Supporting Information

For

DOUBLE MICHAEL ADDITION OF OXINDOLES TO DIENONES CATALYZED BY TBAB: AN EFFICIENT ROUTE TO SPIROCYCLIC OXINDOLES

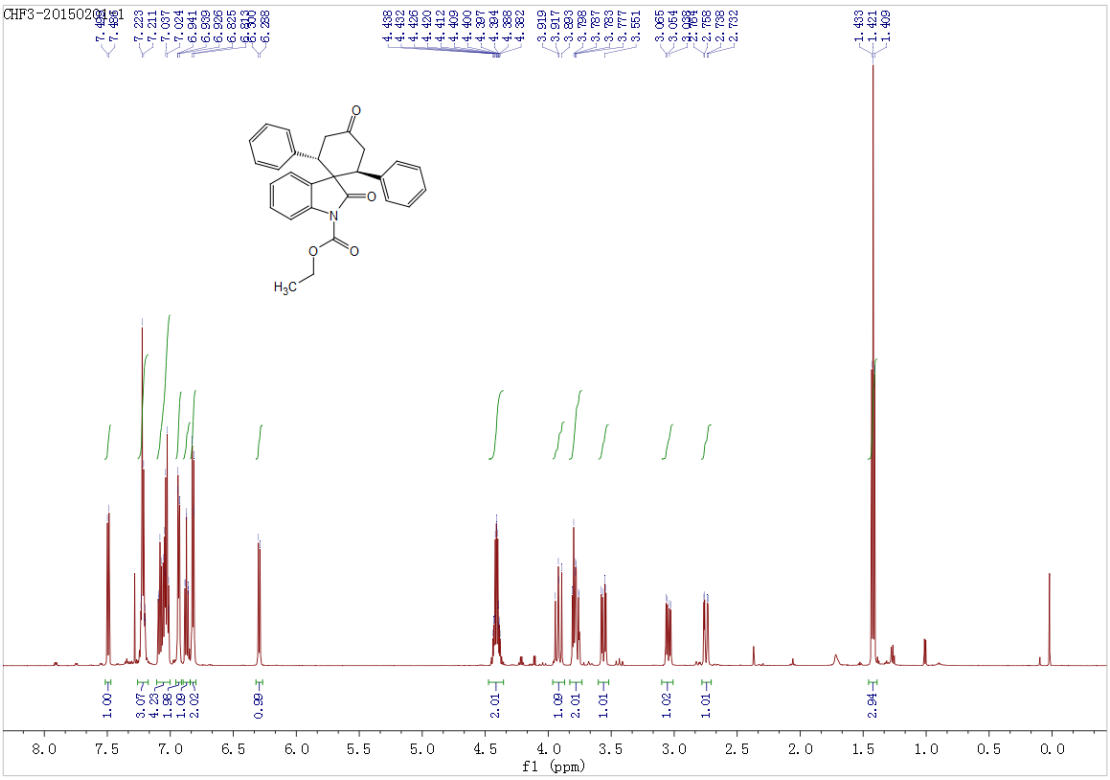
Haiyong Cao, [a,#] Yan Lin, [a,#] Pingnan Wan, [a] Wenqin Liu, [a] Jinxiang Zeng, [b*] and Hanfeng Cui [a*]

[a]School of Pharmacy, Jiangxi University of Traditional Chinese Medicine, Nanchang 330004, China. [b]Research Center of Chinese Medicine Resource and National Medicine, Jiangxi University of Traditional Chinese Medicine, Nanchang 330004, China.

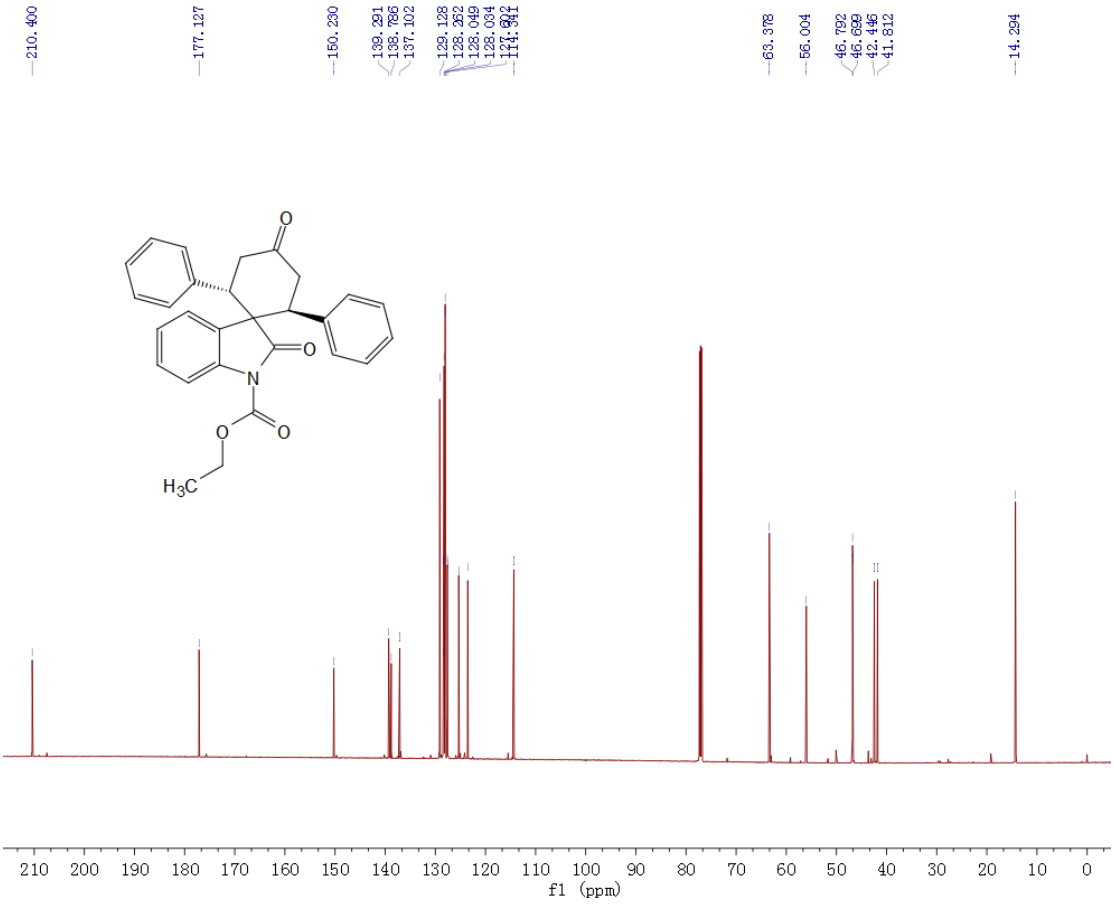
E-mail: zjx@jxutcm.edu.cn (J. X. Zeng); cuihanfeng@126.com (H. F. Cui). [#]The first two authors contribute equally to this work.

^{1}H NMR and ^{13}C NMR spectra of the compounds

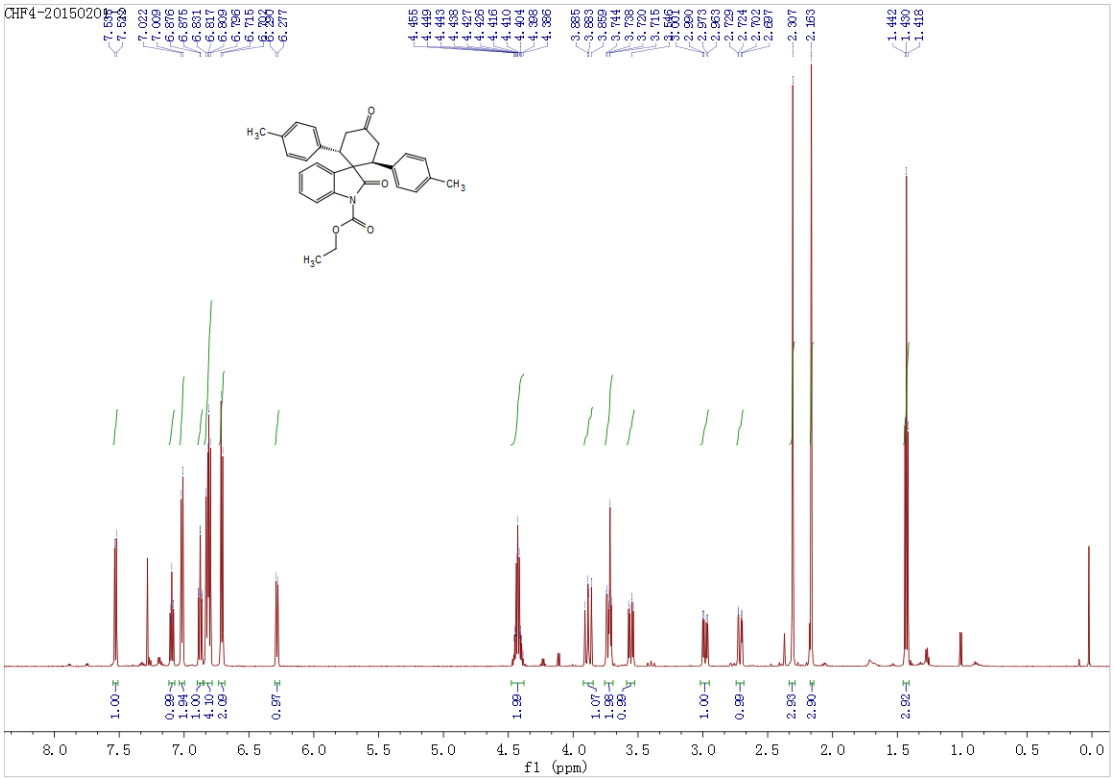
Ethyl-2',4-dioxo-2,6-diphenylspiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3a) ^{1}H NMR



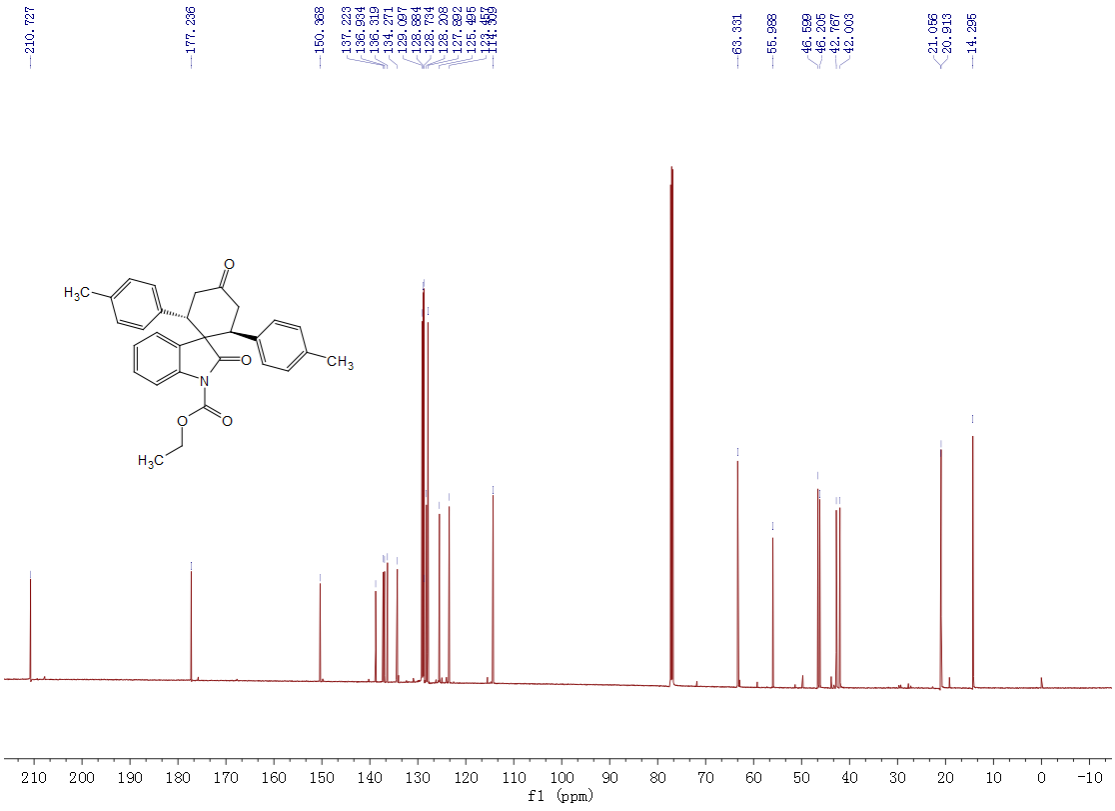
Ethyl-2',4-dioxo-2,6-diphenylspiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3a) ^{13}C NMR



