

Regioselective Synthesis of Isoxazole and 1,2,4-Oxadiazole-Derived Phosphonates via [3+2] Cycloaddition

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9012595s1.1.fid

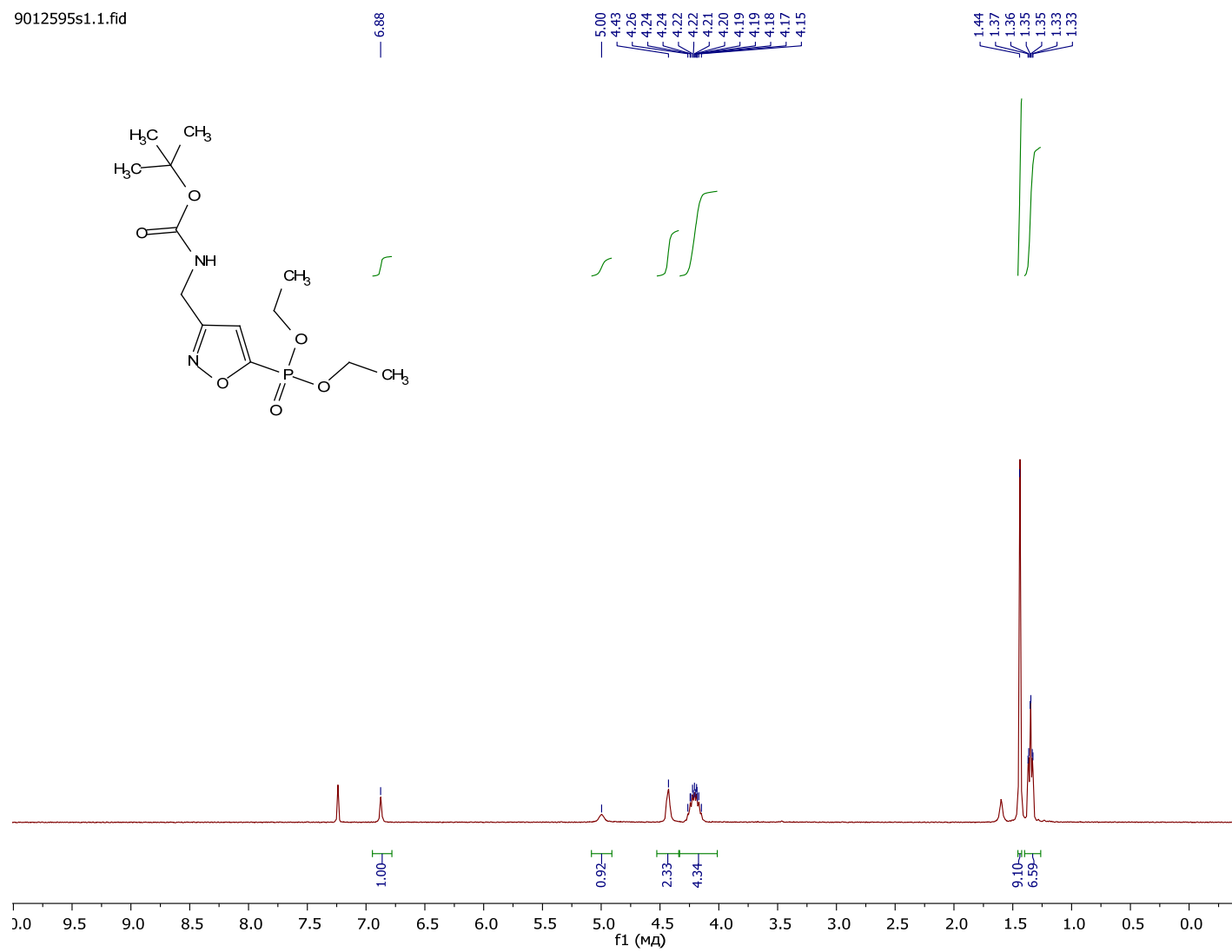


Figure 1 ¹H NMR spectrum of 1a

sklif6662_C13.1.fid

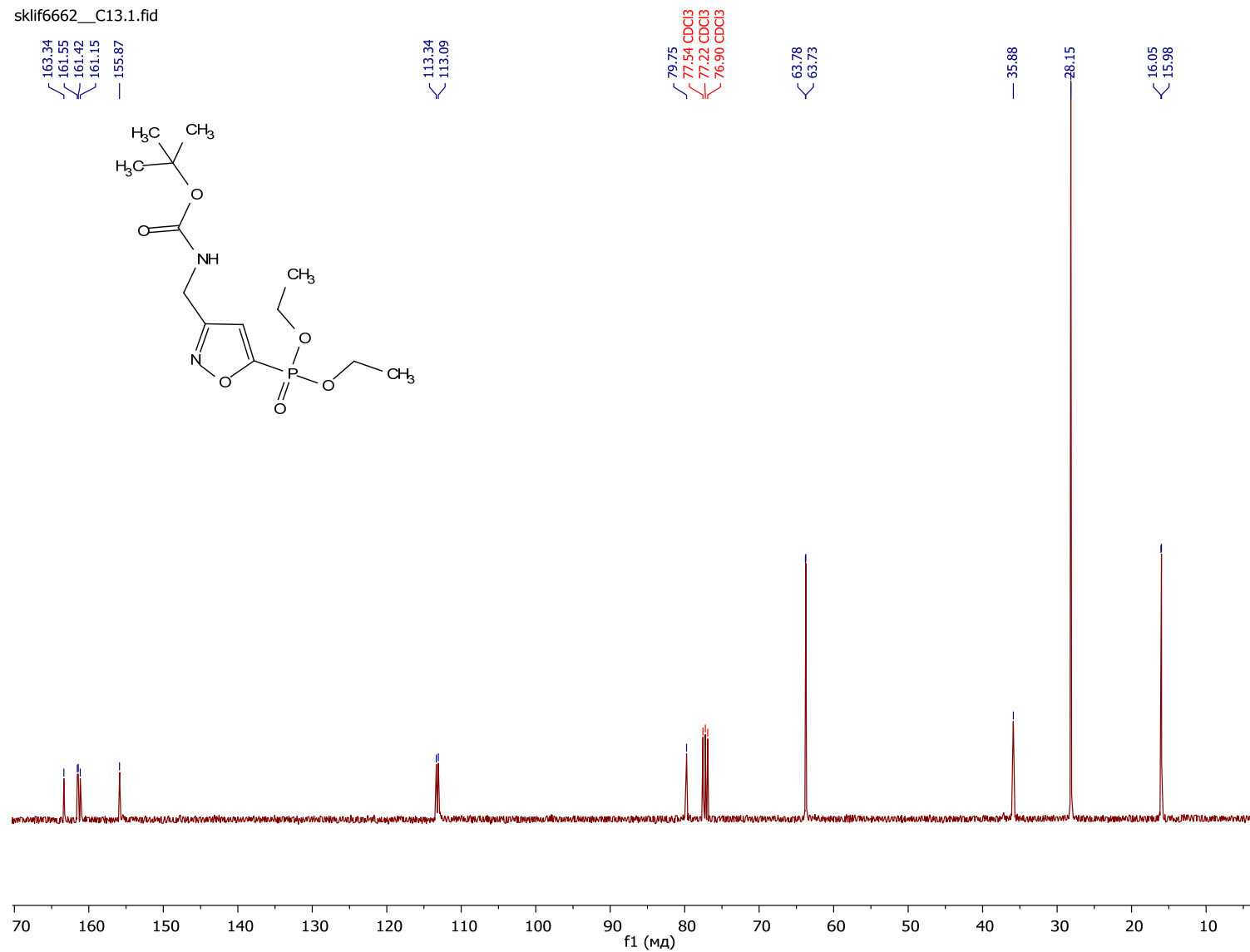


Figure 2 ^{13}C NMR spectrum of 1a

sklif6662__P31.1.fid

— 0.34

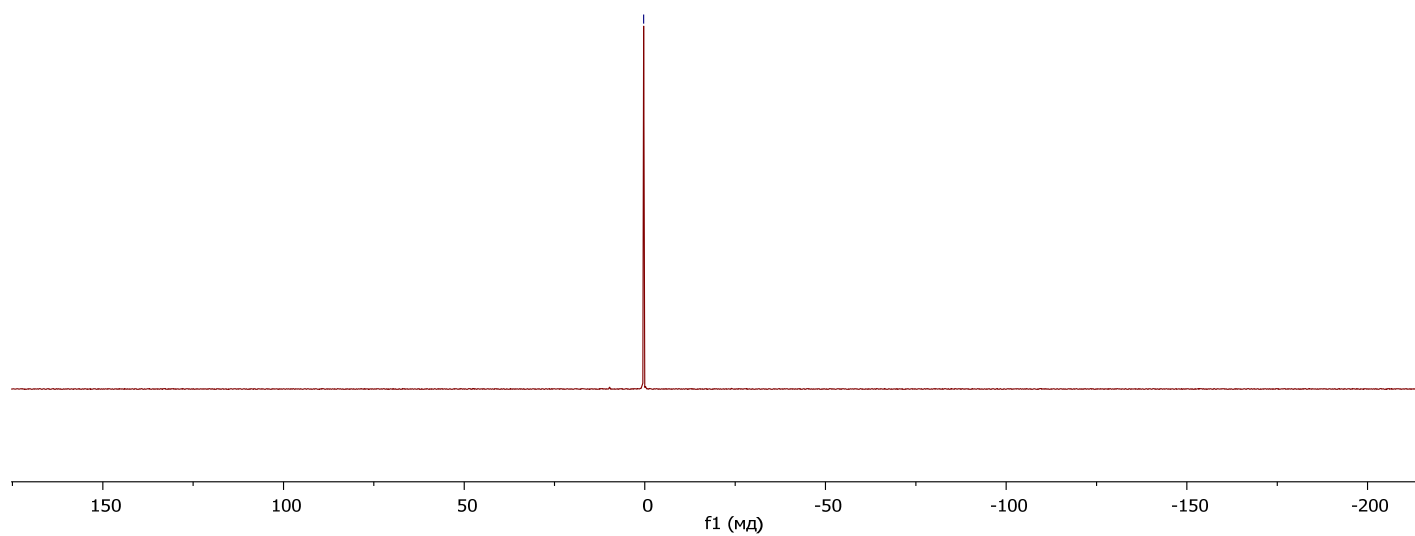
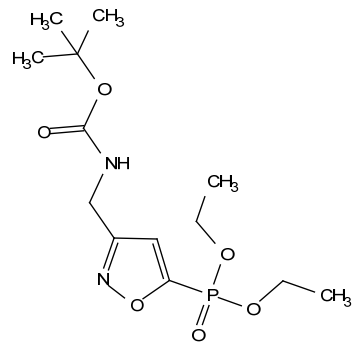


Figure 3 ^{31}P NMR spectrum of 1a

9012610s1.1.fid

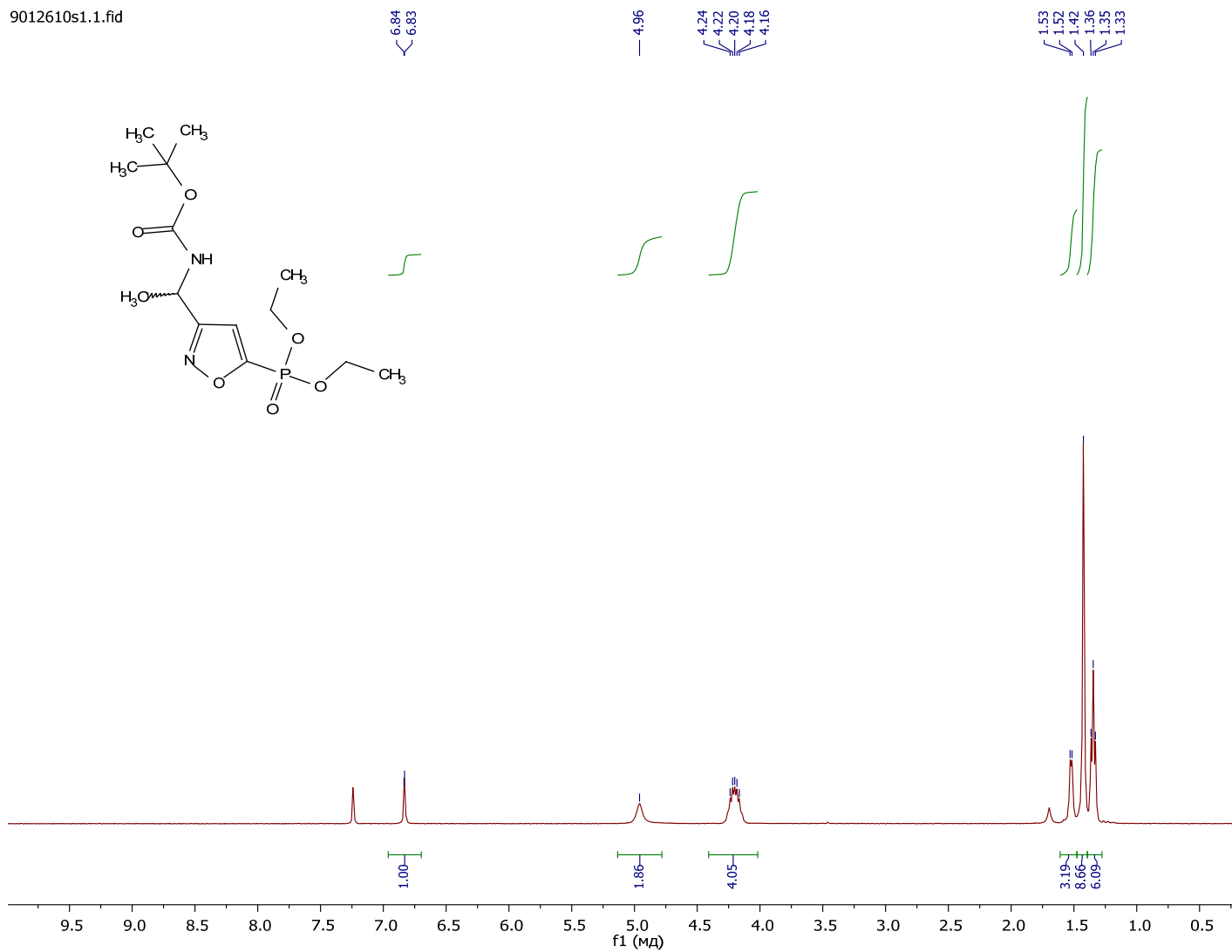


Figure 4 ^1H NMR spectrum of 1b and 1c (R-isomer)

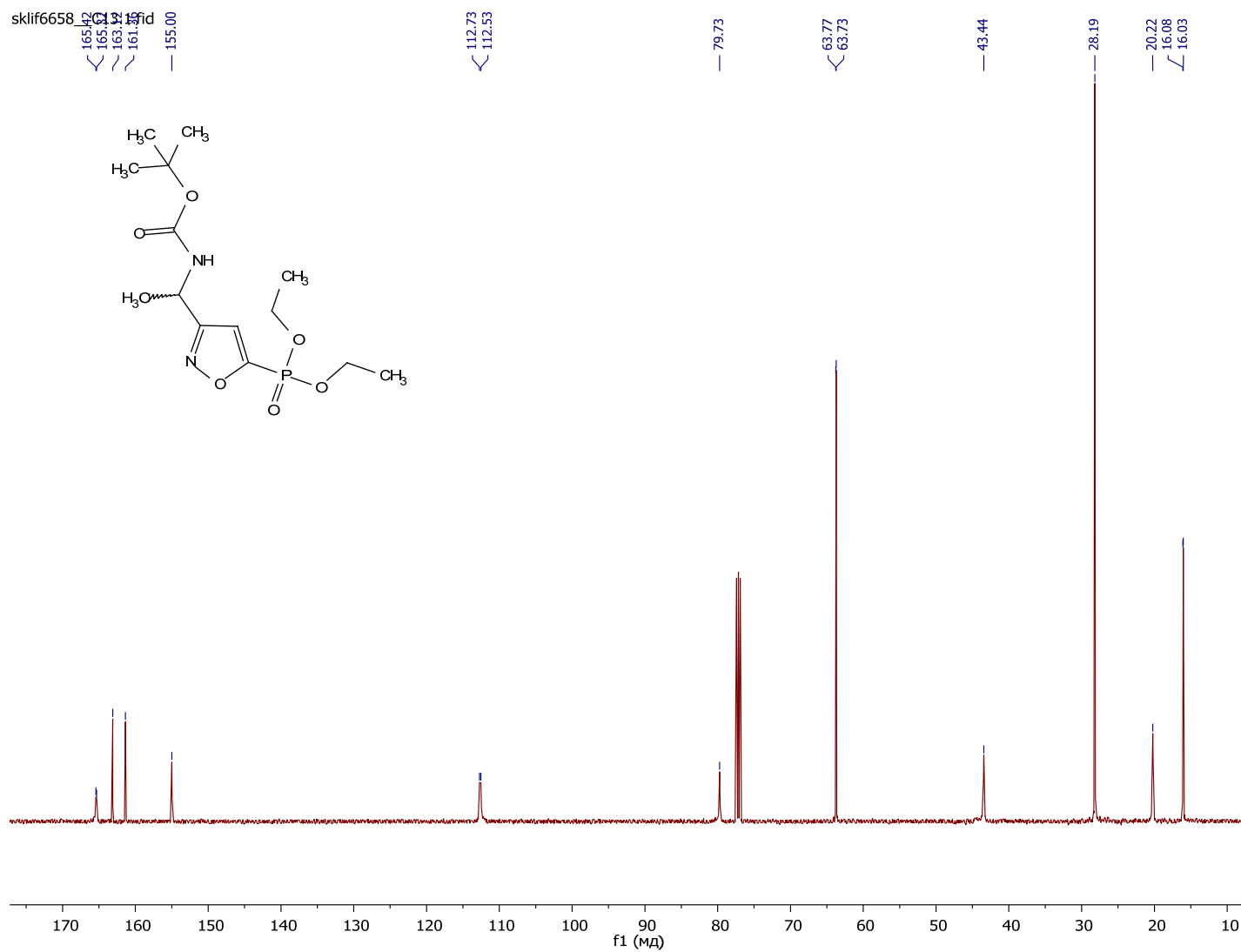


Figure 5 ^{13}C NMR spectrum of 1b and 1c (*R*-isomer)

sklif6658__P31.1.fid

— 0.31

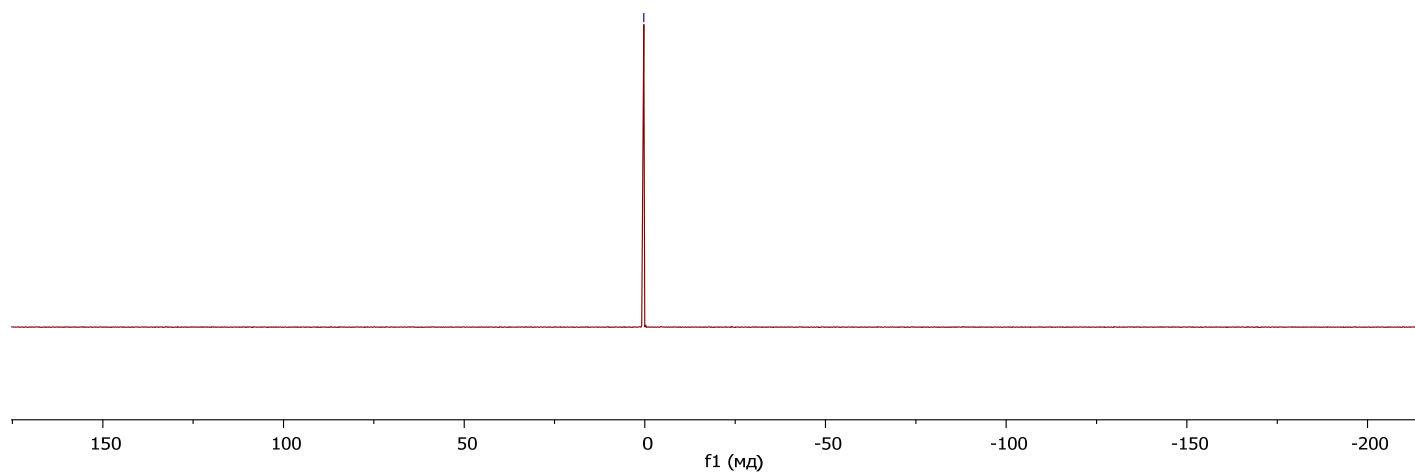
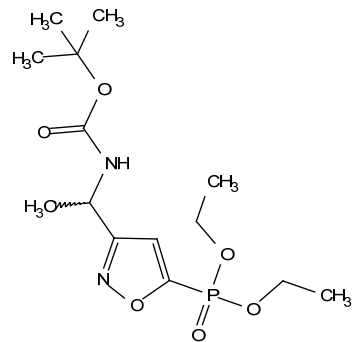


Figure 6 ^{31}P NMR spectrum of 1b and 1c (*R*-isomer)

AB6566-3.1.fid

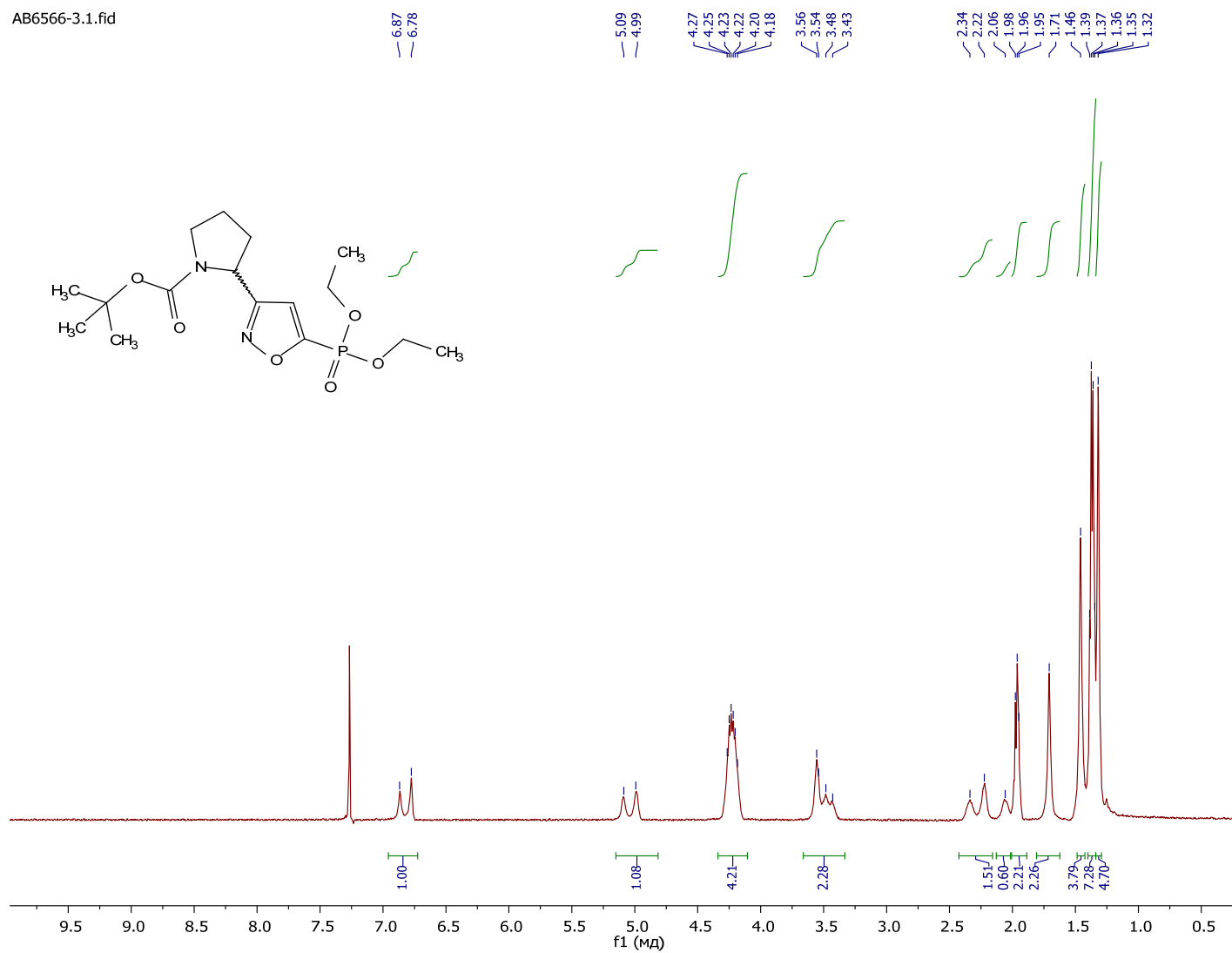


Figure 7 ^1H NMR spectrum of 1f and 1g (R-isomer)

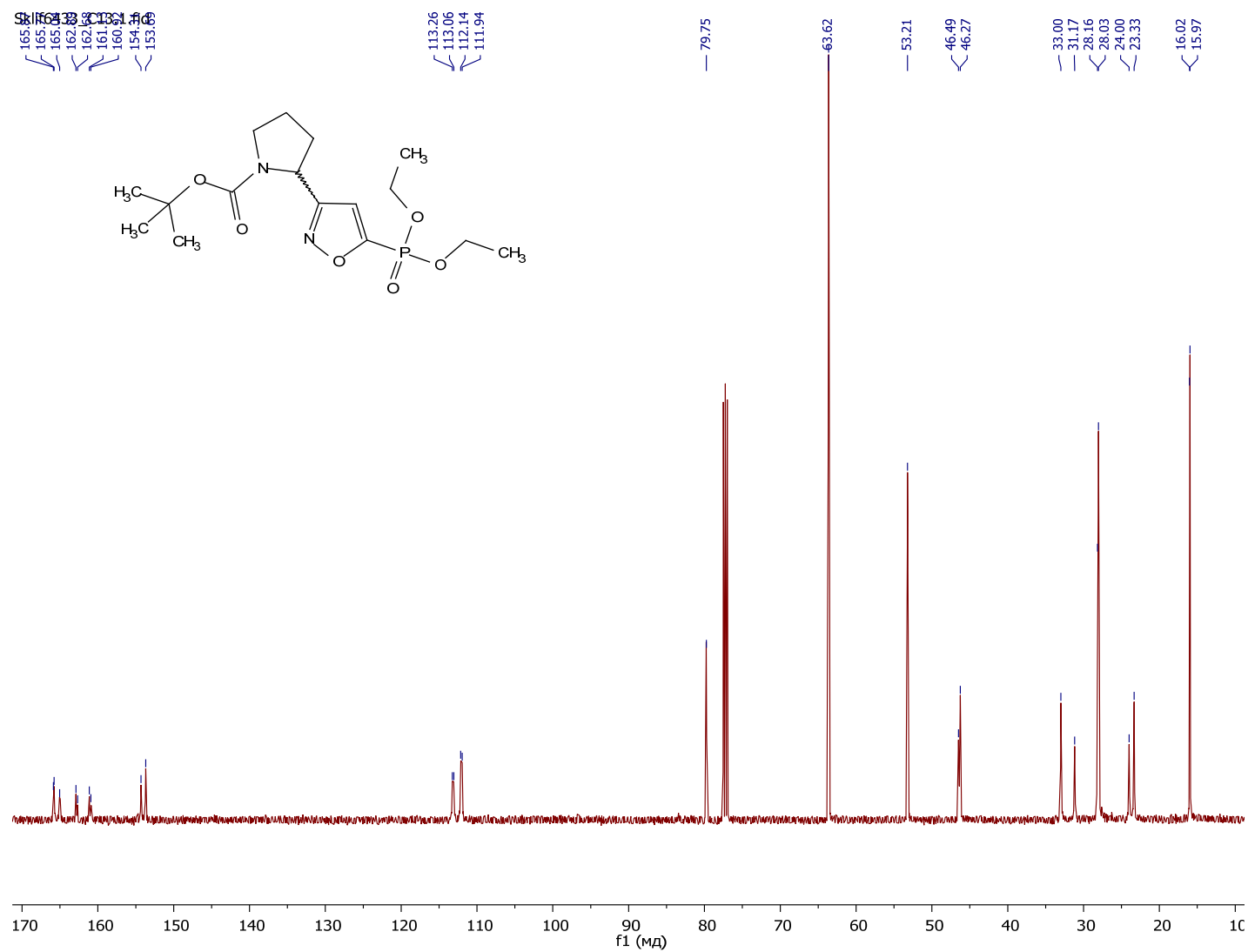


Figure 8 ¹³C NMR spectrum of 1f and 1g (*R*-isomer)

Sklif6433_P31.1.fid
31P-{1H}

0.50
0.35

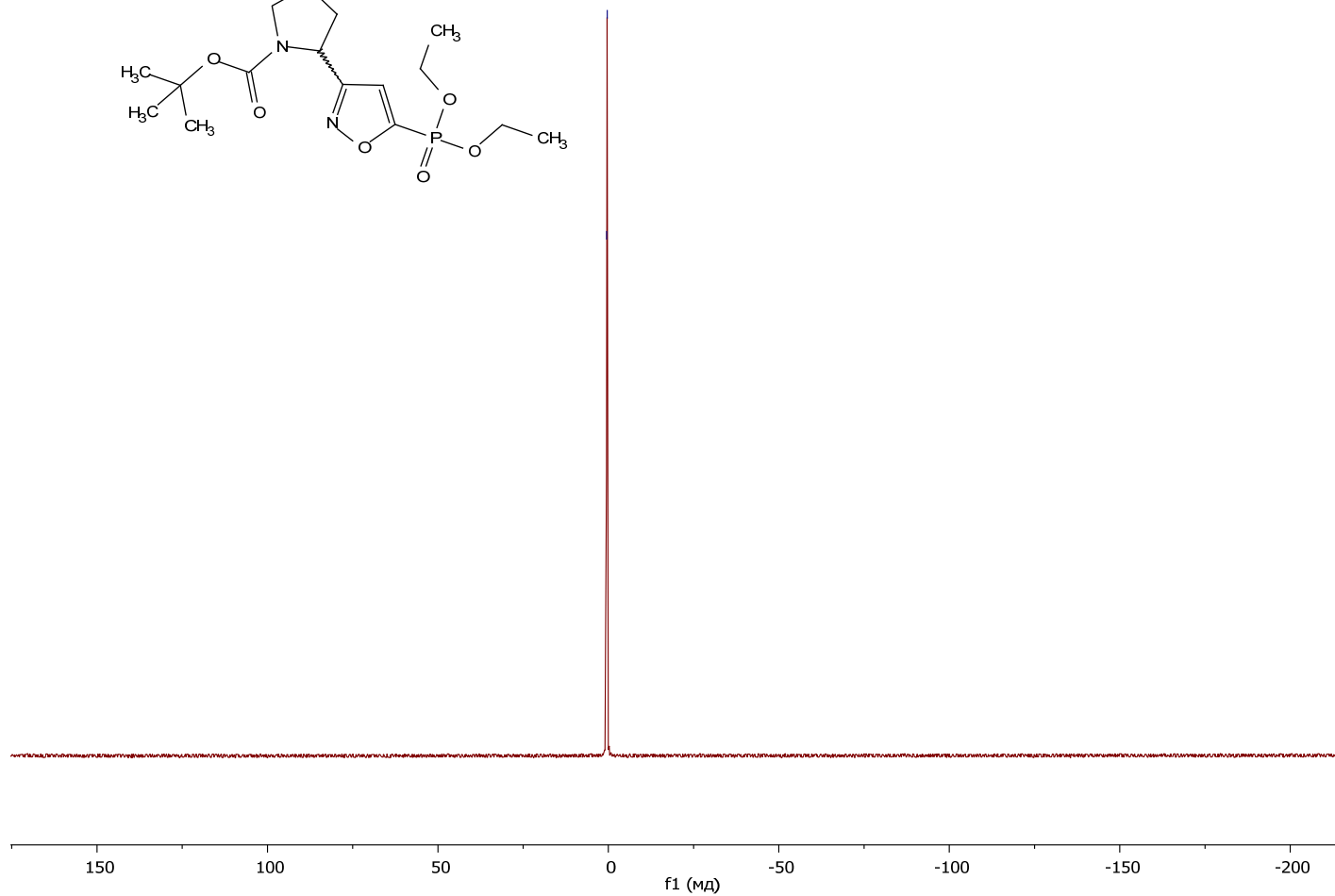
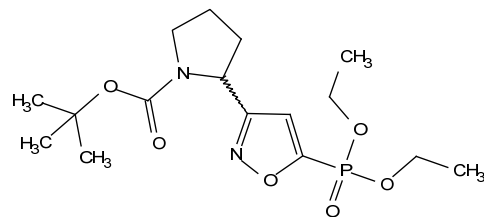


Figure 9 ^{31}P NMR spectrum of 1f and 1g (*R*-isomer)

9000692s2.1.fid

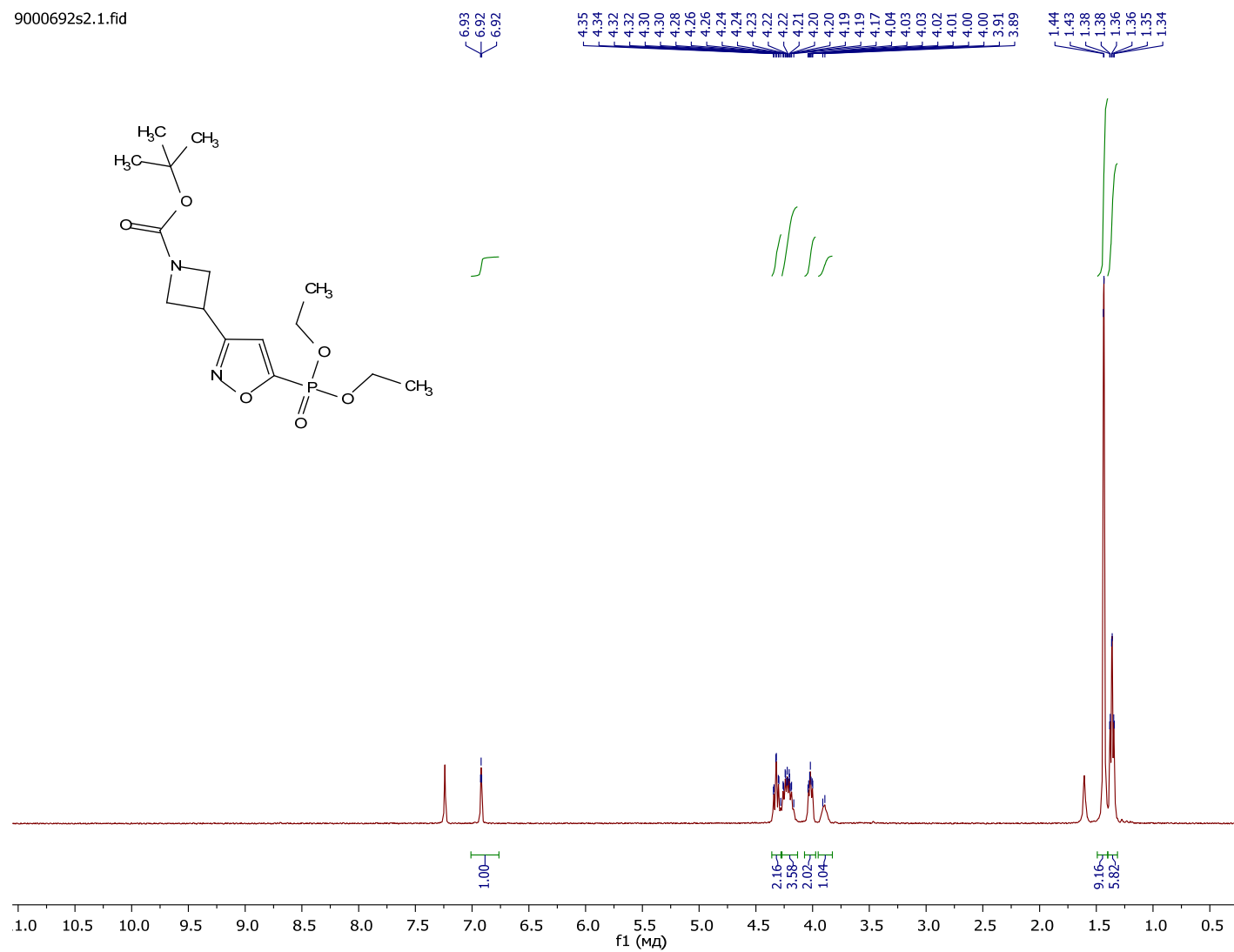


Figure 10 ¹H NMR spectrum of 1j

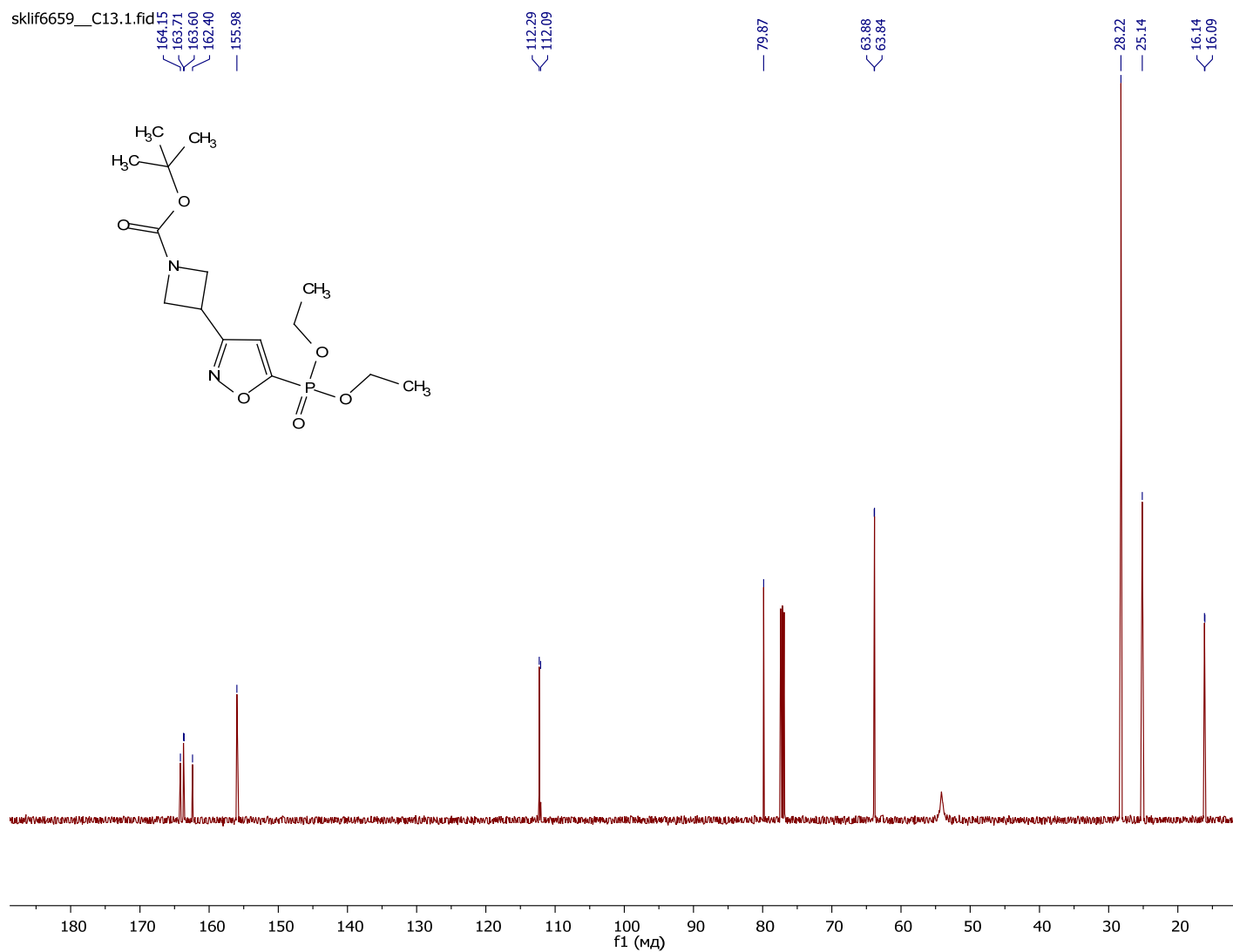


Figure 11 ^{13}C NMR spectrum of 1j

sklif6659__P31.1.fid

0.09

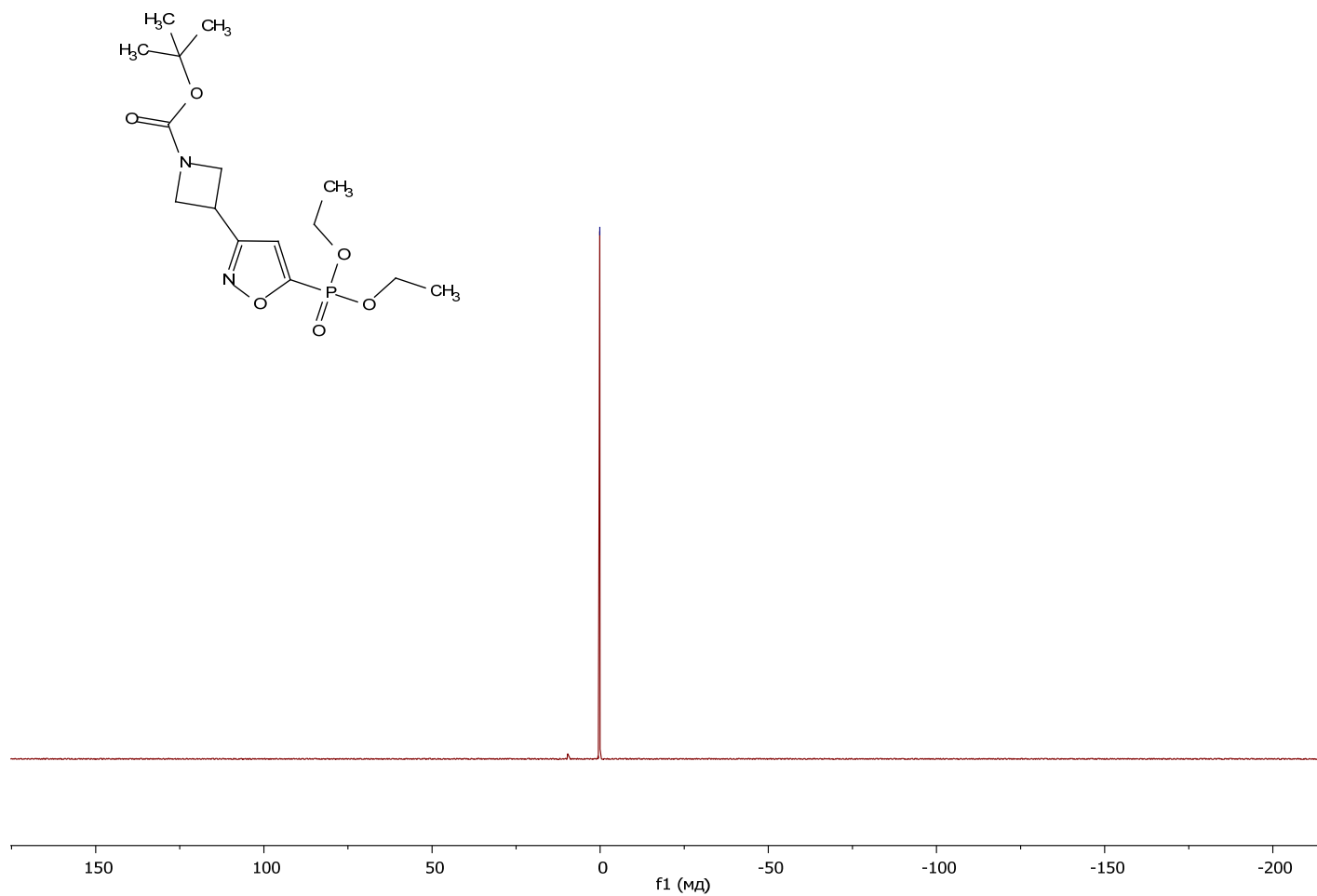


Figure 12 ^{31}P NMR spectrum of 1j

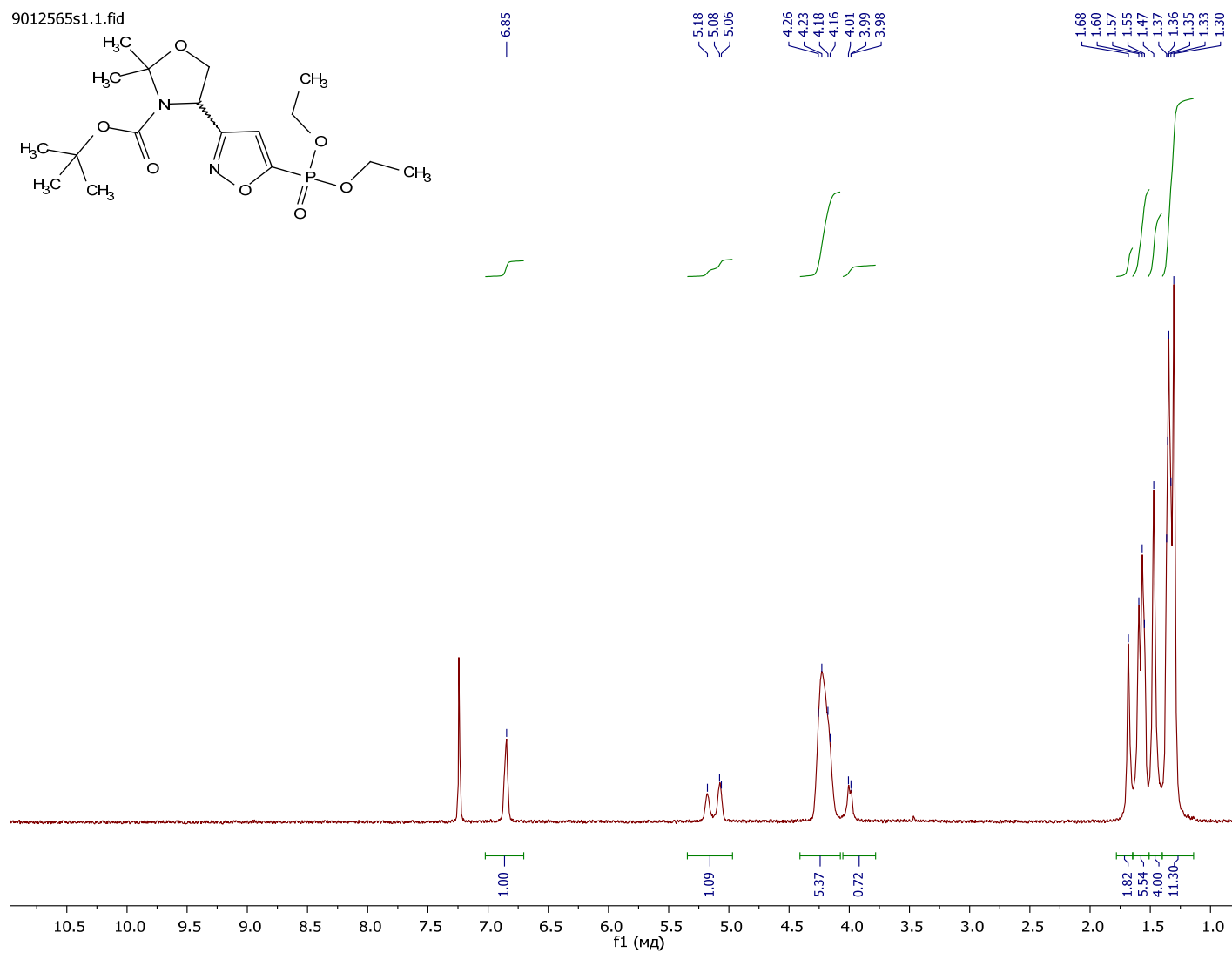


Figure 13 ^1H NMR spectrum of 1k and 1l (*R*-isomer)

