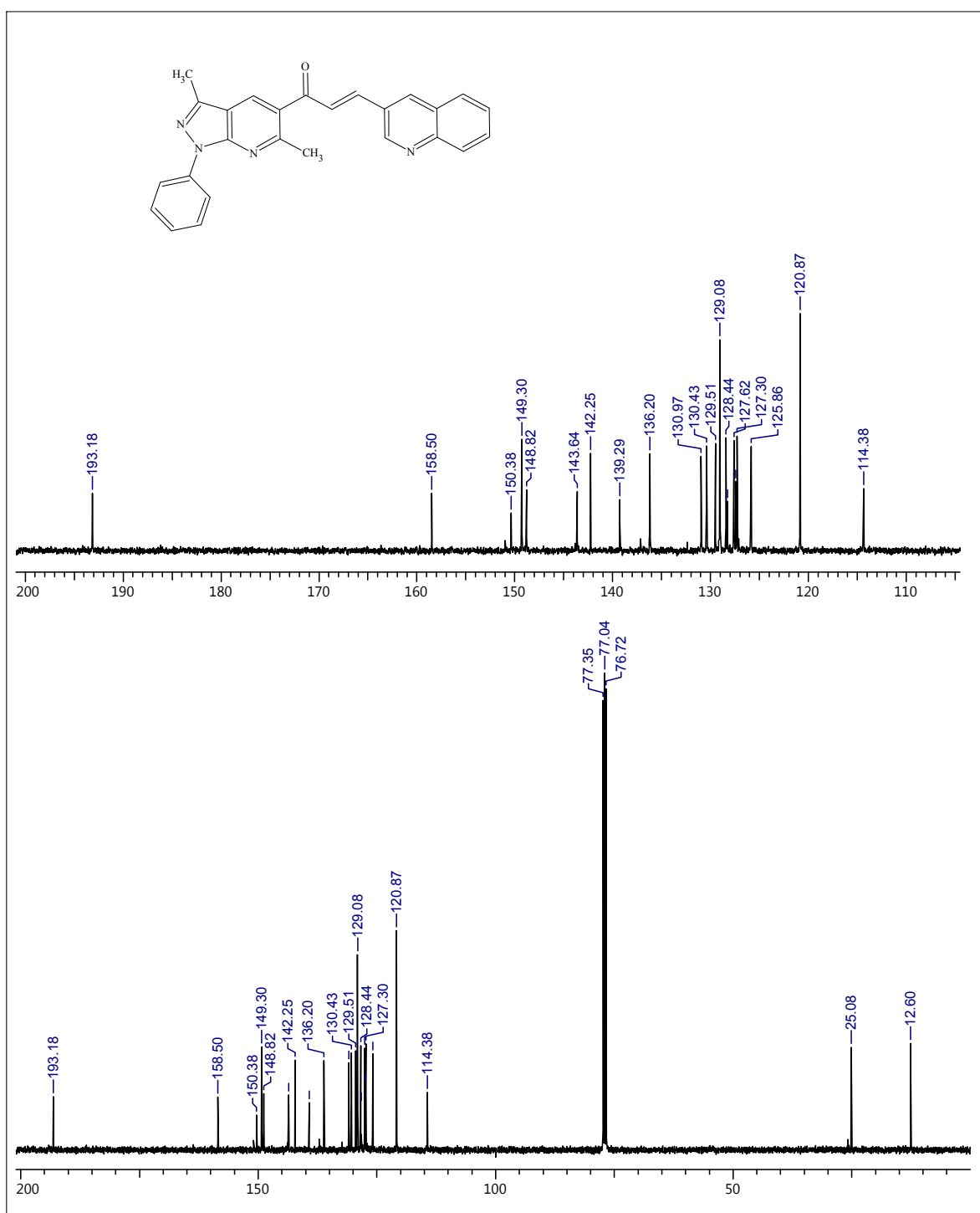


Fig. S58 ^{13}C -NMR spectra for (E)-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyridin-5-yl)-3-(quinolin-3-yl)prop-2-en-1-one (**6m**)