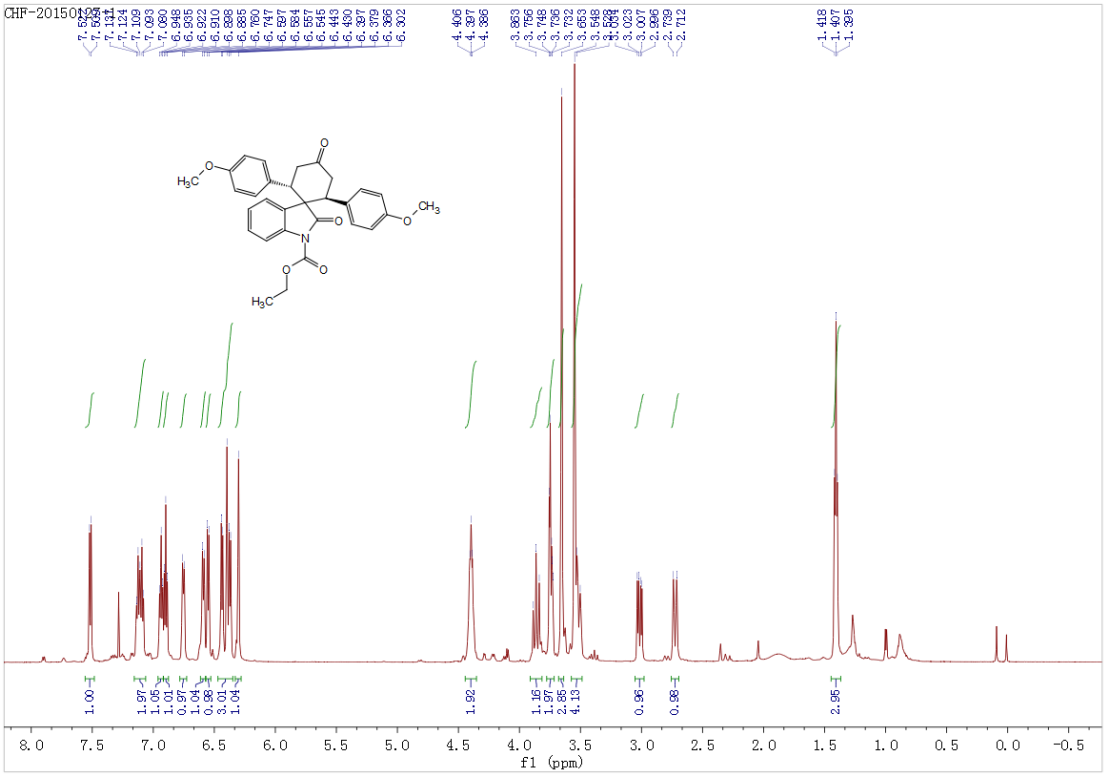
Ethyl-2',4-dioxo-2,6-dip-tolylspiro[cyclohexane-1,3'-indoline]-1'-carboxylate(3b) ^{1}H NMR



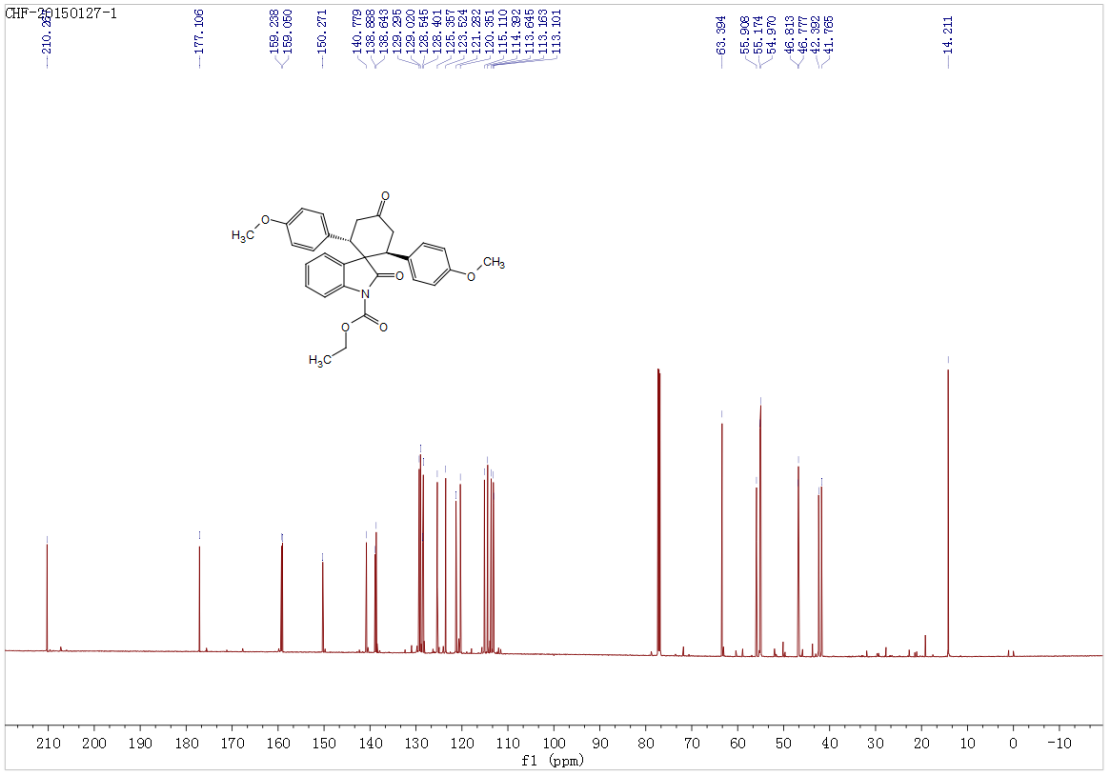
Ethyl-2',4-dioxo-2,6-dip-tolylspiro[cyclohexane-1,3'-indoline]-1'-carboxylate(3b) ^{13}C NMR



Ethyl-2,6-bis(4-methoxyphenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3c) ^{1}H NMR

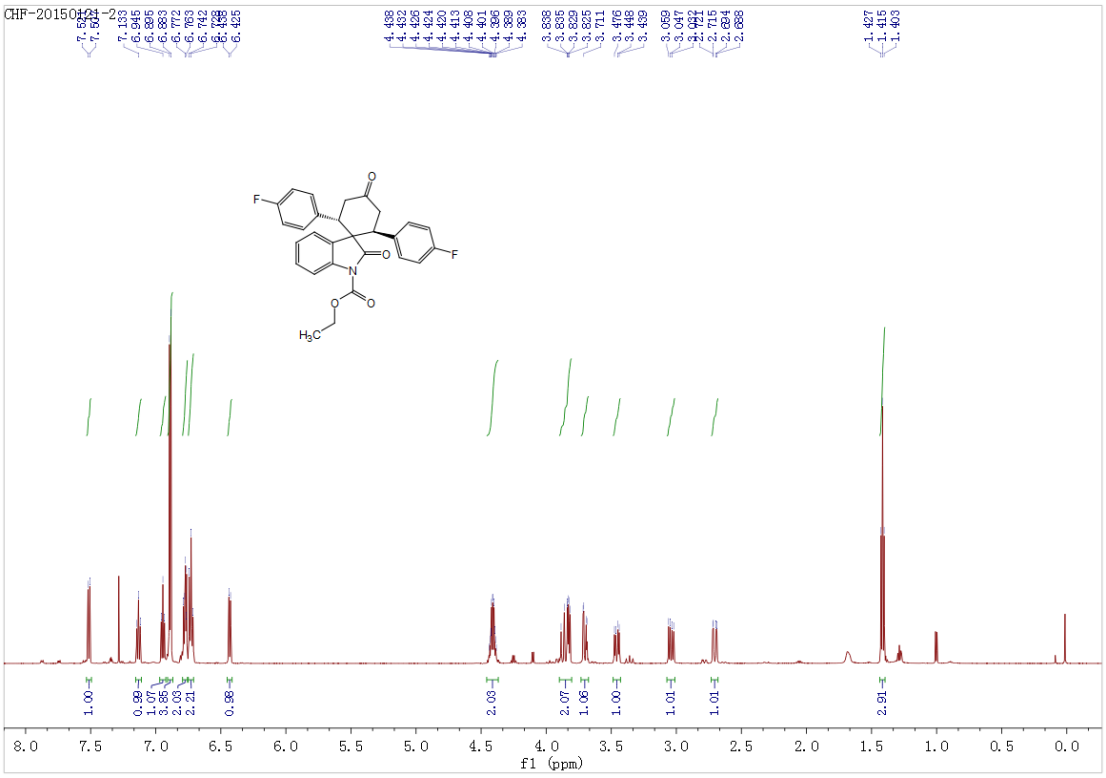


Ethyl-2,6-bis(4-methoxyphenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3c) ^{13}C NMR



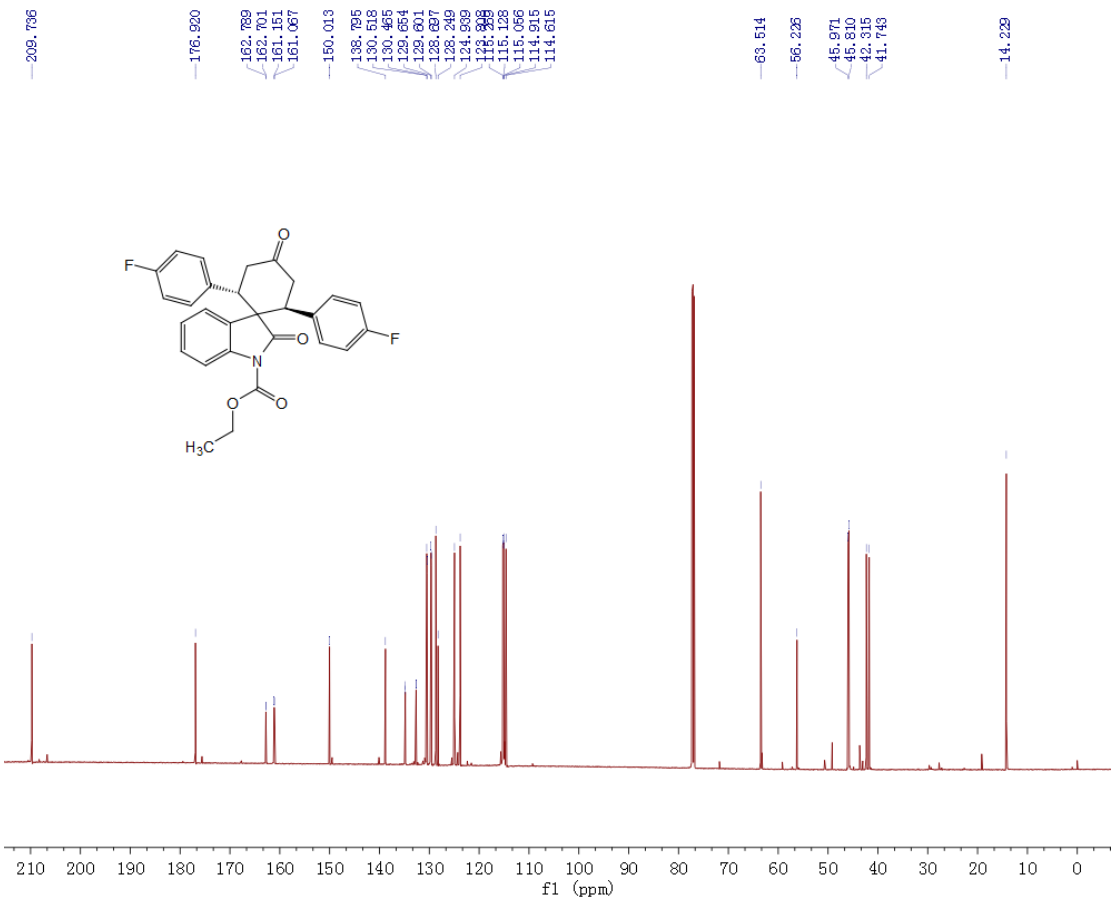
Ethyl-2,6-bis(4-fluorophenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3d)

^{1}H NMR



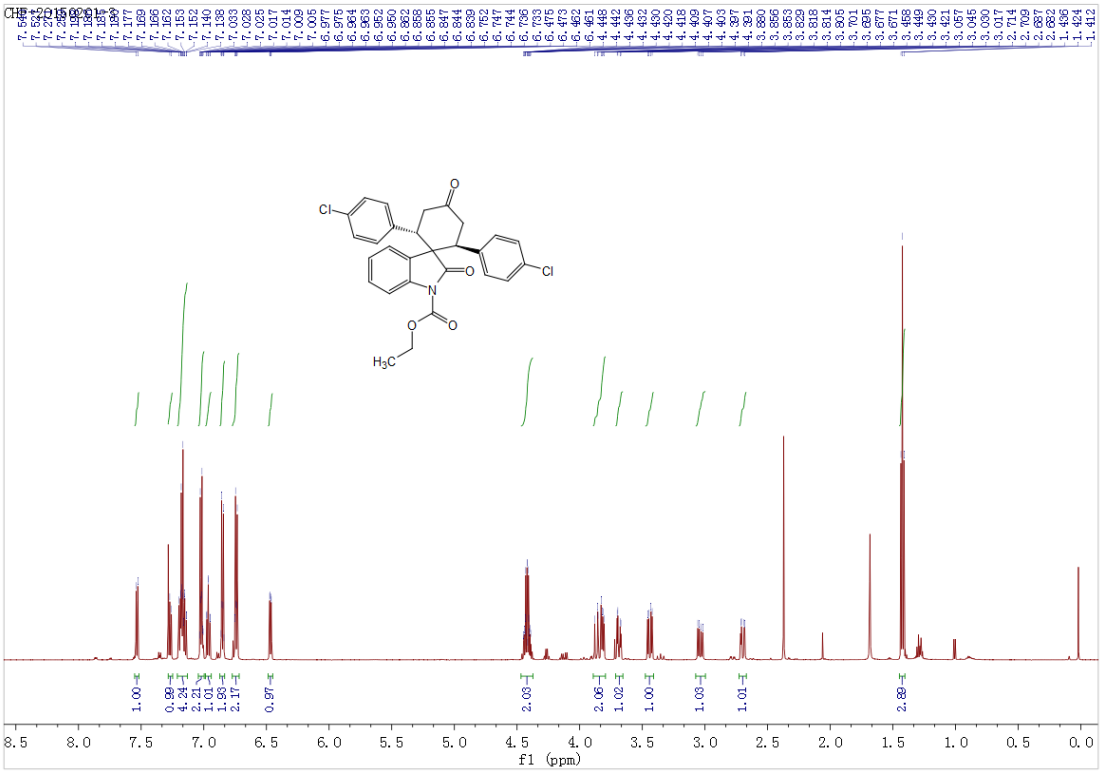
Ethyl-2,6-bis(4-fluorophenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3d)