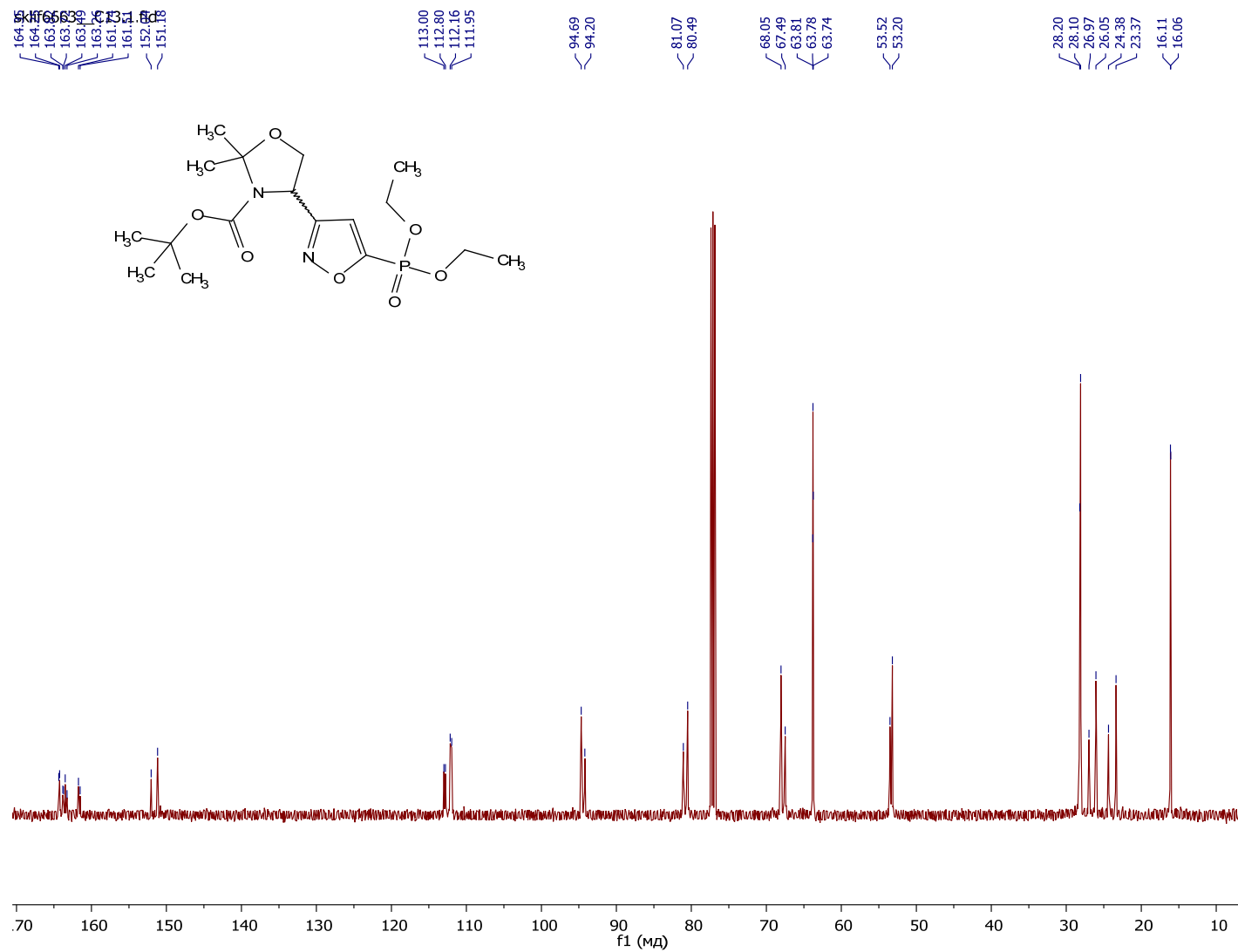


Figure 14 ¹³C NMR spectrum of 1k and 1l (*R*-isomer)

sklif6663__P31.1.fid

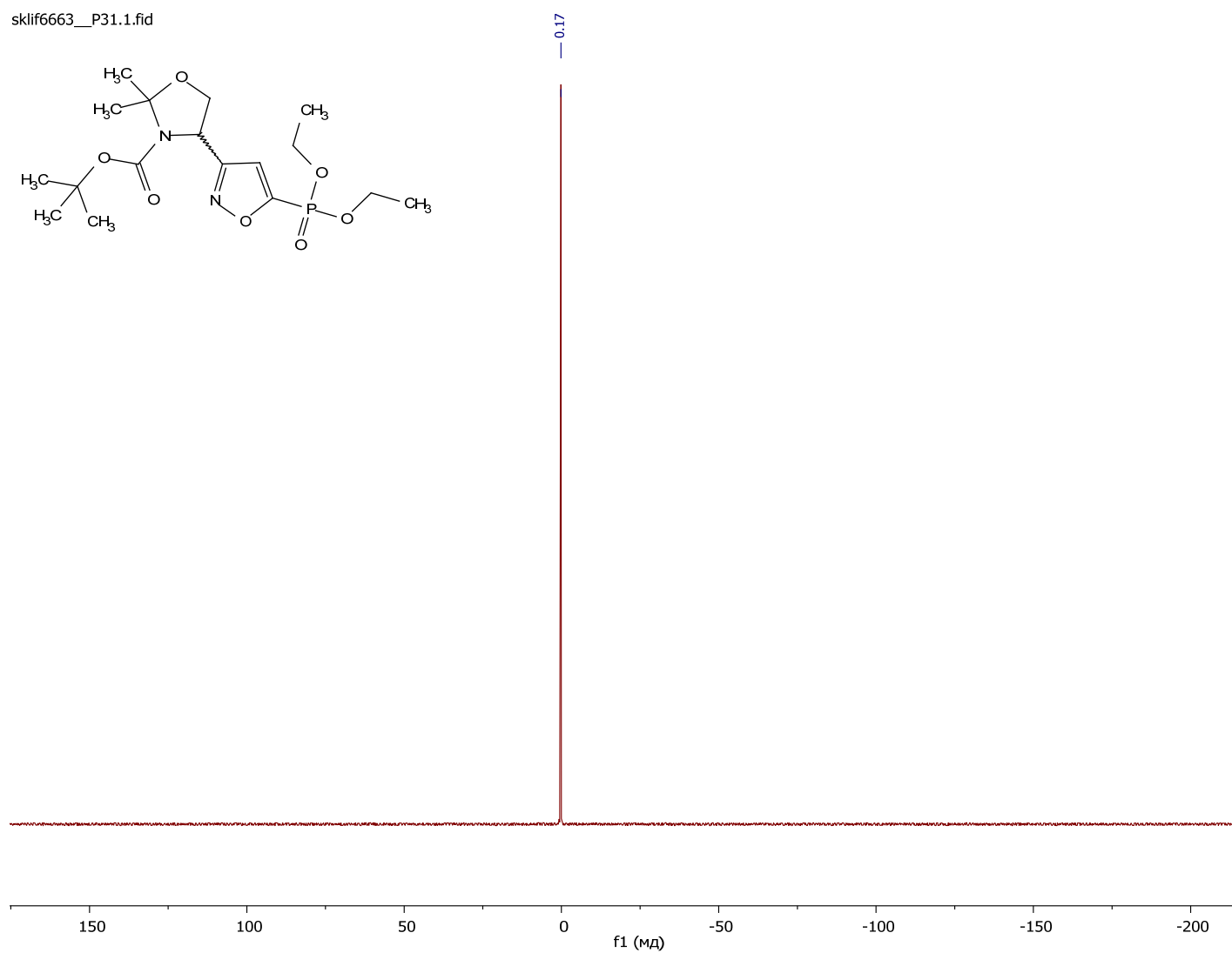


Figure 15 ^{31}P NMR spectrum of 1k and 1l (*R*-isomer)

M024208s2

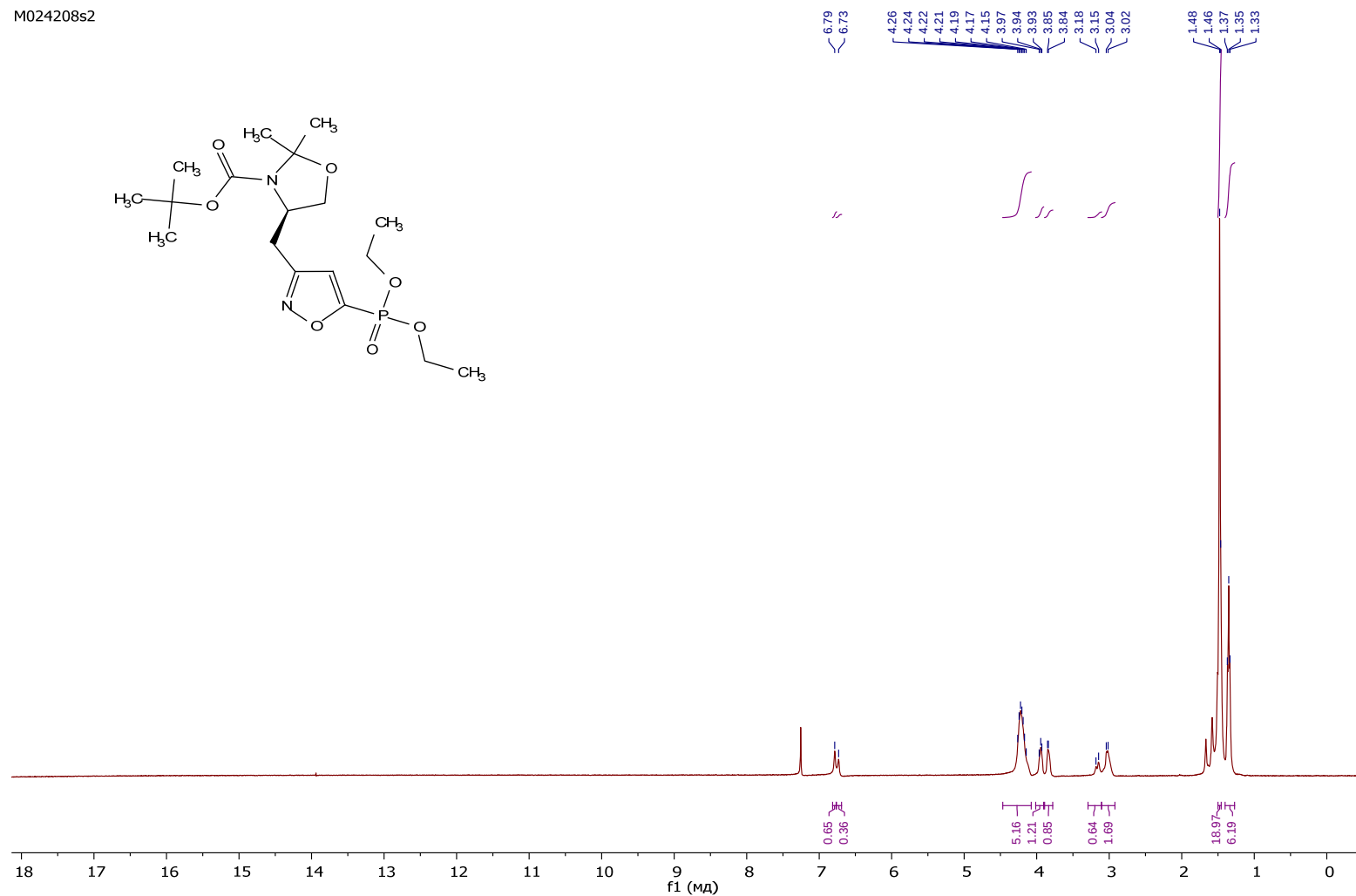


Figure 16. ¹H NMR spectrum of 1m and 1n (*R*-isomer)

sklif1868___13C.1.fid

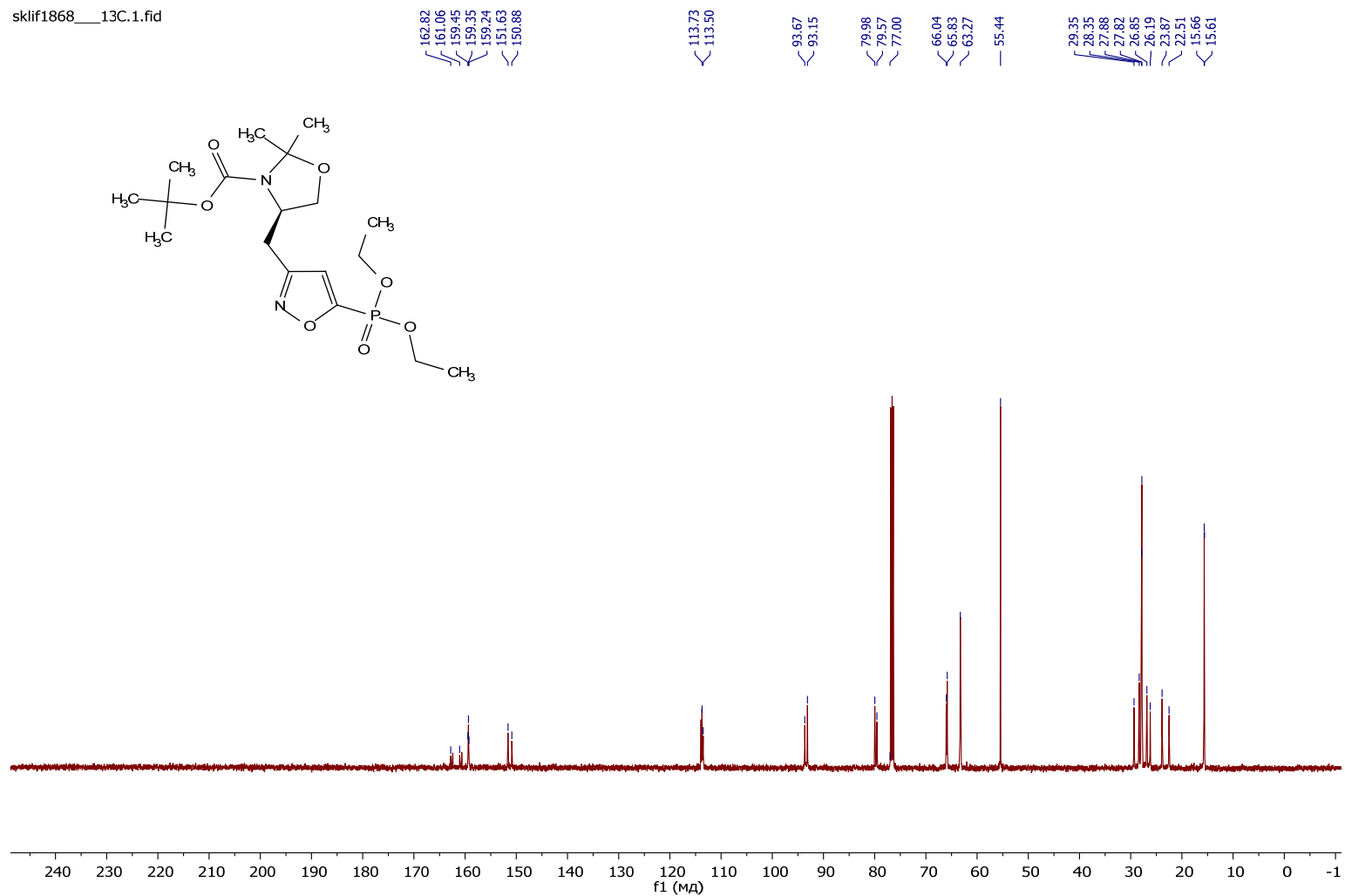


Figure 17. ¹³C NMR spectrum of 1m and 1n (*R*-isomer)

sklif1858___31P.1.fid

0.07
0.03
-0.01
-0.19
-0.23
-0.27

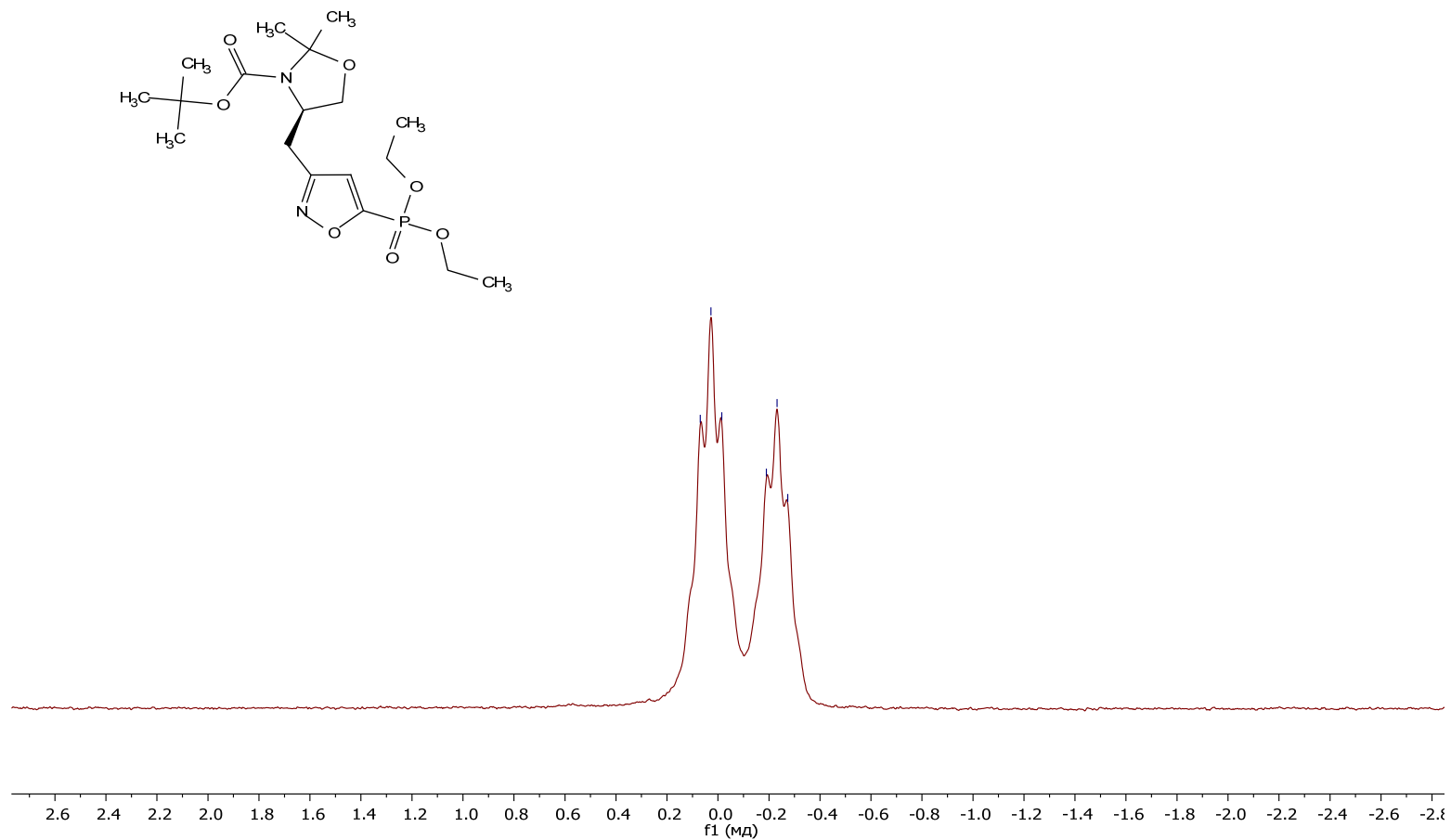


Figure 18. ^{31}P NMR spectrum of 1m and 1n (*R*-isomer)

K774890s2

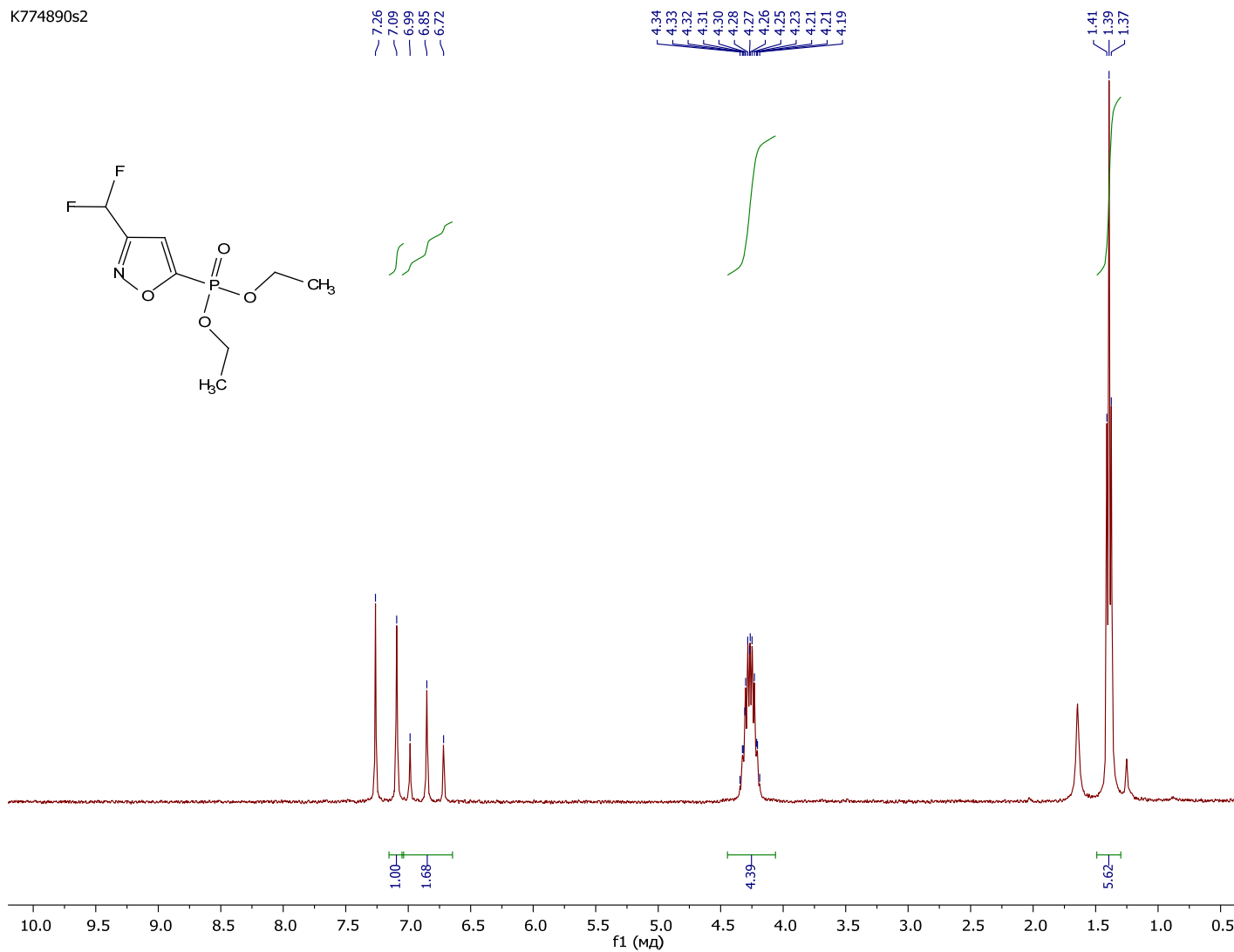


Figure 19 ¹H NMR spectrum of 1p

sklif3125_C13.1.fid

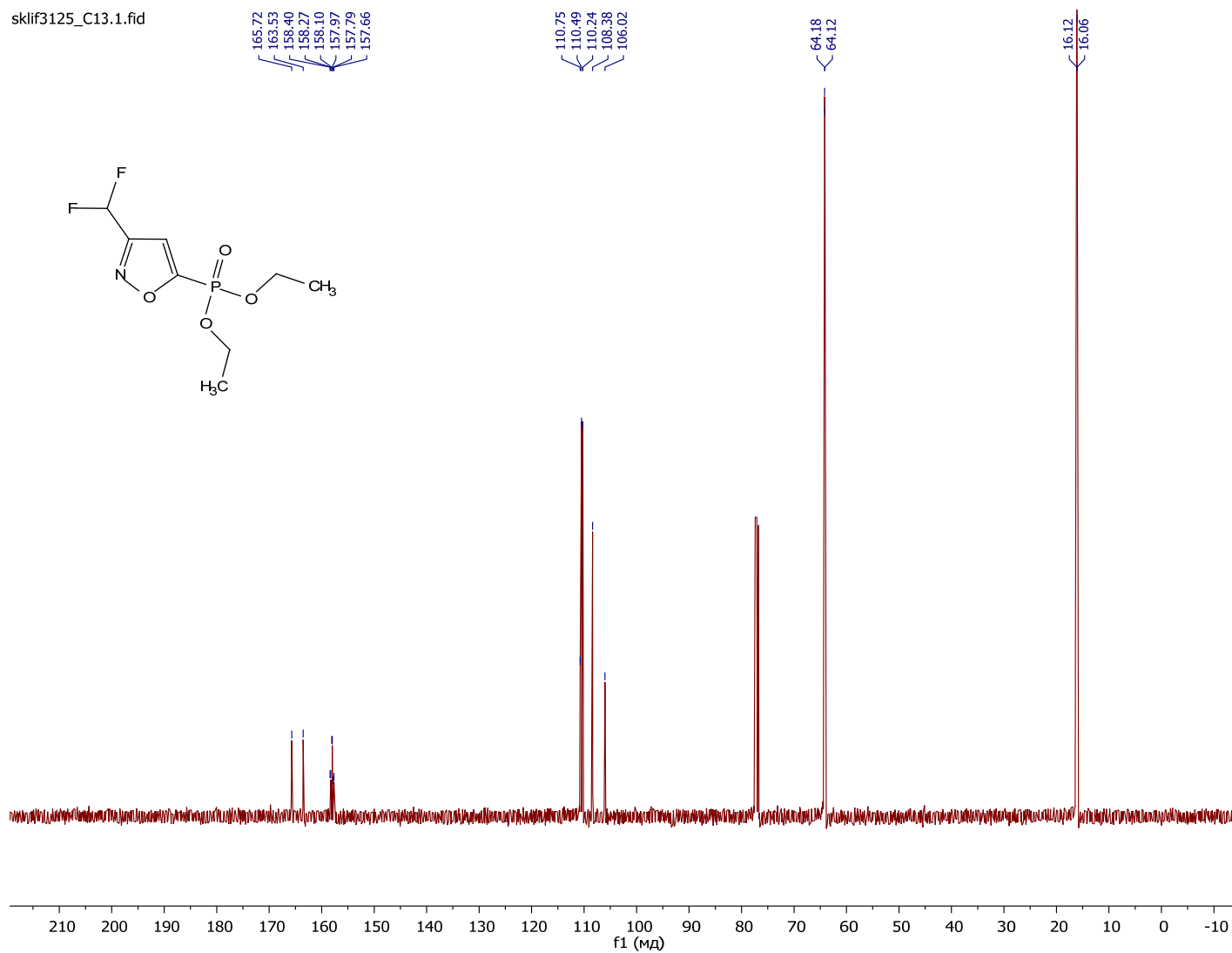


Figure 20 ¹³C NMR spectrum of 1p

sklif3125 31P{1H}.1.fid

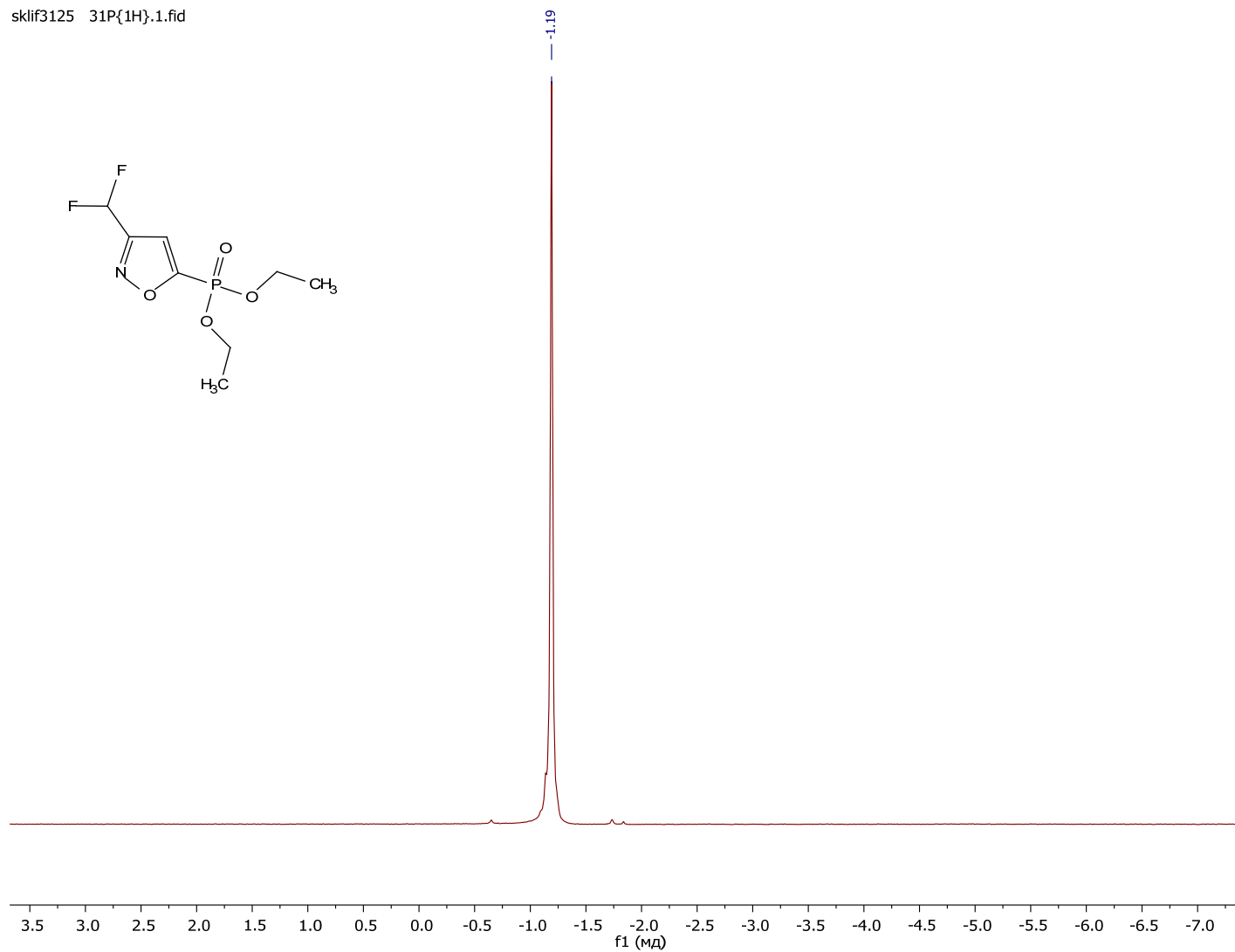


Figure 21 ^{31}P NMR spectrum of 1p

sklif3125_F19{H}.1.fid
19F-{1H}

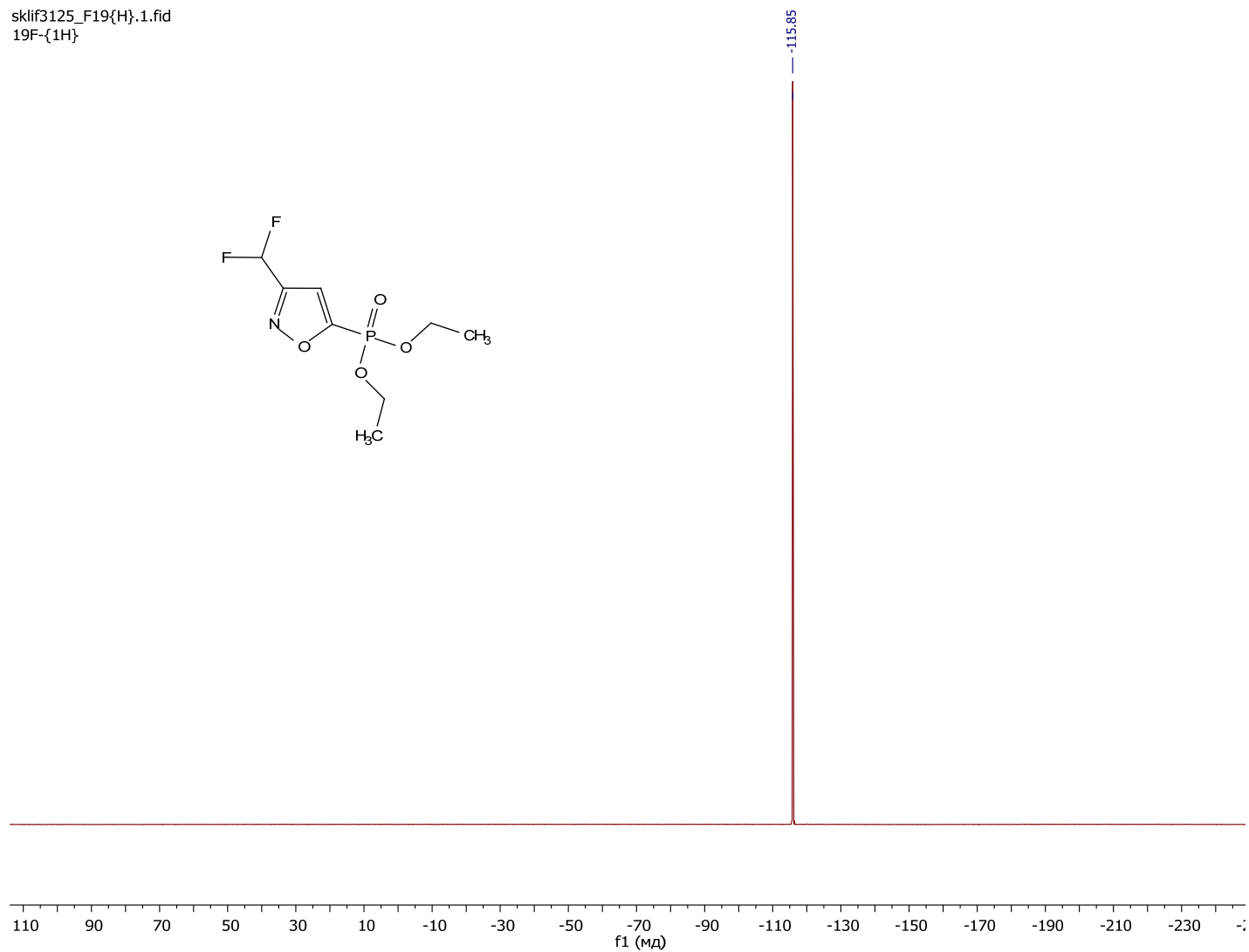


Figure 22 ^{19}F NMR spectrum of 1p

9085983s4

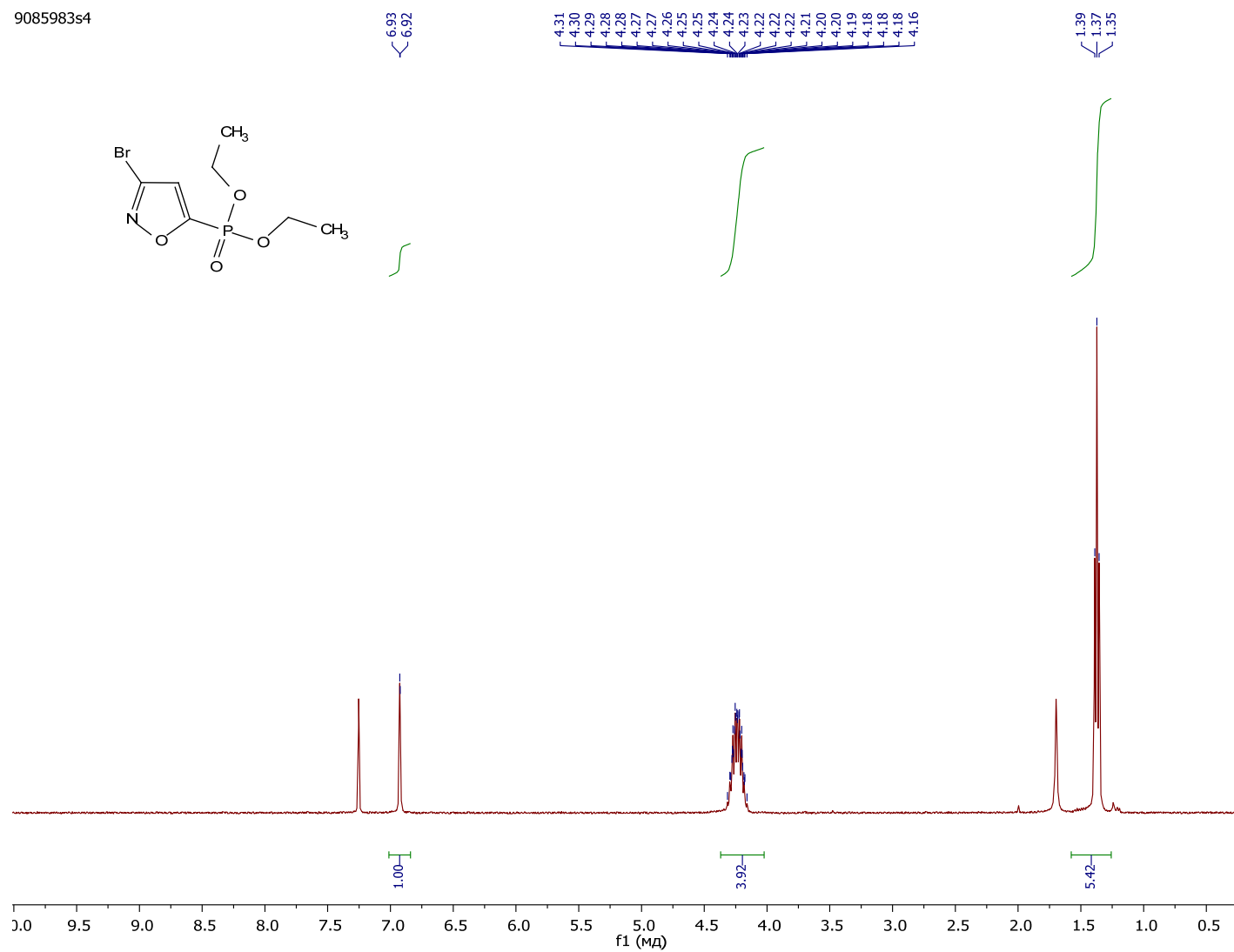


Figure 23 ¹H NMR spectrum of 1q

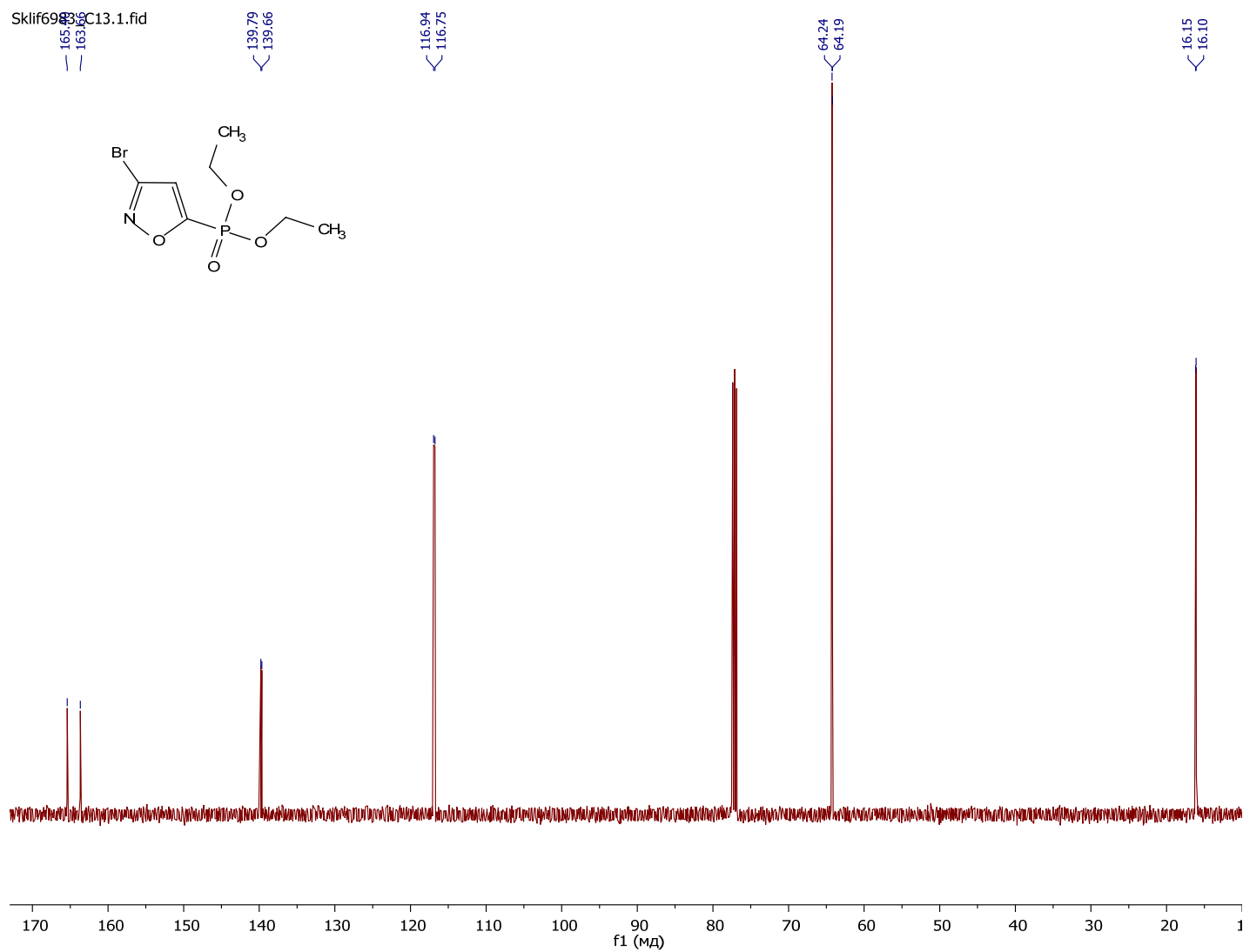
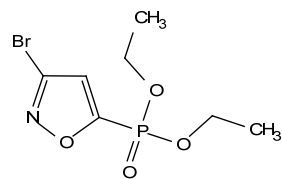