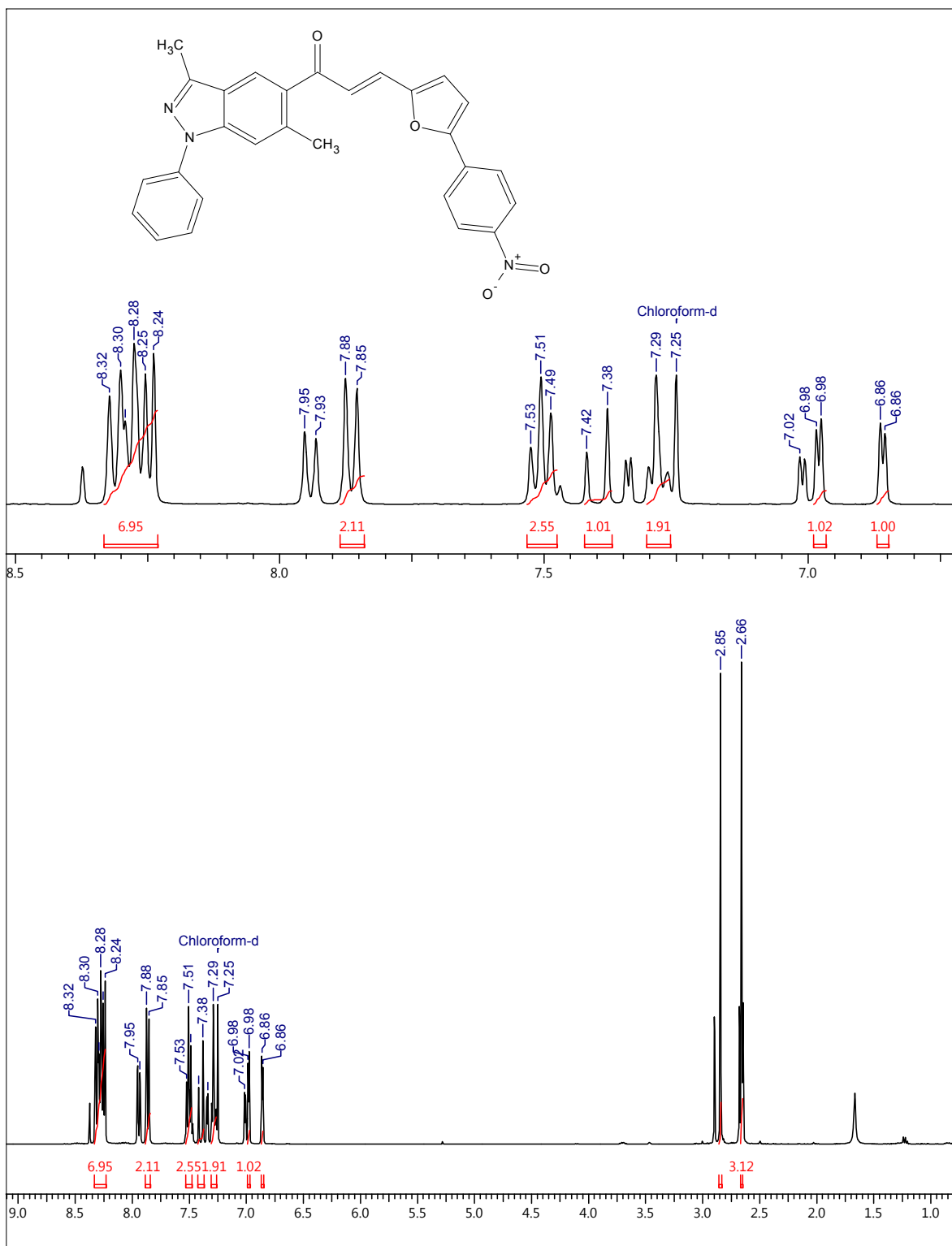


Fig. S59 ^1H -NMR spectra for *(E)*-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyridin-5-yl)-3-(5-(4-nitrophenyl)furan-2-yl)prop-2-en-1-one (**6n**)