^{13}C NMR



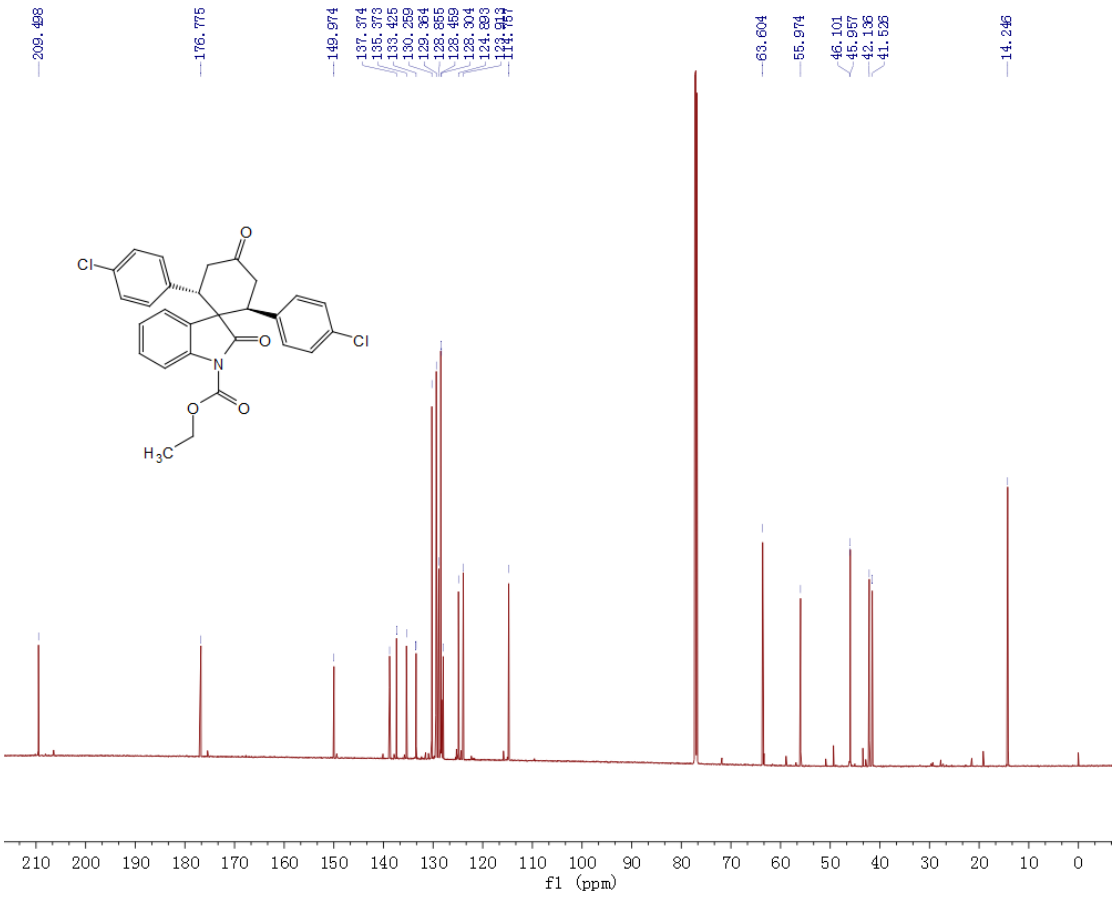
Ethyl-2,6-bis(4-chlorophenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3e)

^{1}H NMR



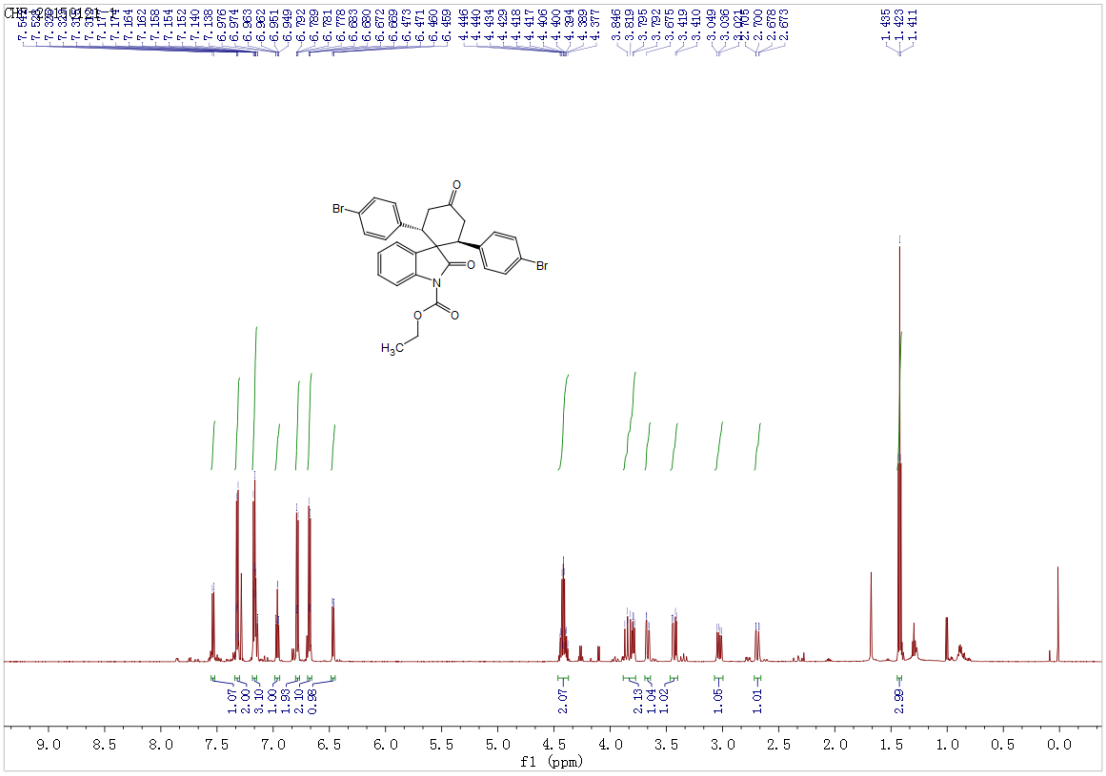
Ethyl-2,6-bis(4-chlorophenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3e)

^{13}C NMR



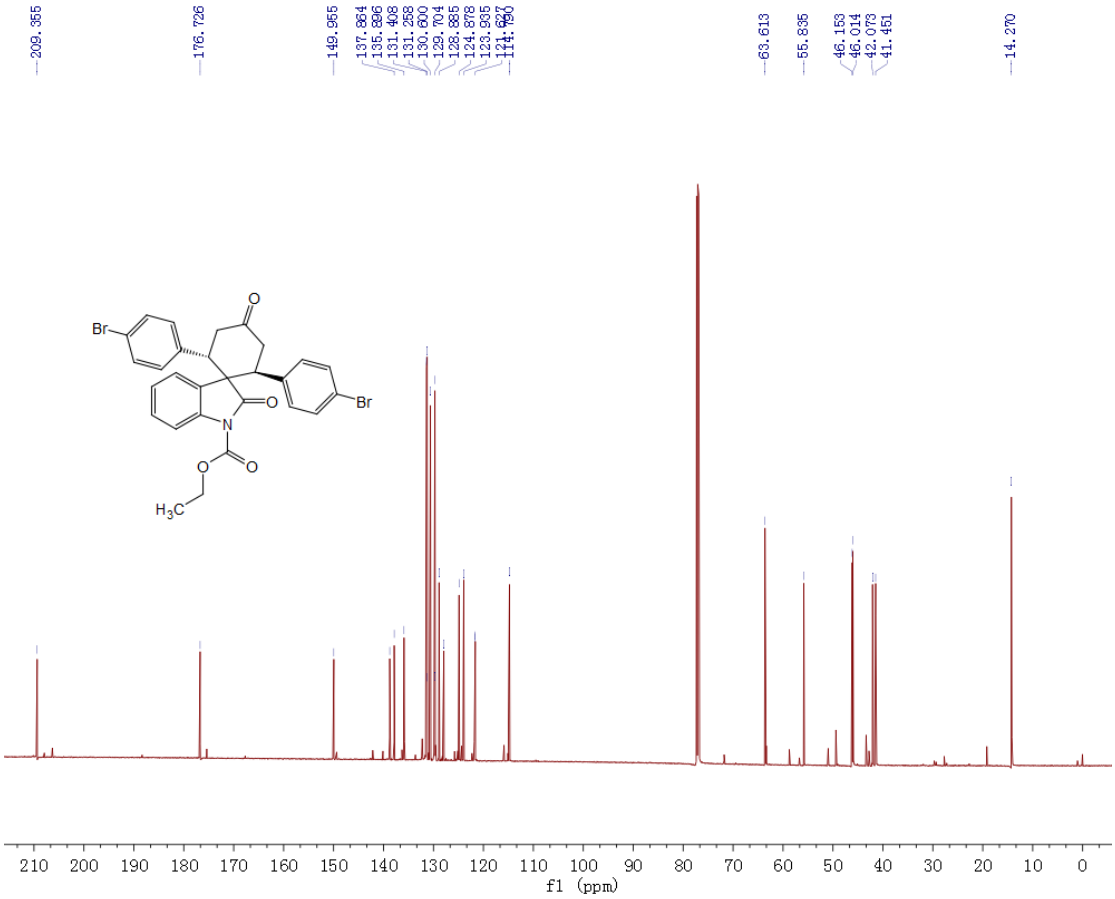
Ethyl-2,6-bis(4-bromophenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3f)

^{1}H NMR



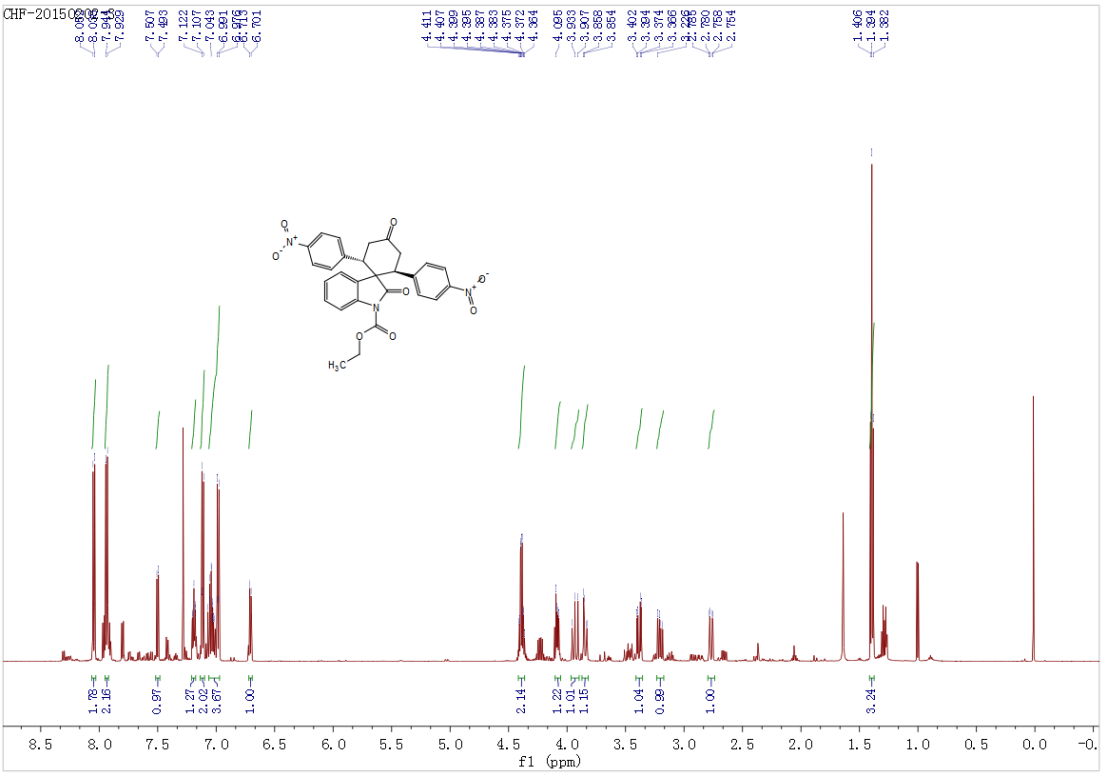
Ethyl-2,6-bis(4-bromophenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3f)