Figure 24 ^{13}C NMR spectrum of 1q

Sklif6983_P31.1.fid
31P-{1H}



-1.83

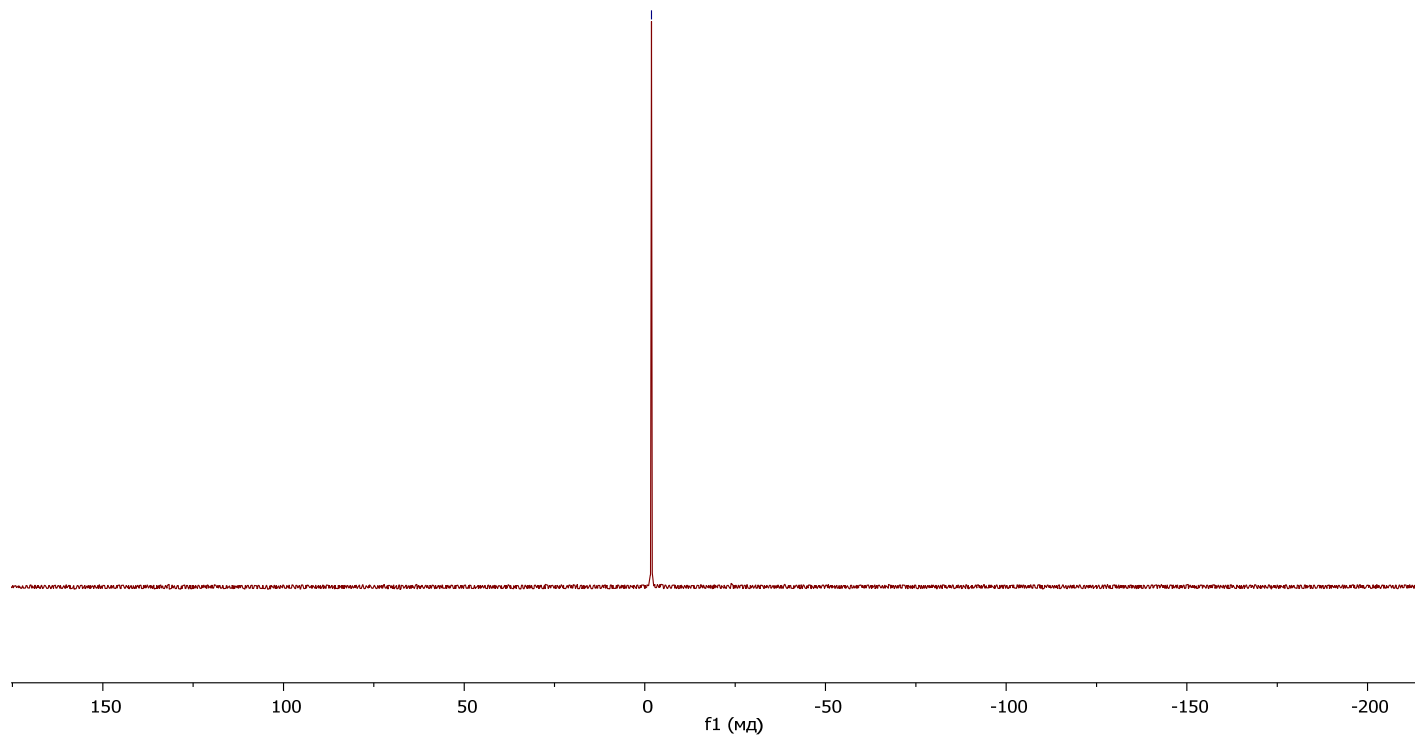


Figure 25 ^{31}P NMR spectrum of 1q

ab5985-31

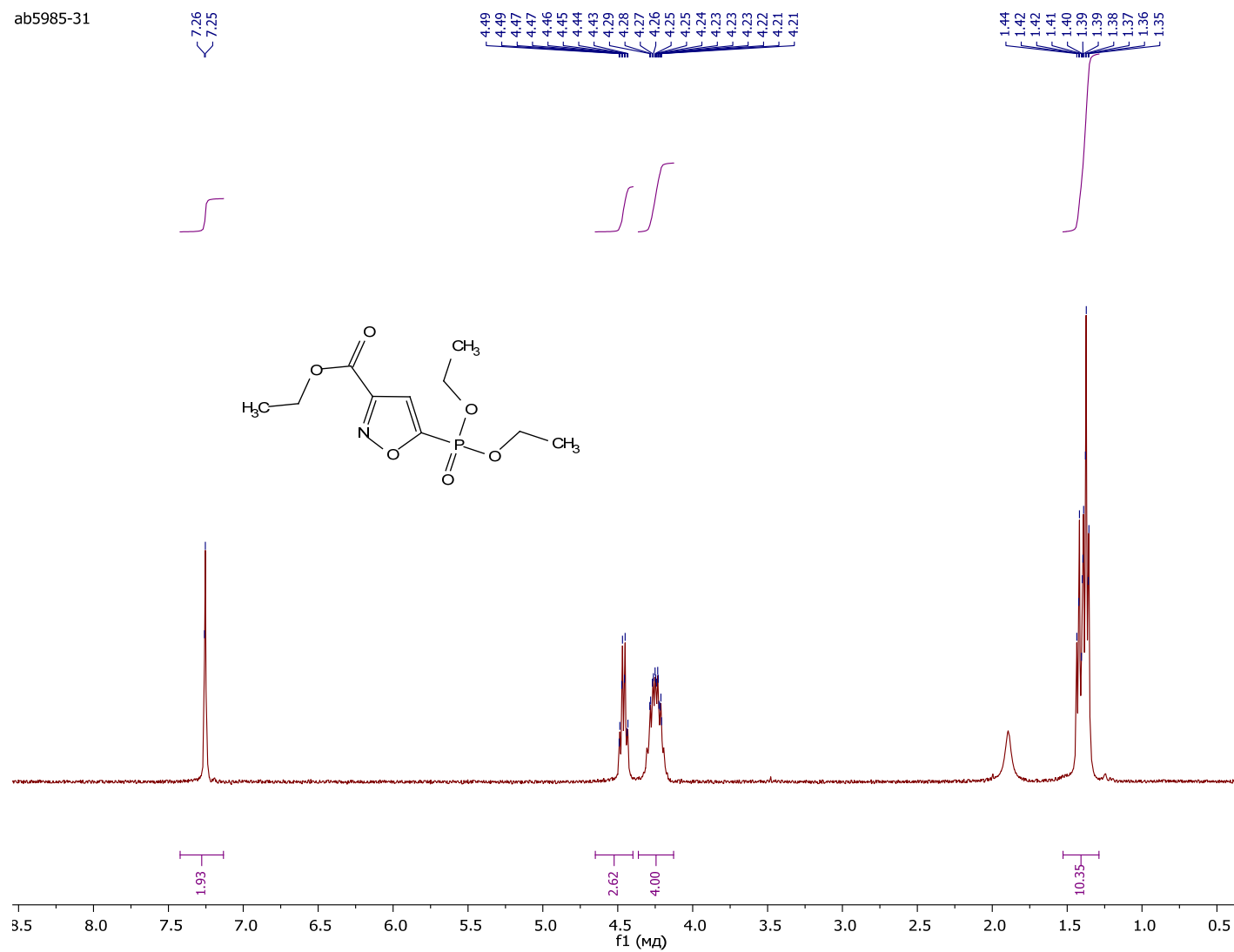


Figure 26 ¹H NMR spectrum of 1r

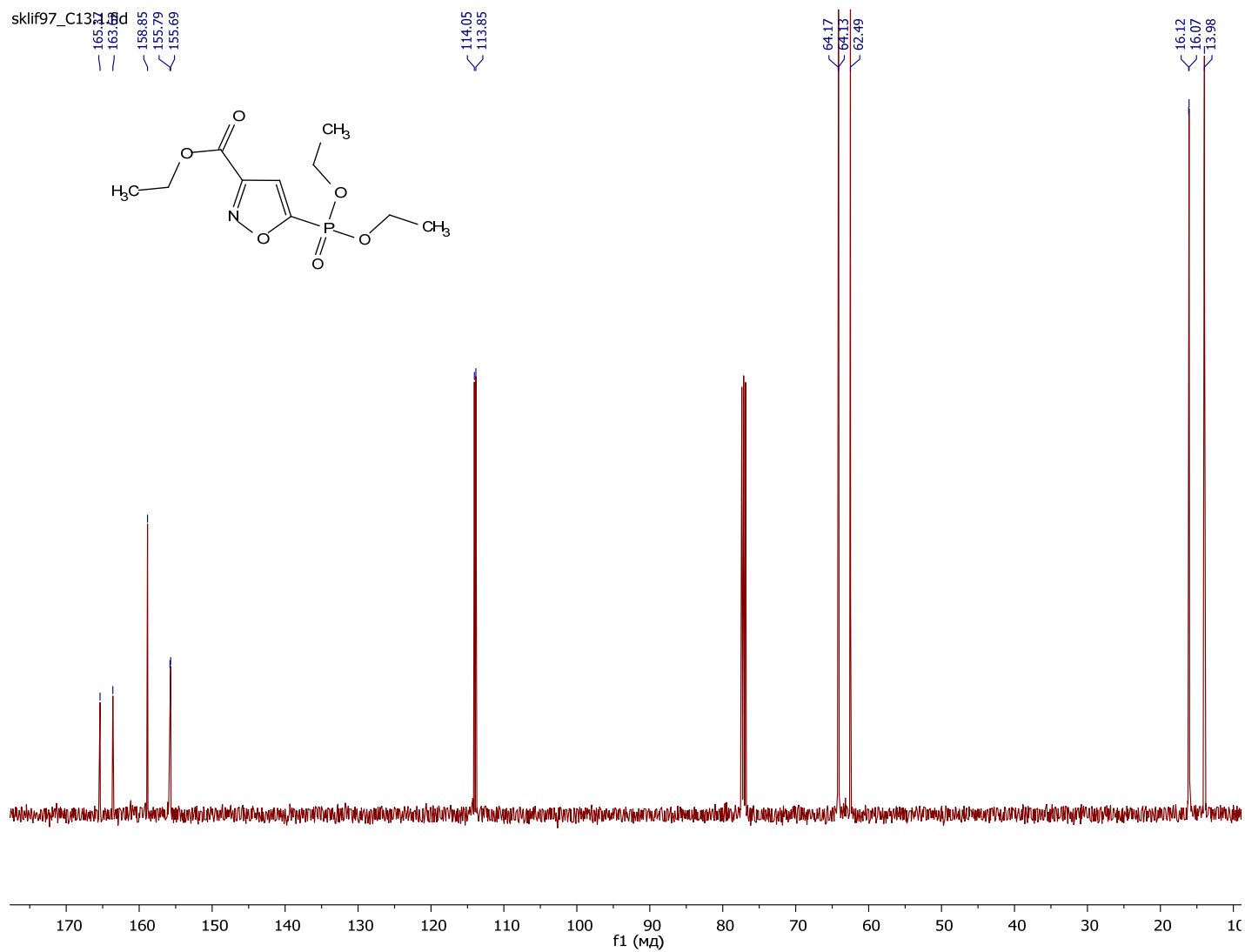


Figure 27 ¹³C NMR spectrum of 1r

sklif97_P31{H}.1.fid

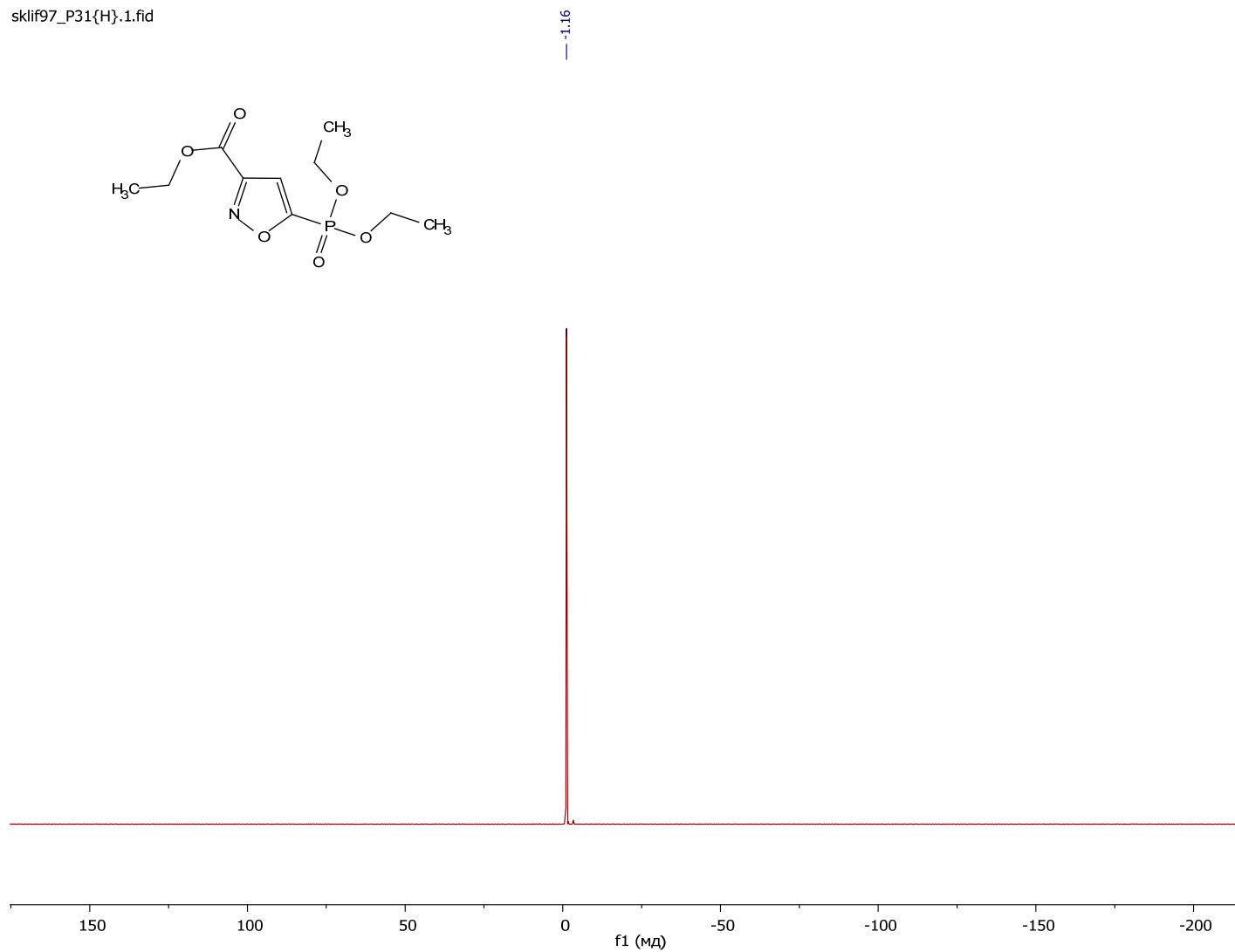


Figure 28 ^{31}P NMR spectrum of 1r

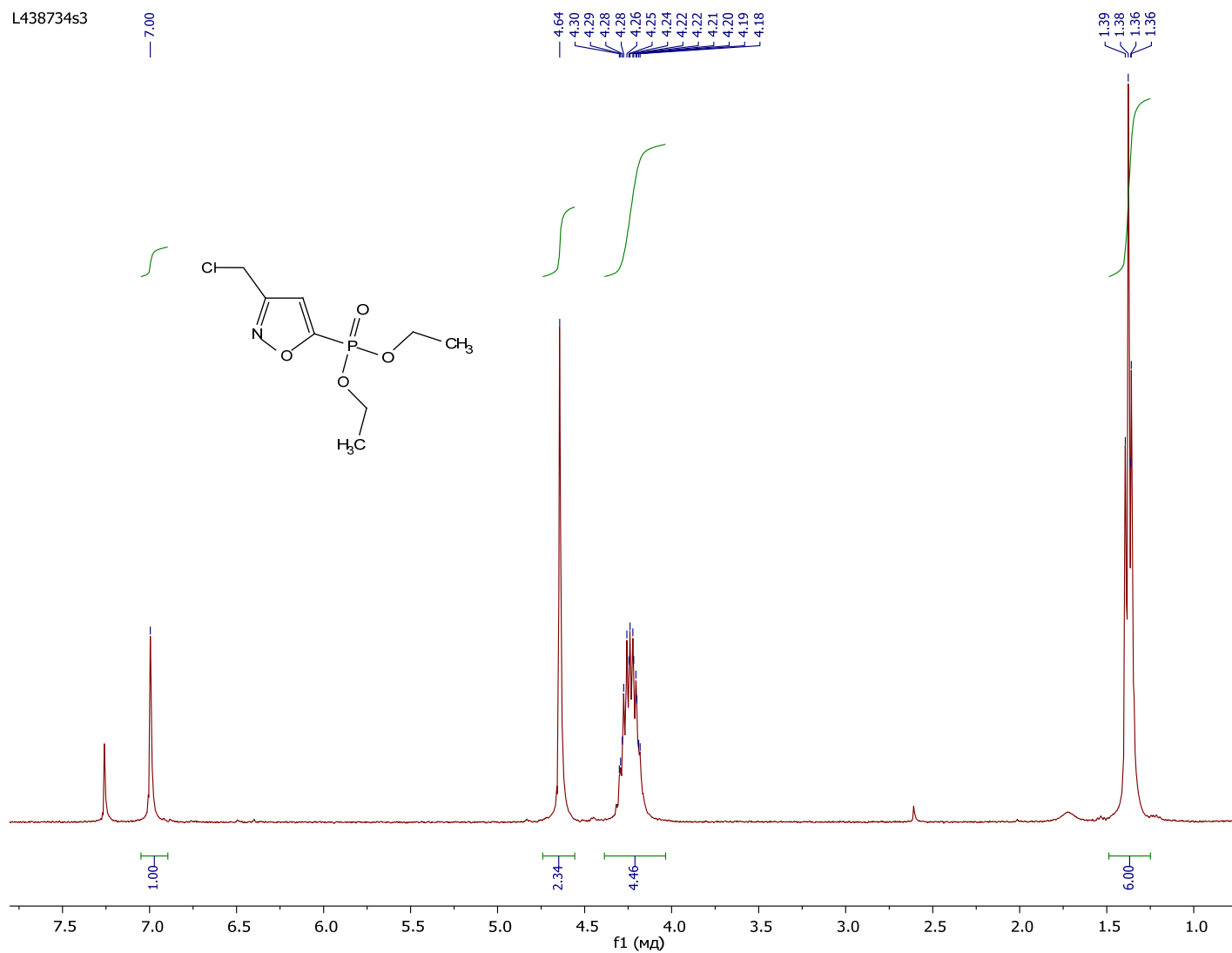


Figure 29 ¹H NMR spectrum of 1s

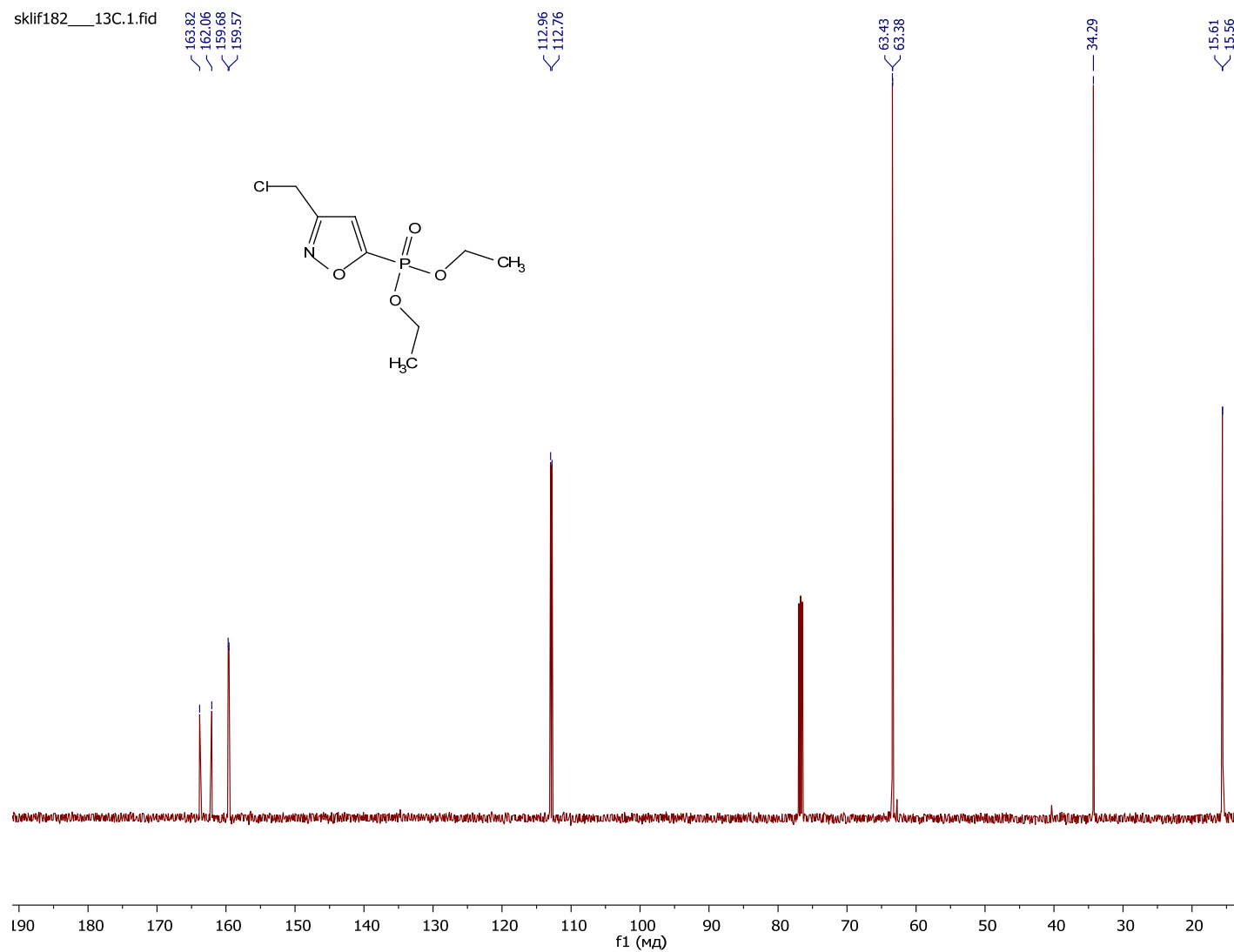


Figure 30 ¹³C NMR spectrum of 1s

sklif182_P31{H}.1.fid

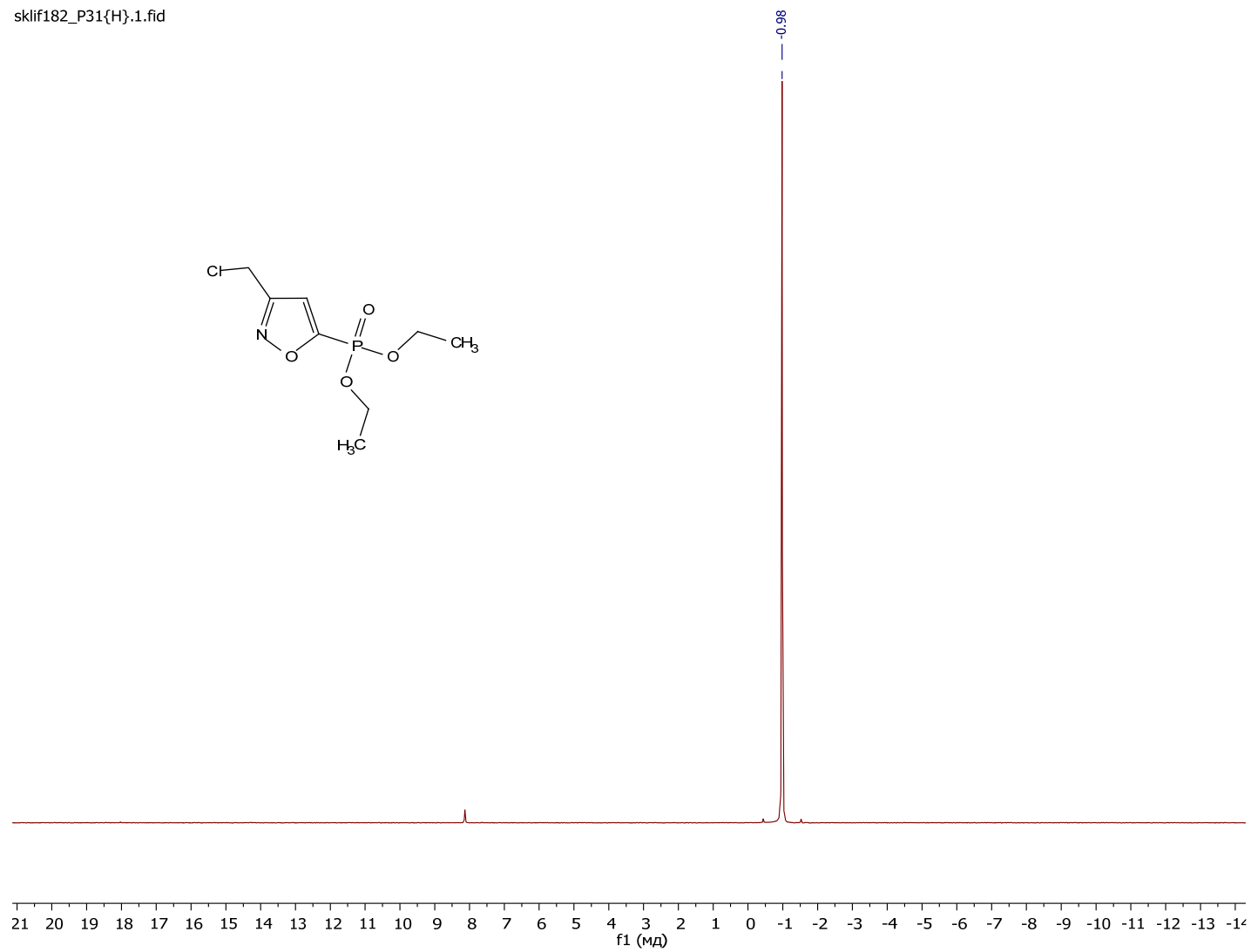
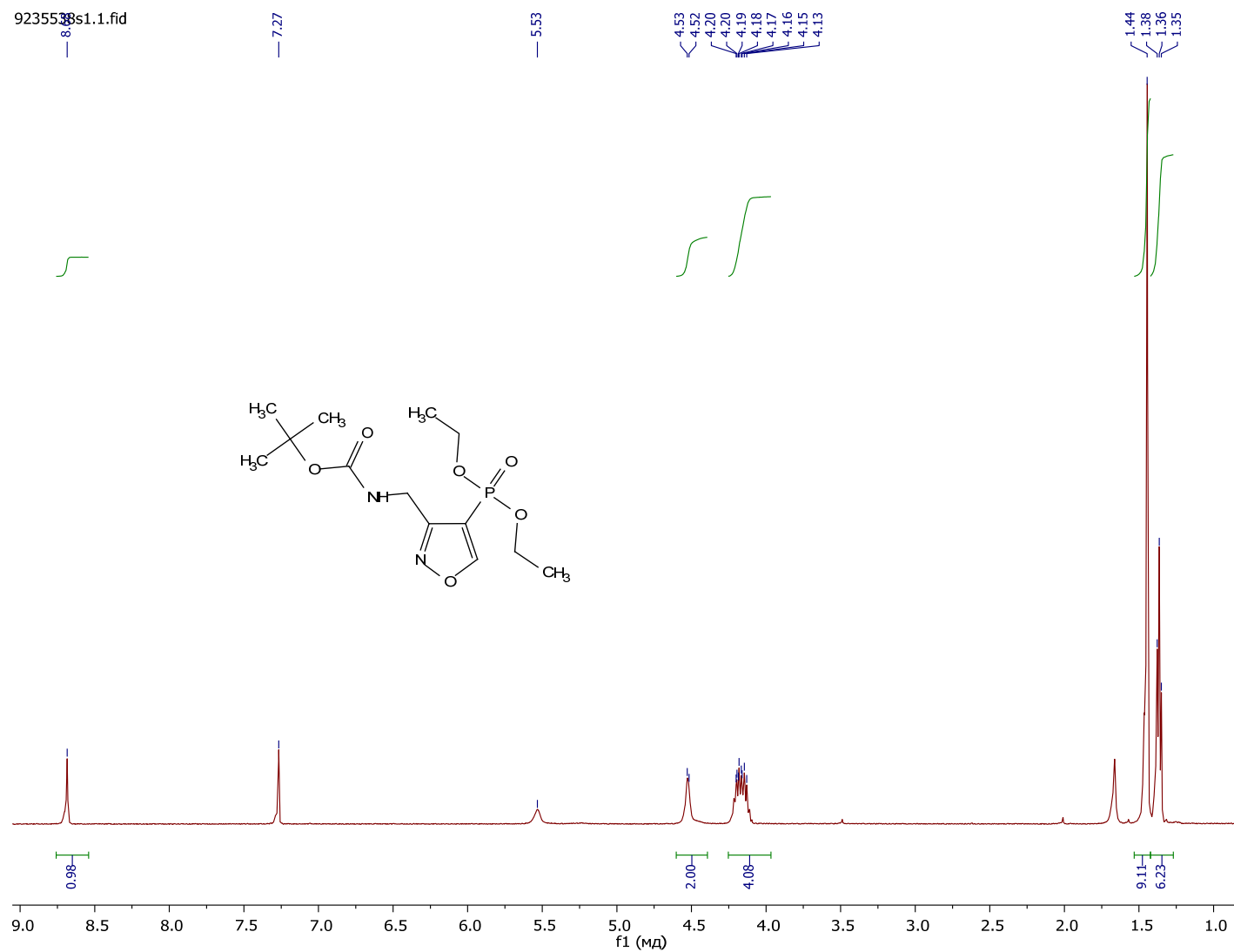


Figure 31 ^{31}P NMR spectrum of **1s**



sklif379_C13.1.fid

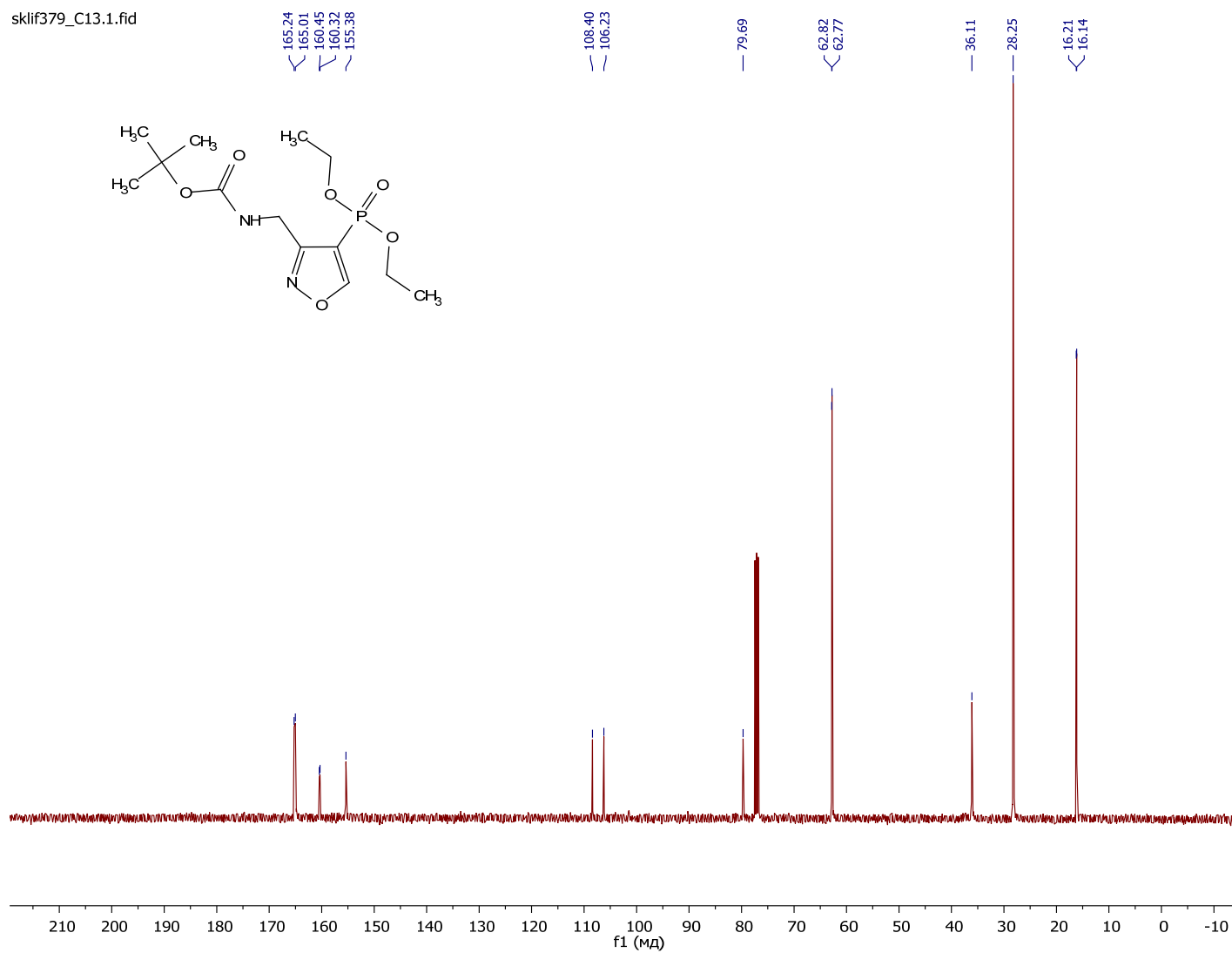


Figure 33 ^{13}C NMR spectrum of 2a

sklif379_P31{H}.1.fid

— 9.81

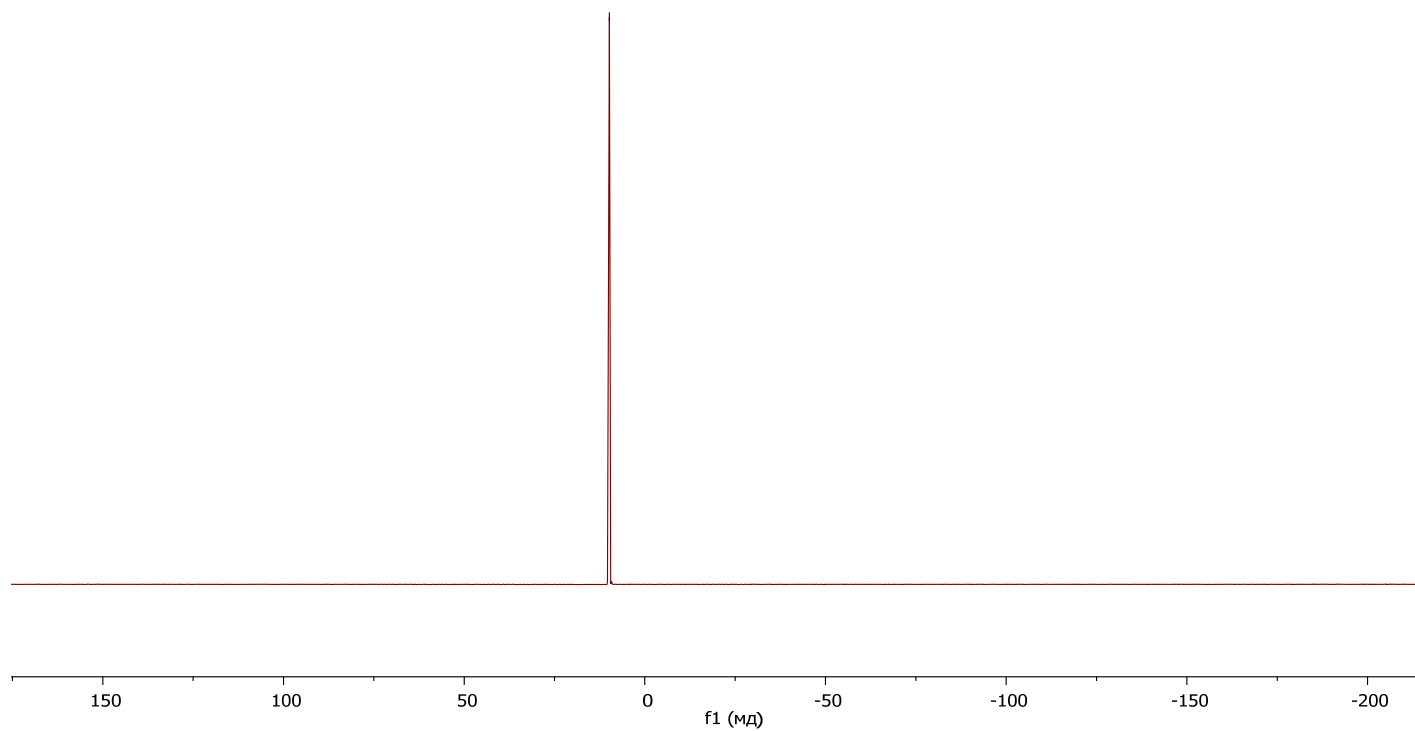
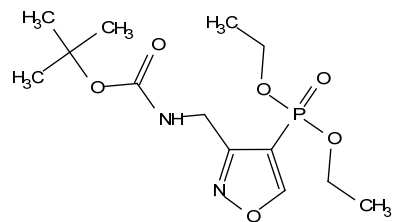


Figure 34 ^{31}P NMR spectrum of 2a

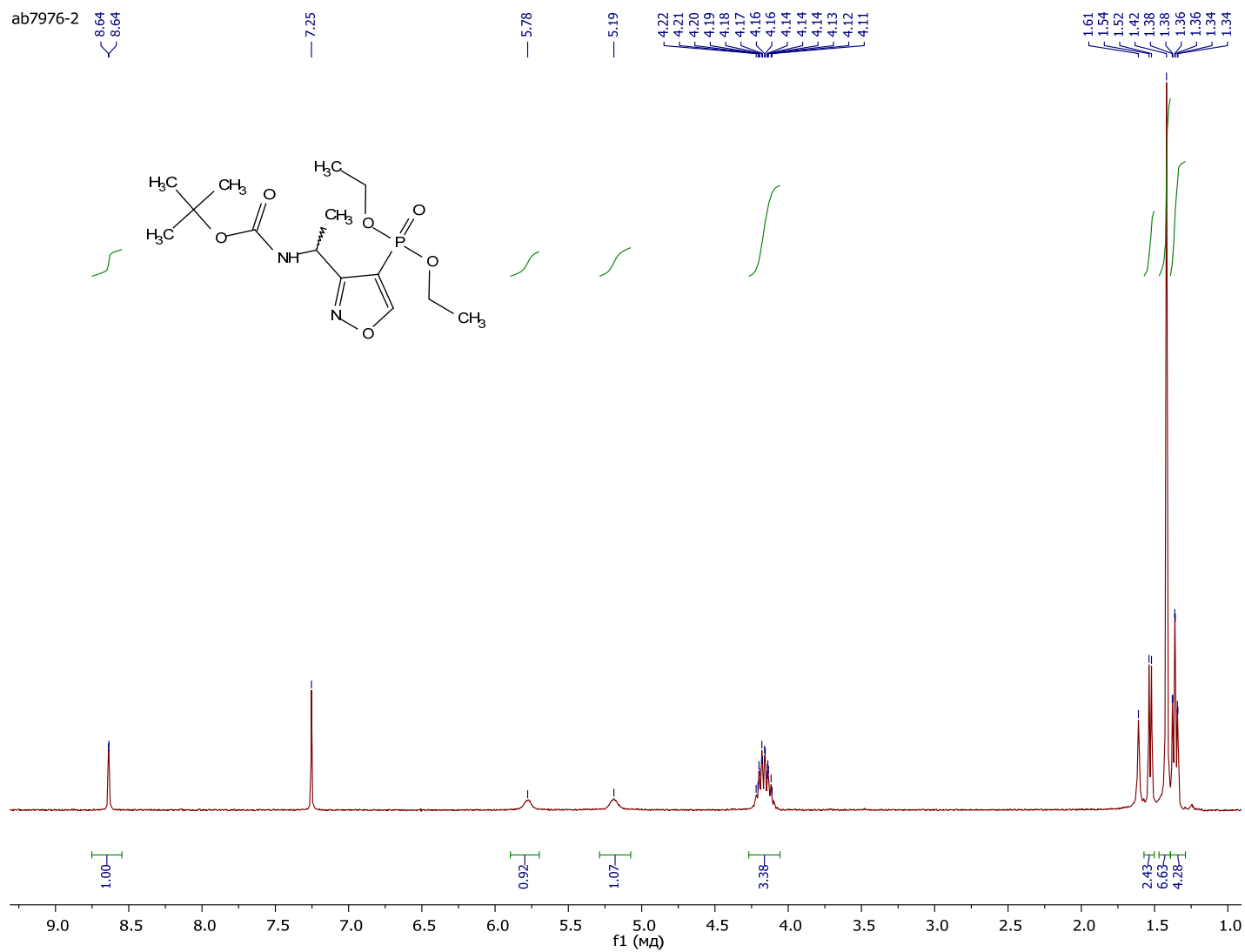


Figure 35 ¹H NMR spectrum of 2b and 2c (*R*-isomer)