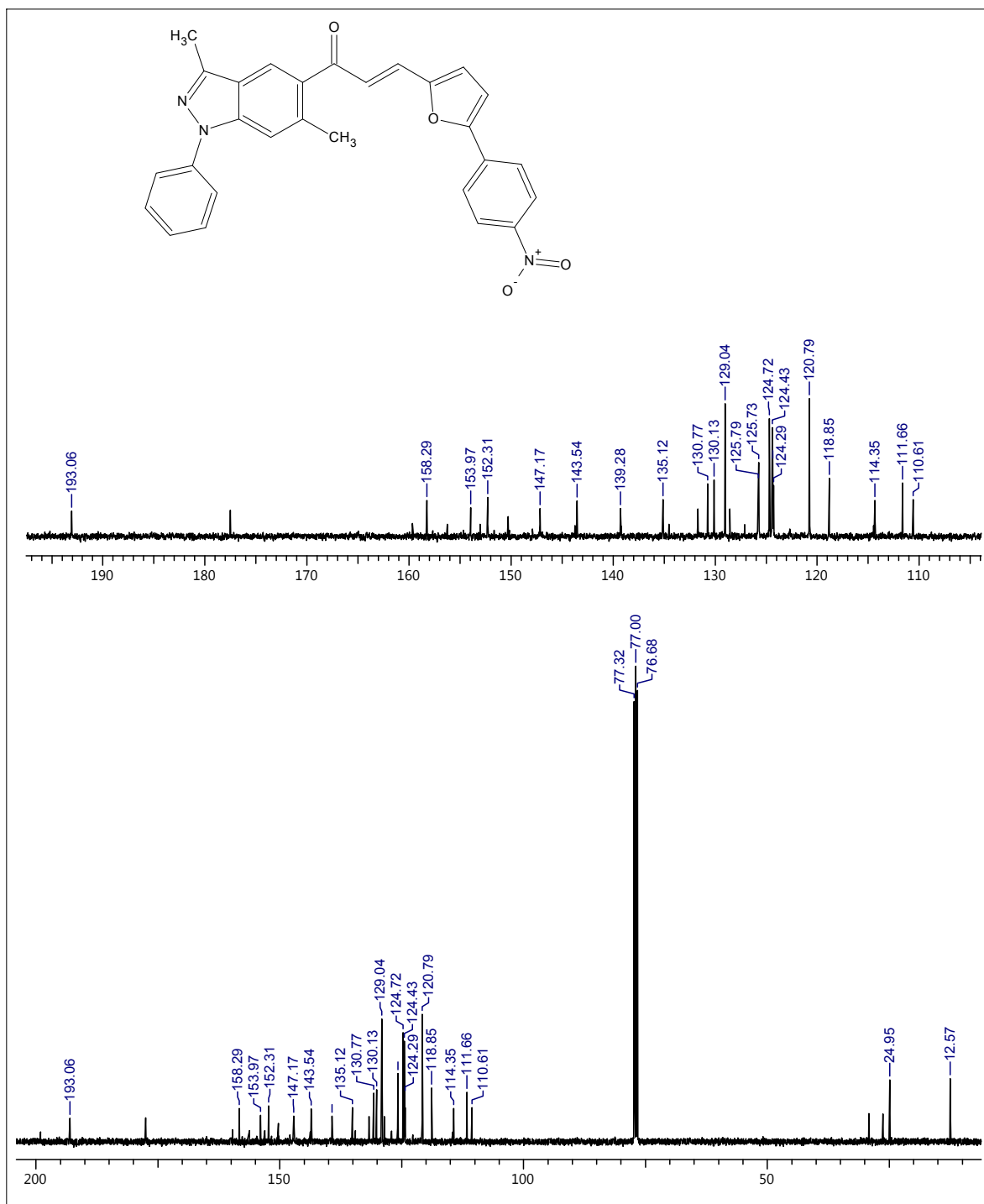


Fig. S60 ^{13}C -NMR spectra for *(E)*-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyridin-5-yl)-3-(5-(4-nitrophenyl)furan-2-yl)prop-2-en-1-one (**6n**)