^{13}C NMR



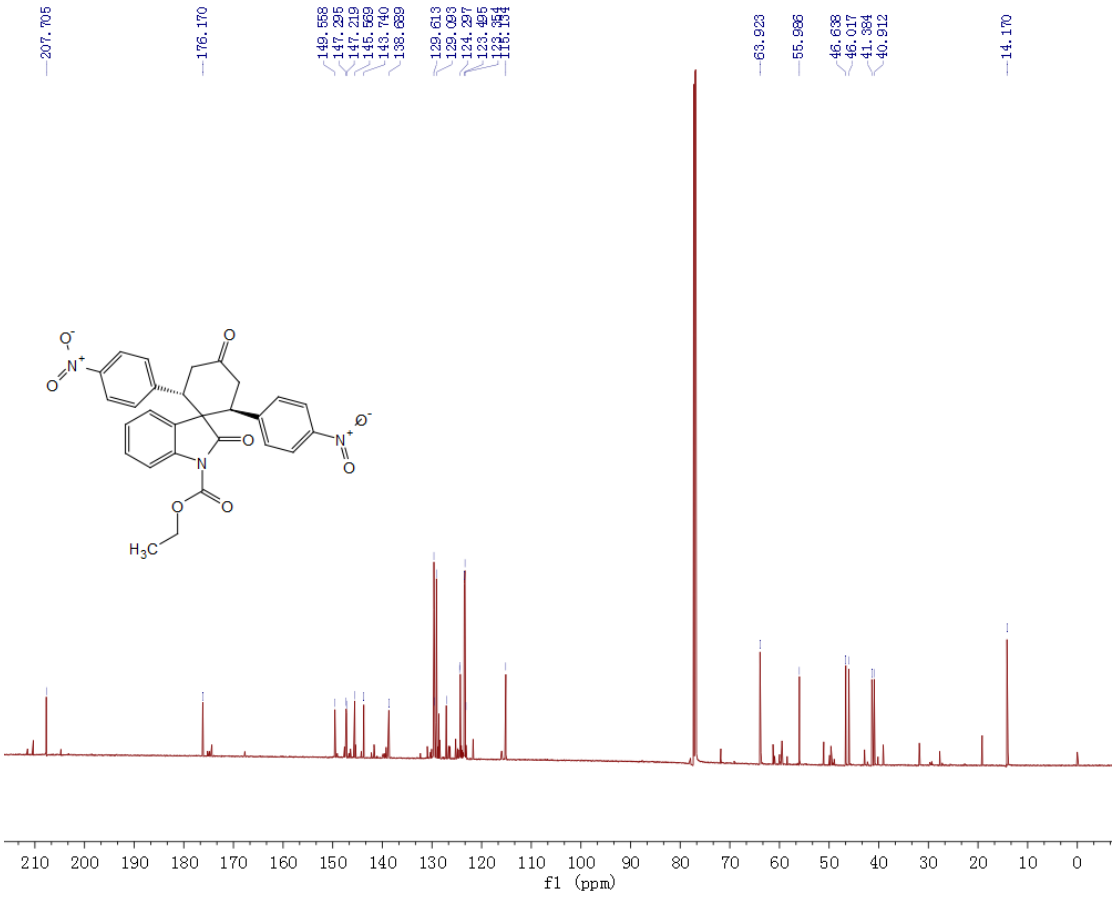
Ethyl-2,6-bis(4-nitrophenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3g)

^{1}H NMR



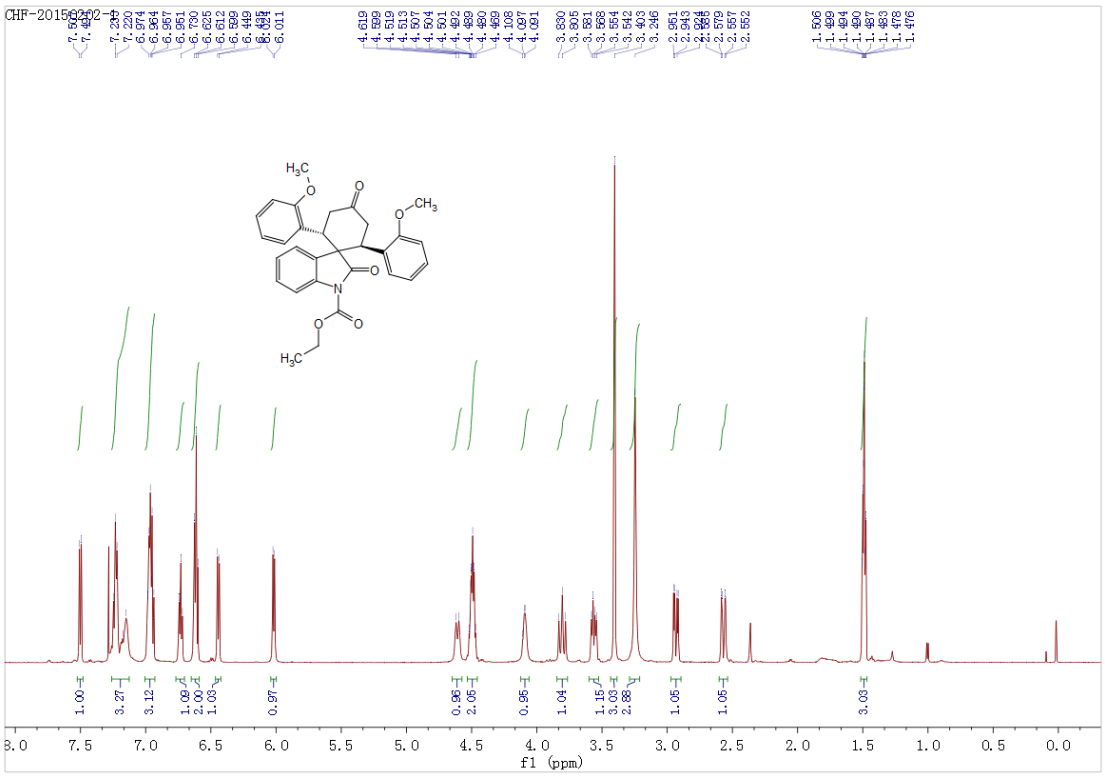
Ethyl-2,6-bis(4-nitrophenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3g)

^{13}C NMR



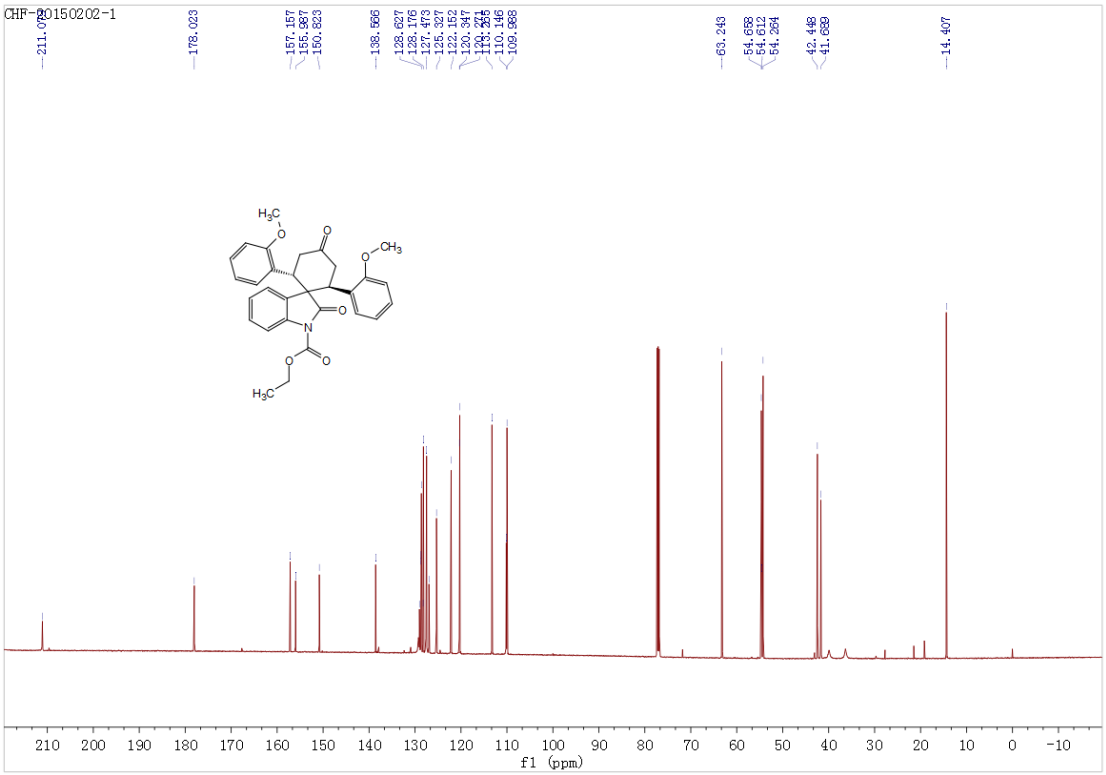
Ethyl-2,6-bis(2-methoxyphenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3i)

^{1}H NMR



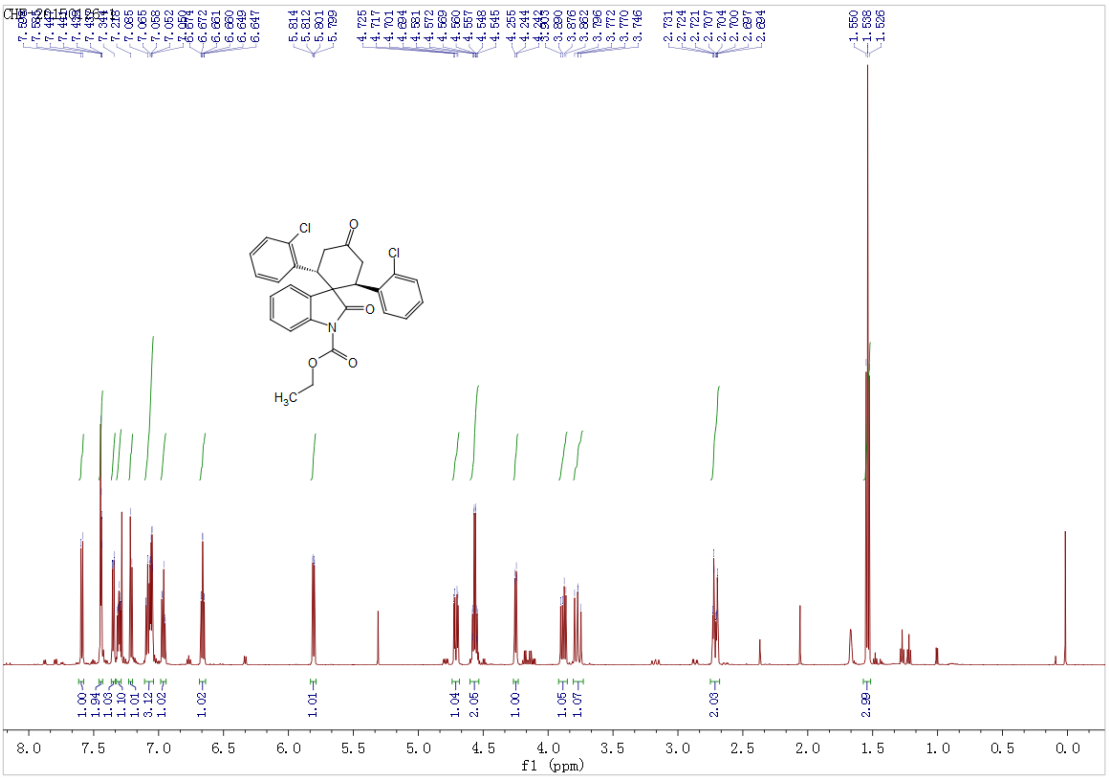
Ethyl-2,6-bis(2-methoxyphenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3i)

^{13}C NMR



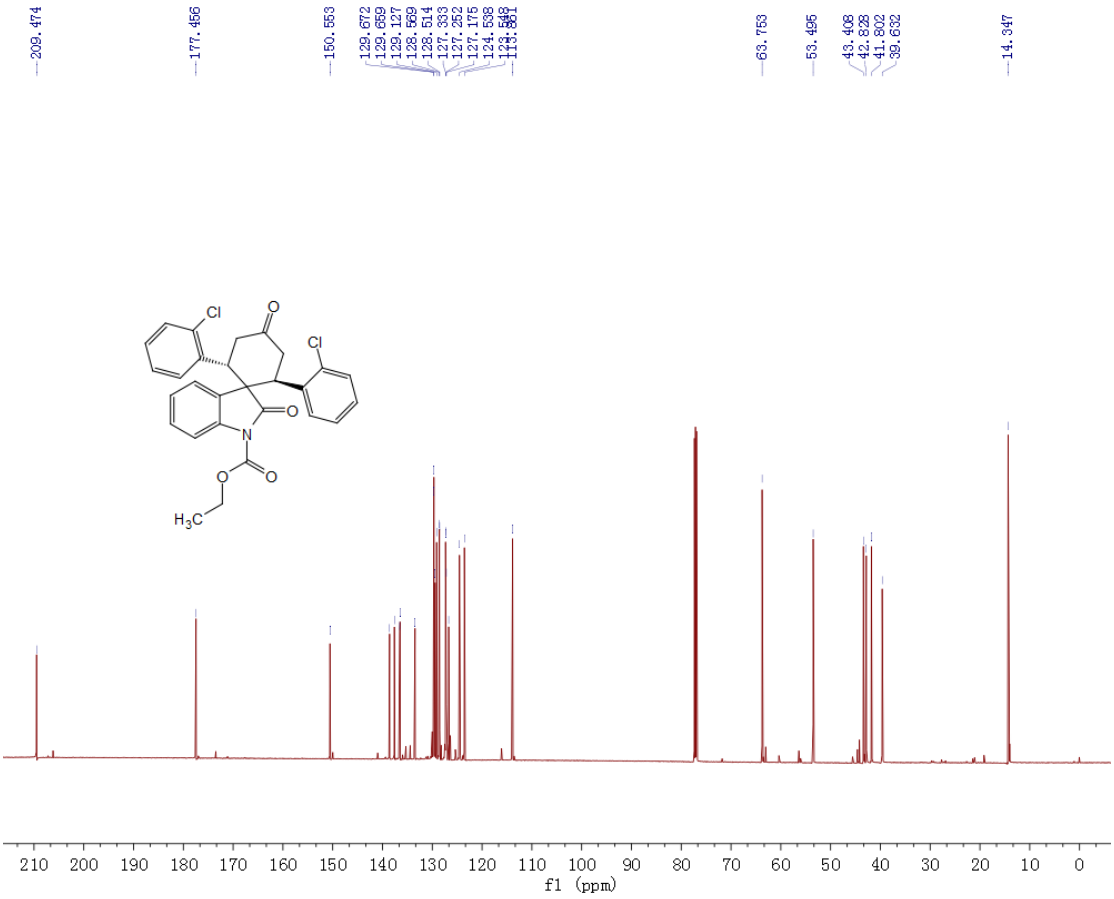
Ethyl-2,6-bis(2-chlorophenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3j)