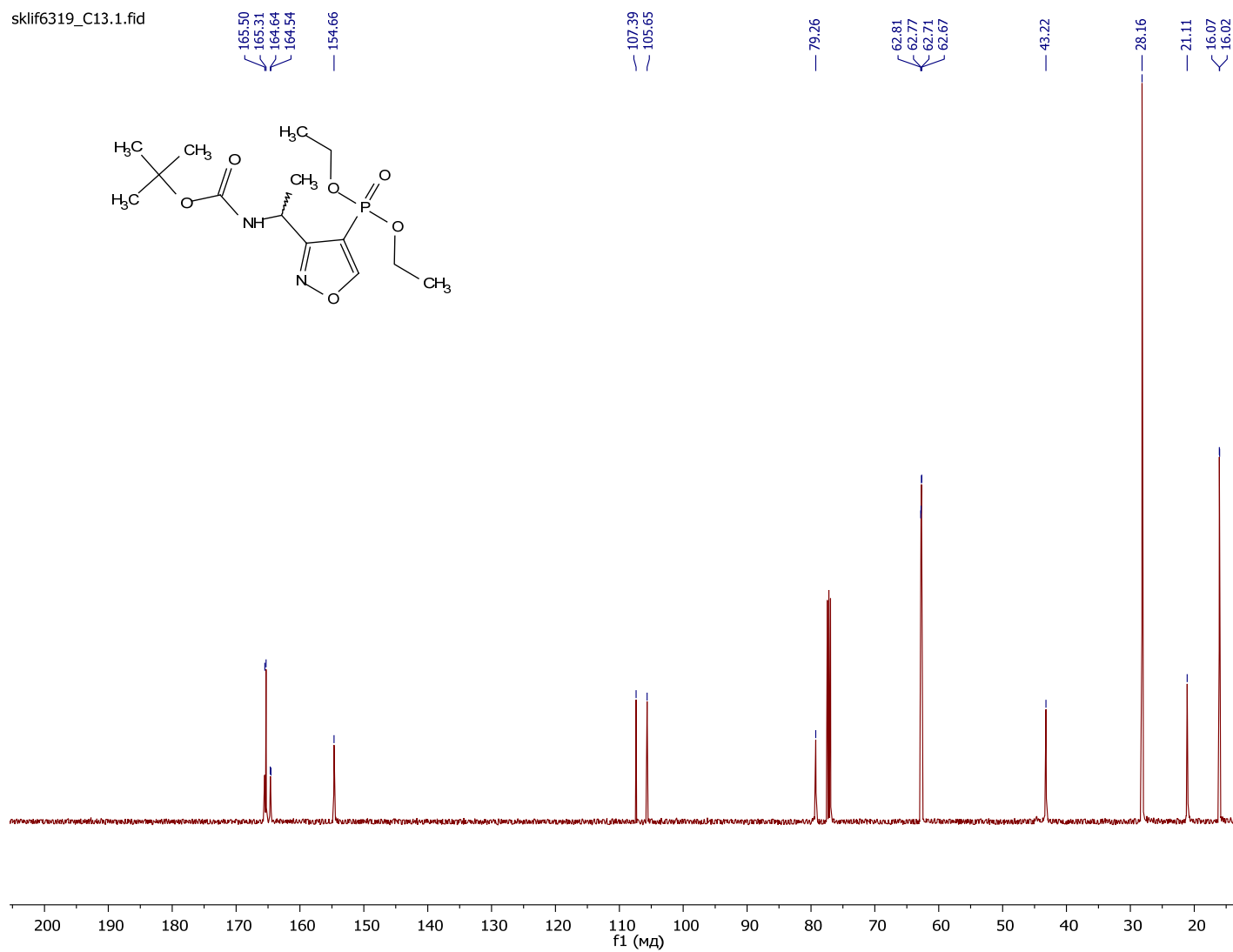


Figure 36 ¹³C NMR spectrum of 2b and 2c (*R*-isomer)

sklif6319_P31.1.fid

— 10.21

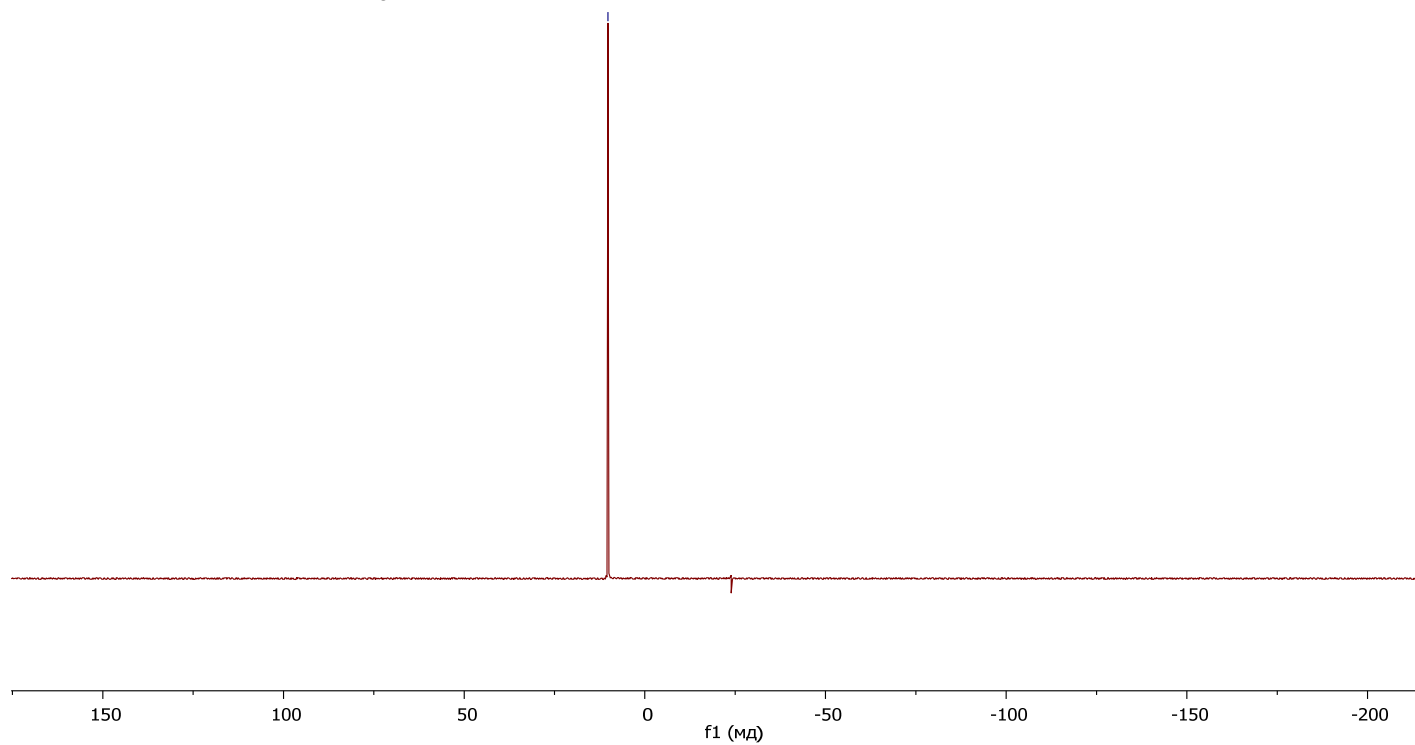
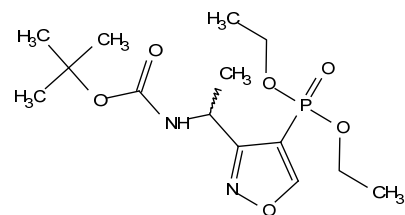
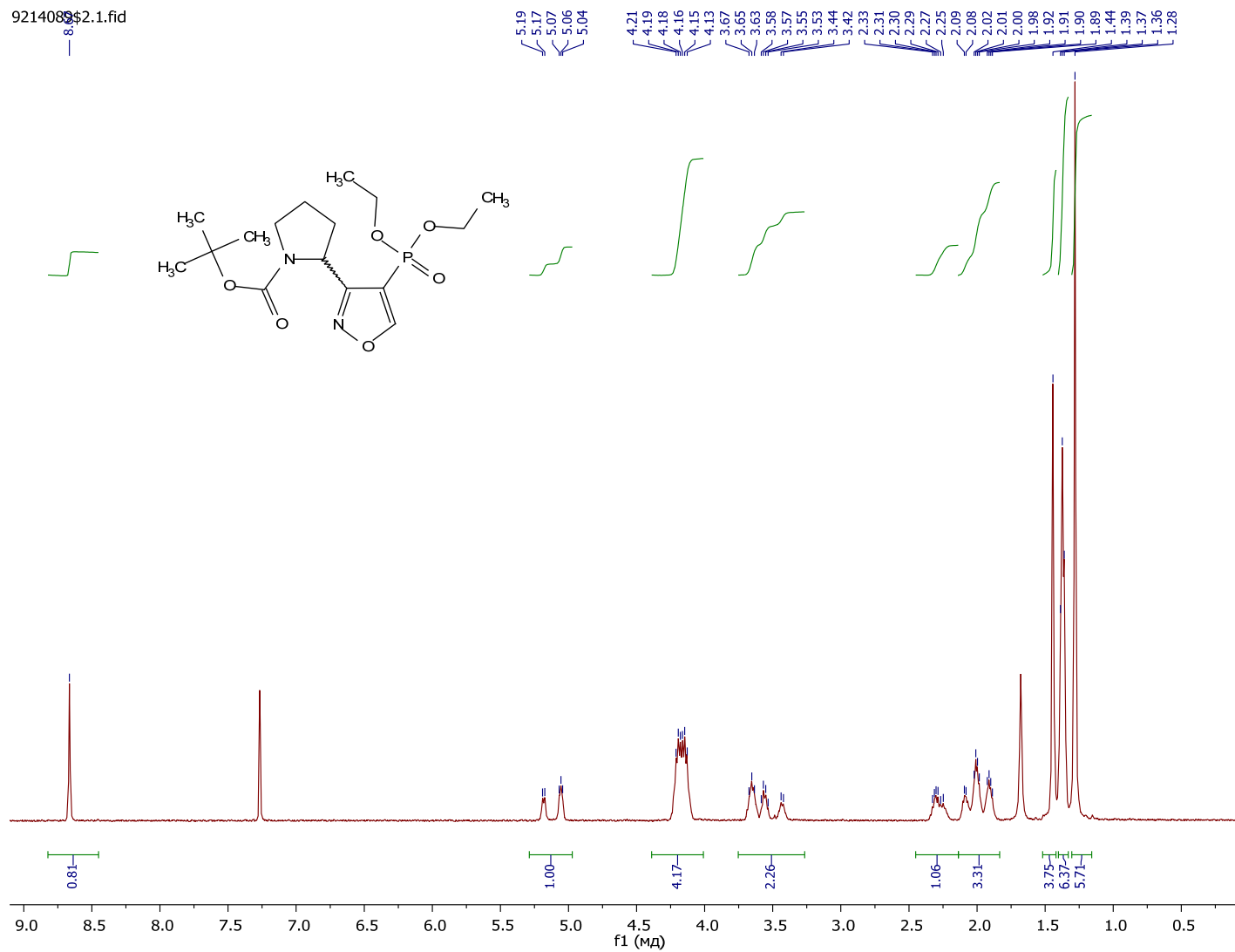


Figure 37 ^{31}P NMR spectrum of 2b and 2c (*R*-isomer)



sklif331 C13.1.fid

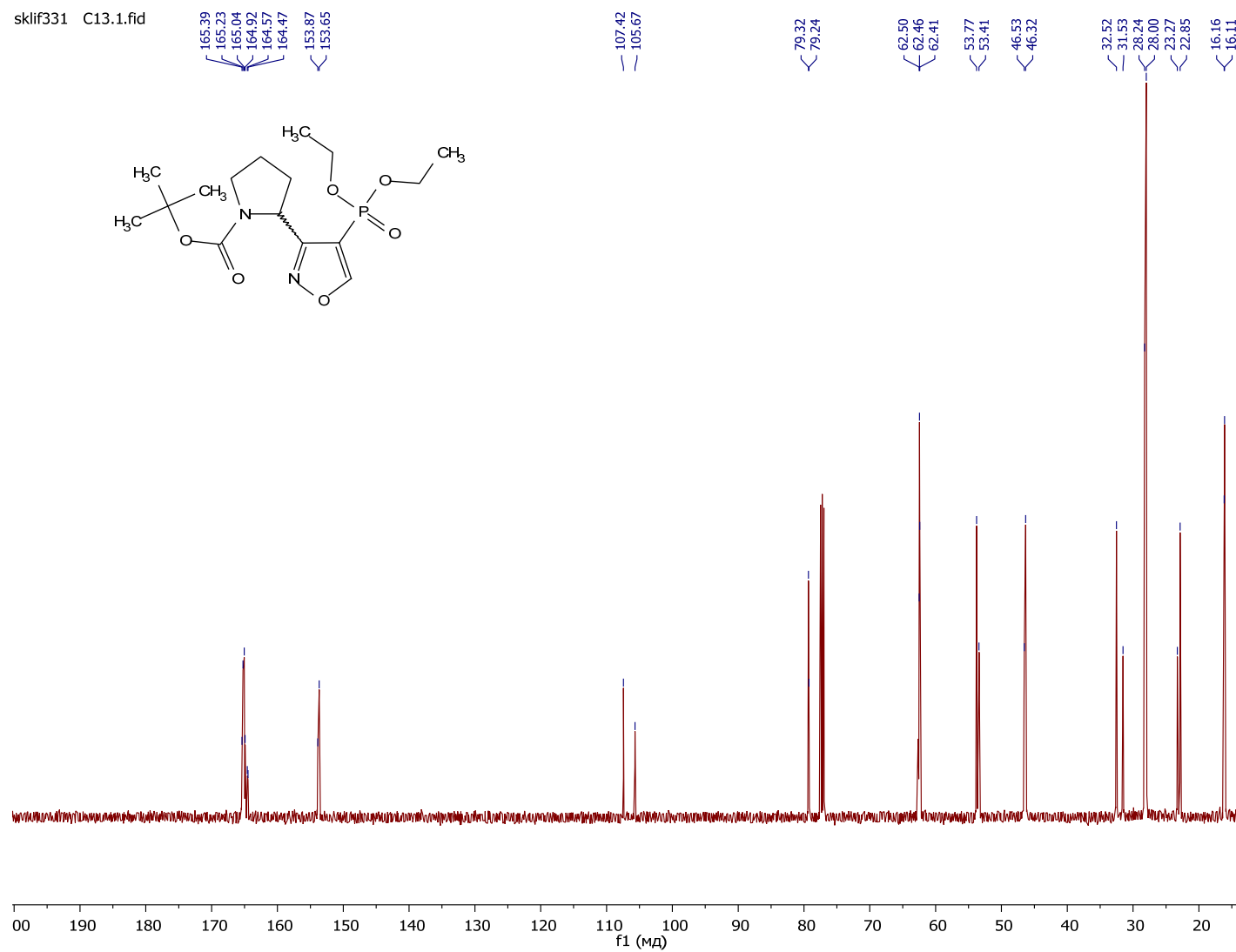


Figure 39 ^{13}C NMR spectrum of 2f and 2g (*R*-isomer)

SKLif331_P31.1.fid
31P-{1H}

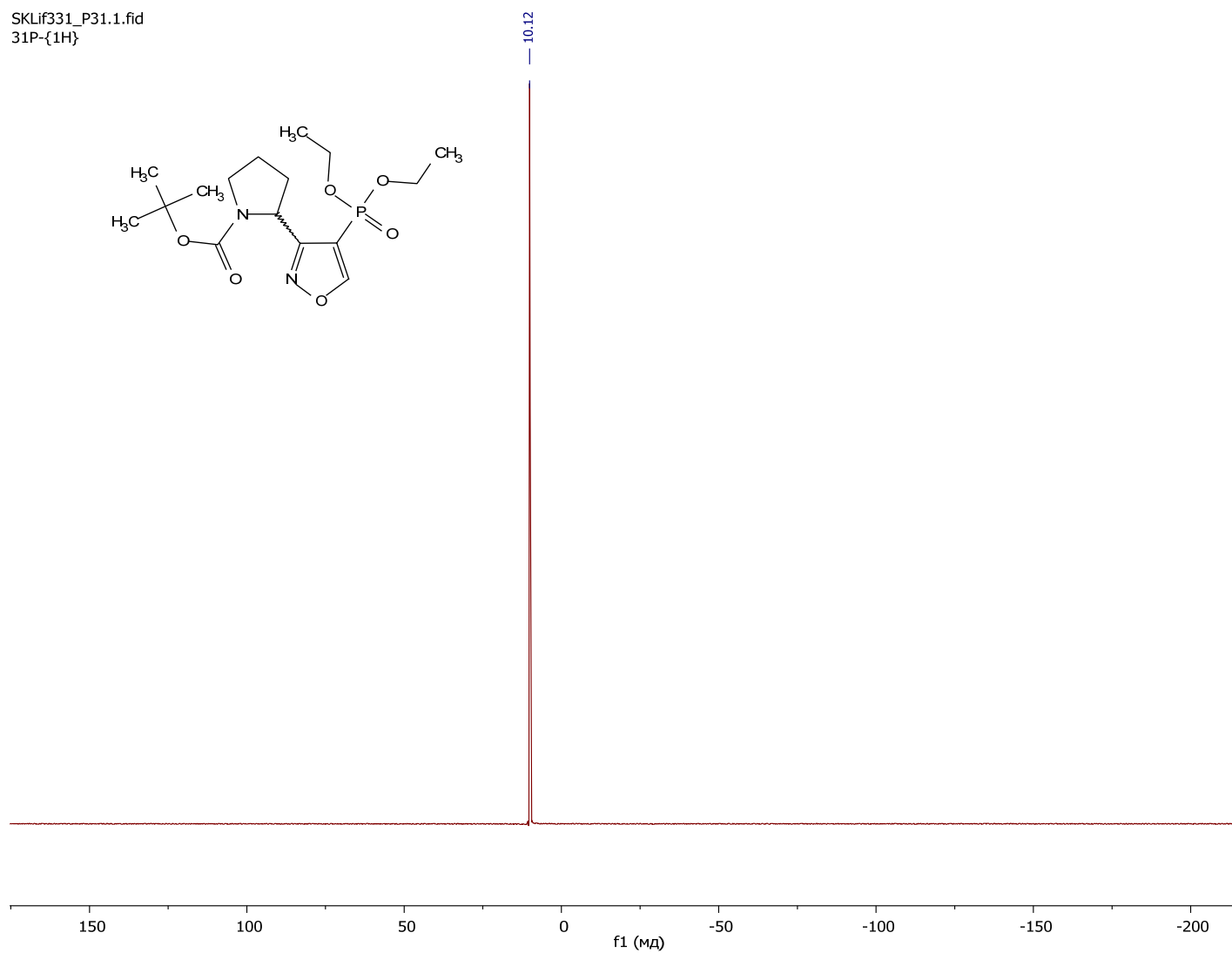
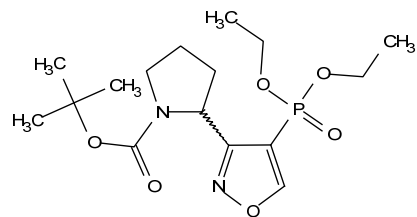


Figure 40 ^{31}P NMR spectrum of 2f and 2g (*R*-isomer)

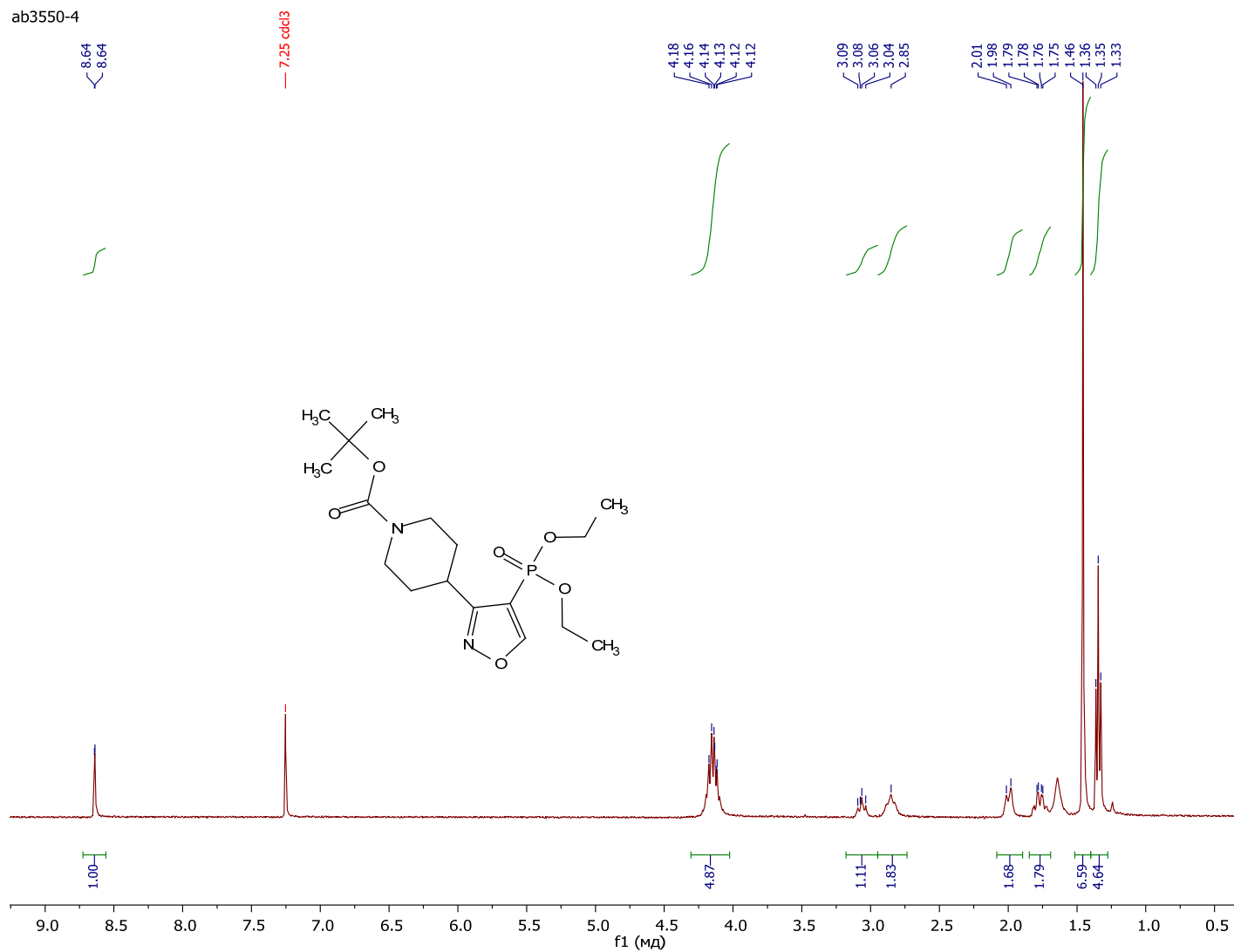


Figure 41 ¹H NMR spectrum of 2h

sklif6330_C13.1.fid

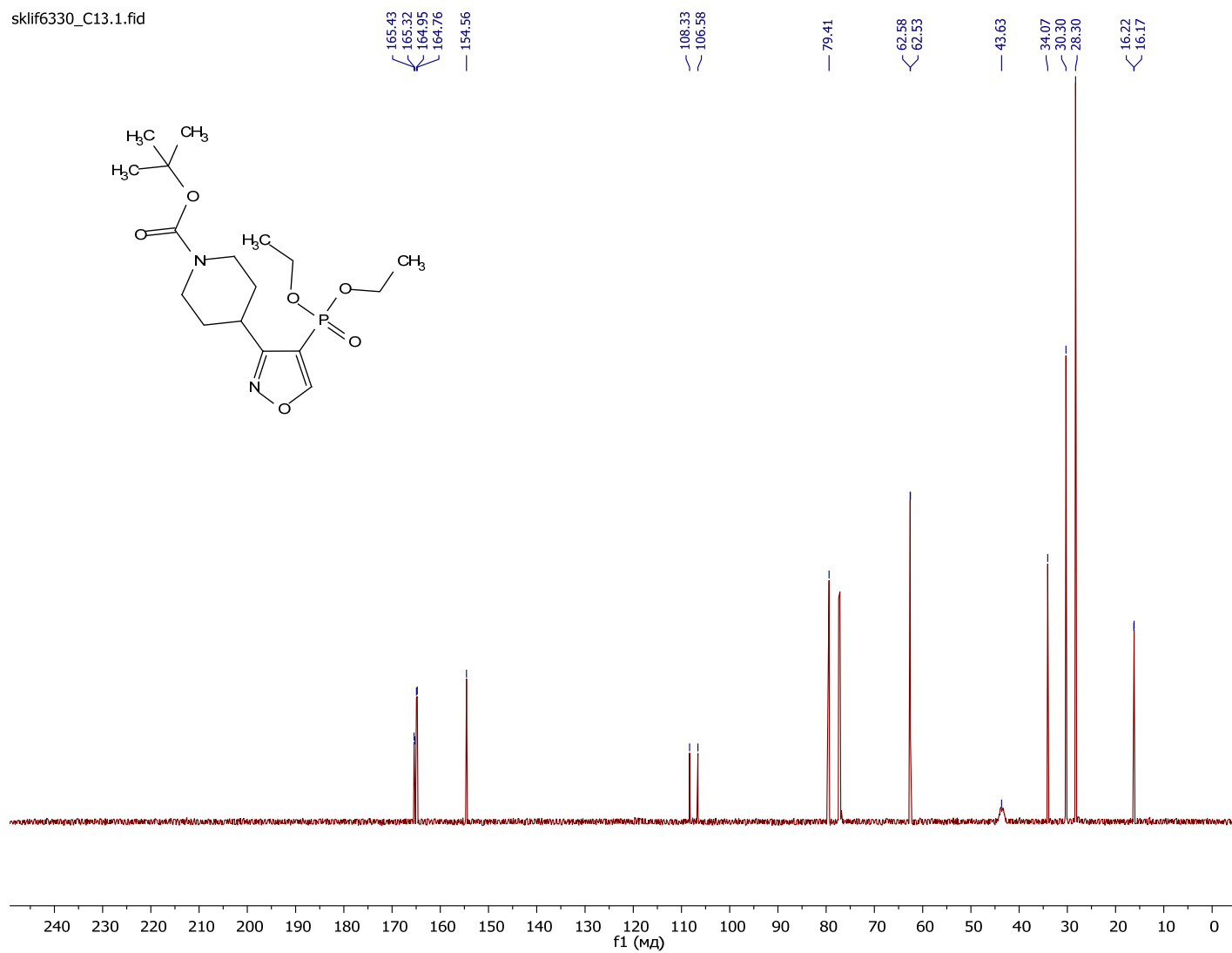


Figure 42 ^{13}C NMR spectrum of 2h

sklif6330_P31.1.fid

10.47
10.43
10.39

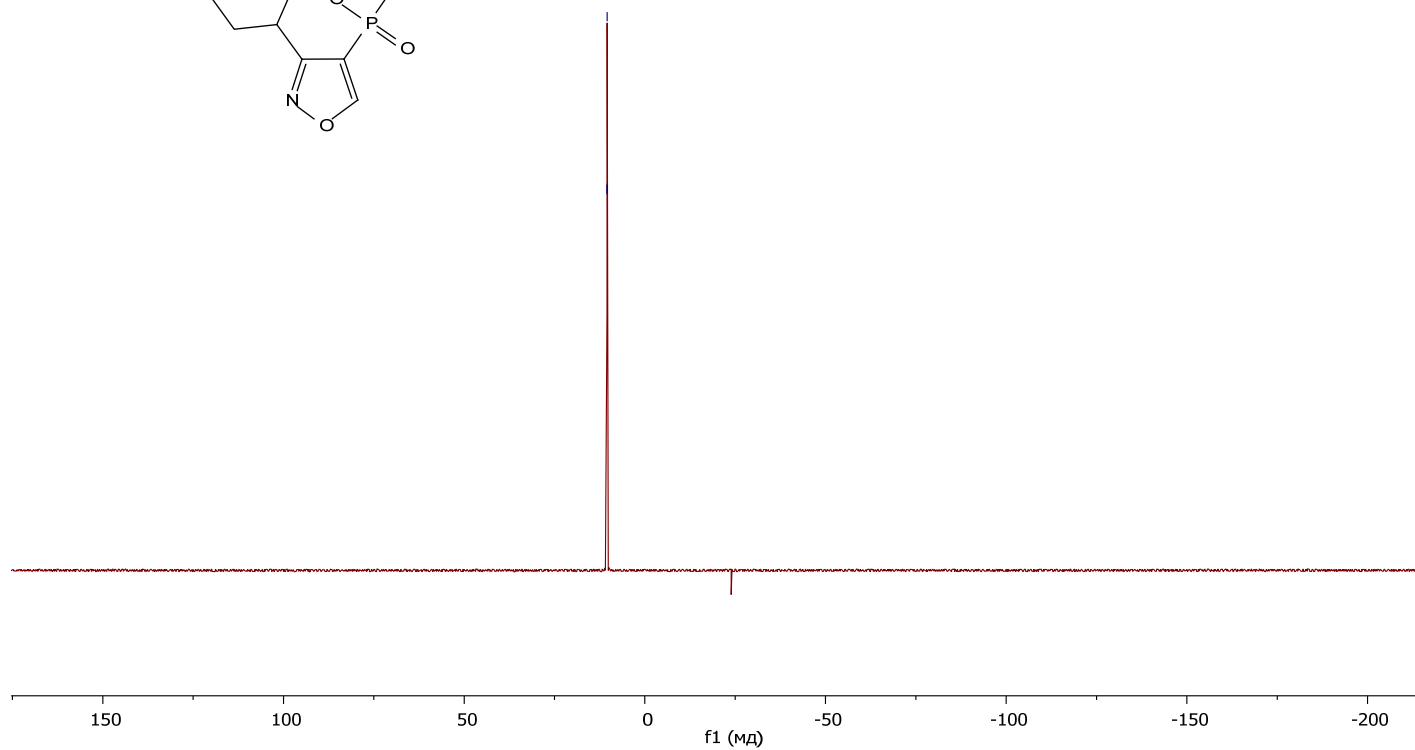
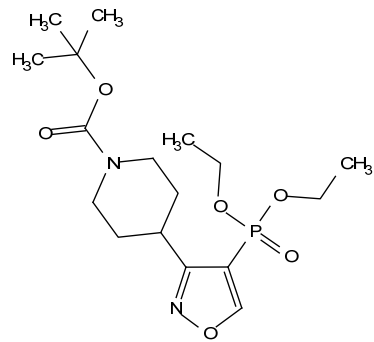