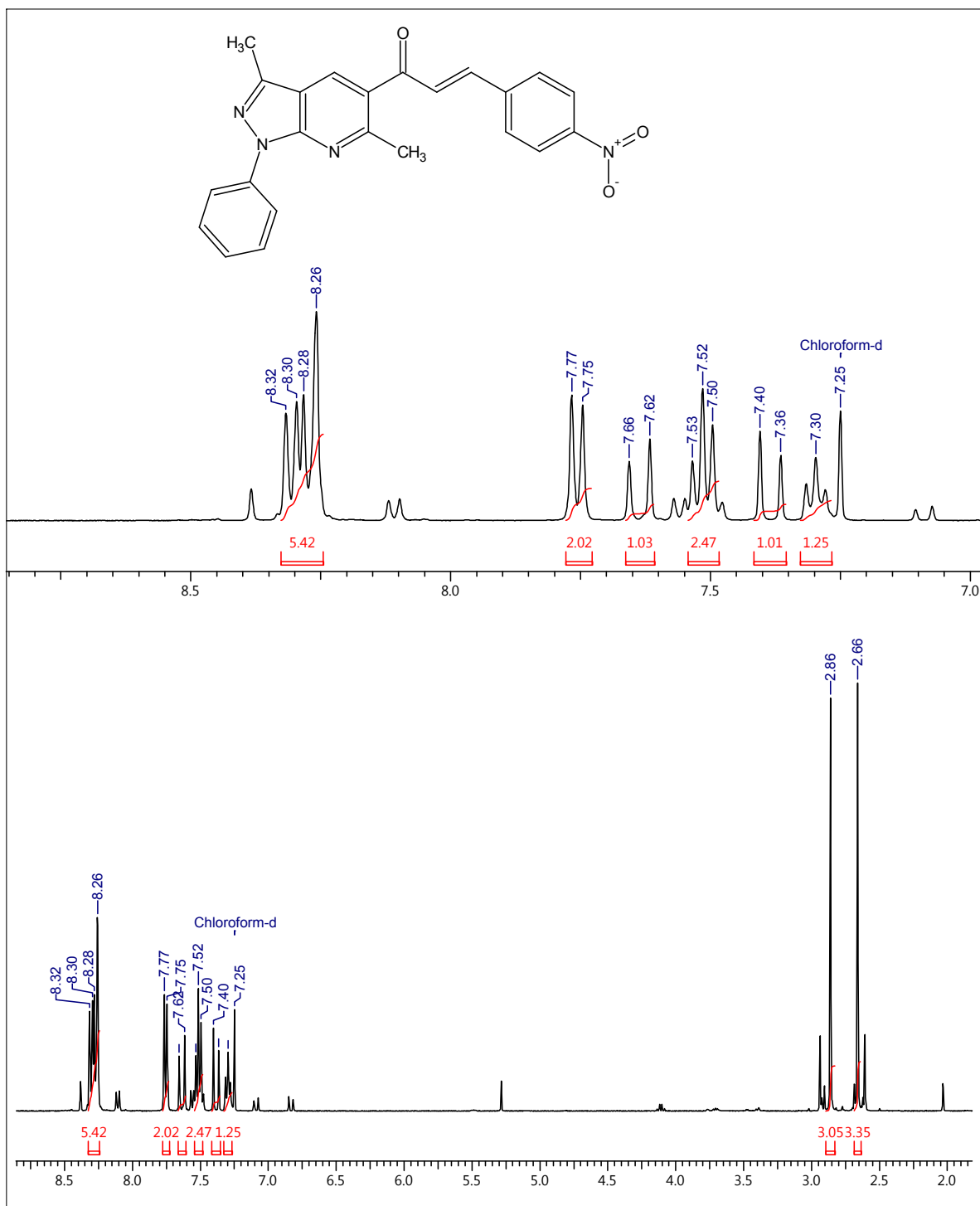


Fig. S61 ¹H-NMR spectra for (E)-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyridin-5-yl)-3-(4-nitrophenyl)prop-2-en-1-one (**6o**)