^{1}H NMR

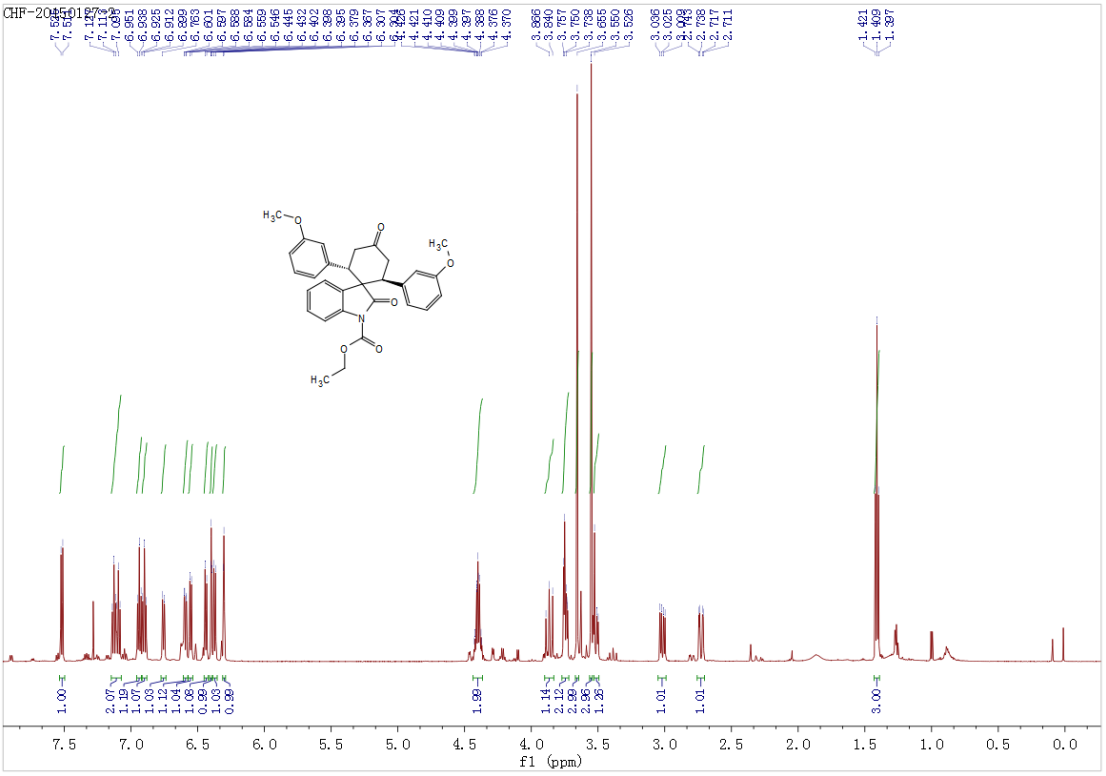


Ethyl-2,6-bis(2-chlorophenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3j)

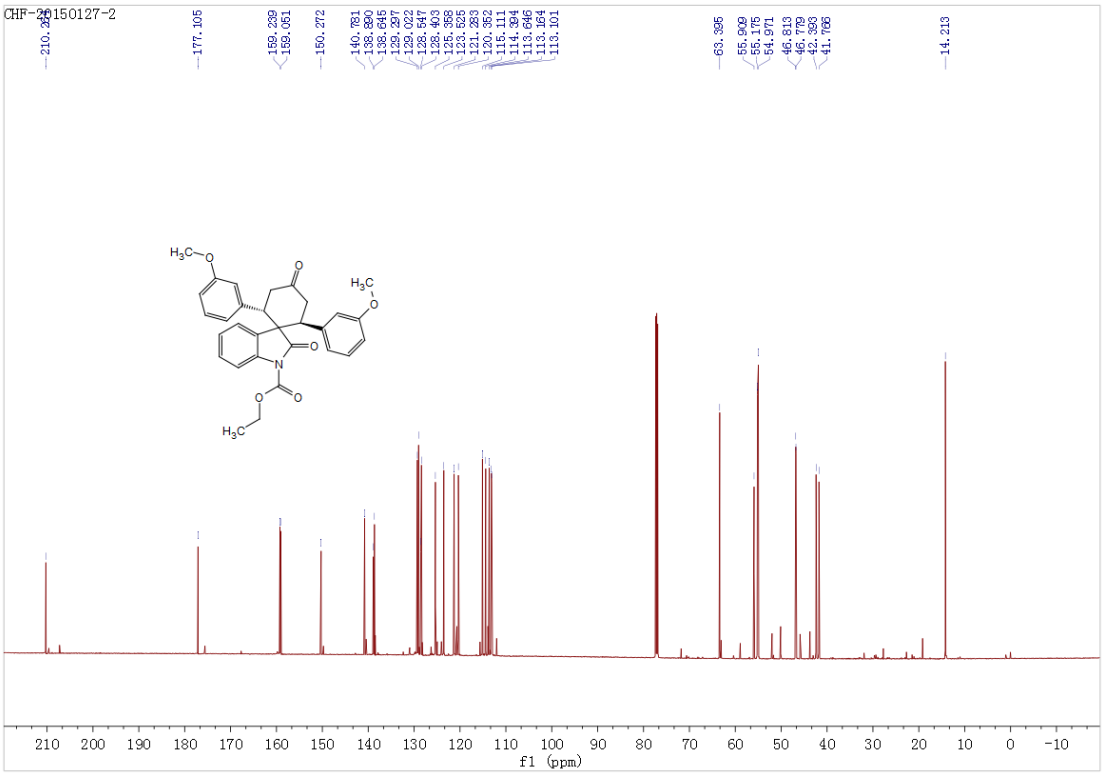
^{13}C NMR



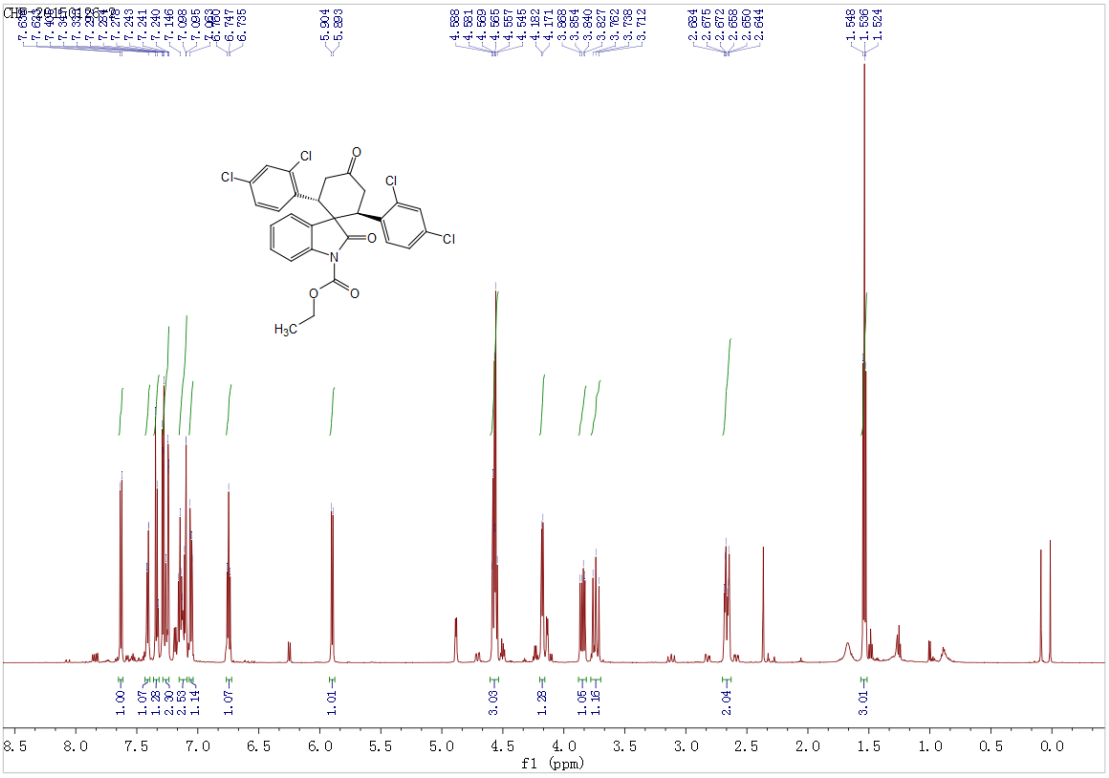
Ethyl-2,6-bis(3-methoxyphenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3k) ^{1}H NMR



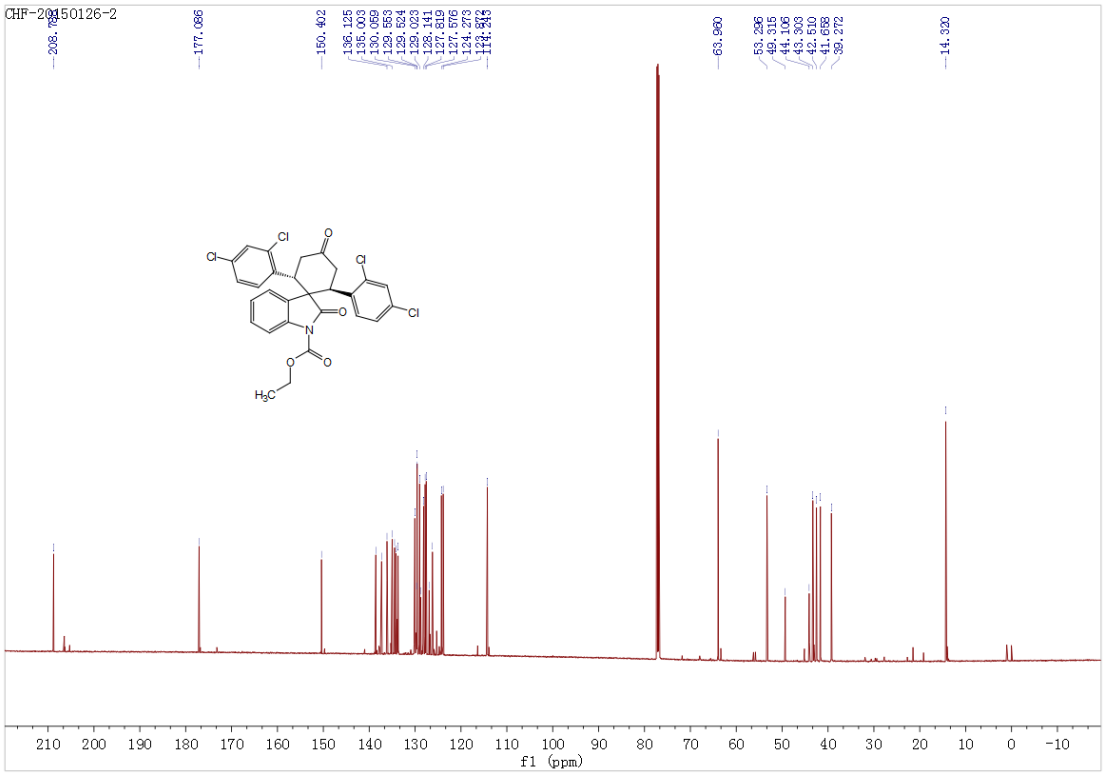
Ethyl-2,6-bis(3-methoxyphenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3k) ^{13}C NMR



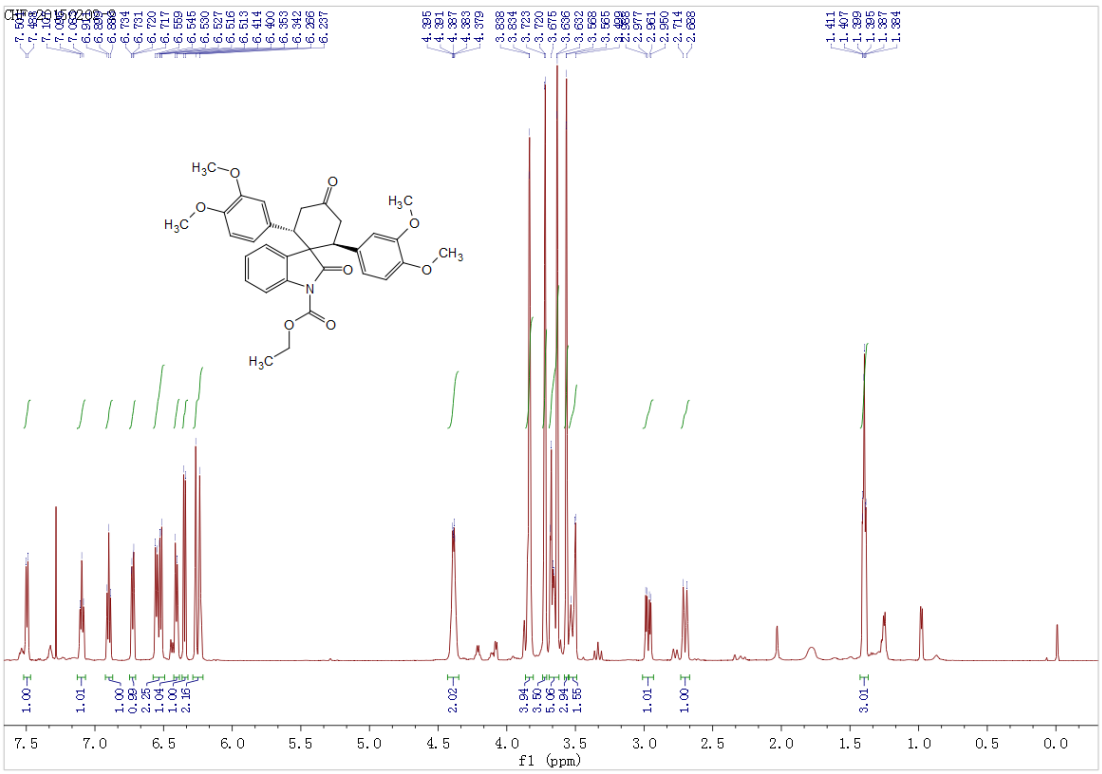
Ethyl-2,6-bis(2,4-dichlorophenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3l) ^{1}H NMR