Figure 43 ^{31}P NMR spectrum of 2h

K777909s2

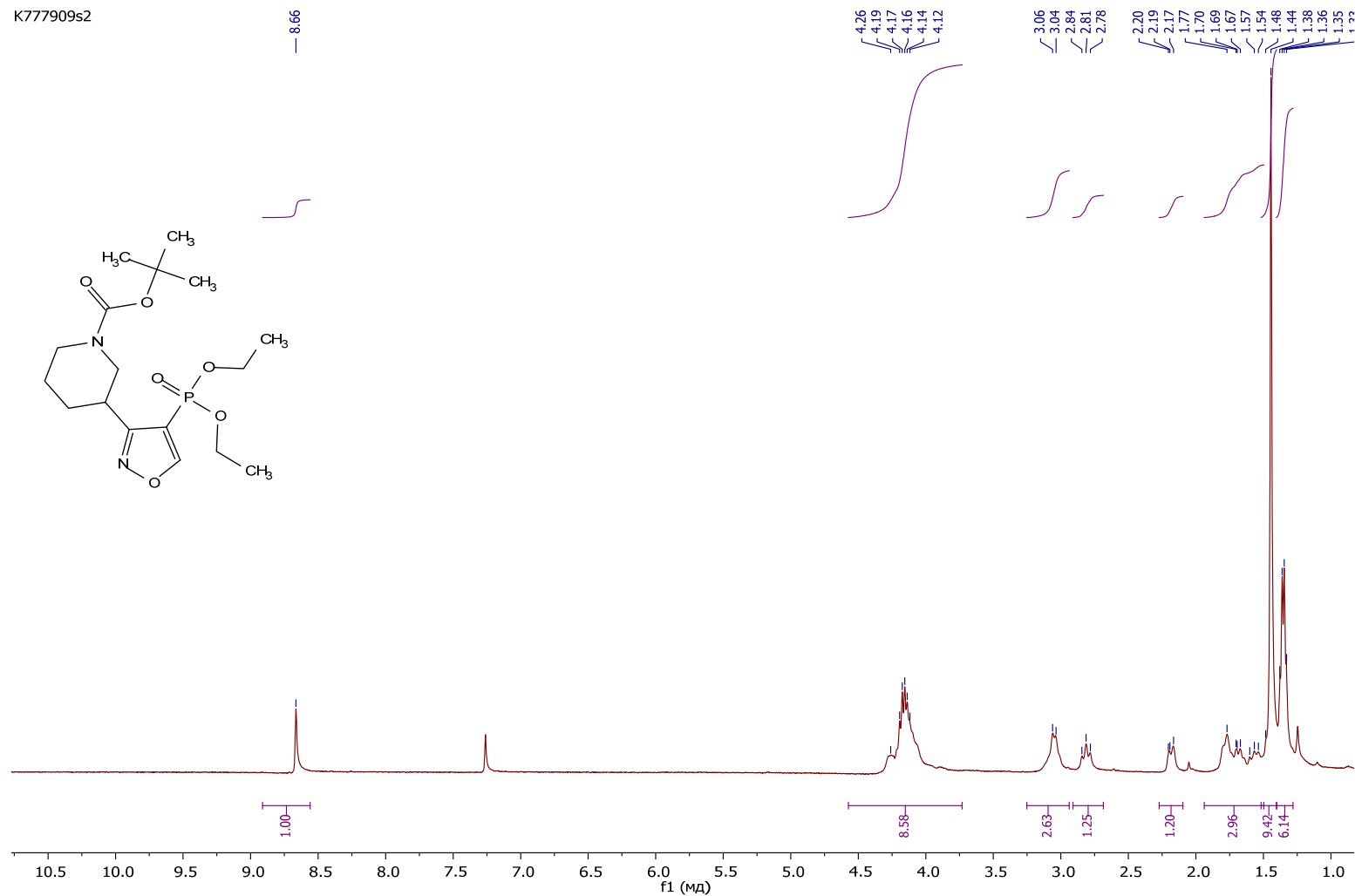


Figure 44. ¹H NMR spectrum of 2i

sklif3138_C13.1.fid

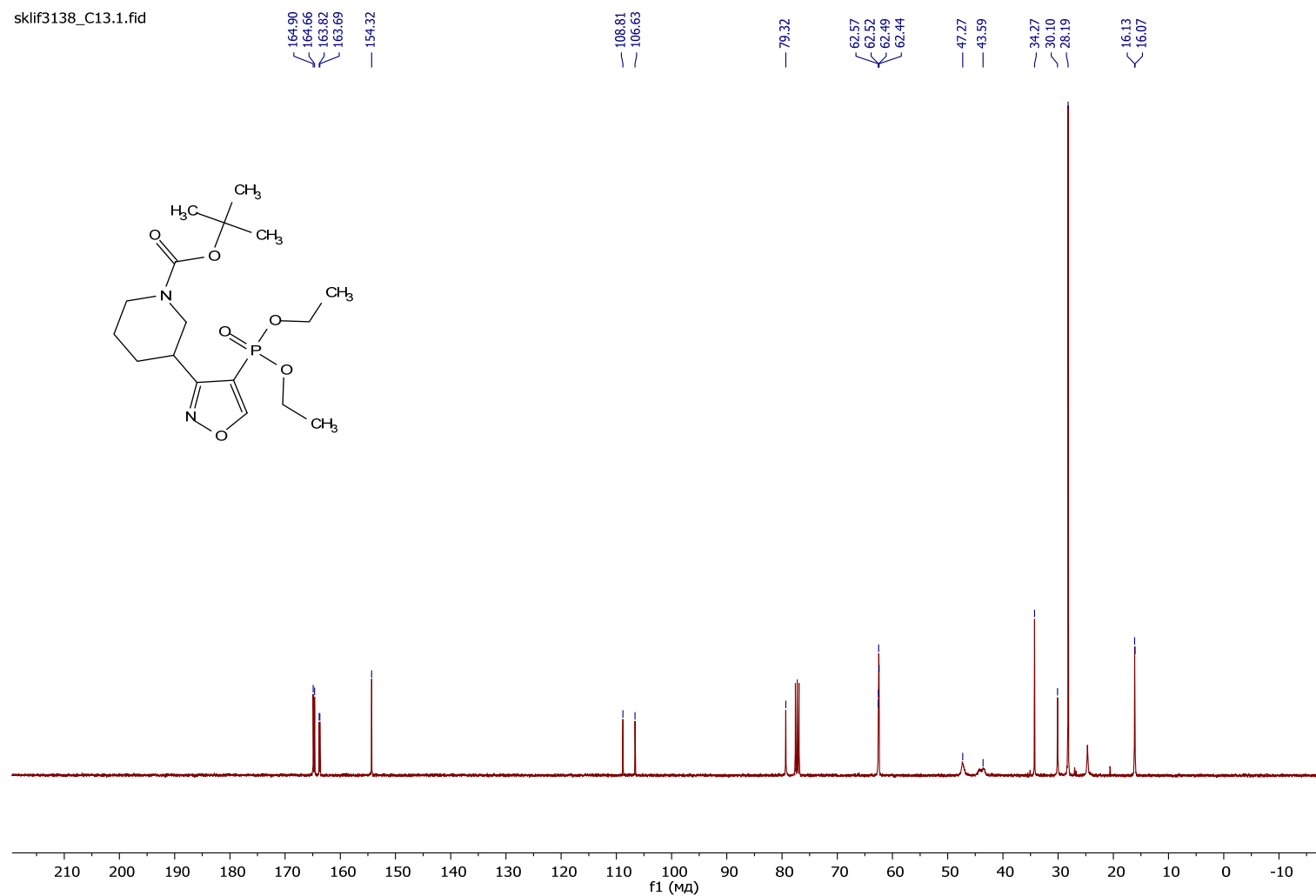


Figure 45. ¹³C NMR spectrum of 2i

sklif3138 31P{1H}.1.fid

— 10.10

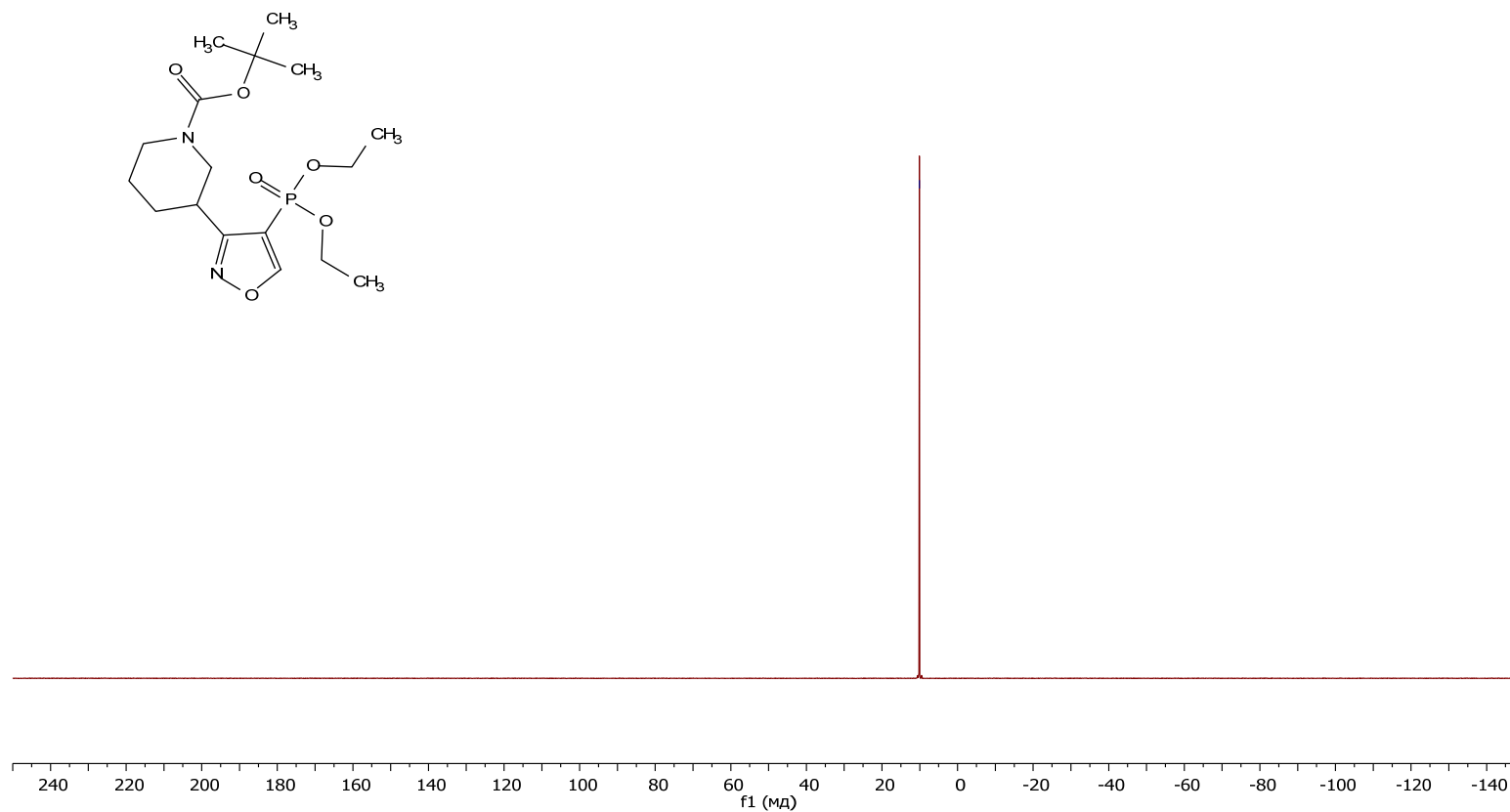


Figure 46. ^{31}P NMR spectrum of 2i

9231572s2.1.fid

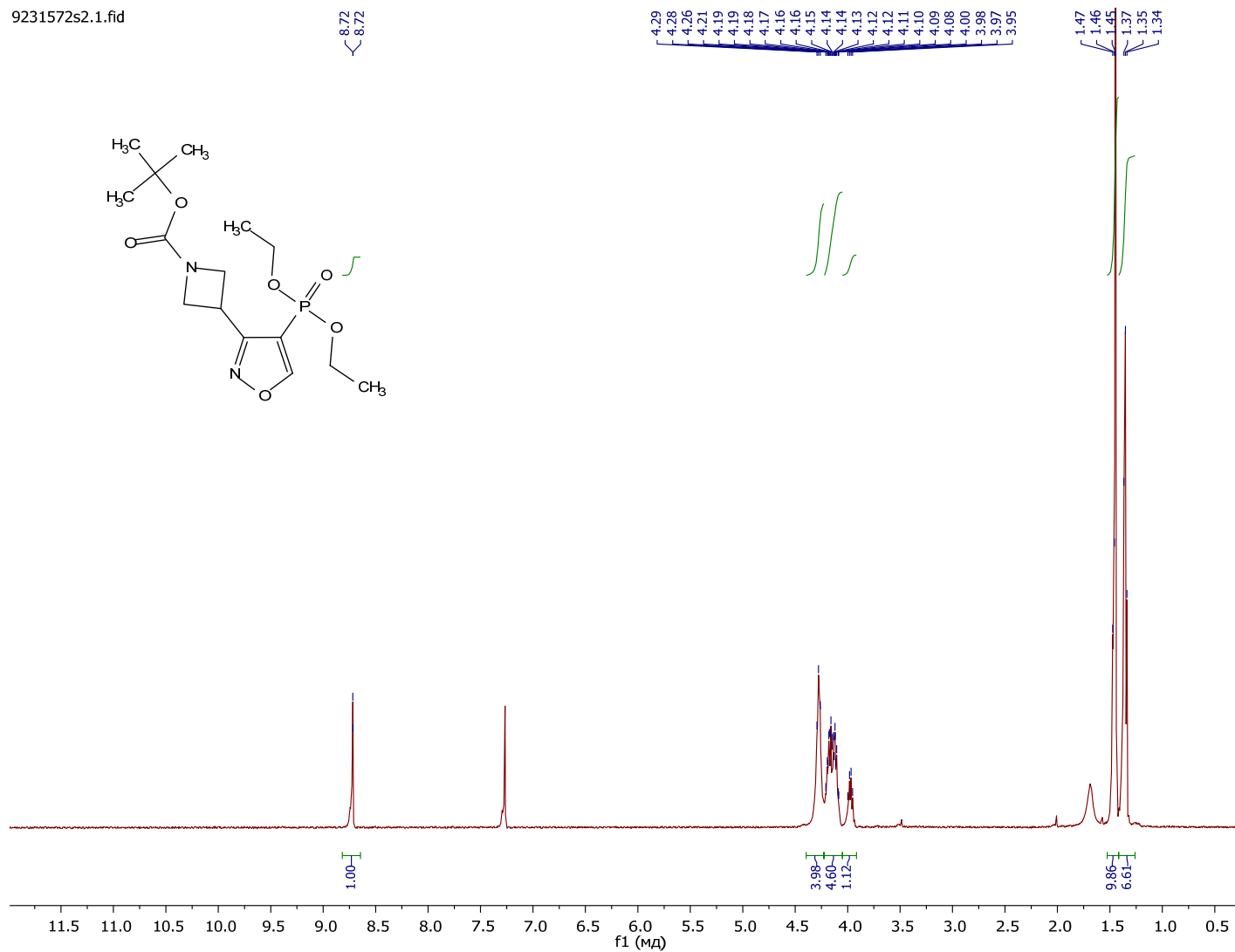


Figure 47 ¹H NMR spectrum of 2j

sklif378_C13.1.fid

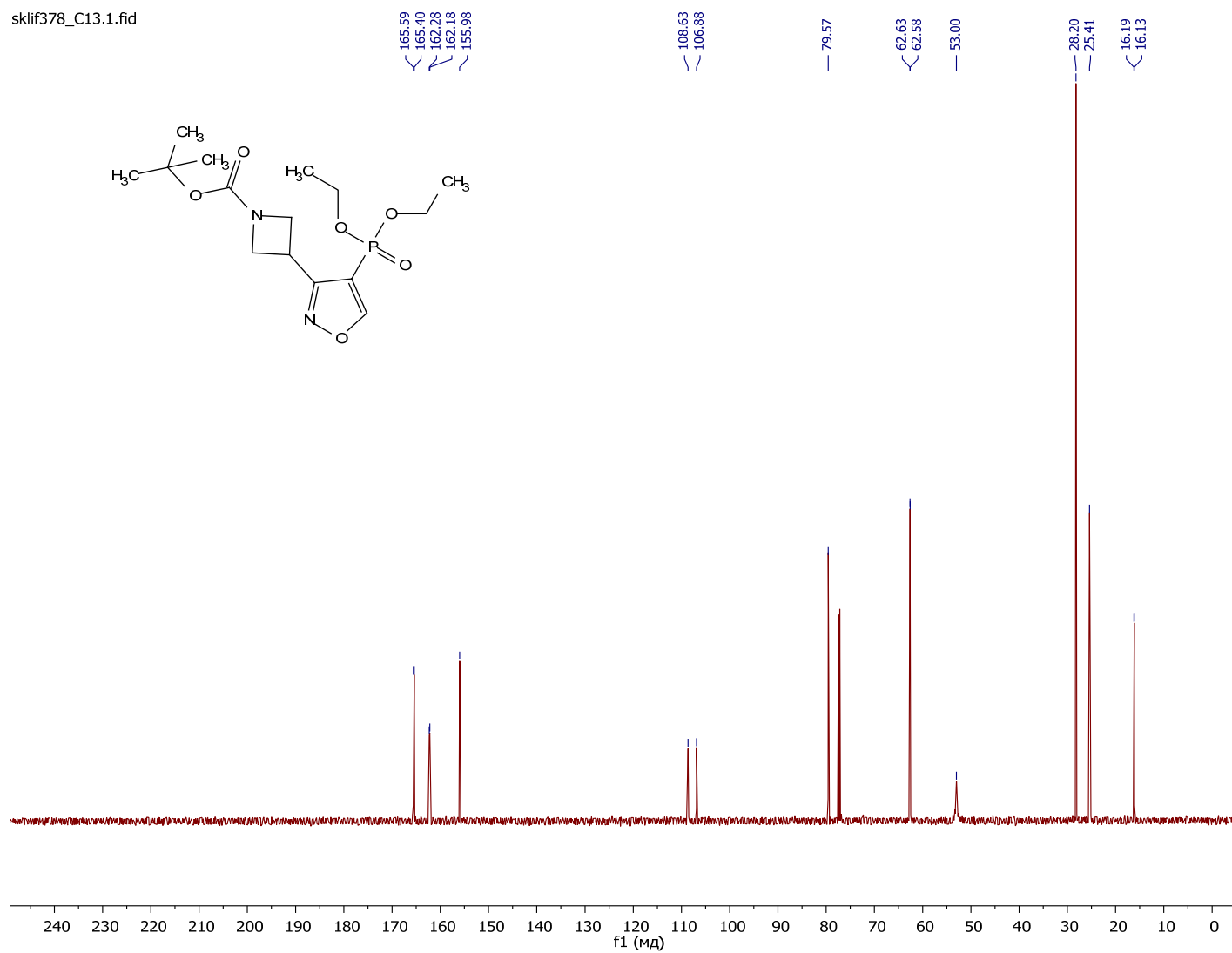


Figure 48 ¹³C NMR spectrum of 2j

sklif378_P31.1.fid

89.6

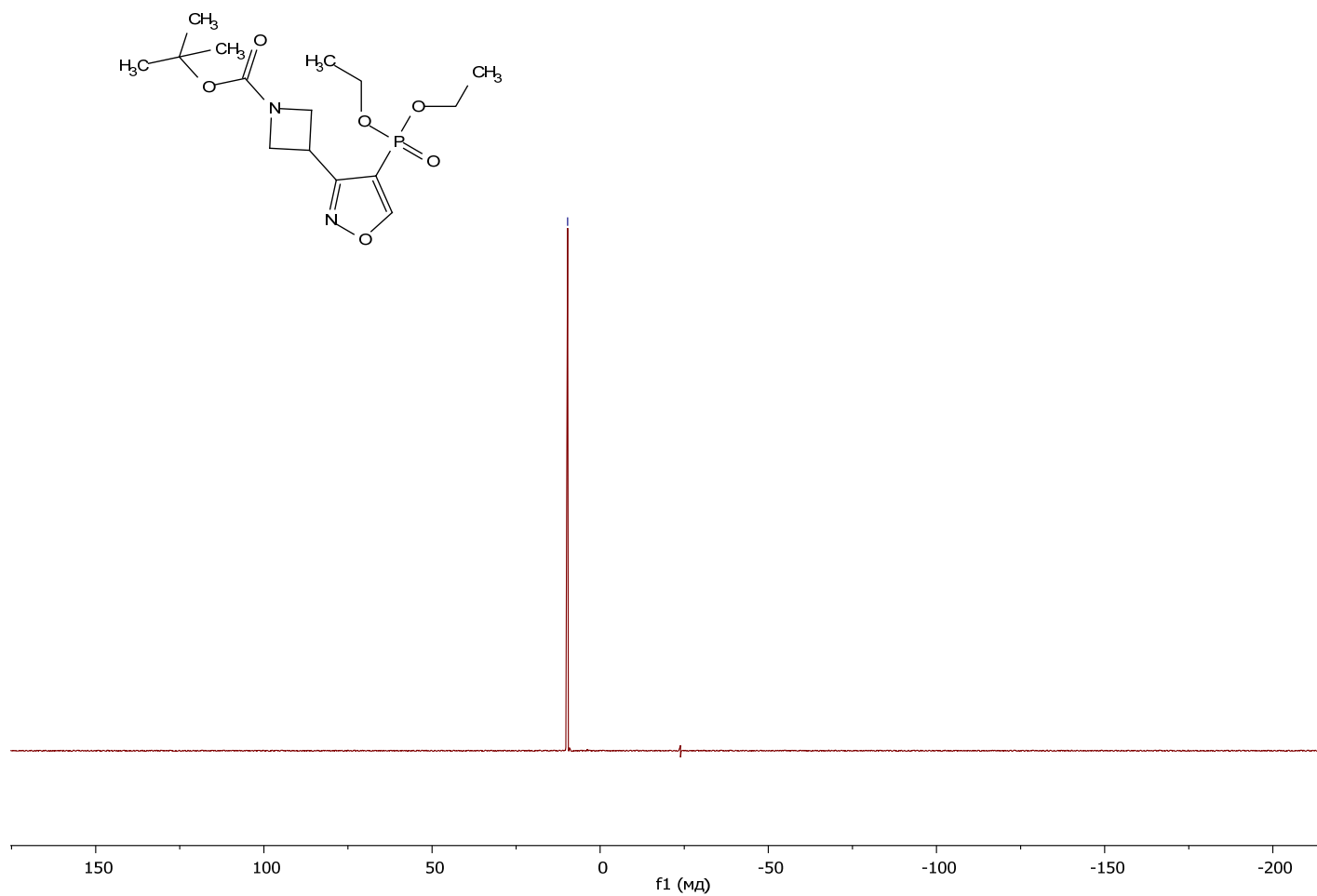


Figure 49 ^{31}P NMR spectrum of 2j

9082802s2

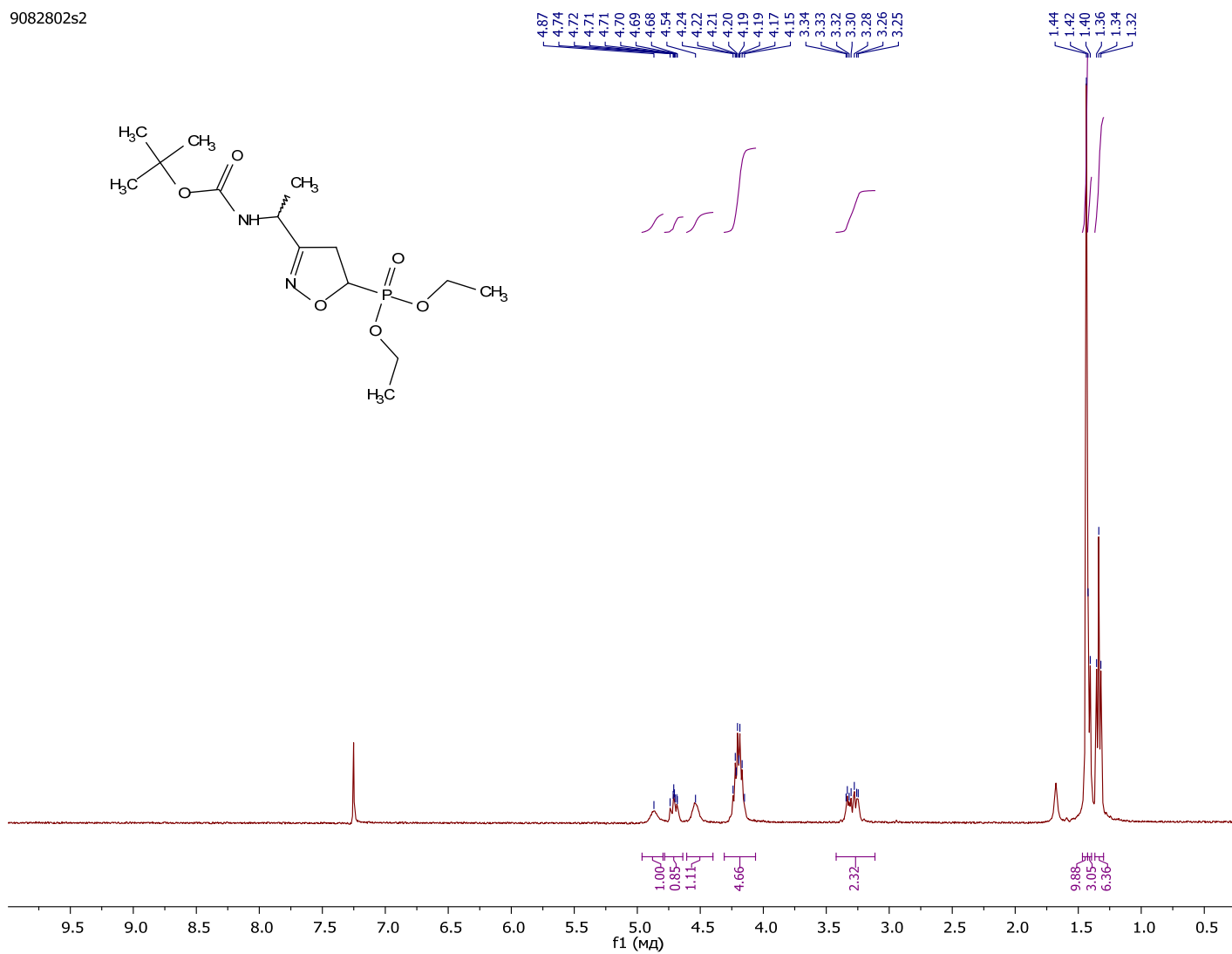


Figure 50 ^1H NMR spectrum of 16b and 16c (R-isomer)

sklif6991__C13.1.fid

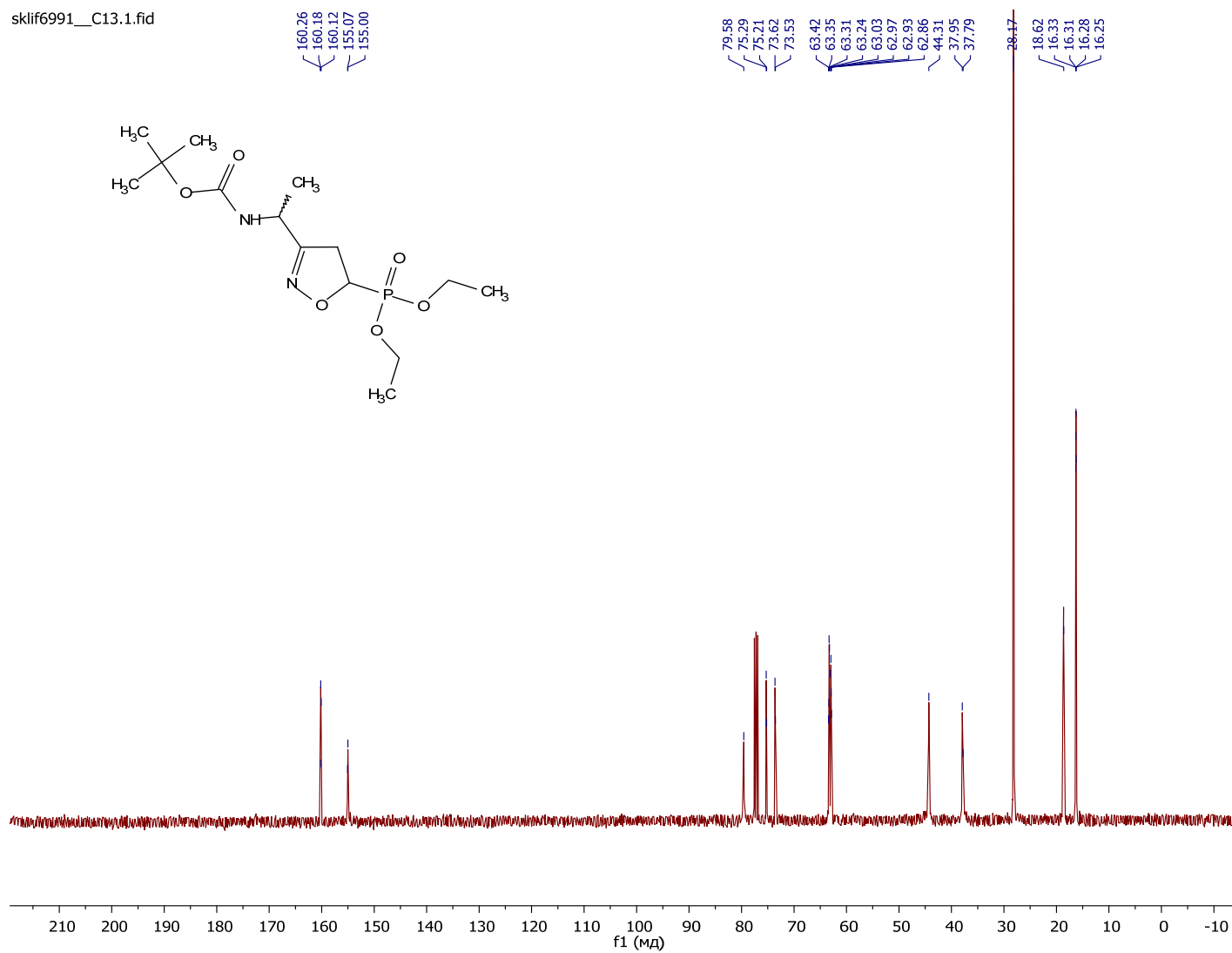


Figure 51 ^{13}C NMR spectrum of 16b and 16c (*R*-isomer)

Sklif6991_P31.1.fid
31P-{1H}

19.57
19.34

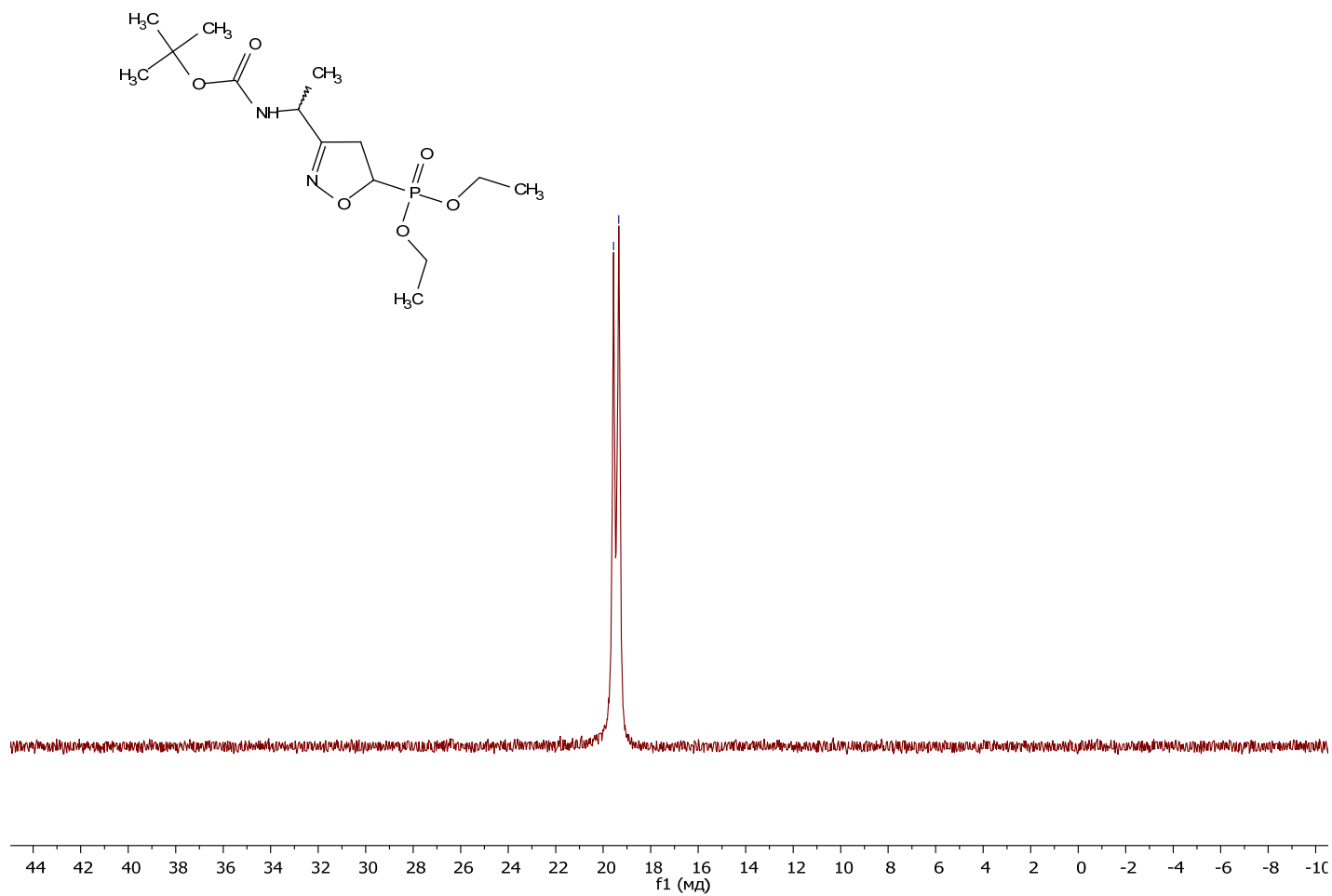


Figure 52 ^{31}P NMR spectrum of 16b and 16c (*R*-isomer)

9000690s1.1.fid

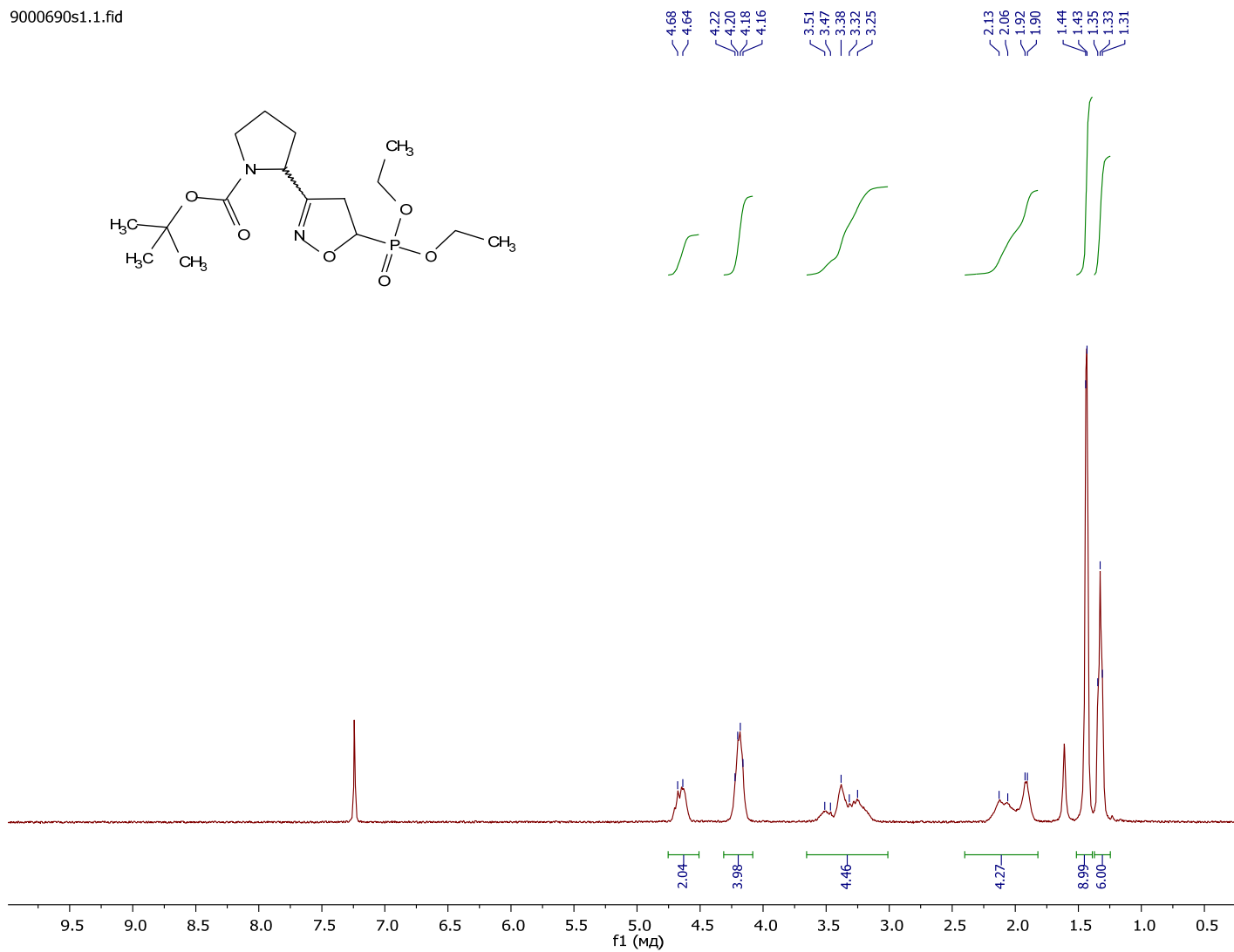


Figure 53 ¹H NMR spectrum of 16f and 16g (R-isomer)

sklif6660__C13.1.fid

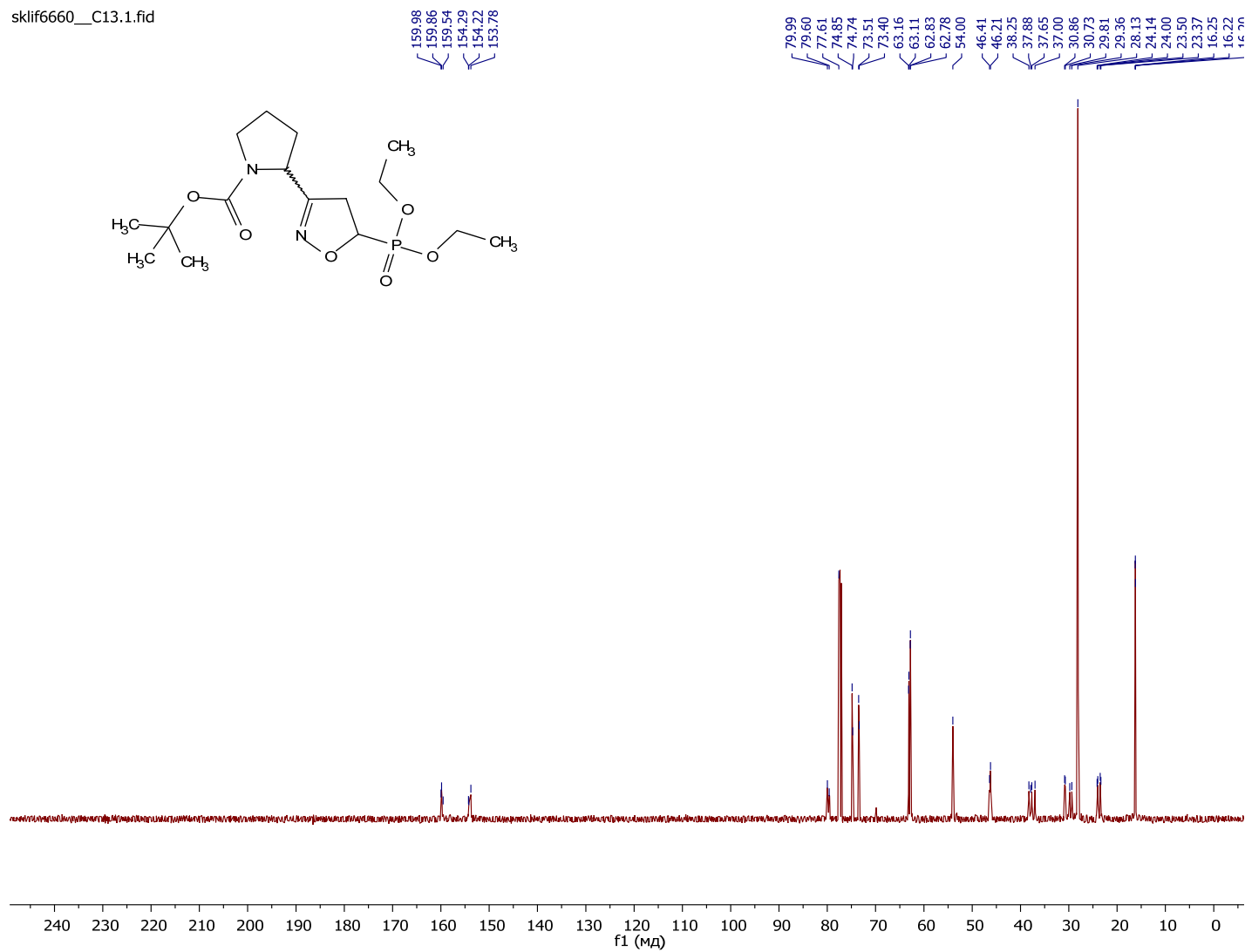


Figure 54 ¹³C NMR spectrum of 16f and 16g (R-isomer)

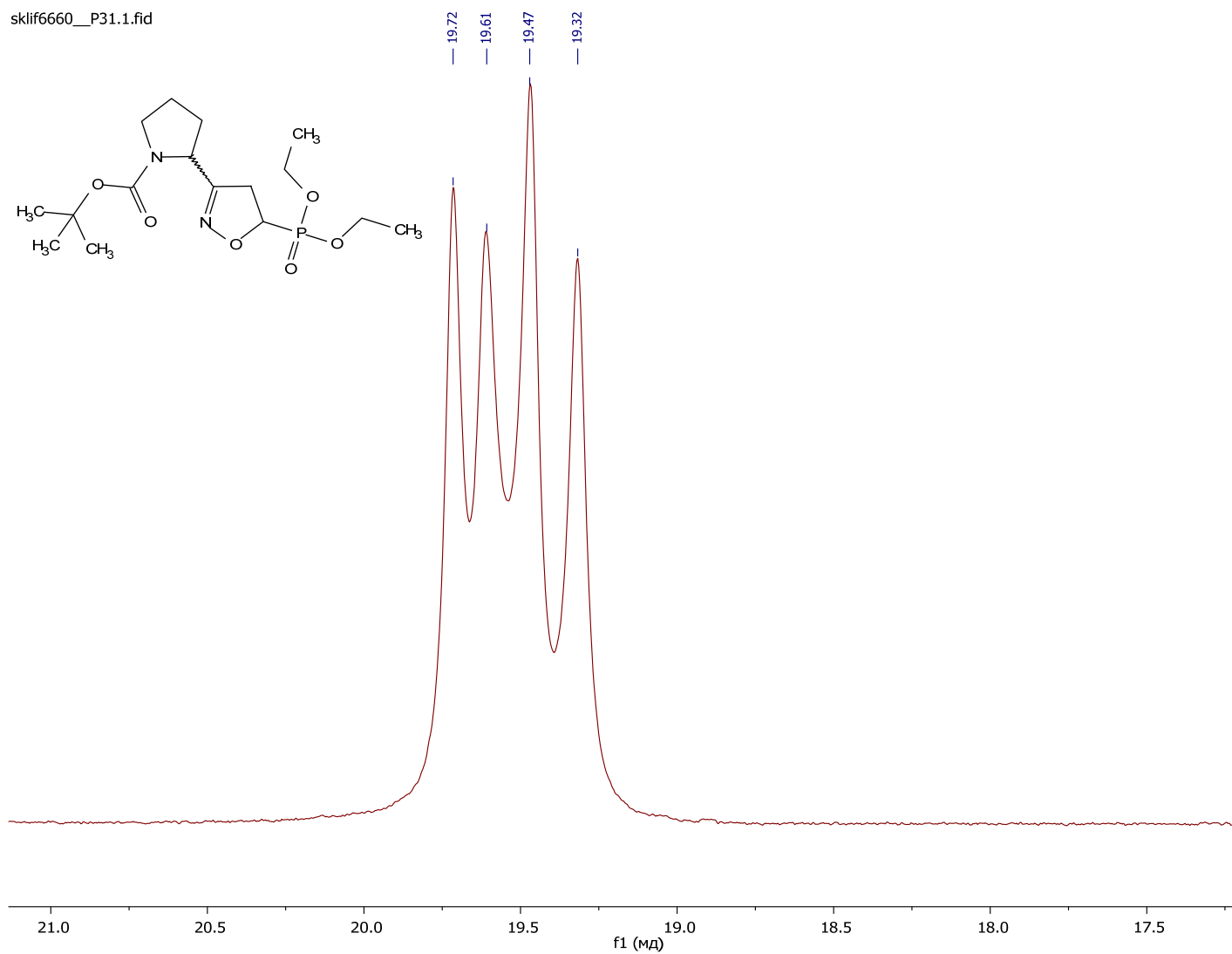


Figure 55 ^{31}P NMR spectrum of 16f and 16g (*R*-isomer)