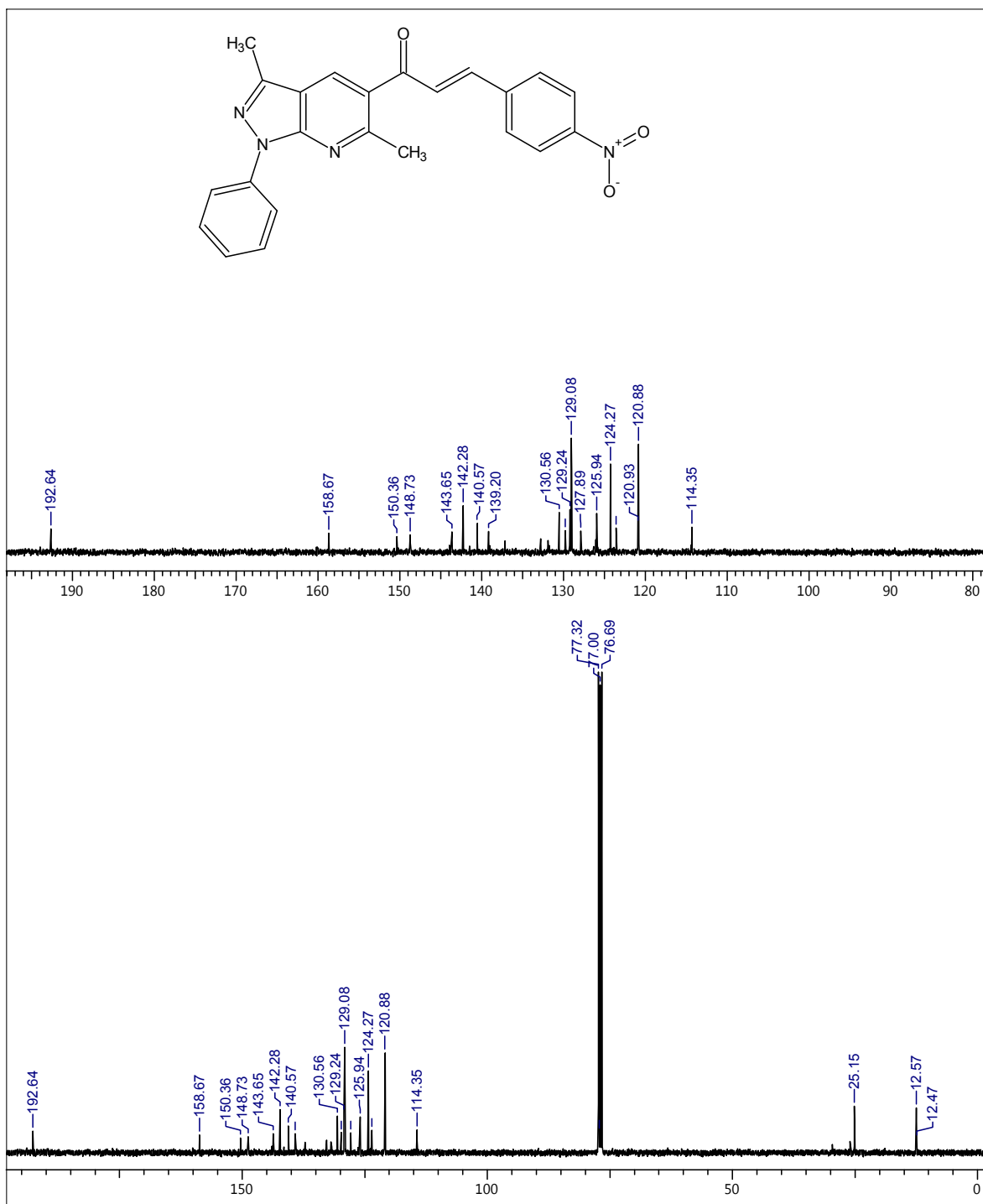


Fig. S62 ^{13}C -NMR spectra for (E)-1-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyridin-5-yl)-3-(4-nitrophenyl)prop-2-en-1-one (6o)