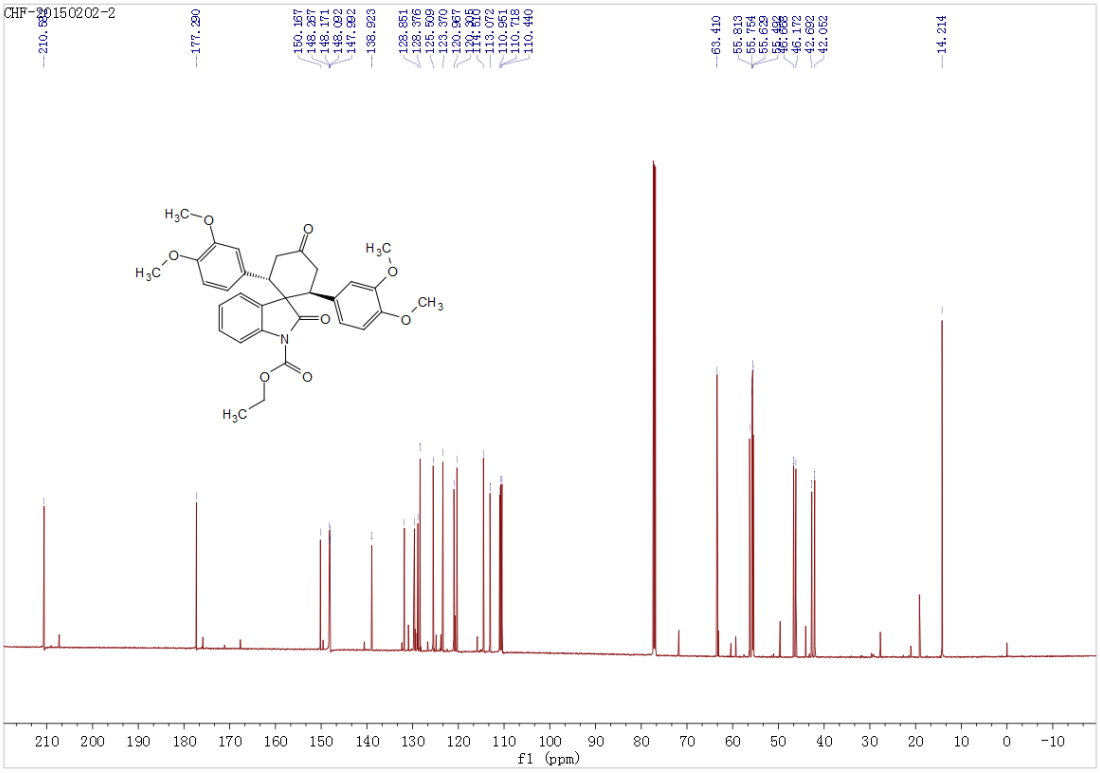
Ethyl-2,6-bis(2,4-dichlorophenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3l) ^{13}C NMR



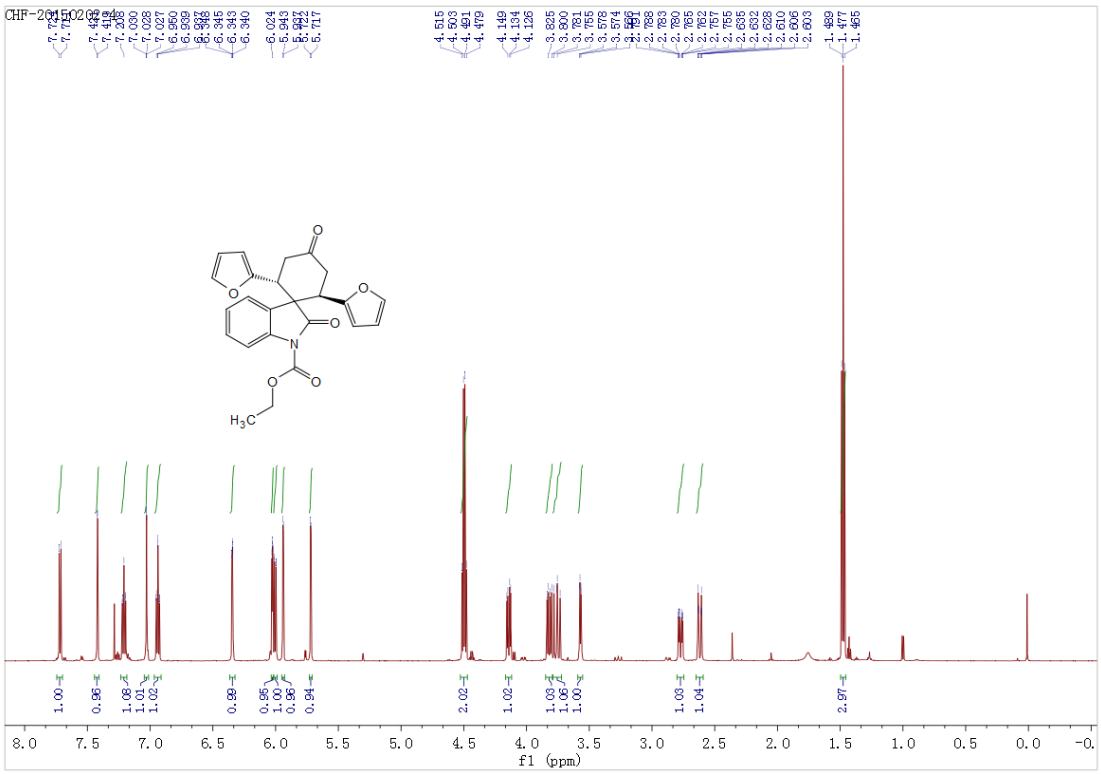
Ethyl-2,6-bis(3,4-dimethoxyphenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3m) ^{1}H NMR



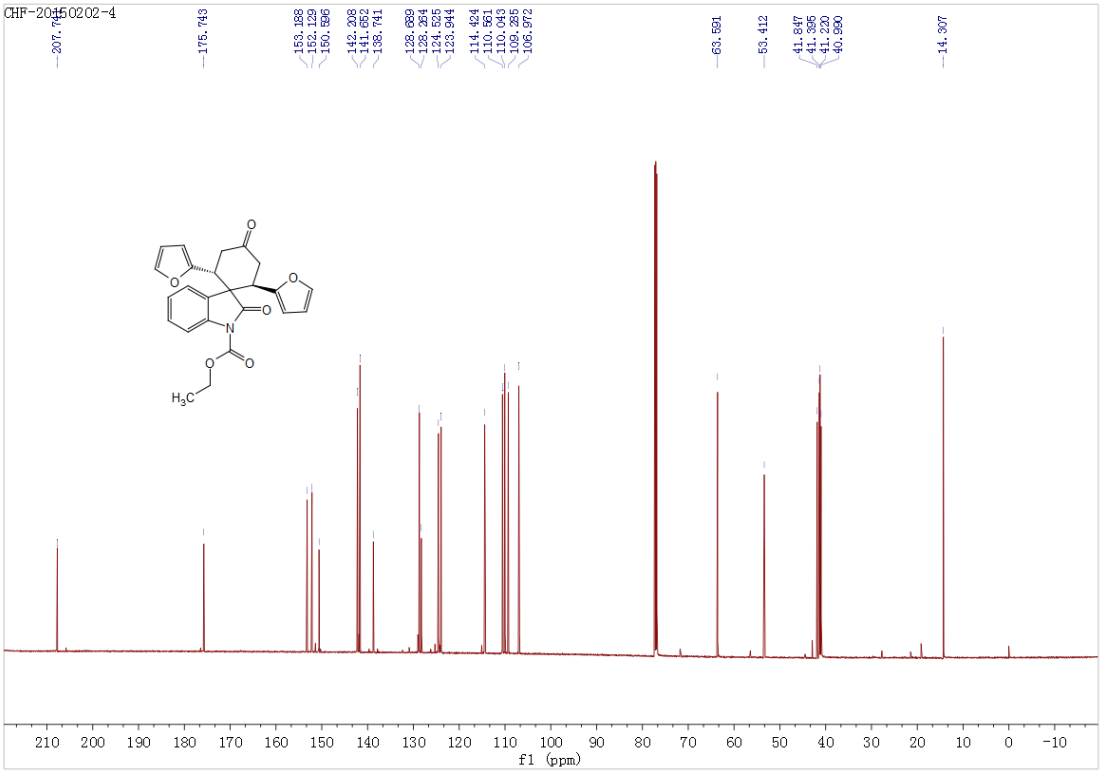
Ethyl-2,6-bis(3,4-dimethoxyphenyl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3m) ^{13}C NMR



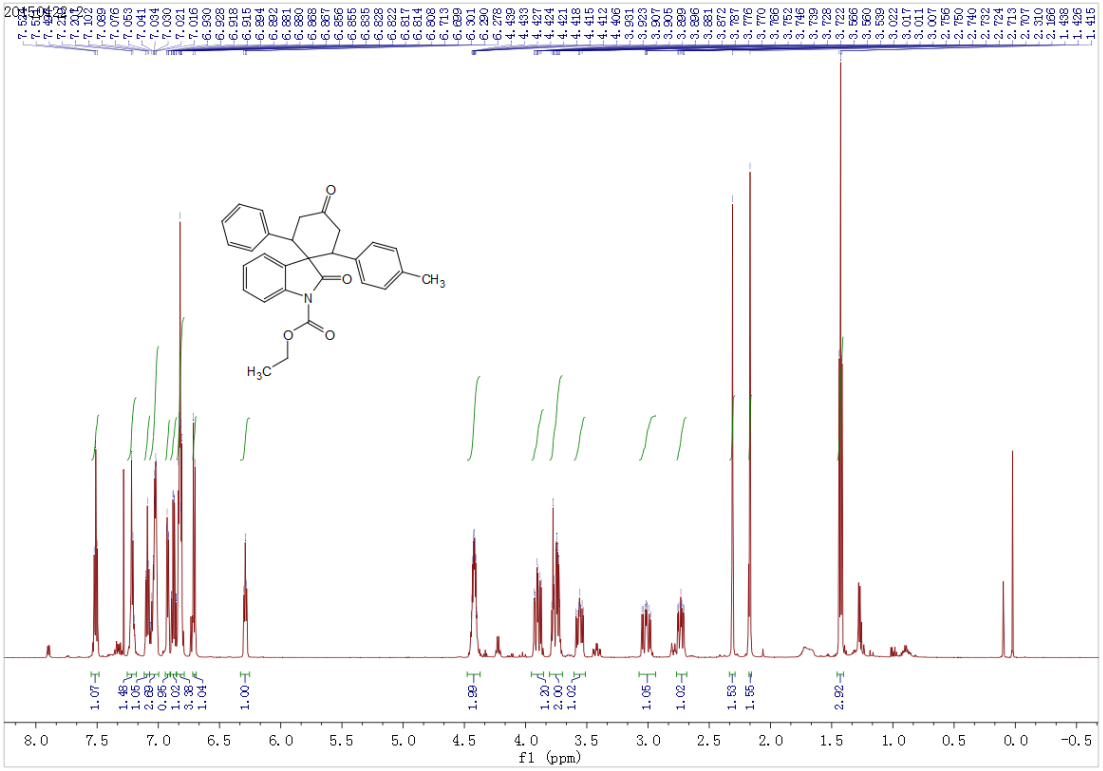
Ethyl-2,6-di(furan-2-yl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3n) ^{1}H NMR



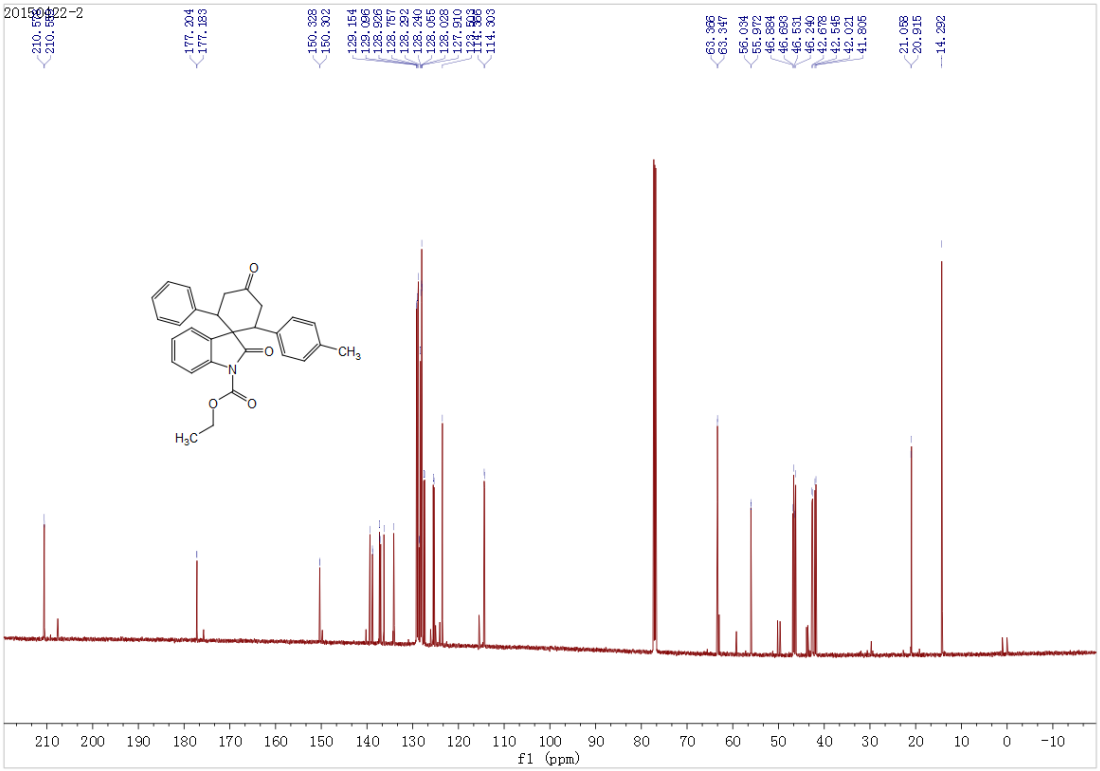
Ethyl-2,6-di(furan-2-yl)-2',4-dioxospiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3n) ^{13}C NMR