ab0572-1

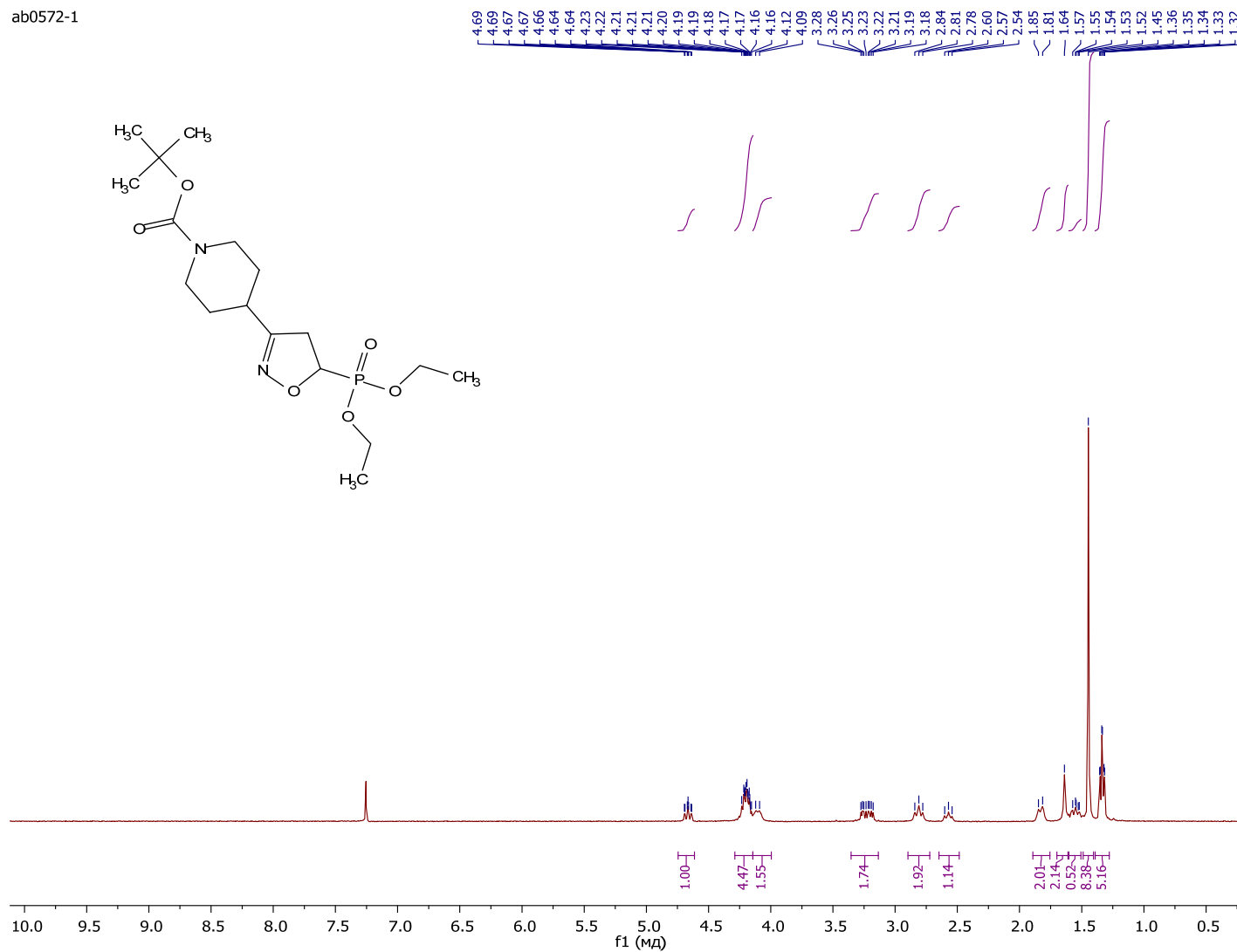


Figure S6 ¹H NMR spectrum of 16h

sklif6279__C13.1.fid

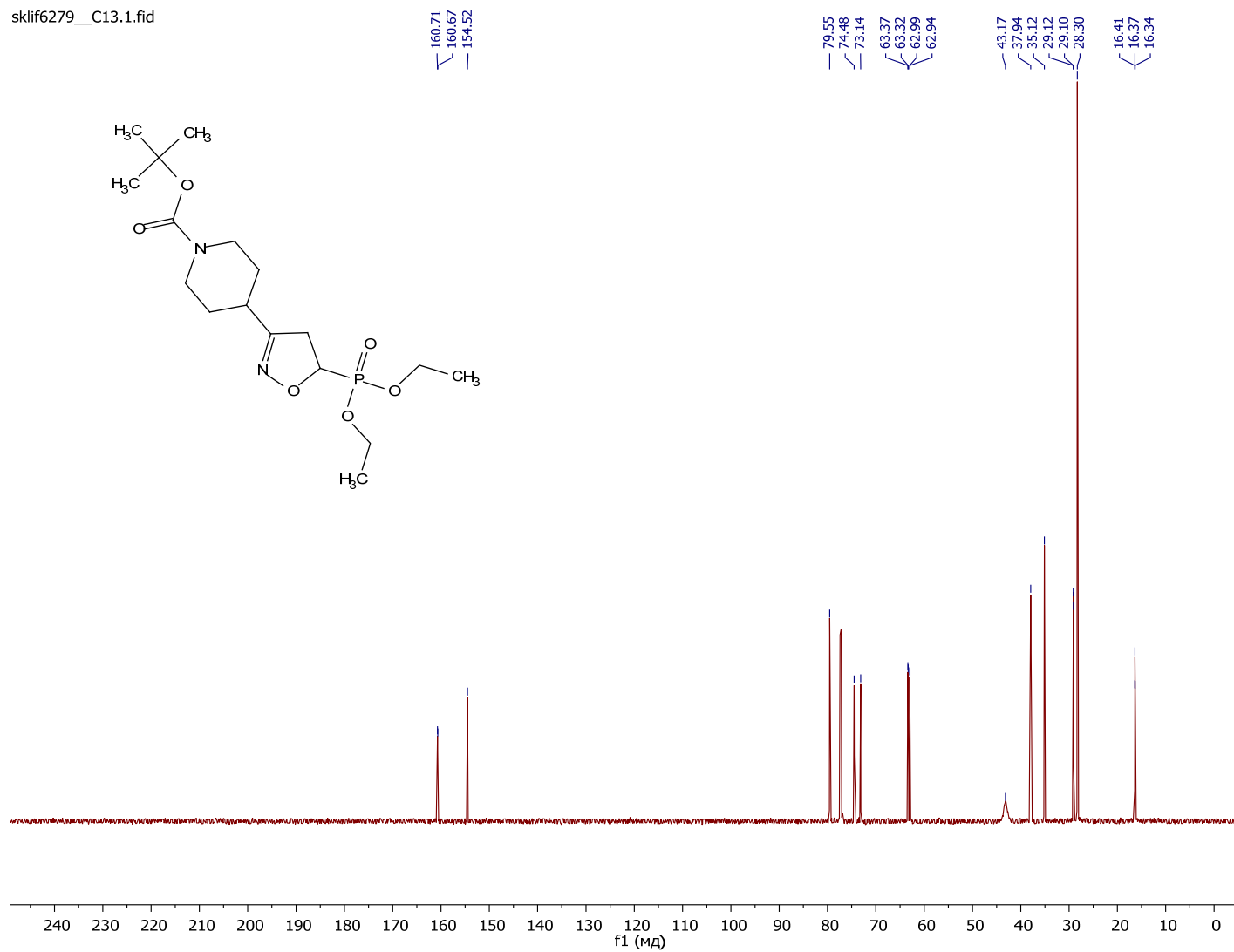


Figure S7 ¹³C NMR spectrum of 16h

sklif6279__P31{H}.1.fid

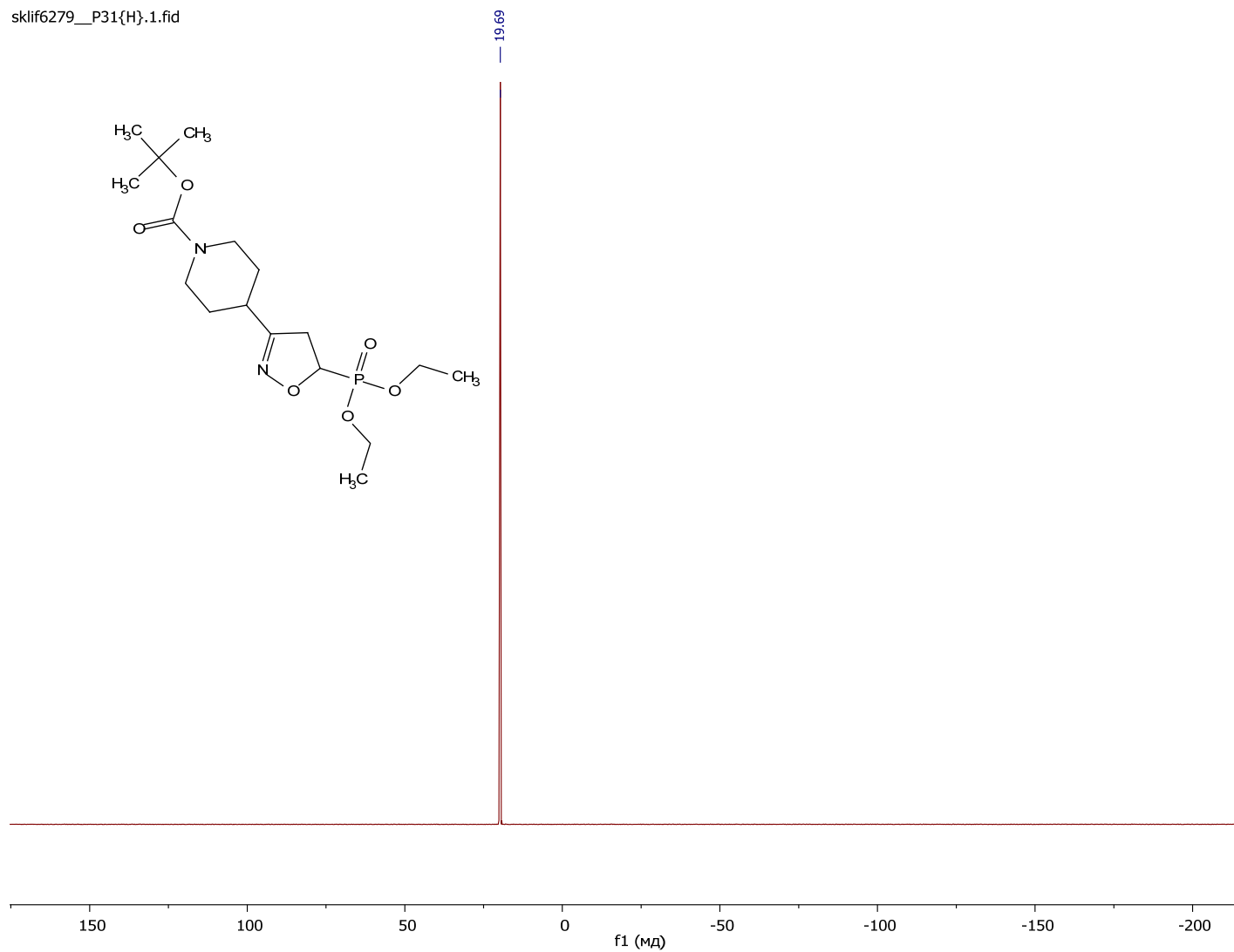


Figure S8 ^{31}P NMR spectrum of 16h

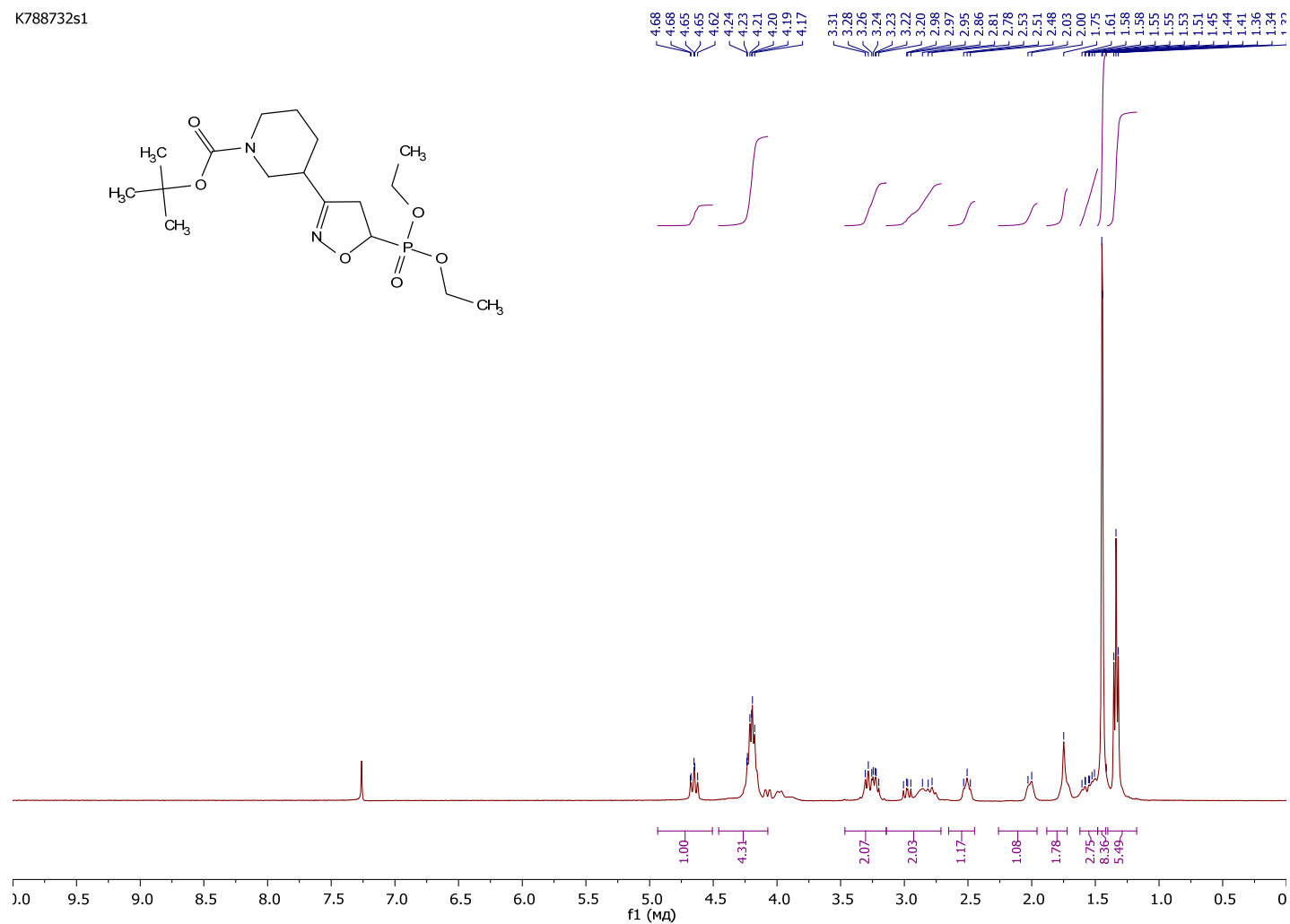
CC(C)(C)OC(=O)N1CCCCC1C2=CNOC2C3=CC=CC=C3C4=CC=CC=C4C5=CC=CC=C5C6=CC=CC=C6C7=CC=CC=C7C8=CC=CC=C8C9=CC=CC=C9C10=CC=CC=C10C11=CC=CC=C11C12=CC=CC=C12C13=CC=CC=C13C14=CC=CC=C14C15=CC=CC=C15C16=CC=CC=C16C17=CC=CC=C17C18=CC=CC=C18C19=CC=CC=C19C20=CC=CC=C20C21=CC=CC=C21C22=CC=CC=C22C23=CC=CC=C23C24=CC=CC=C24C25=CC=CC=C25C26=CC=CC=C26C27=CC=CC=C27C28=CC=CC=C28C29=CC=CC=C29C30=CC=CC=C30C31=CC=CC=C31C32=CC=CC=C32C33=CC=CC=C33C34=CC=CC=C34C35=CC=CC=C35C36=CC=CC=C36C37=CC=CC=C37C38=CC=CC=C38C39=CC=CC=C39C40=CC=CC=C40C41=CC=CC=C41C42=CC=CC=C42C43=CC=CC=C43C44=CC=CC=C44C45=CC=CC=C45C46=CC=CC=C46C47=CC=CC=C47C48=CC=CC=C48C49=CC=CC=C49C50=CC=CC=C50C51=CC=CC=C51C52=CC=CC=C52C53=CC=CC=C53C54=CC=CC=C54C55=CC=CC=C55C56=CC=CC=C56C57=CC=CC=C57C58=CC=CC=C58C59=CC=CC=C59C60=CC=CC=C60C61=CC=CC=C61C62=CC=CC=C62C63=CC=CC=C63C64=CC=CC=C64C65=CC=CC=C65C66=CC=CC=C66C67=CC=CC=C67C68=CC=CC=C68C69=CC=CC=C69C70=CC=CC=C70C71=CC=CC=C71C72=CC=CC=C72C73=CC=CC=C73C74=CC=CC=C74C75=CC=CC=C75C76=CC=CC=C76C77=CC=CC=C77C78=CC=CC=C78C79=CC=CC=C79C80=CC=CC=C80C81=CC=CC=C81C82=CC=CC=C82C83=CC=CC=C83C84=CC=CC=C84C85=CC=CC=C85C86=CC=CC=C86C87=CC=CC=C87C88=CC=CC=C88C89=CC=CC=C89C90=CC=CC=C90C91=CC=CC=C91C92=CC=CC=C92C93=CC=CC=C93C94=CC=CC=C94C95=CC=CC=C95C96=CC=CC=C96C97=CC=CC=C97C98=CC=CC=C98C99=CC=CC=C99C100=CC=CC=C100C101=CC=CC=C101C102=CC=CC=C102C103=CC=CC=C103C104=CC=CC=C104C105=CC=CC=C105C106=CC=CC=C106C107=CC=CC=C107C108=CC=CC=C108C109=CC=CC=C109C110=CC=CC=C110C111=CC=CC=C111C112=CC=CC=C112C113=CC=CC=C113C114=CC=CC=C114C115=CC=CC=C115C116=CC=CC=C116C117=CC=CC=C117C118=CC=CC=C118C119=CC=CC=C119C120=CC=CC=C120C121=CC=CC=C121C122=CC=CC=C122C123=CC=CC=C123C124=CC=CC=C124C125=CC=CC=C125C126=CC=CC=C126C127=CC=CC=C127C128=CC=CC=C128C129=CC=CC=C129C130=CC=CC=C130C131=CC=CC=C131C132=CC=CC=C132C133=CC=CC=C133C134=CC=CC=C134C135=CC=CC=C135C136=CC=CC=C136C137=CC=CC=C137C138=CC=CC=C138C139=CC=CC=C139C140=CC=CC=C140C141=CC=CC=C141C142=CC=CC=C142C143=CC=CC=C143C144=CC=CC=C144C145=CC=CC=C145C146=CC=CC=C146C147=CC=CC=C147C148=CC=CC=C148C149=CC=CC=C149C150=CC=CC=C150C151=CC=CC=C151C152=CC=CC=C152C153=CC=CC=C153C154=CC=CC=C154C155=CC=CC=C155C156=CC=CC=C156C157=CC=CC=C157C158=CC=CC=C158C159=CC=CC=C159C160=CC=CC=C160C161=CC=CC=C161C162=CC=CC=C162C163=CC=CC=C163C164=CC=CC=C164C165=CC=CC=C165C166=CC=CC=C166C167=CC=CC=C167C168=CC=CC=C168C169=CC=CC=C169C170=CC=CC=C170C171=CC=CC=C171C172=CC=CC=C172C173=CC=CC=C173C174=CC=CC=C174C175=CC=CC=C175C176=CC=CC=C176C177=CC=CC=C177C178=CC=CC=C178C179=CC=CC=C179C180=CC=CC=C180C181=CC=CC=C181C182=CC=CC=C182C183=CC=CC=C183C184=CC=CC=C184C185=CC=CC=C185C186=CC=CC=C186C187=CC=CC=C187C188=CC=CC=C188C189=CC=CC=C189C190=CC=CC=C190C191=CC=CC=C191C192=CC=CC=C192C193=CC=CC=C193C194=CC=CC=C194C195=CC=CC=C195C196=CC=CC=C196C197=CC=CC=C197C198=CC=CC=C198C199=CC=CC=C199C200=CC=CC=C200C201=CC=CC=C201C202=CC=CC=C202C203=CC=CC=C203C204=CC=CC=C204C205=CC=CC=C205C206=CC=CC=C206C207=CC=CC=C207C208=CC=CC=C208C209=CC=CC=C209C210=CC=CC=C210C211=CC=CC=C211C212=CC=CC=C212C213=CC=CC=C213C214=CC=CC=C214C215=CC=CC=C215C216=CC=CC=C216C217=CC=CC=C217C218=CC=CC=C218C219=CC=CC=C219C220=CC=CC=C220C221=CC=CC=C221C222=CC=CC=C222C223=CC=CC=C223C224=CC=CC=C224C225=CC=CC=C225C226=CC=CC=C226C227=CC=CC=C227C228=CC=CC=C228C229=CC=CC=C229C230=CC=CC=C230C231=CC=CC=C231C232=CC=CC=C232C233=CC=CC=C233C234=CC=CC=C234C235=CC=CC=C235C236=CC=CC=C236C237=CC=CC=C237C238=CC=CC=C238C239=CC=CC=C239C240=CC=CC=C240C241=CC=CC=C241C242=CC=CC=C242C243=CC=CC=C243C244=CC=CC=C244C245=CC=CC=C245C246=CC=CC=C246C247=CC=CC=C247C248=CC=CC=C248C249=CC=CC=C249C250=CC=CC=C250C251=CC=CC=C251C252=CC=CC=C252C253=CC=CC=C253C254=CC=CC=C254C255=CC=CC=C255C256=CC=CC=C256C257=CC=CC=C257C258=CC=CC=C258C259=CC=CC=C259C260=CC=CC=C260C261=CC=CC=C261C262=CC=CC=C262C263=CC=CC=C263C264=CC=CC=C264C265=CC=CC=C265C266=CC=CC=C266C267=CC=CC=C267C268=CC=CC=C268C269=CC=CC=C269C270=CC=CC=C270C271=CC=CC=C271C272=CC=CC=C272C273=CC=CC=C273C274=CC=CC=C274C275=CC=CC=C275C276=CC=CC=C276C277=CC=CC=C277C278=CC=CC=C278C279=CC=CC=C279C280=CC=CC=C280C281=CC=CC=C281C282=CC=CC=C282C283=CC=CC=C283C284=CC=CC=C284C285=CC=CC=C285C286=CC=CC=C286C287=CC=CC=C287C288=CC=CC=C288C289=CC=CC=C289C290=CC=CC=C290C291=CC=CC=C291C292=CC=CC=C292C293=CC=CC=C293C294=CC=CC=C294C295=CC=CC=C295C296=CC=CC=C296C297=CC=CC=C297C298=CC=CC=C298C299=CC=CC=C299C300=CC=CC=C300C301=CC=CC=C301C302=CC=CC=C302C303=CC=CC=C303C304=CC=CC=C304C305=CC=CC=C305C306=CC=CC=C306C307=CC=CC=C307C308=CC=CC=C308C309=CC=CC=C309C310=CC=CC=C310C311=CC=CC=C311C312=CC=CC=C312C313=CC=CC=C313C314=CC=CC=C314C315=CC=CC=C315C316=CC=CC=C316C317=CC=CC=C317C318=CC=CC=C318C319=CC=CC=C319C320=CC=CC=C320C321=CC=CC=C321C322=CC=CC=C322C323=CC=CC=C323C324=CC=CC=C324C325=CC=CC=C325C326=CC=CC=C326C327=CC=CC=C327C328=CC=CC=C328C329=CC=CC=C329C330=CC=CC=C330C331=CC=CC=C331C332=CC=CC=C332C333=CC=CC=C333C334=CC=CC=C334C335=CC=CC=C335C336=CC=CC=C336C337=CC=CC=C337C338=CC=CC=C338C339=CC=CC=C339C340=CC=CC=C340C341=CC=CC=C341C342=CC=CC=C342C343=CC=CC=C343C344=CC=CC=C344C345=CC=CC=C345C346=CC=CC=C346C347=CC=CC=C347C348=CC=CC=C348C349=CC=CC=C349C350=CC=CC=C350C351=CC=CC=C351C352=CC=CC=C352C353=CC=CC=C353C354=CC=CC=C354C355=CC=CC=C355C356=CC=CC=C356C357=CC=CC=C357C358=CC=CC=C358C359=CC=CC

Figure 59. ^1H NMR spectrum of 16i

sklif3168_C13.1.fid

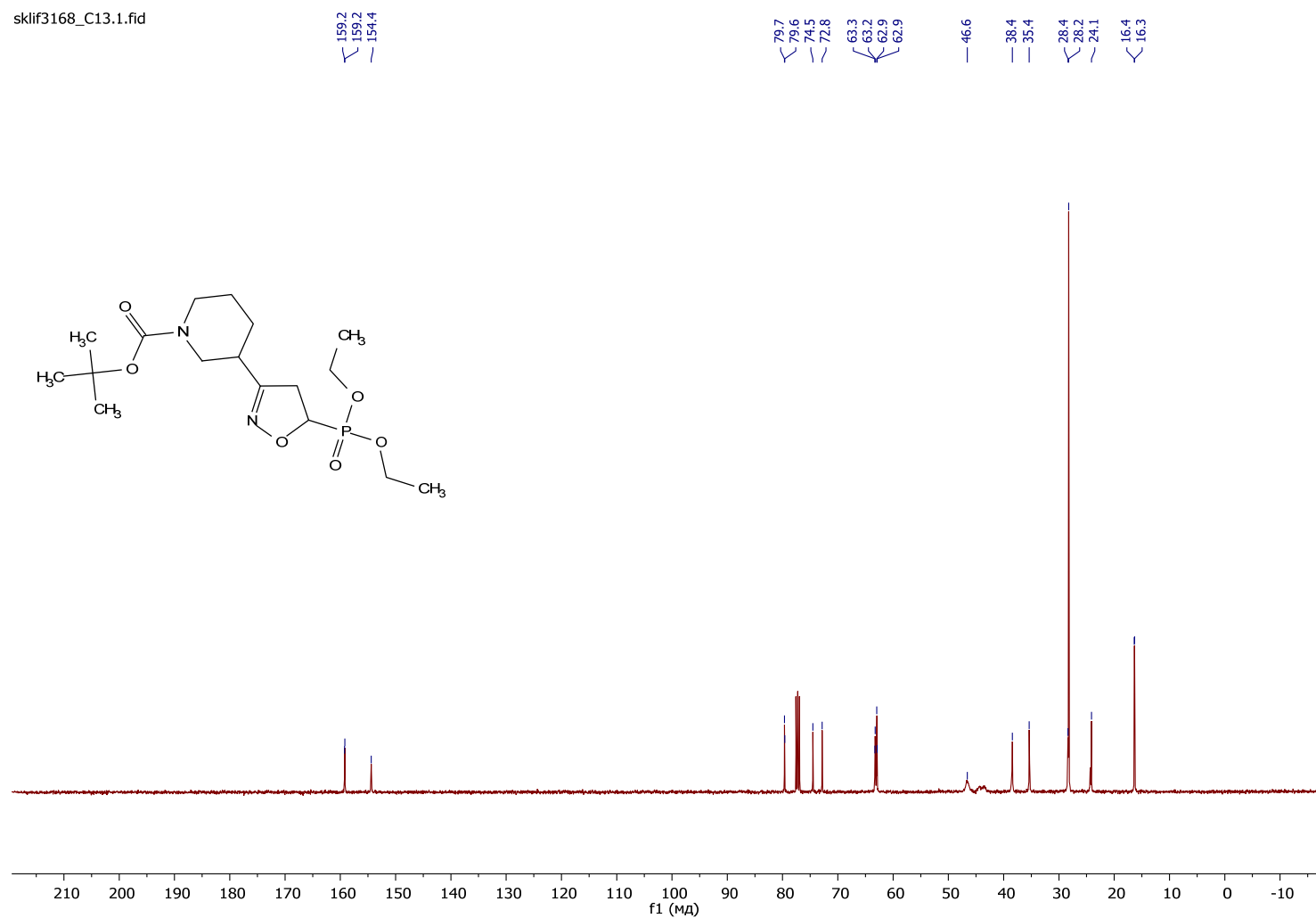


Figure 60. ¹³C NMR spectrum of 16i

sklif3168_P31{H}.1.fid

19.65
19.53

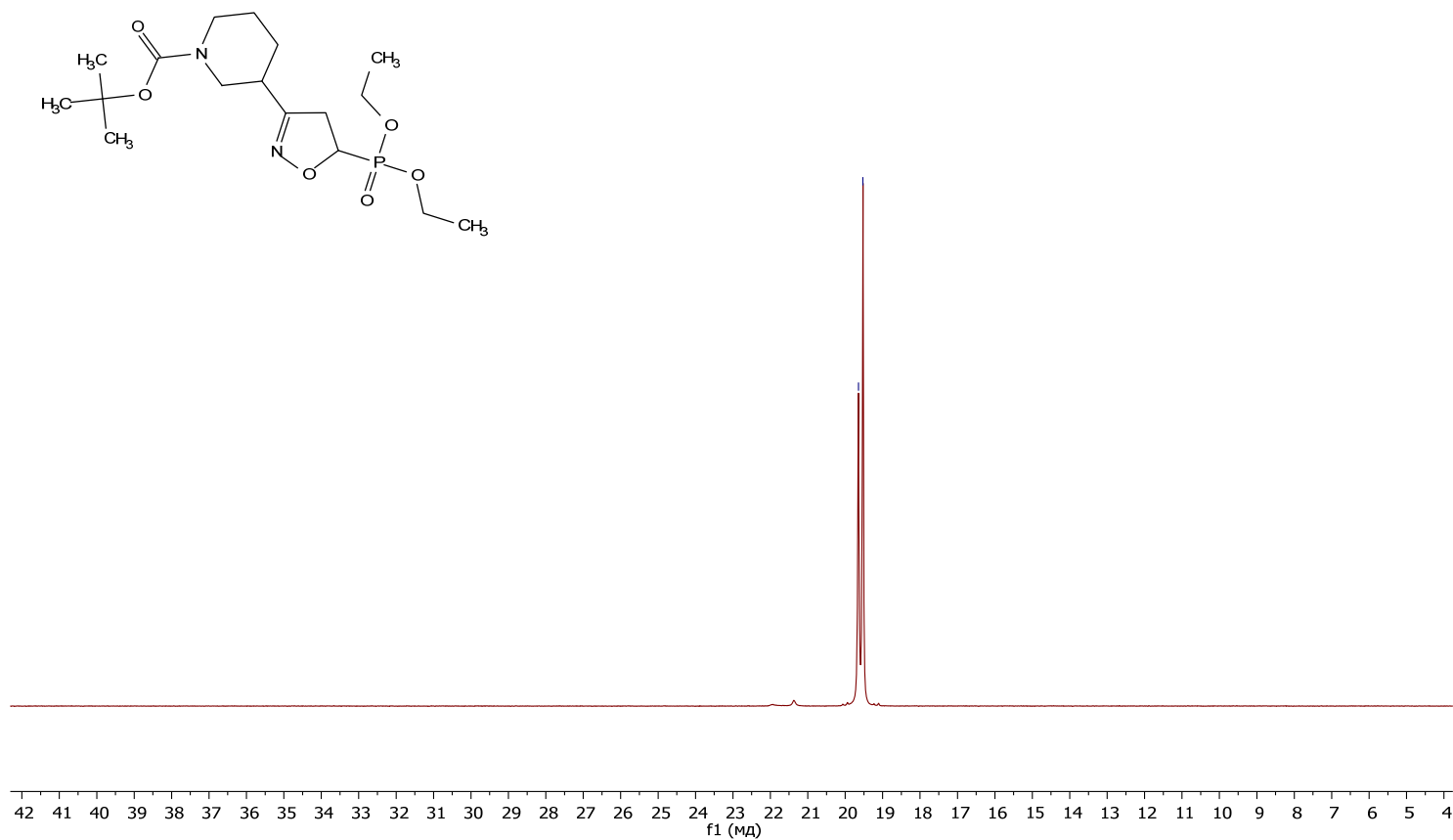


Figure 61. ^{31}P NMR spectrum of 16i

9000691s1.1.fid

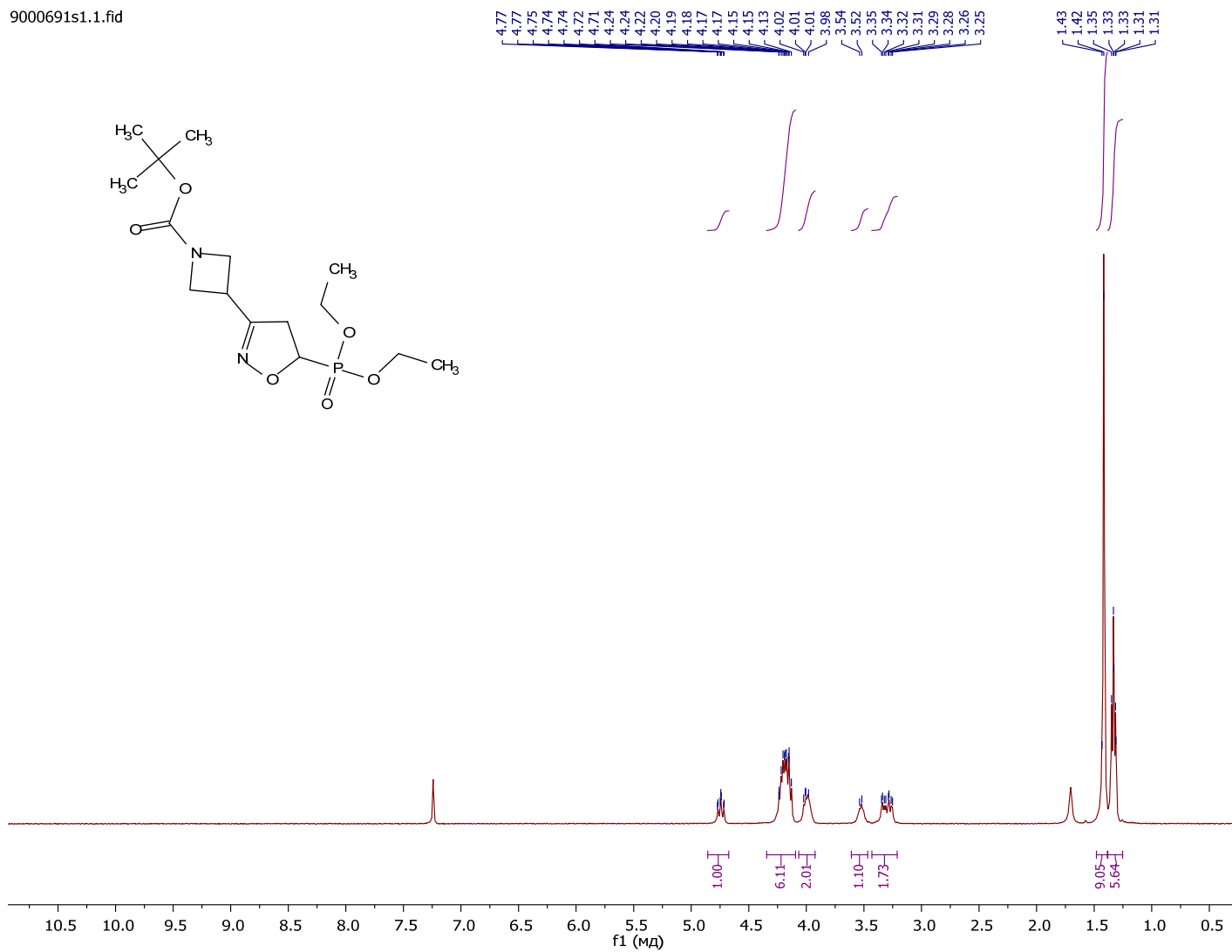


Figure 62 ¹H NMR spectrum of 16j

sklif6661__C13.1.fid

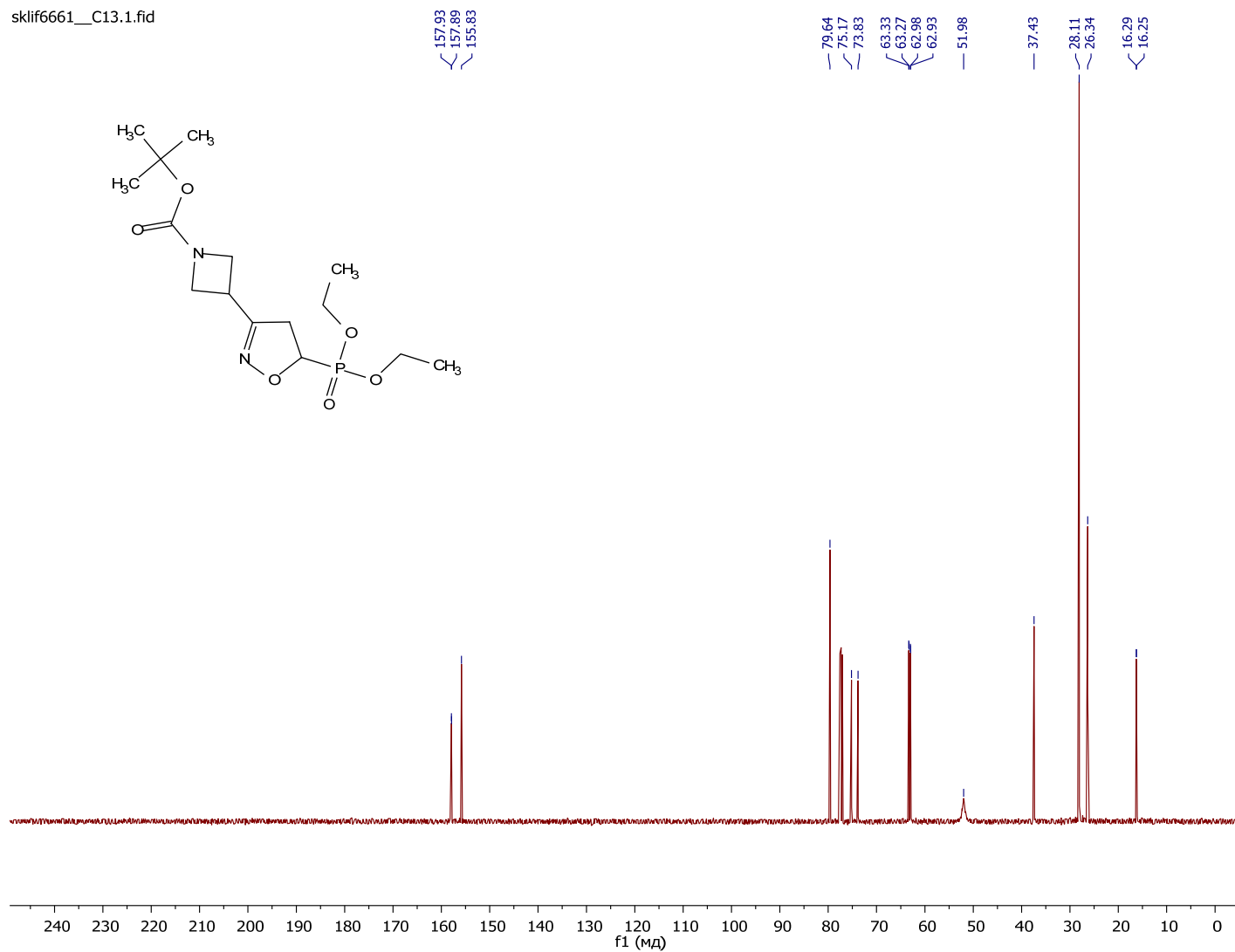


Figure 63 ¹³C NMR spectrum of 16j

sklif6661__P31.1.fid

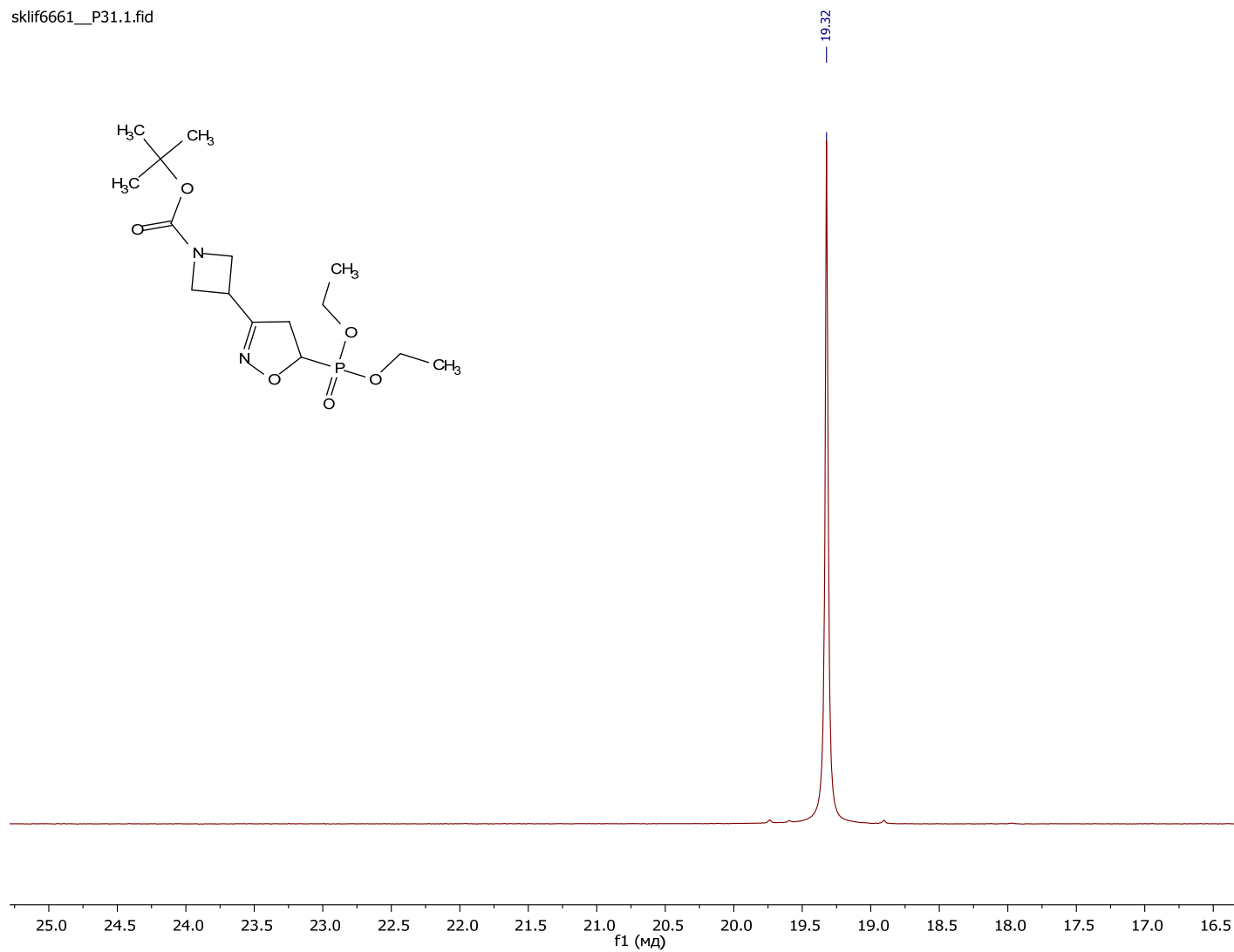


Figure 64. ^{31}P NMR spectrum of 16j

K846846s2

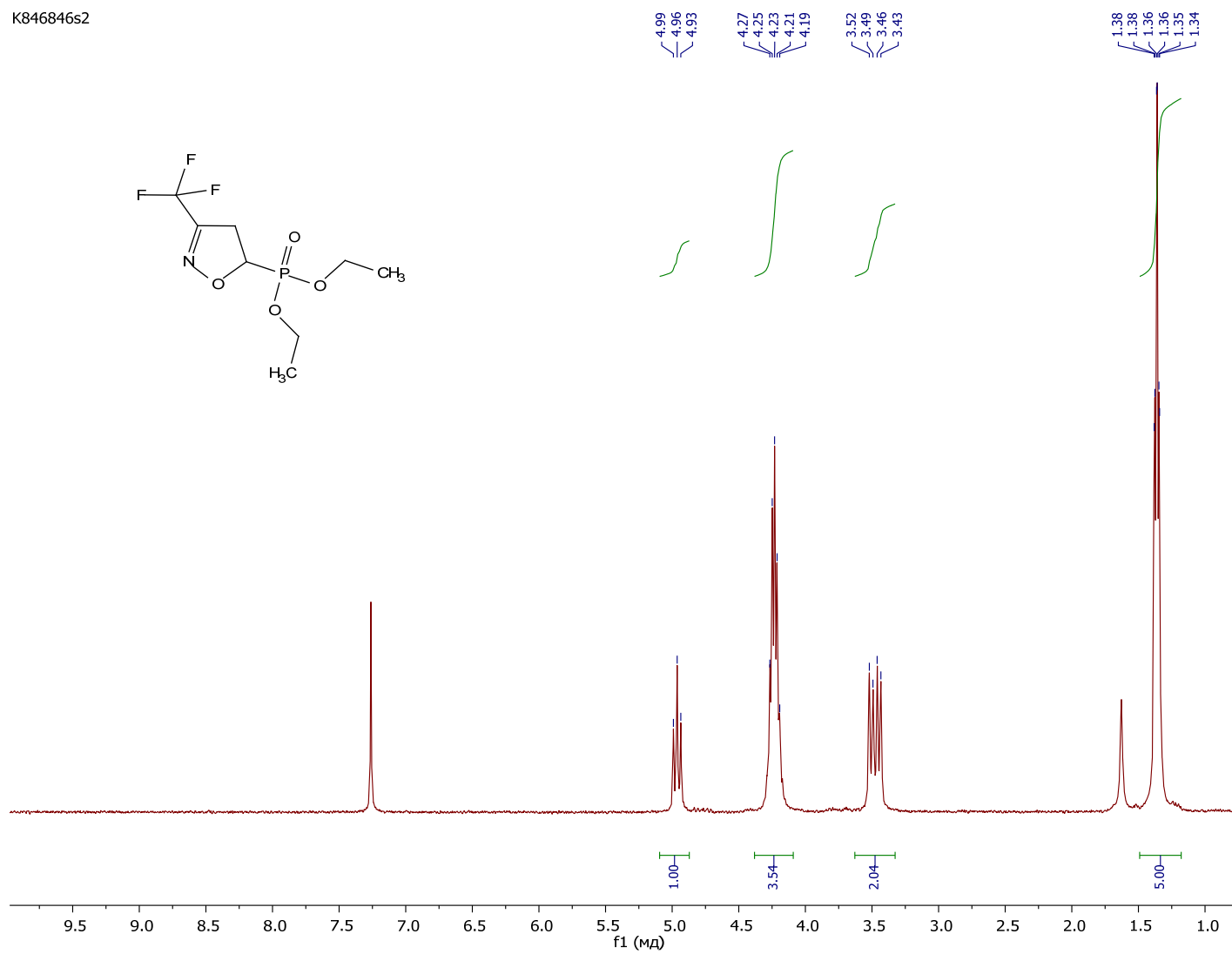


Figure 65. ¹H NMR spectrum of 16o

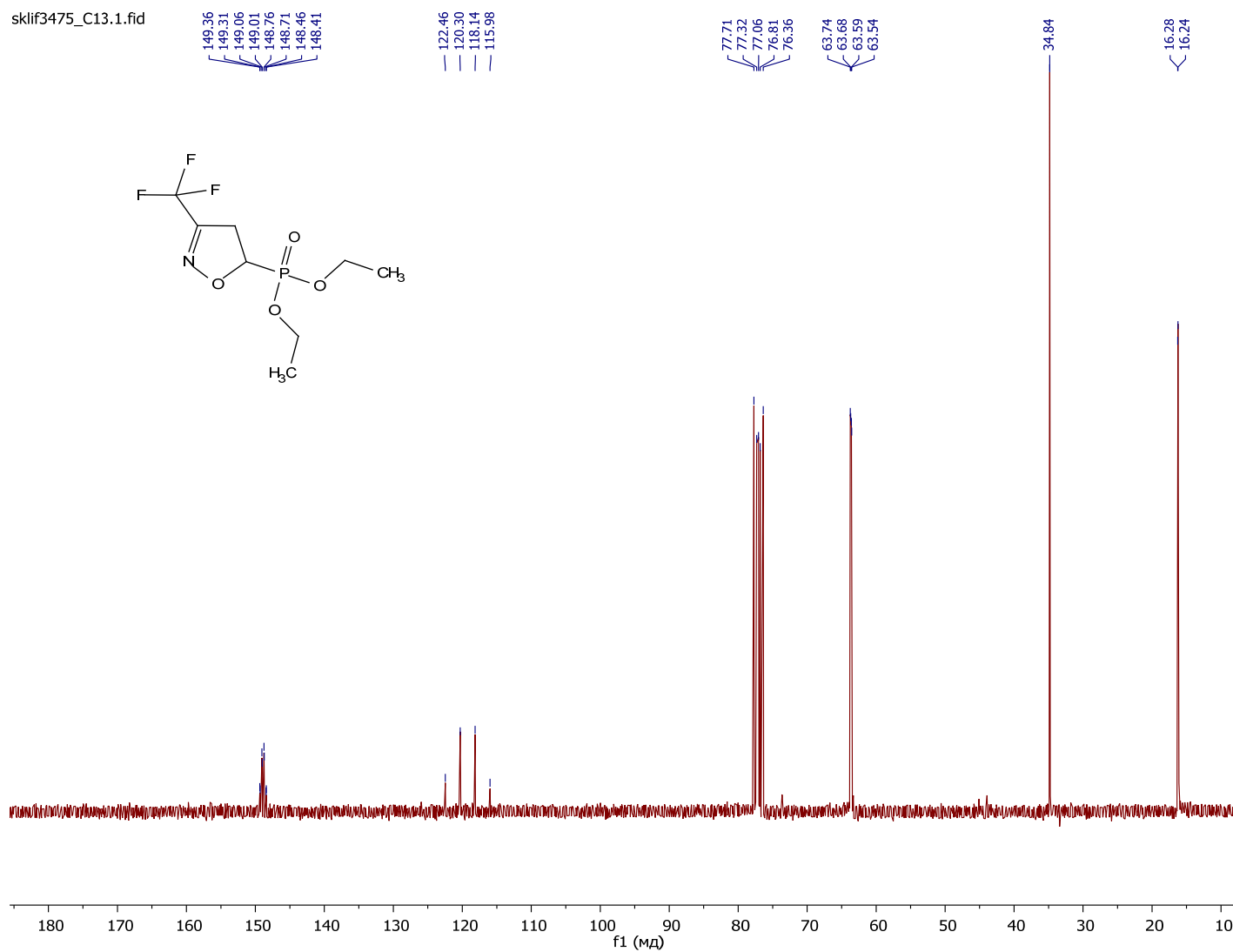


Figure 66. ^{13}C NMR spectrum of 16o

SKLif3475_P31.1.fid
31P-{1H}

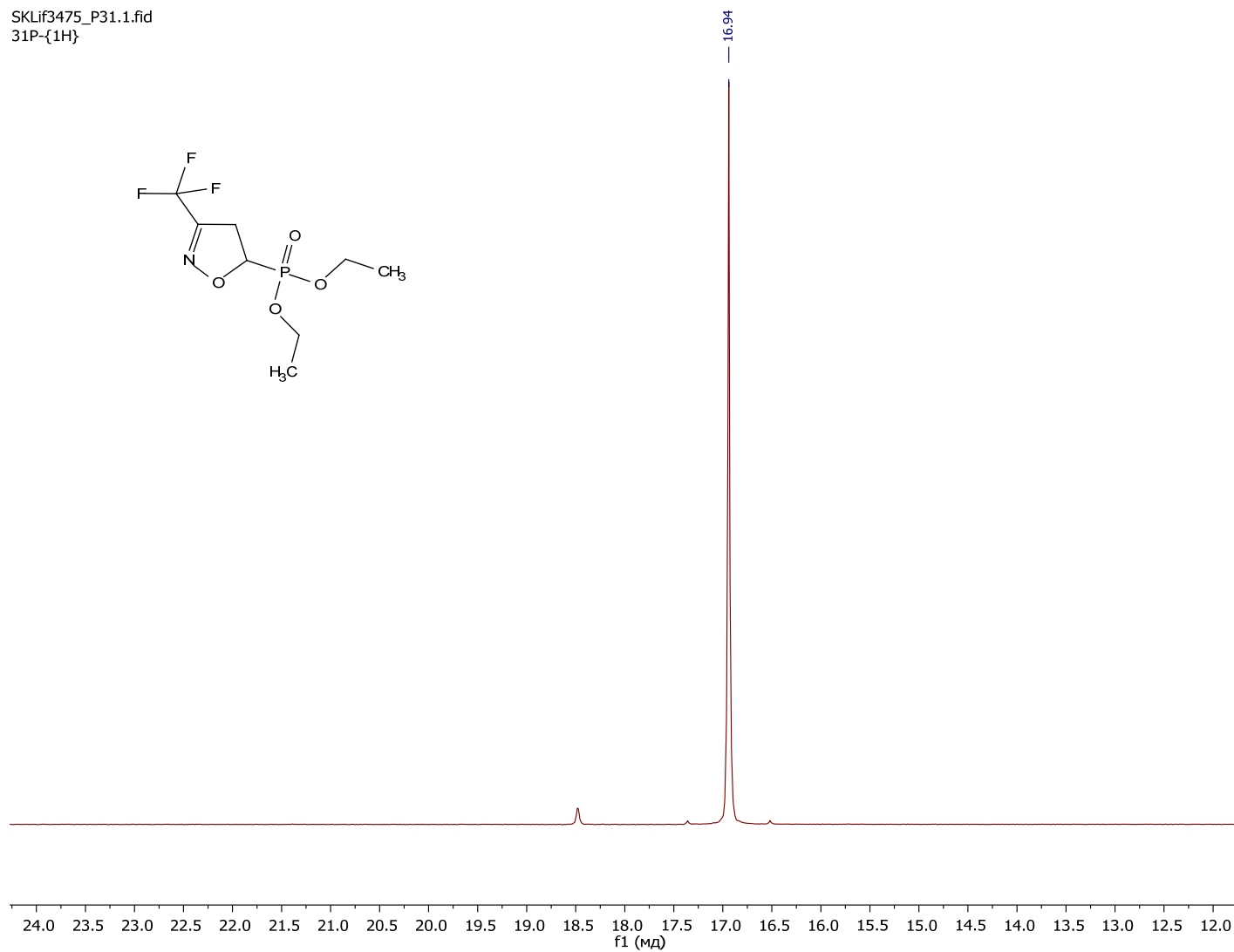
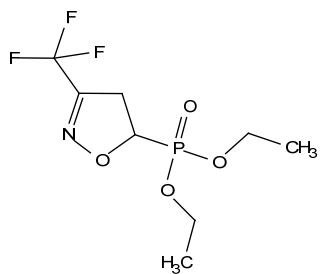