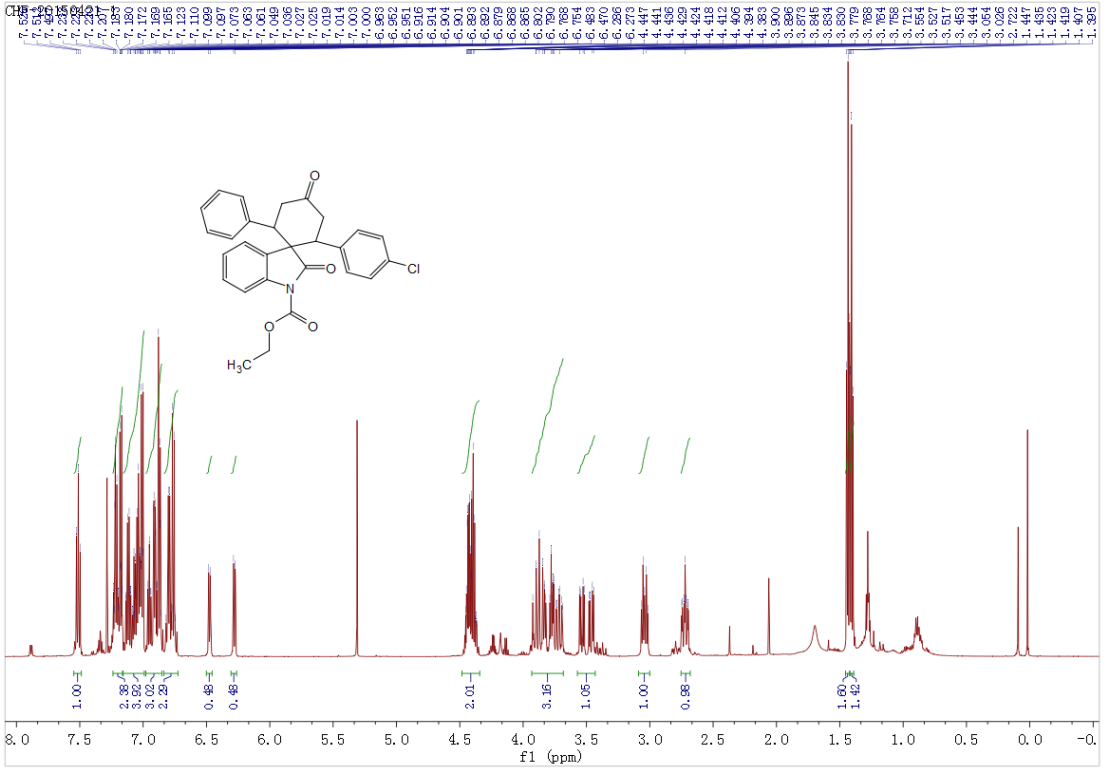
Ethyl-2',4-dioxo-2-phenyl-6-p-tolylspiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3o) ^{1}H NMR



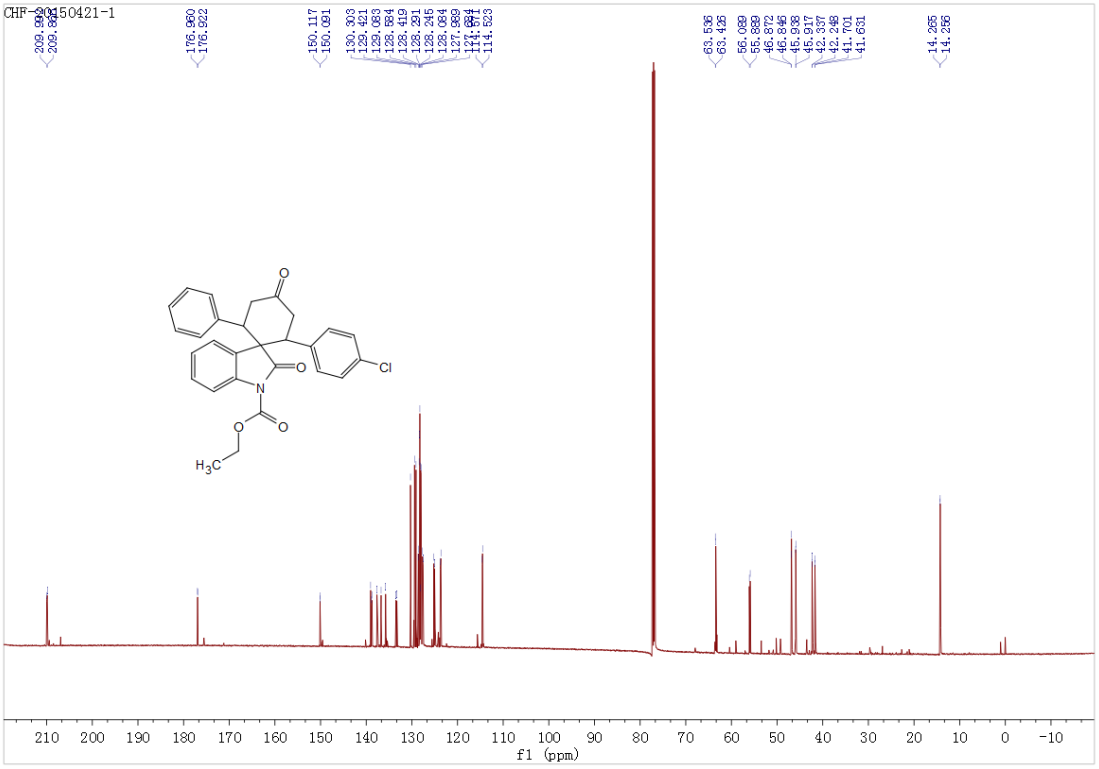
Ethyl-2',4-dioxo-2-phenyl-6-p-tolylspiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3o) ^{13}C NMR



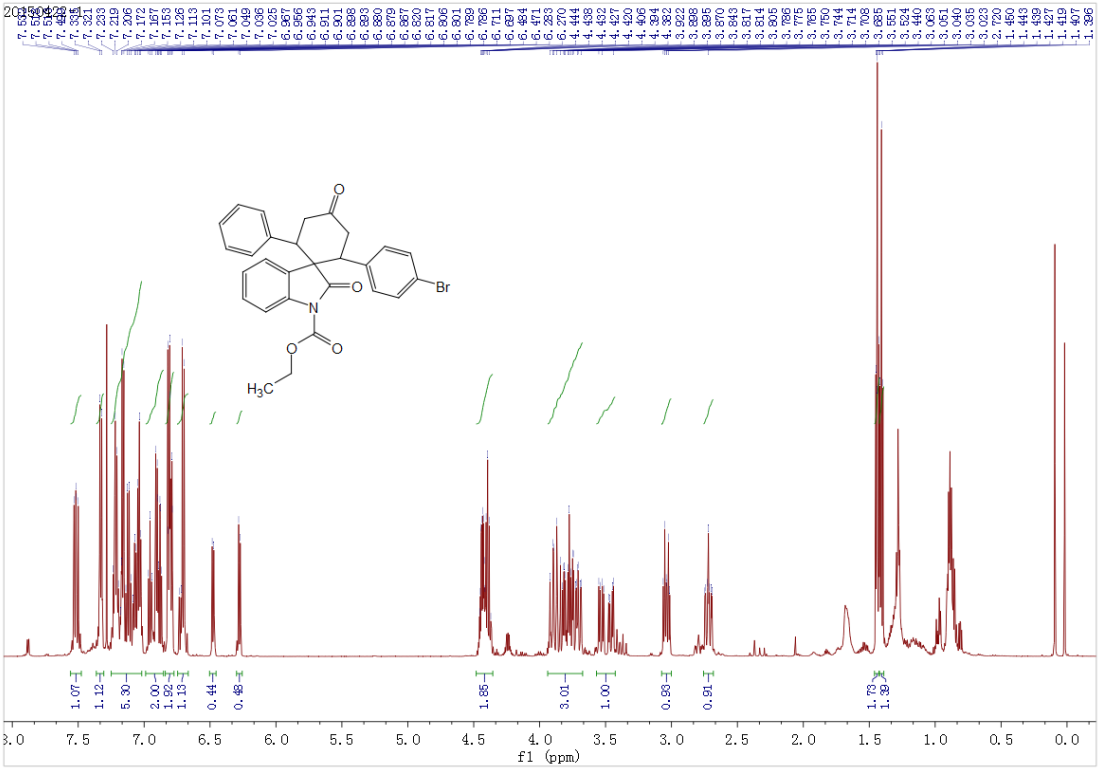
Ethyl-2-(4-chlorophenyl)-2',4-dioxo-6-phenylspiro[cyclohexane-1, 3'-indoline]-1'-carboxylate (3p) ^{1}H NMR



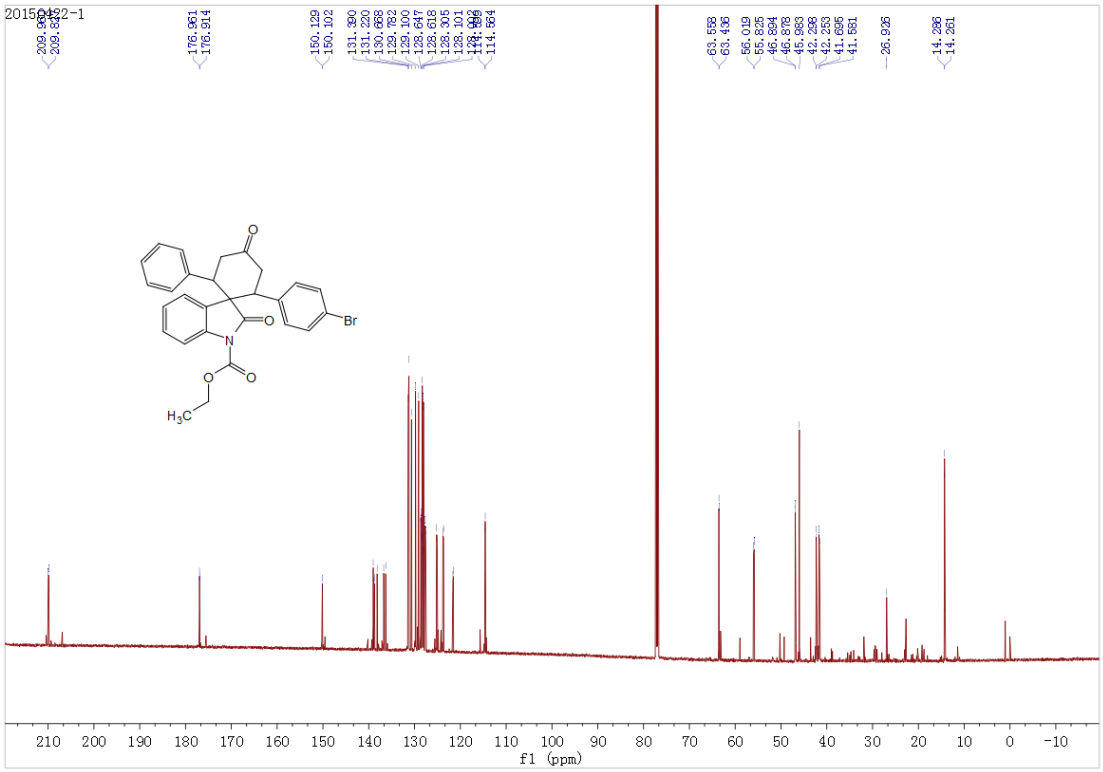
Ethyl-2-(4-chlorophenyl)-2',4-dioxo-6-phenylspiro[cyclohexane-1, 3'-indoline]-1'-carboxylate (3p) ^{13}C NMR



Ethyl-2-(4-bromophenyl)-2',4-dioxo-6-phenylspiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3q) ^{1}H NMR

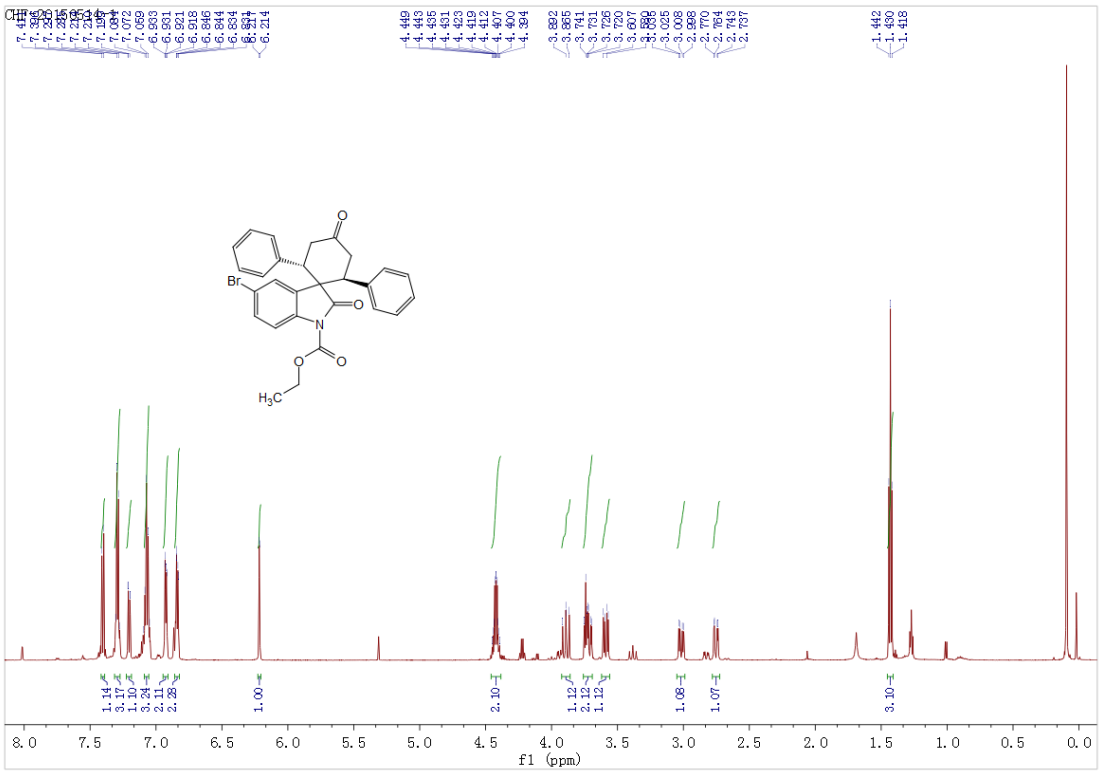


Ethyl-2-(4-bromophenyl)-2',4-dioxo-6-phenylspiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3q) ^{13}C NMR



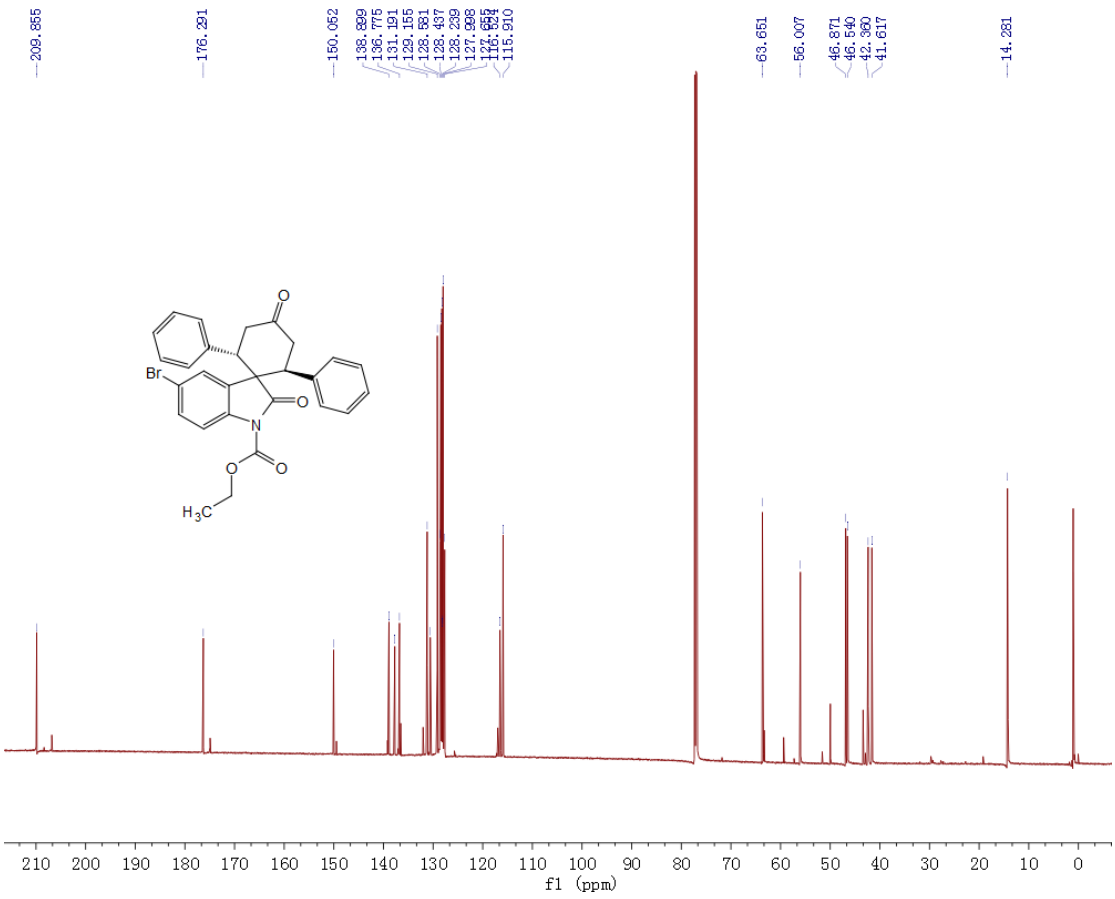
Ethyl-5'-bromo-2',4-dioxo-2,6-diphenylspiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3r)

^{1}H NMR

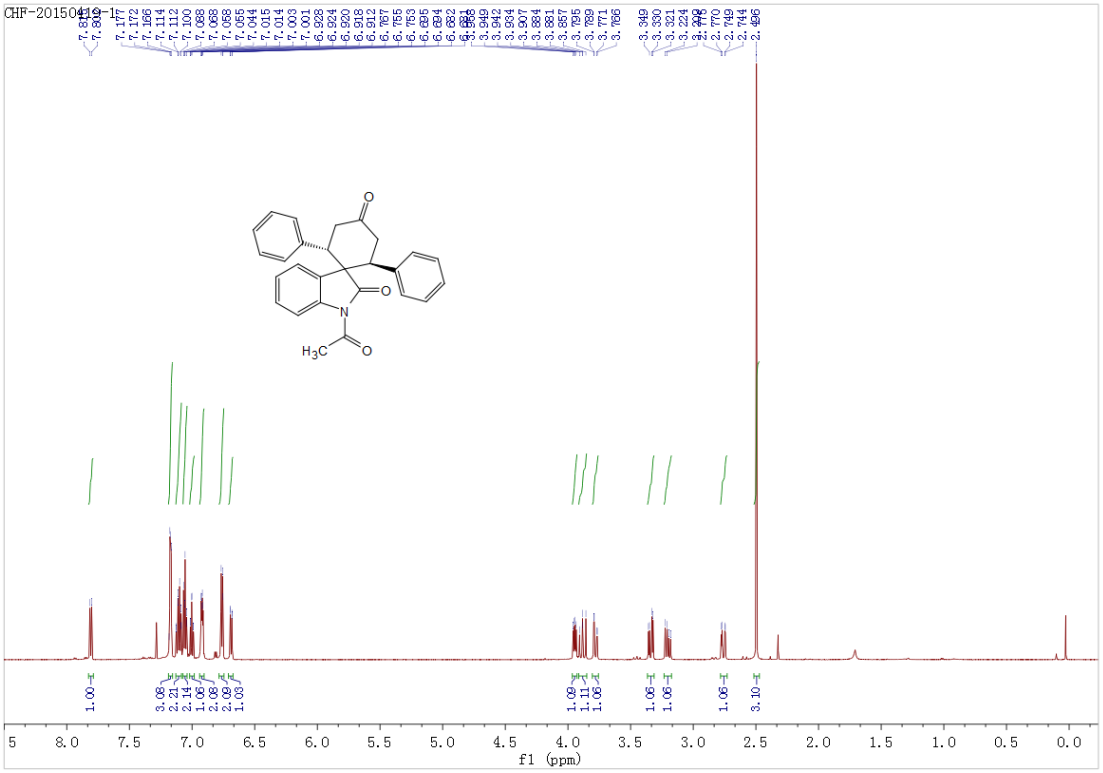


Ethyl-5'-bromo-2',4-dioxo-2,6-diphenylspiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3r)

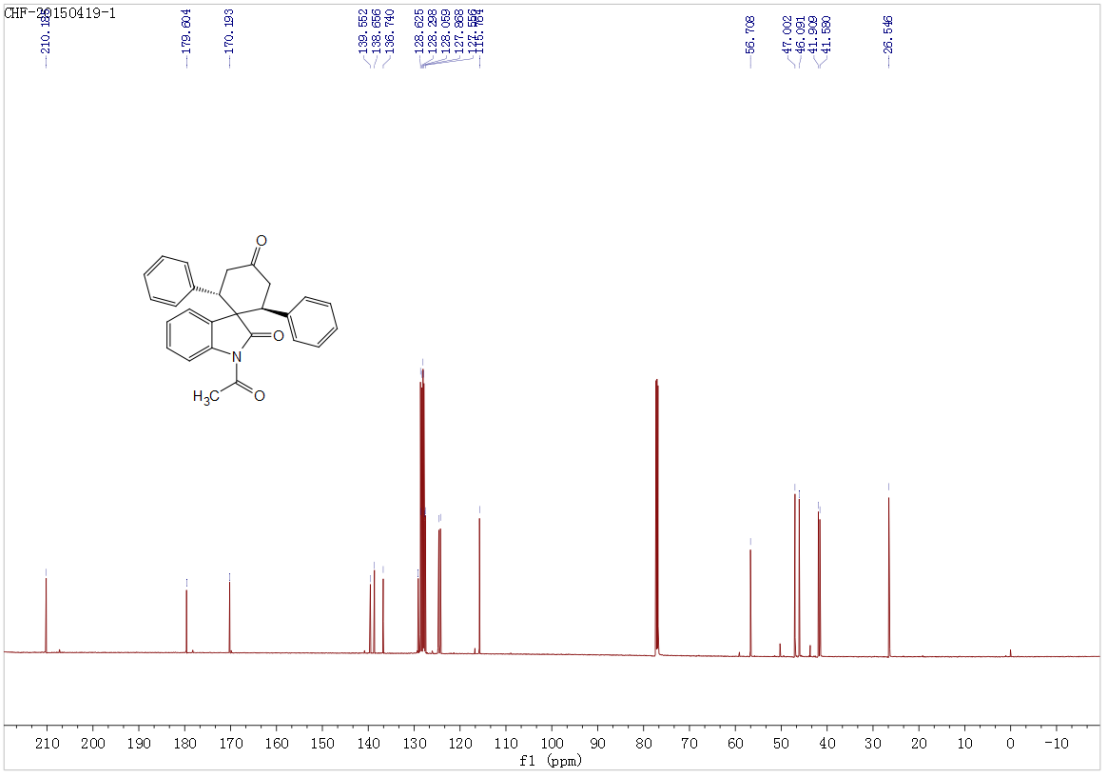
^{13}C NMR



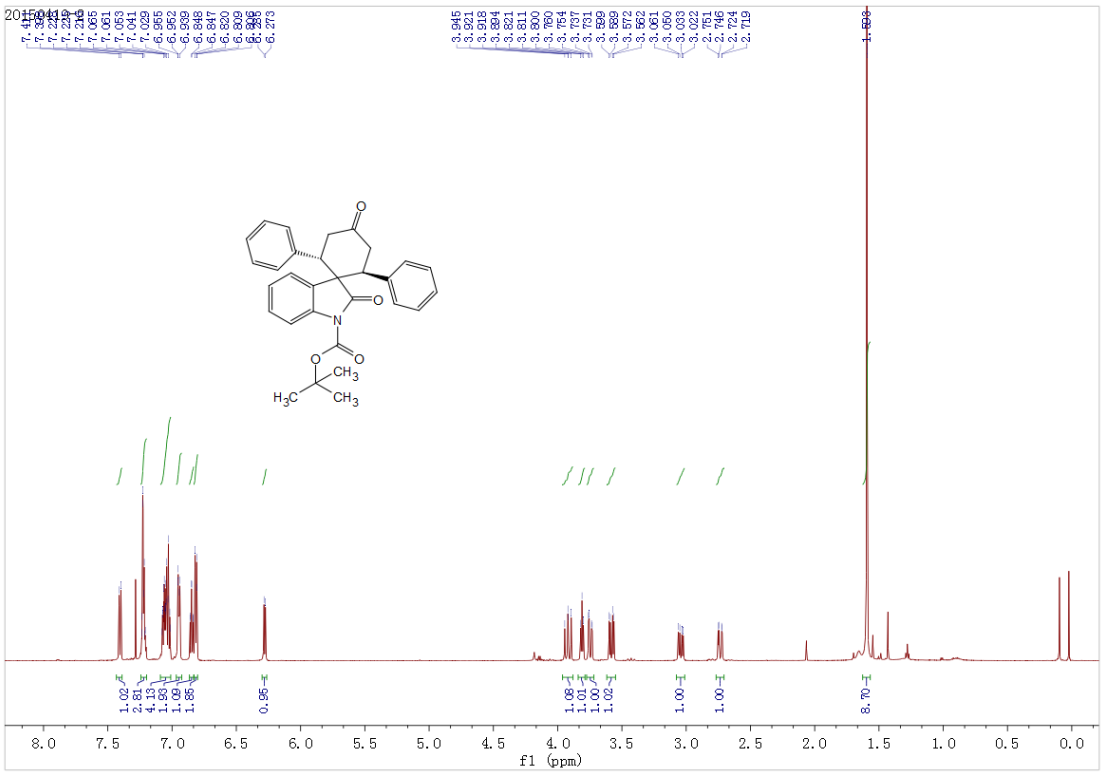
1'-acetyl-2,6-diphenylspiro[cyclohexane-1,3'-indoline]-2',4-dione (3s) ^{1}H NMR



1'-acetyl-2,6-diphenylspiro[cyclohexane-1,3'-indoline]-2',4-dione (3s) ^{13}C NMR



Tert-butyl-2',4-dioxo-2,6-diphenylspiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3t) ^{1}H NMR



Tert-butyl-2',4-dioxo-2,6-diphenylspiro[cyclohexane-1,3'-indoline]-1'-carboxylate (3t) ^{13}C NMR