Figure 67. ^{31}P NMR spectrum of 16o

sklif3475__F19{H}.1.fid

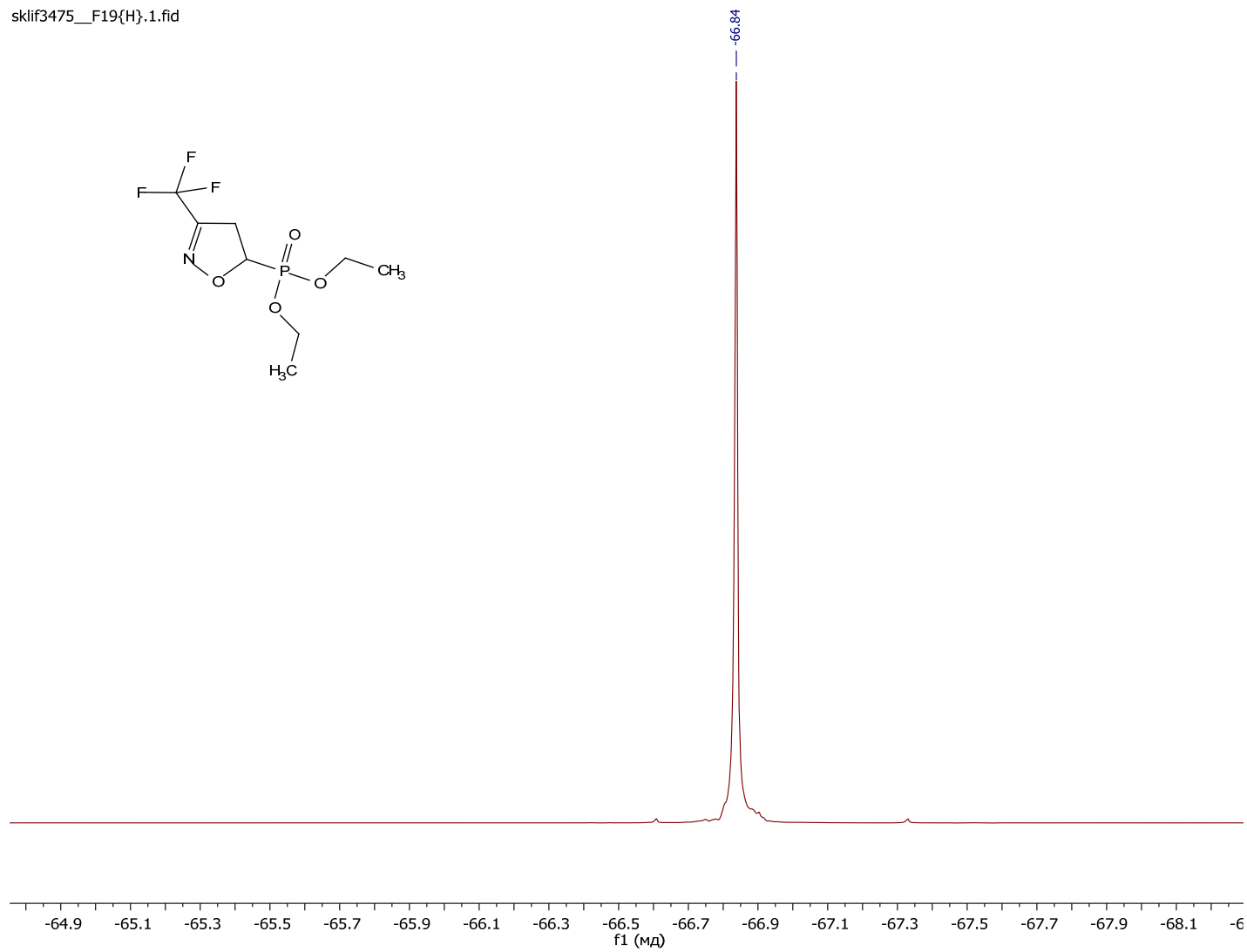


Figure 68. ^{19}F NMR spectrum of 16o

K774898s3

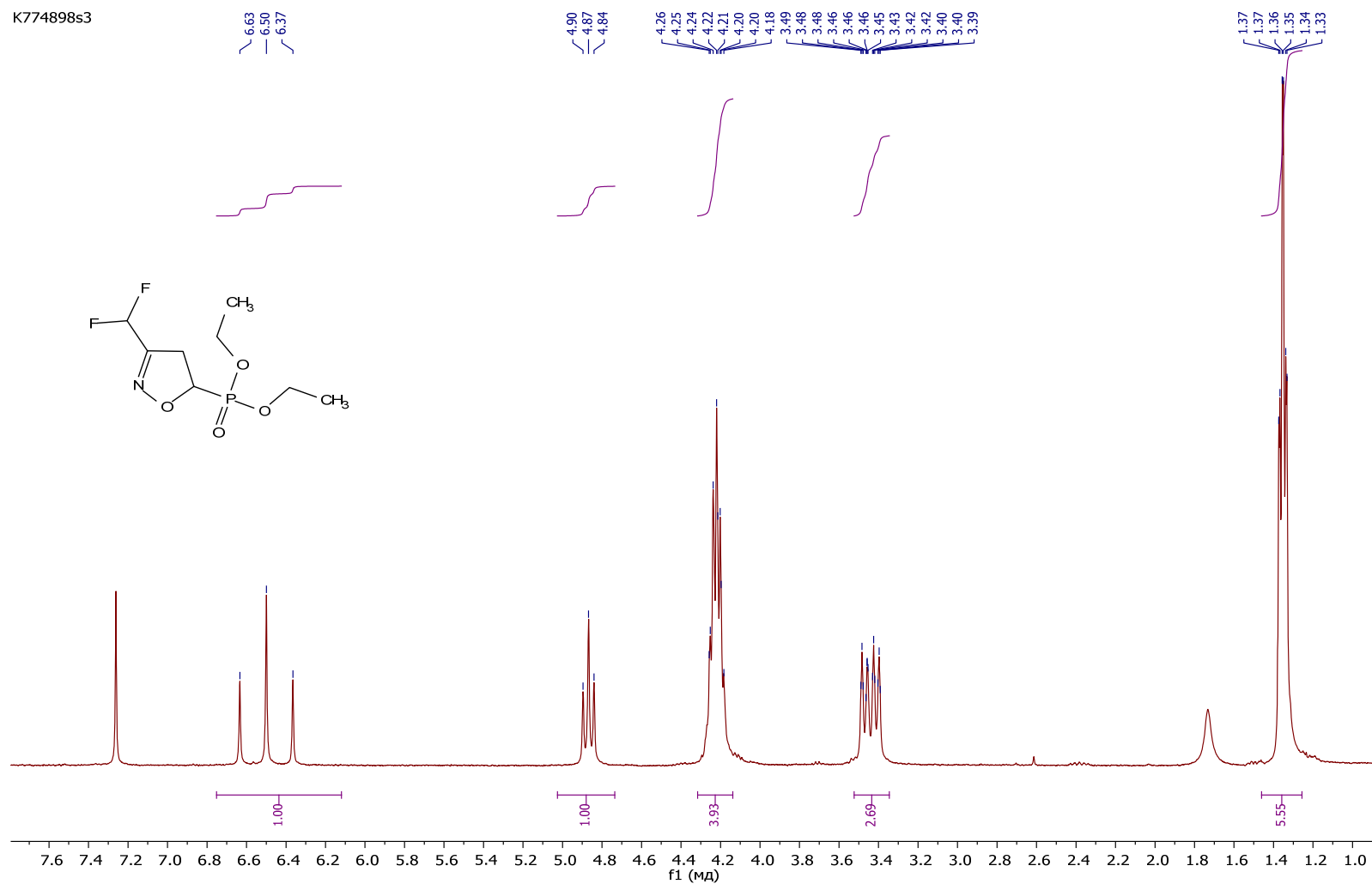


Figure 69. ¹H NMR spectrum of 16p

sklif3137_C13.1.fid

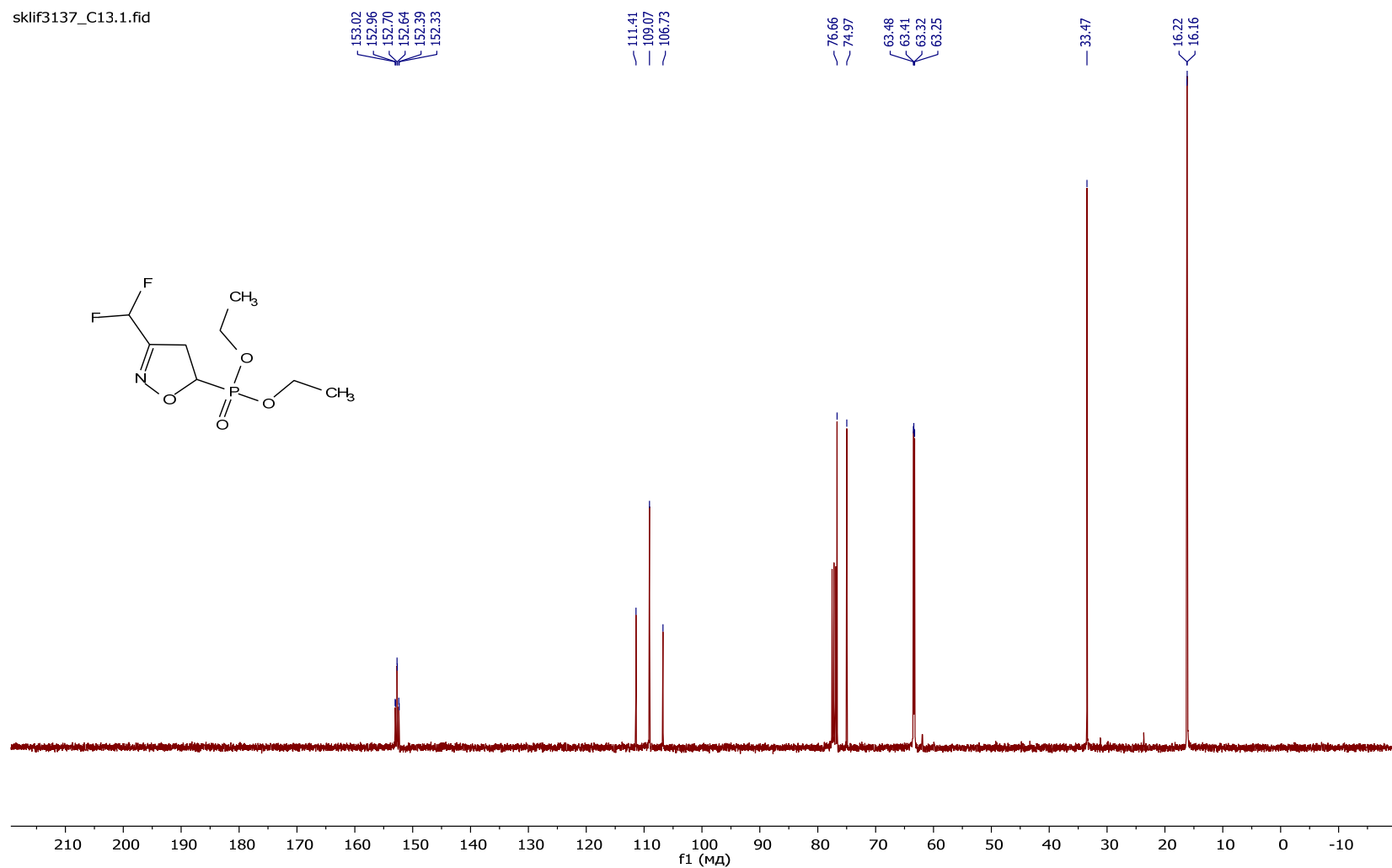


Figure 70. ¹³C NMR spectrum of 16p

sklif3137 31P{1H}.1.fid

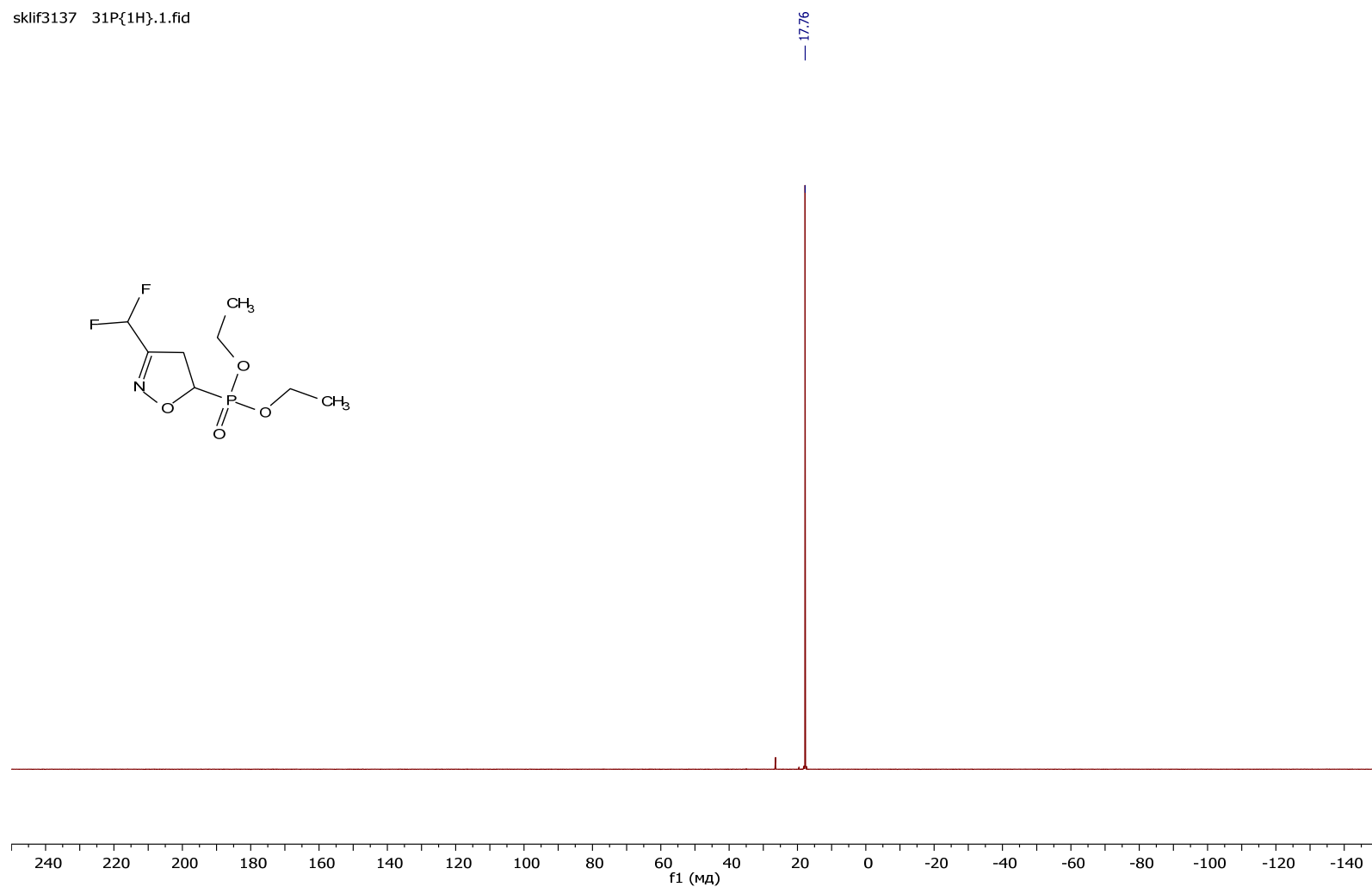


Figure 71. ^{31}P NMR spectrum of 16p

sklif3137_F19{H}.1.fid
19F-{1H}

-120.10

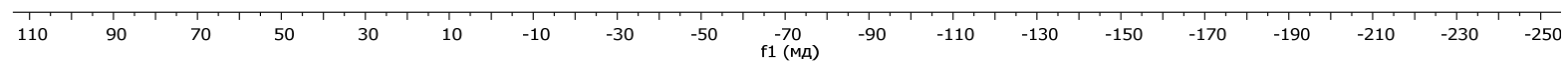
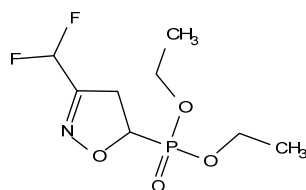


Figure 72. ^{19}F NMR spectrum of 16p

9630994s2

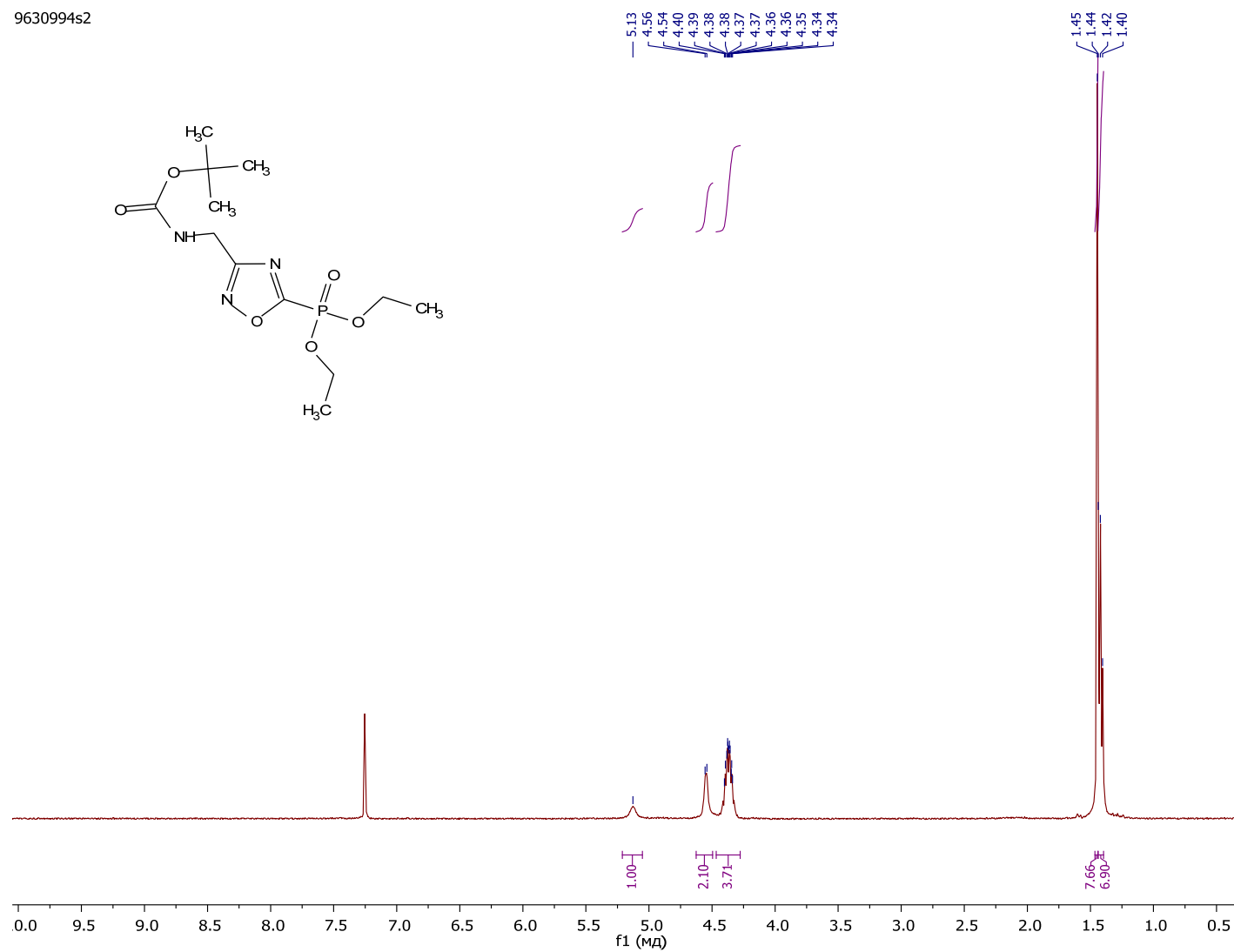


Figure 73 ¹H NMR spectrum of 3a

sklif1799 13C.1.fid

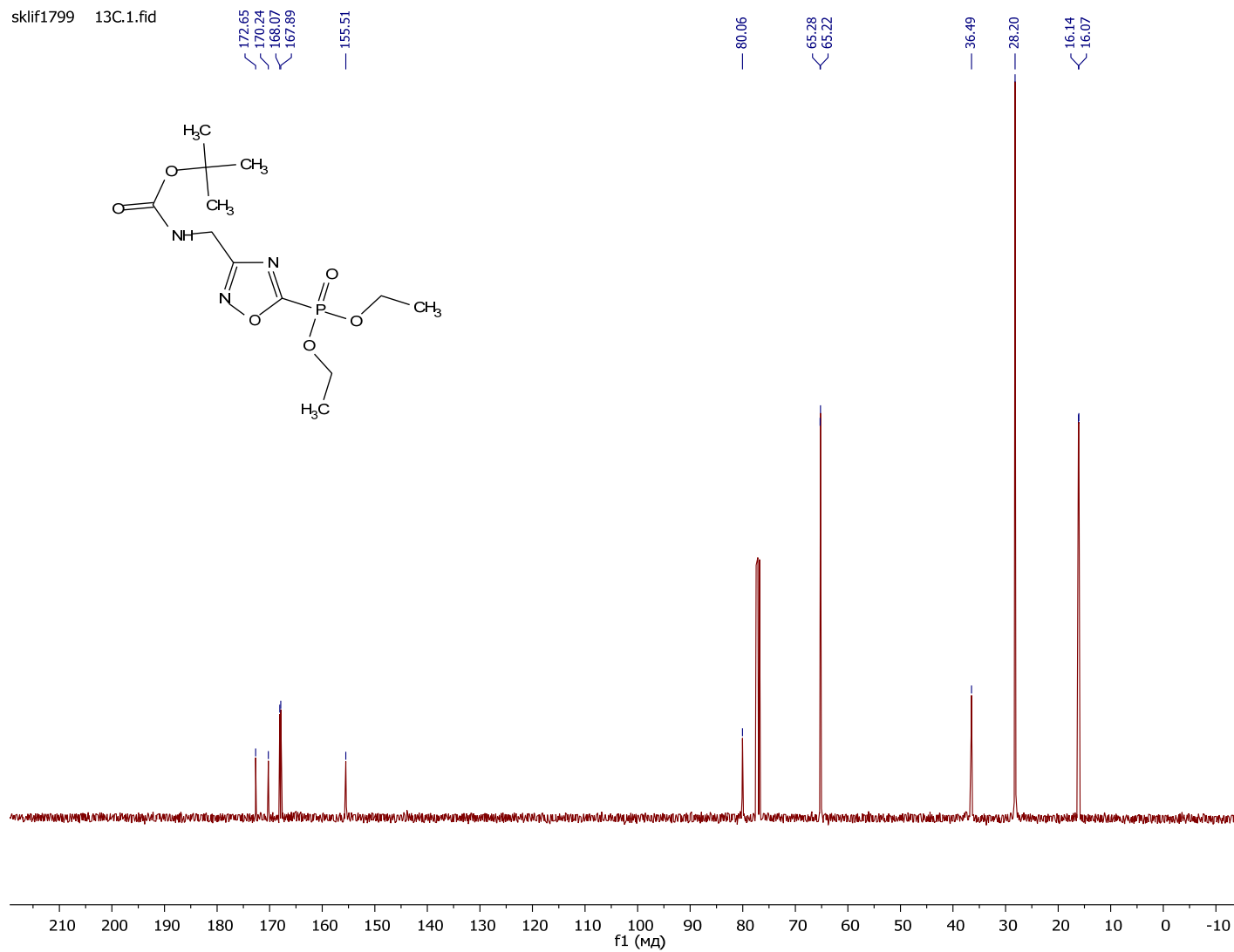


Figure 74 ^{13}C NMR spectrum of 3a

sklif1799_P31.1.fid

-4.74
-4.77
-4.82
-4.86
-4.90

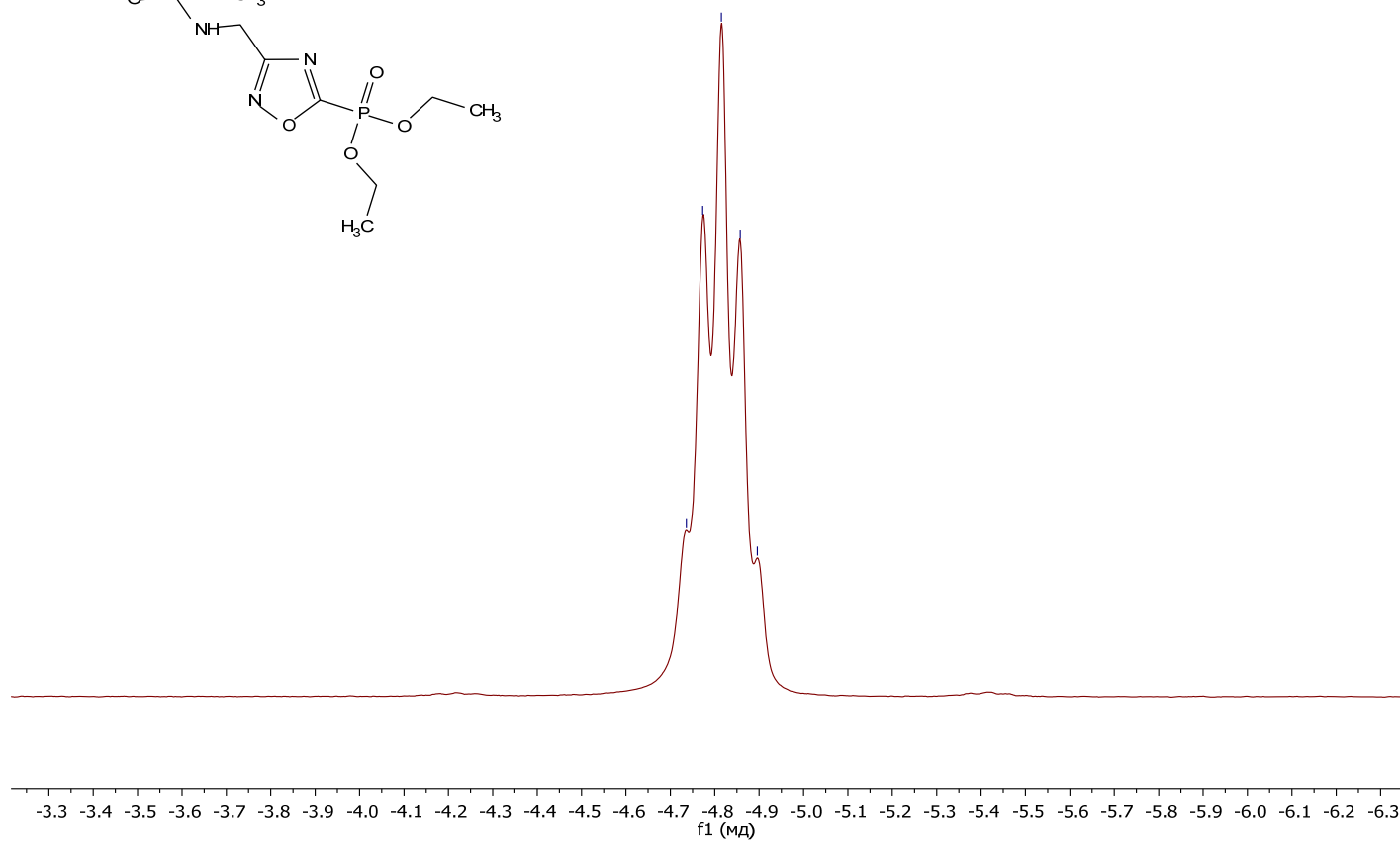
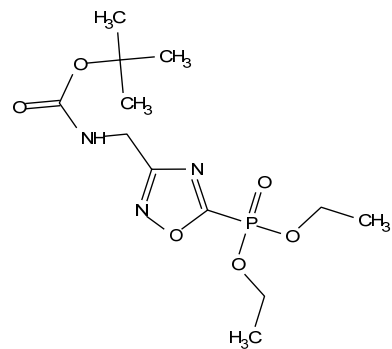


Figure 75 ^{31}P NMR spectrum of 3a

9630995s2

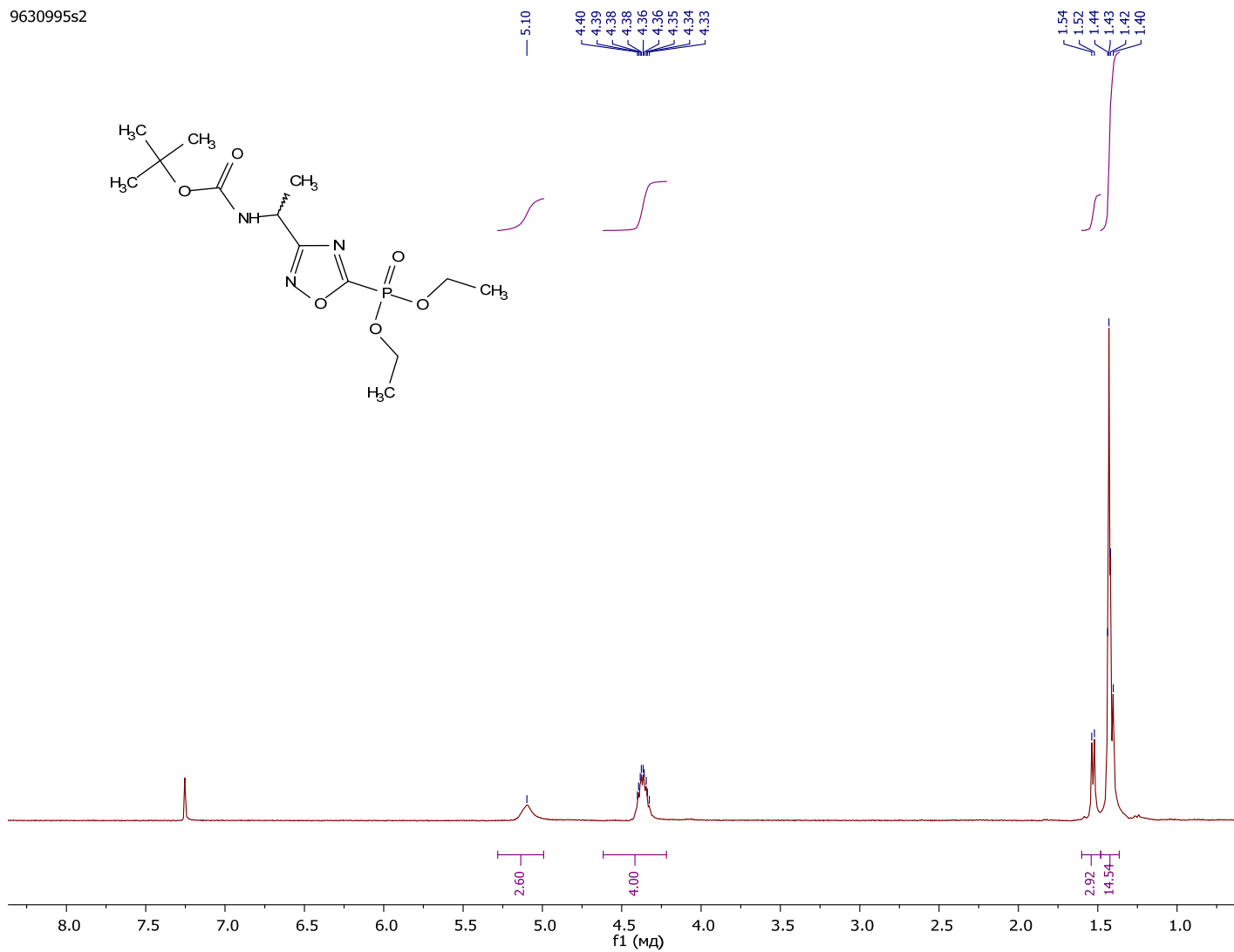


Figure 76 ¹H NMR spectrum of 3b and 3c (*R*-isomer)

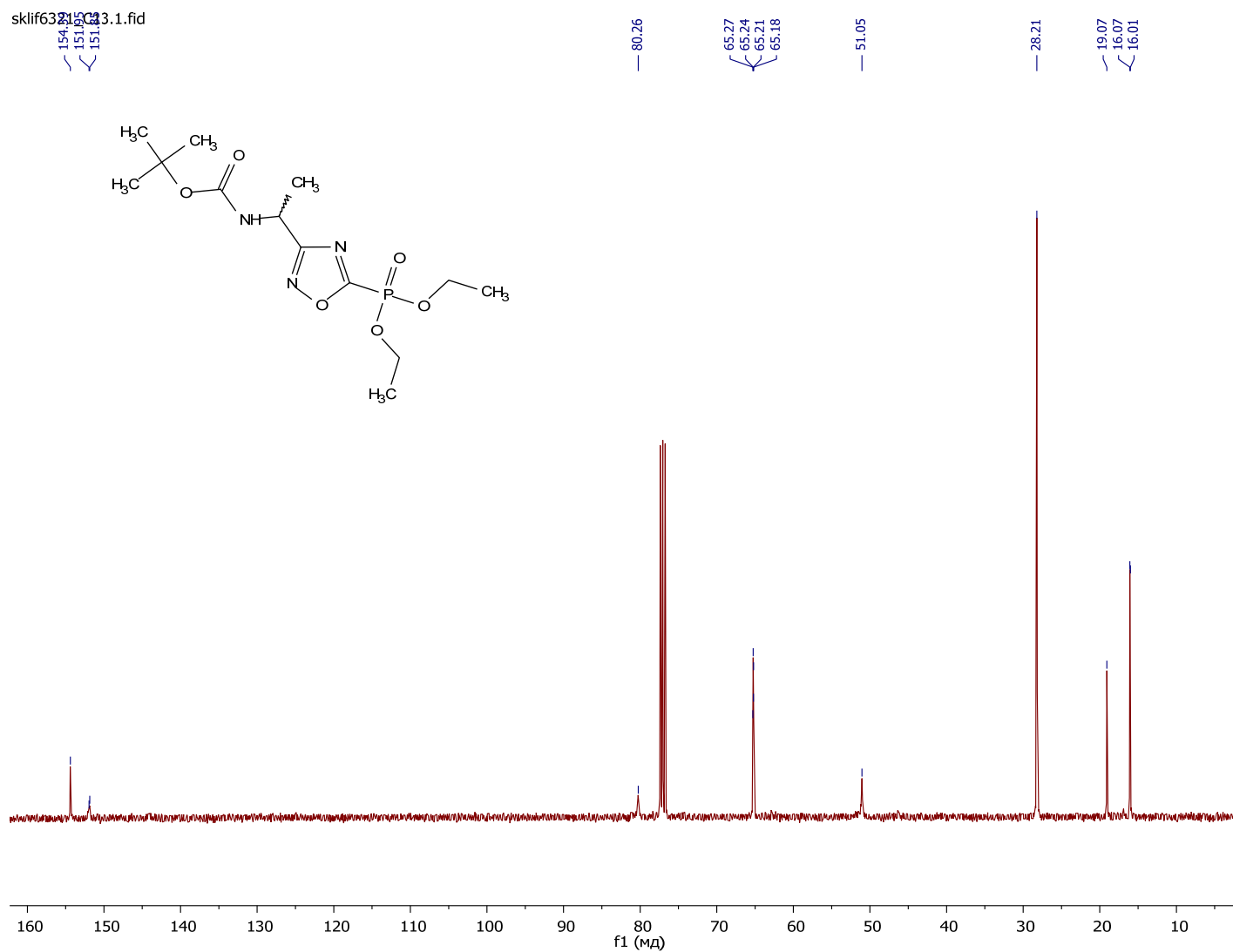


Figure 77 ¹³C NMR spectrum of 3b and 3c (*R*-isomer)

sklif6321_P31.1.fid

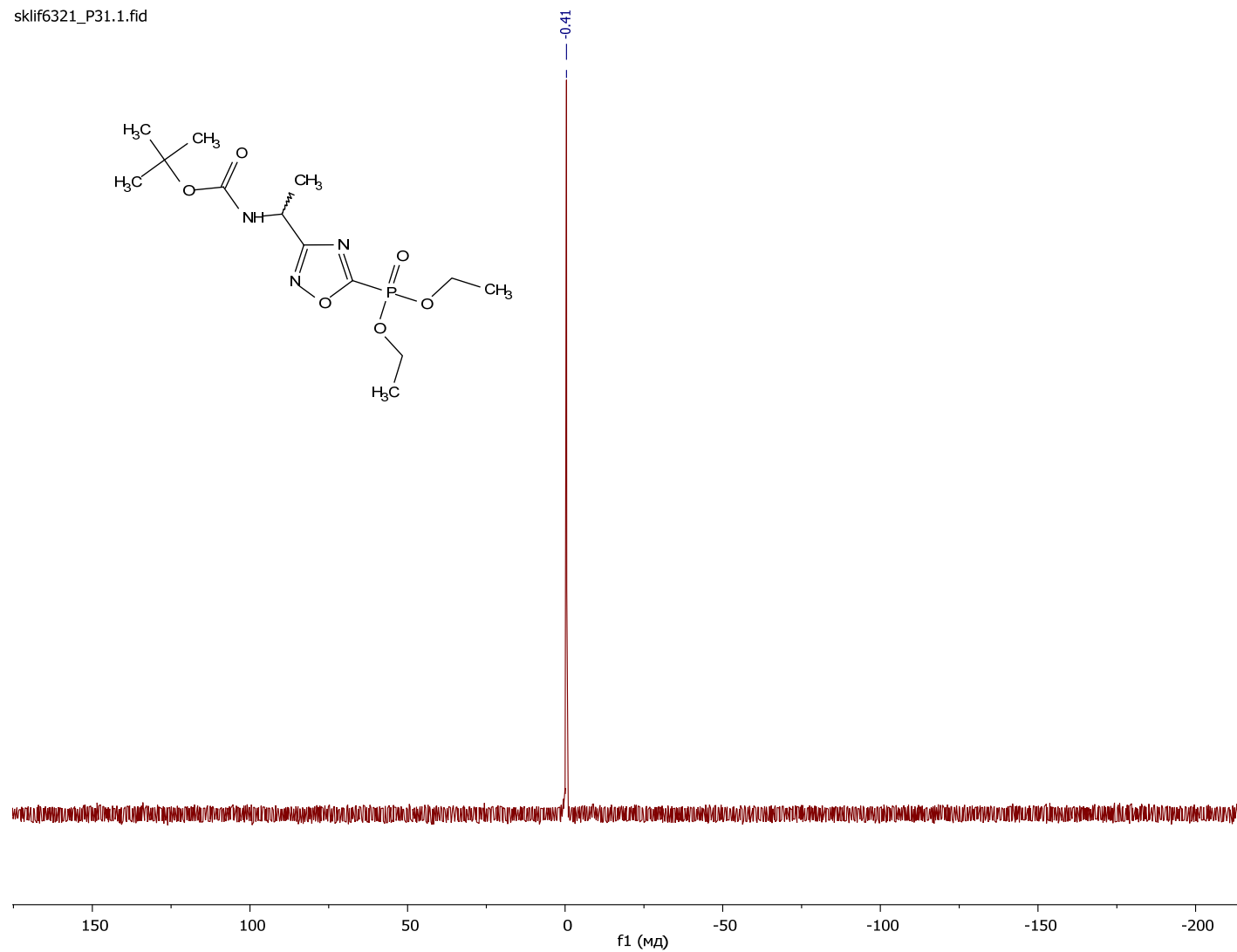


Figure 78 ^{31}P NMR spectrum of 3b and 3c (*R*-isomer)

9832736s1

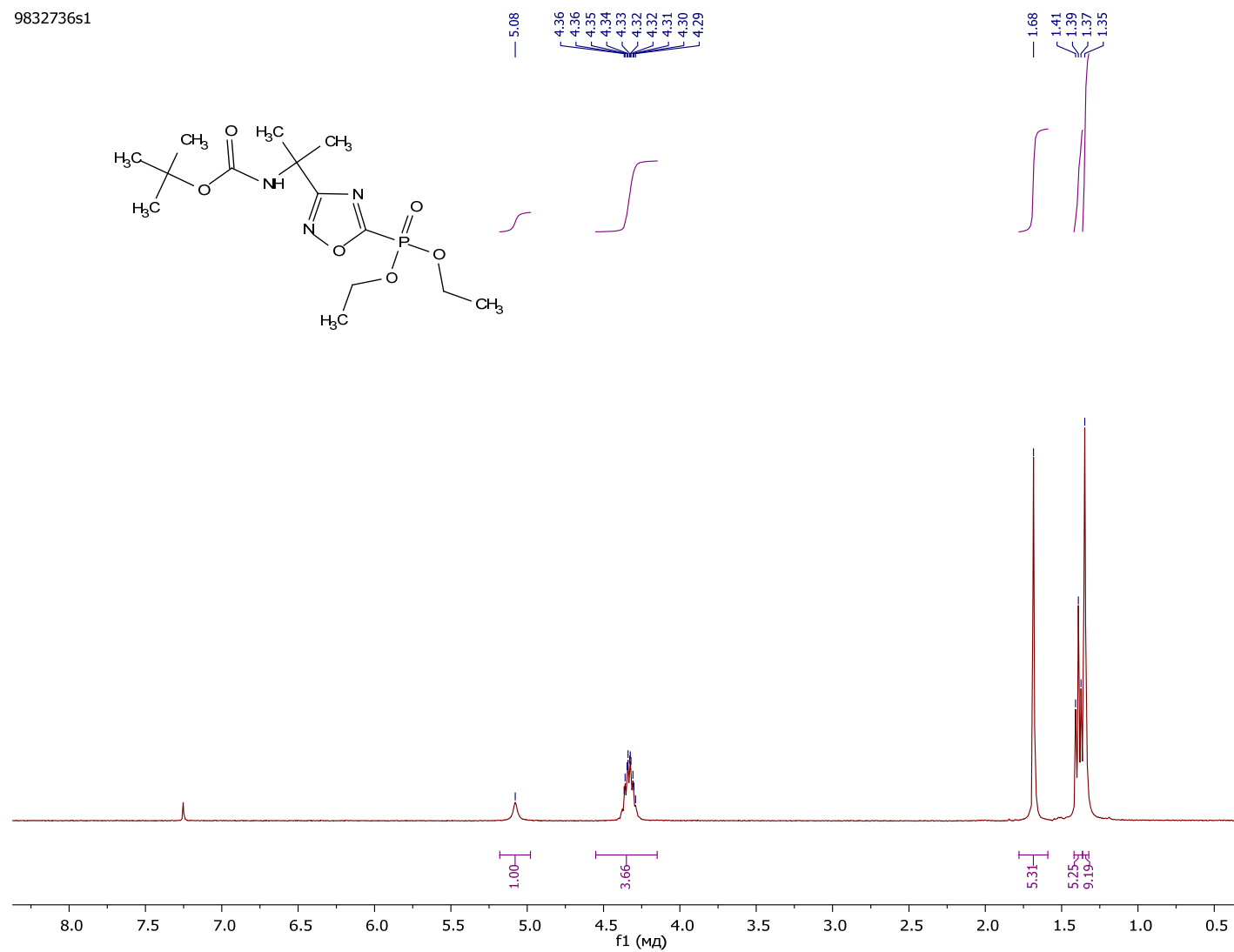


Figure 79 ¹H NMR spectrum of 3d

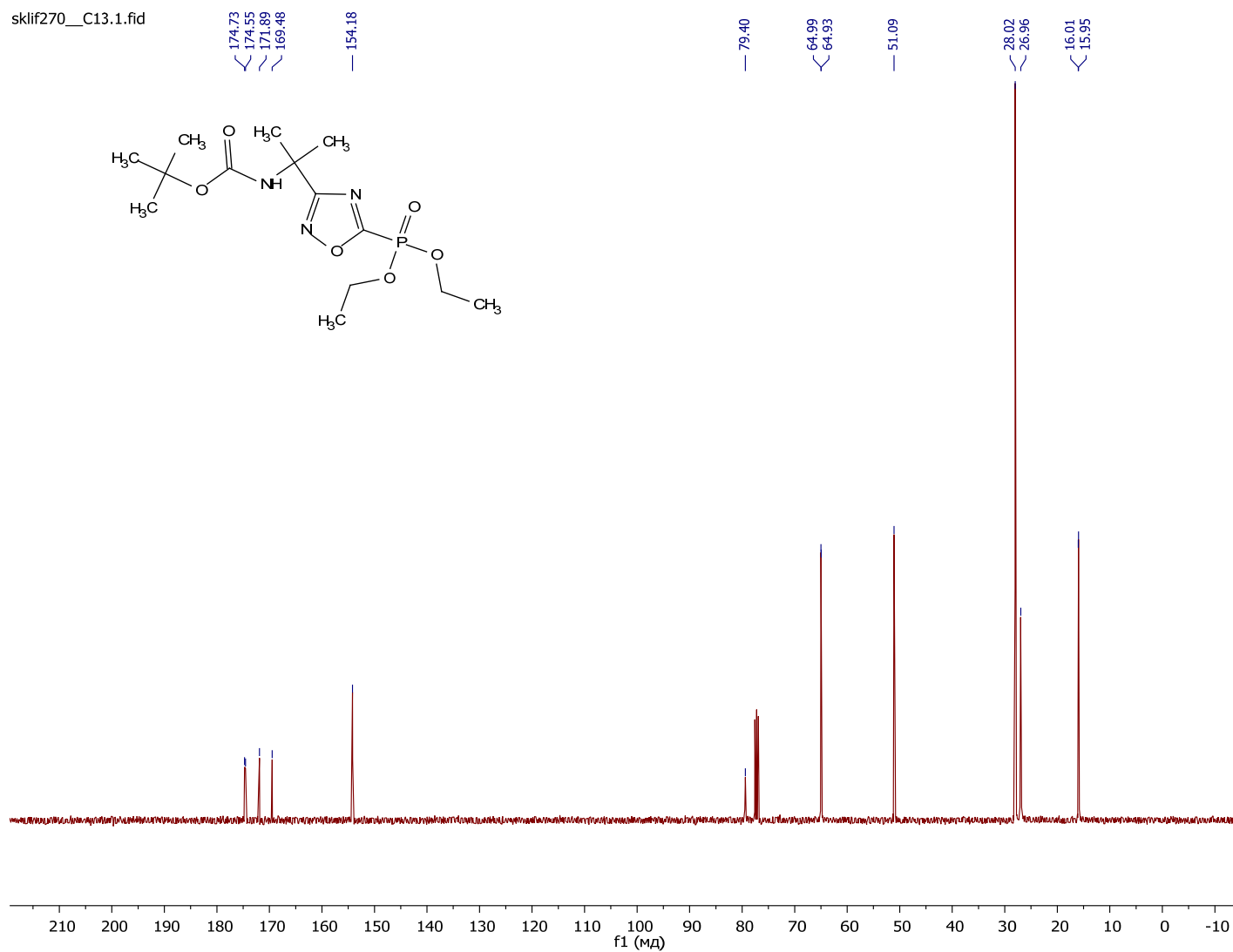


Figure 80 ^{13}C NMR spectrum of 3d

sklif270__P31{H}.1.fid

— -4.59

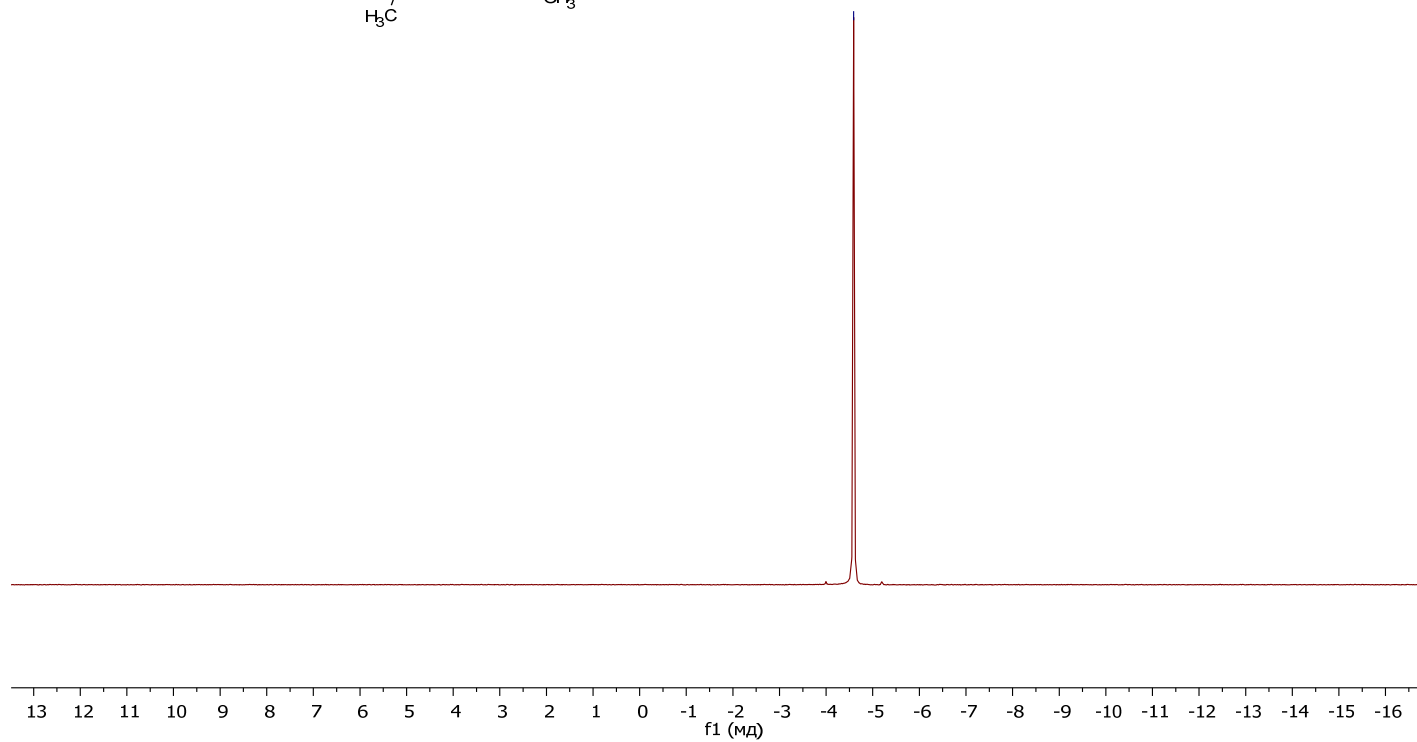
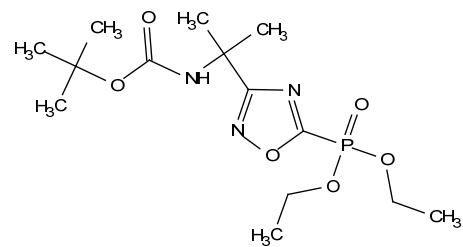


Figure 81 ^{31}P NMR spectrum of 3d

9832735s1

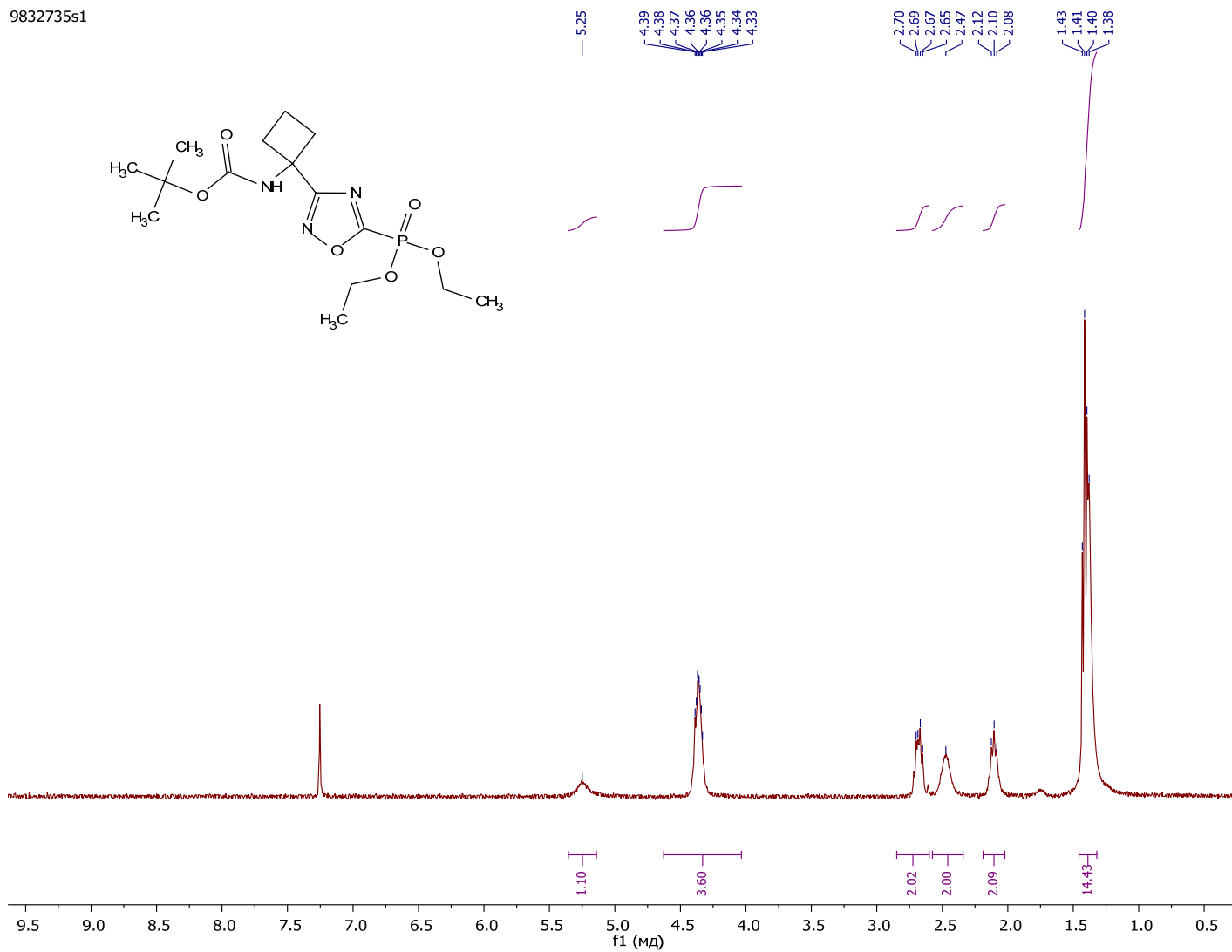


Figure 82 ¹H NMR spectrum of 3e

sklif271_C13.1.fid

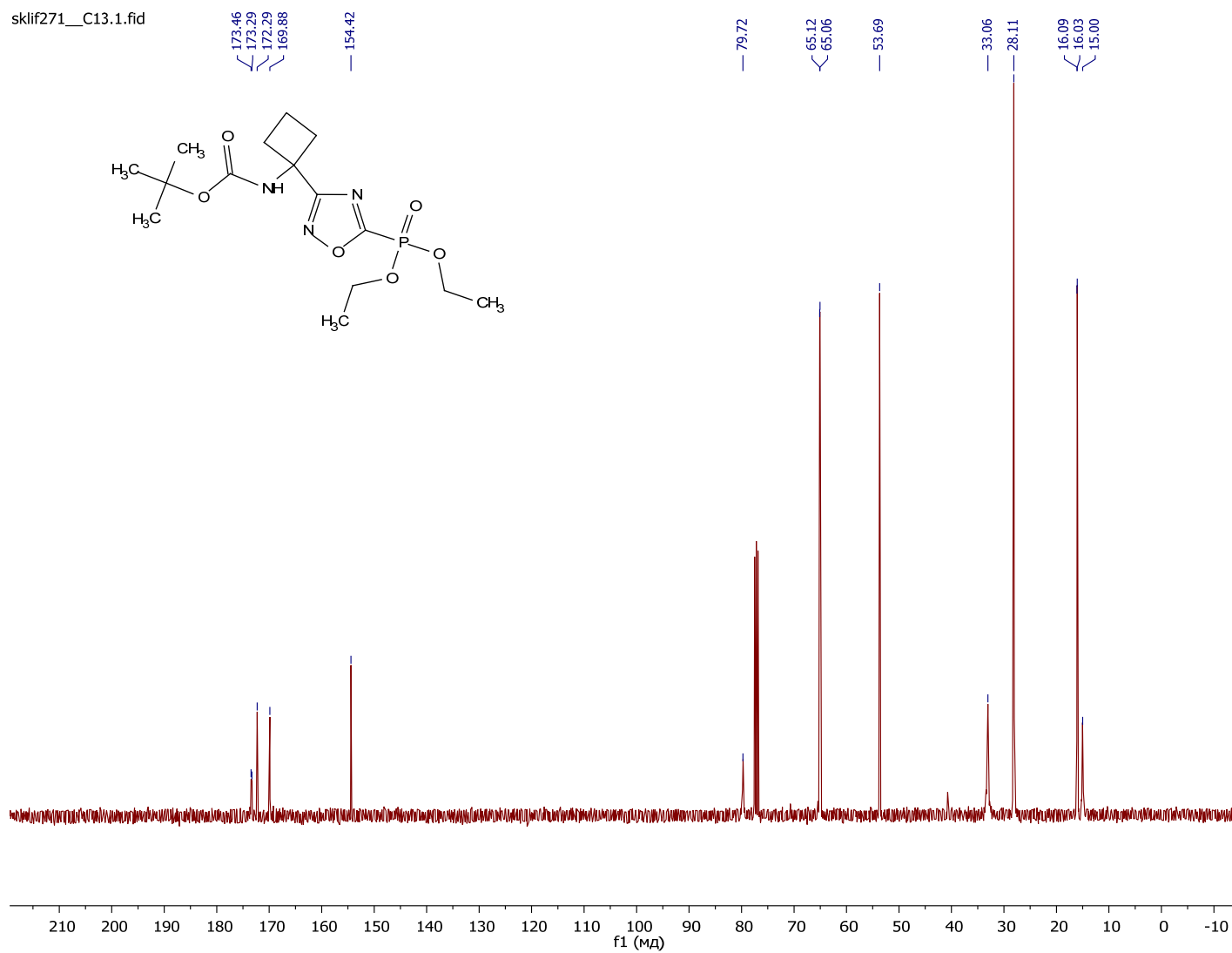


Figure 83 ¹³C NMR spectrum of 3e

sklif271__P31{H}.1.fid

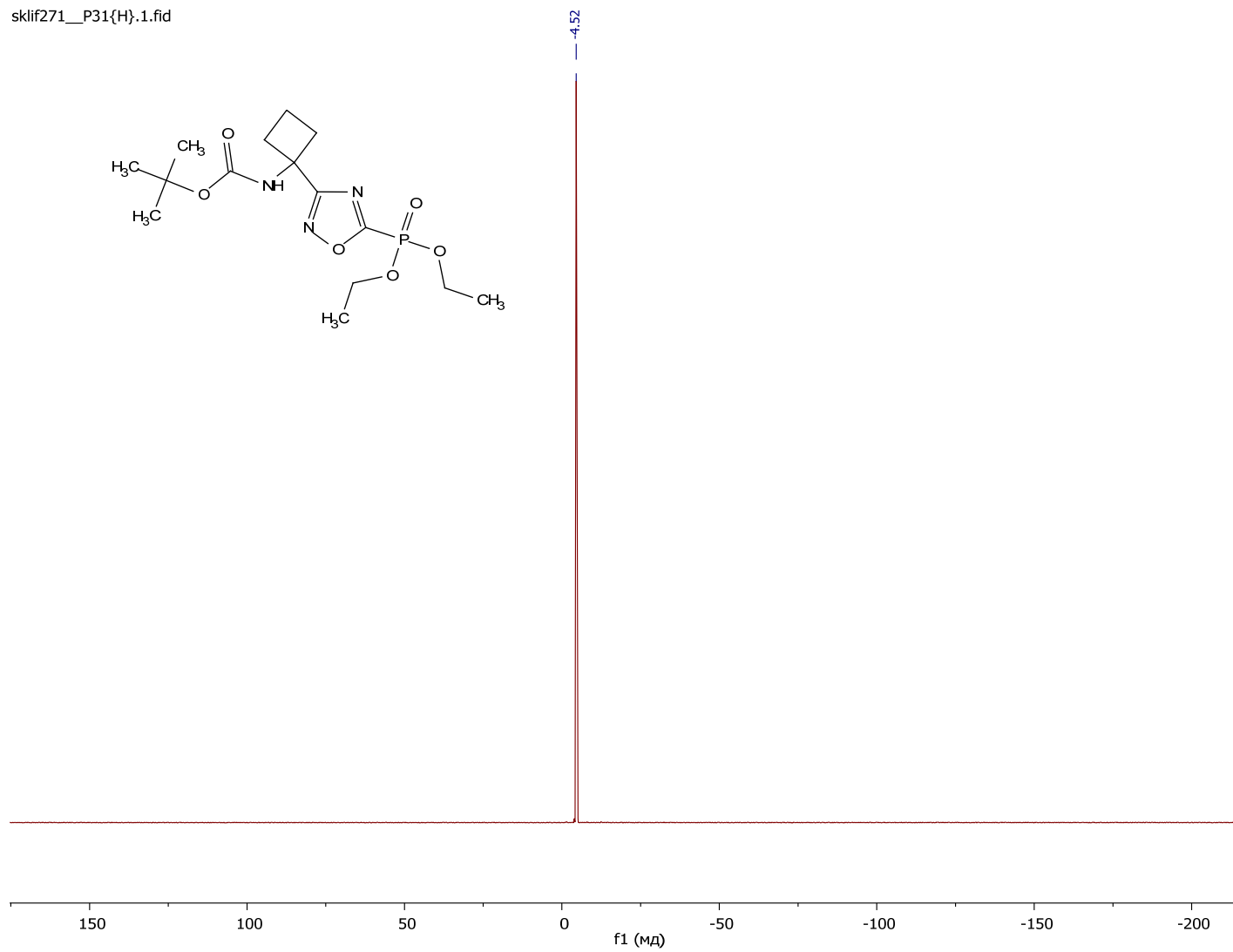


Figure 84 ^{31}P NMR spectrum of 3e

9634182s2

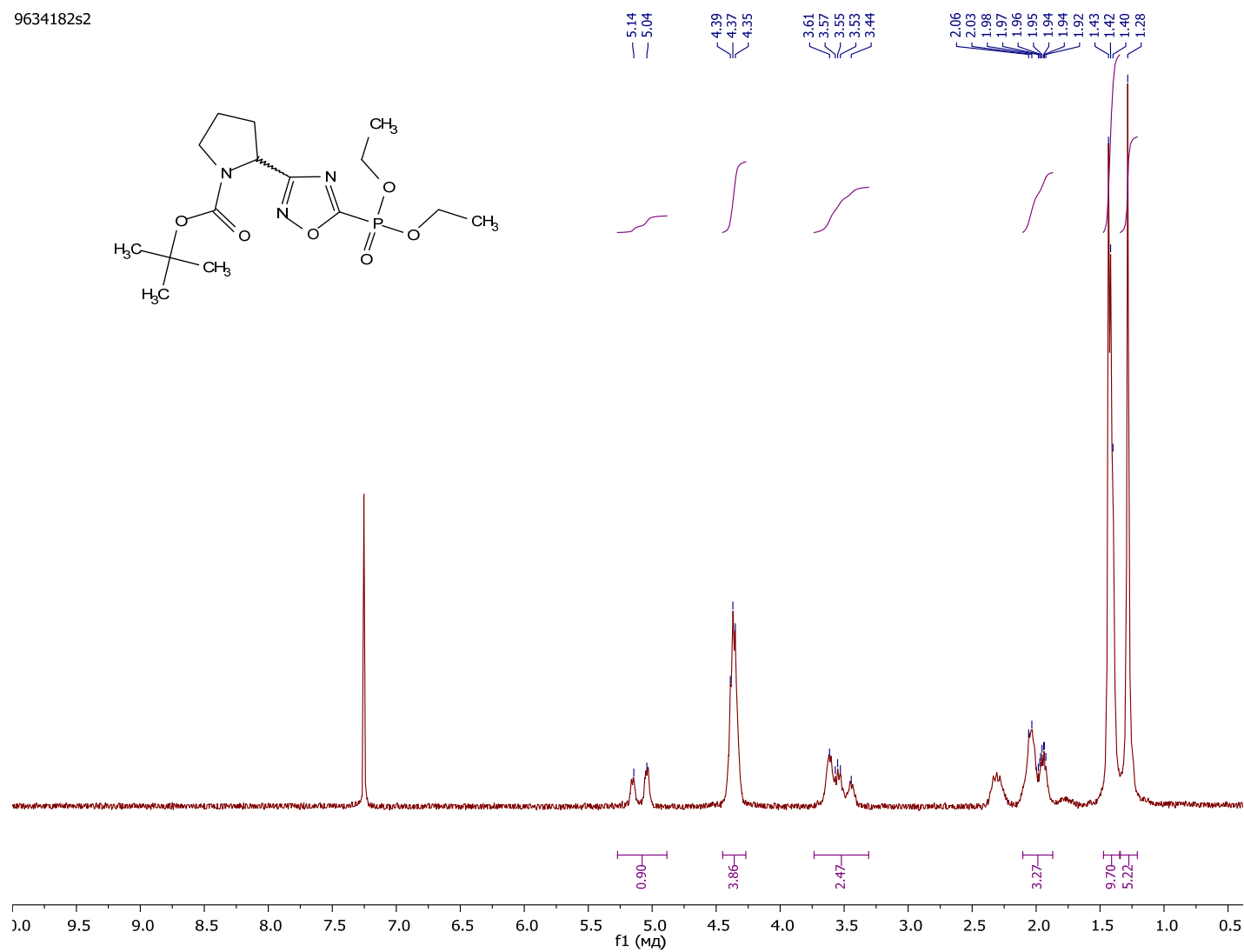


Figure 85 ¹H NMR spectrum of 3f and 3g (R-isomer)

sklif1774_C13.1.fid

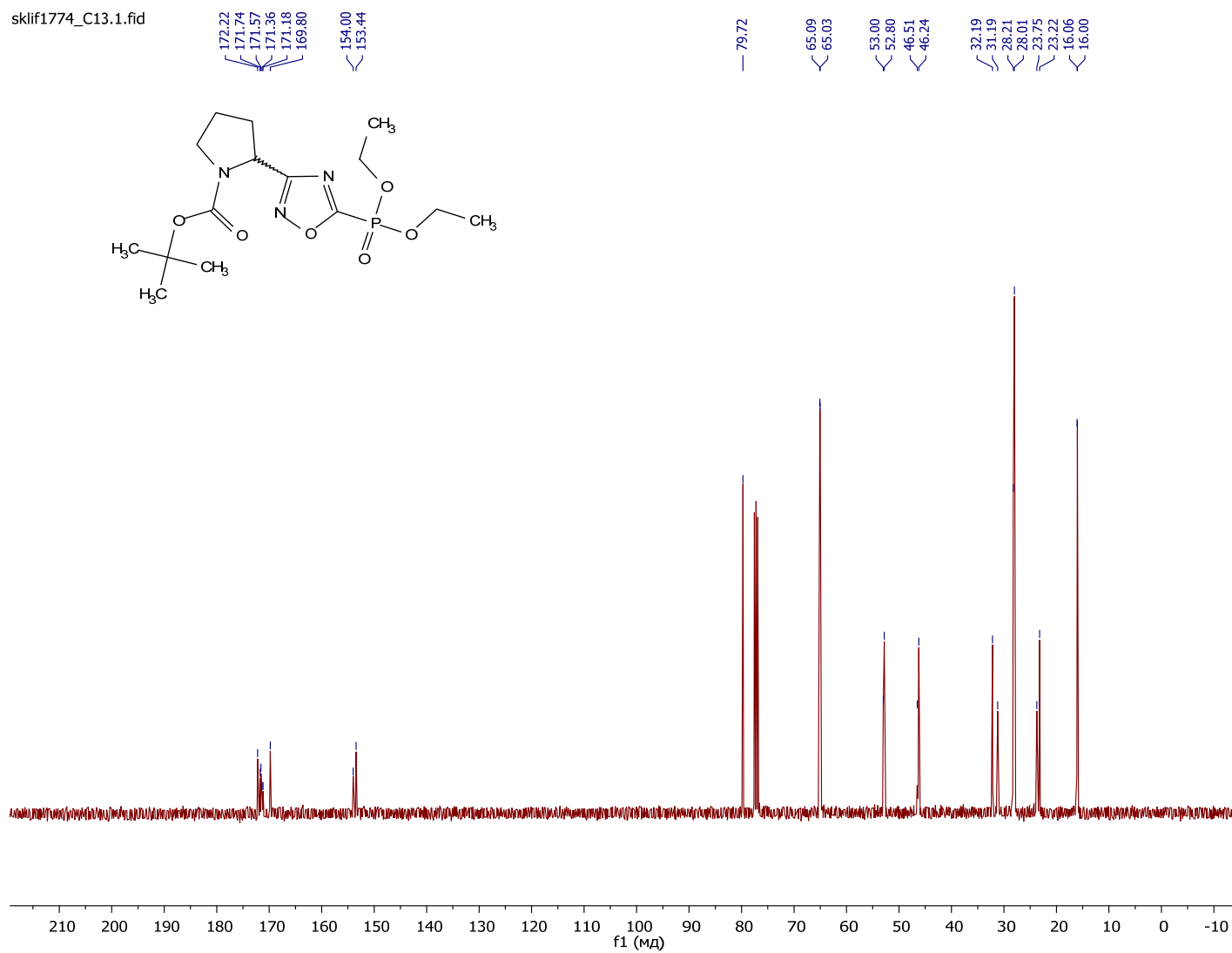


Figure 86. ¹³C NMR spectrum of 3f and 3g (R-isomer)

sklif1774_P31.1.fid

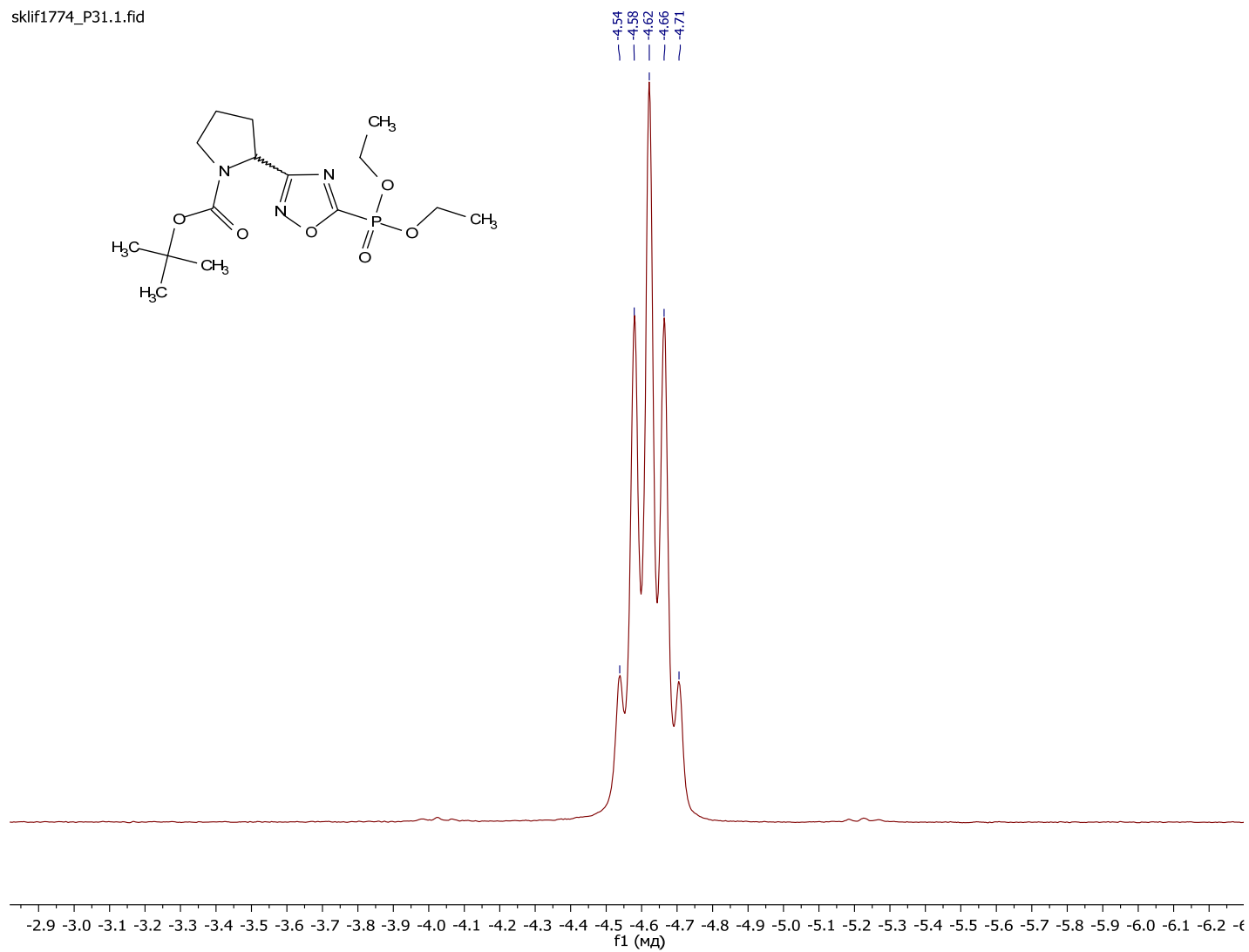


Figure 87. ^{31}P NMR spectrum of 3f and 3g (*R*-isomer)

9638693s13

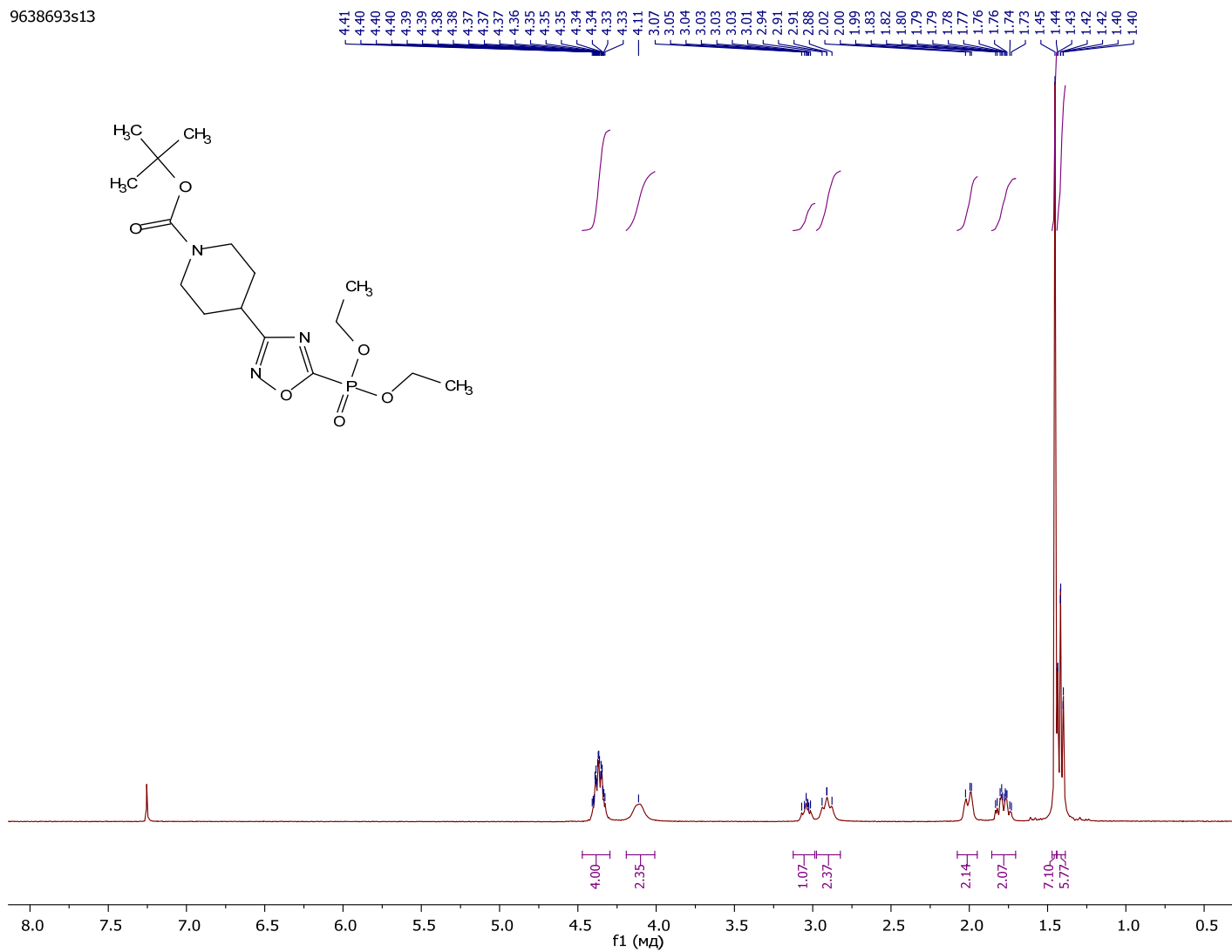


Figure 88 ^1H NMR spectrum of 3h

sklif1964 13C.1.fid

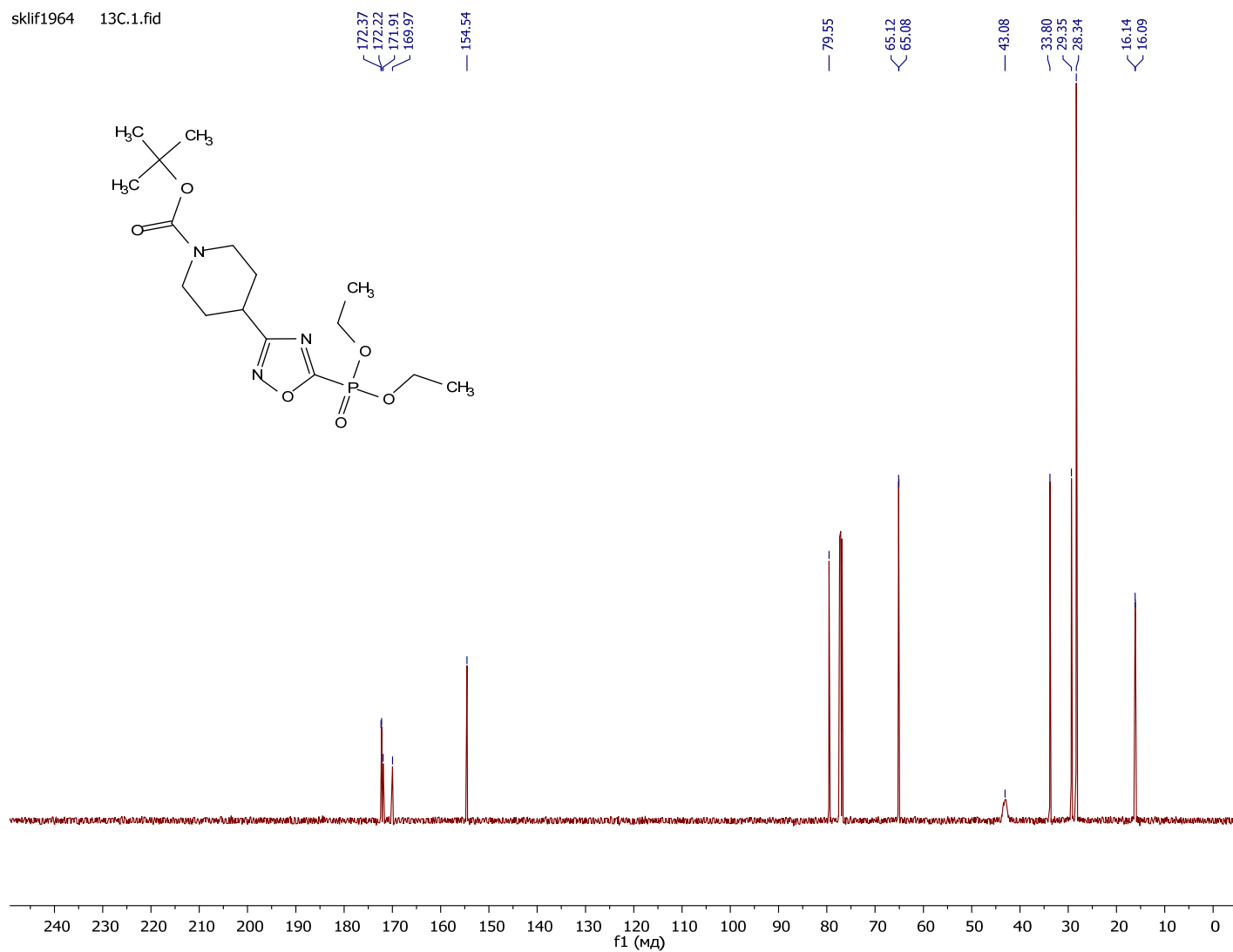


Figure 89 ^{13}C NMR spectrum of 3h

sklif1964_P31.1.fid

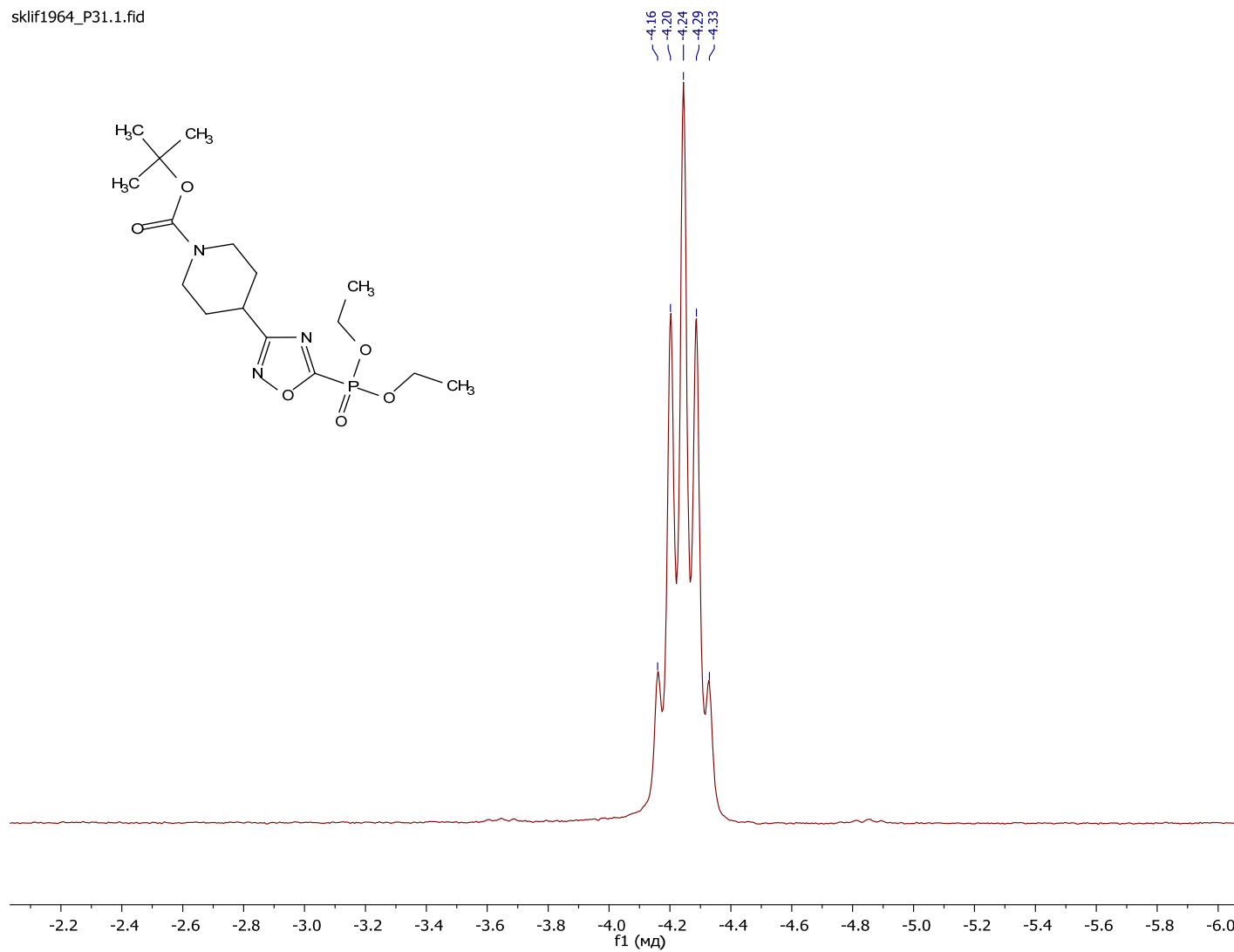


Figure 90 ^{31}P NMR spectrum of 3h

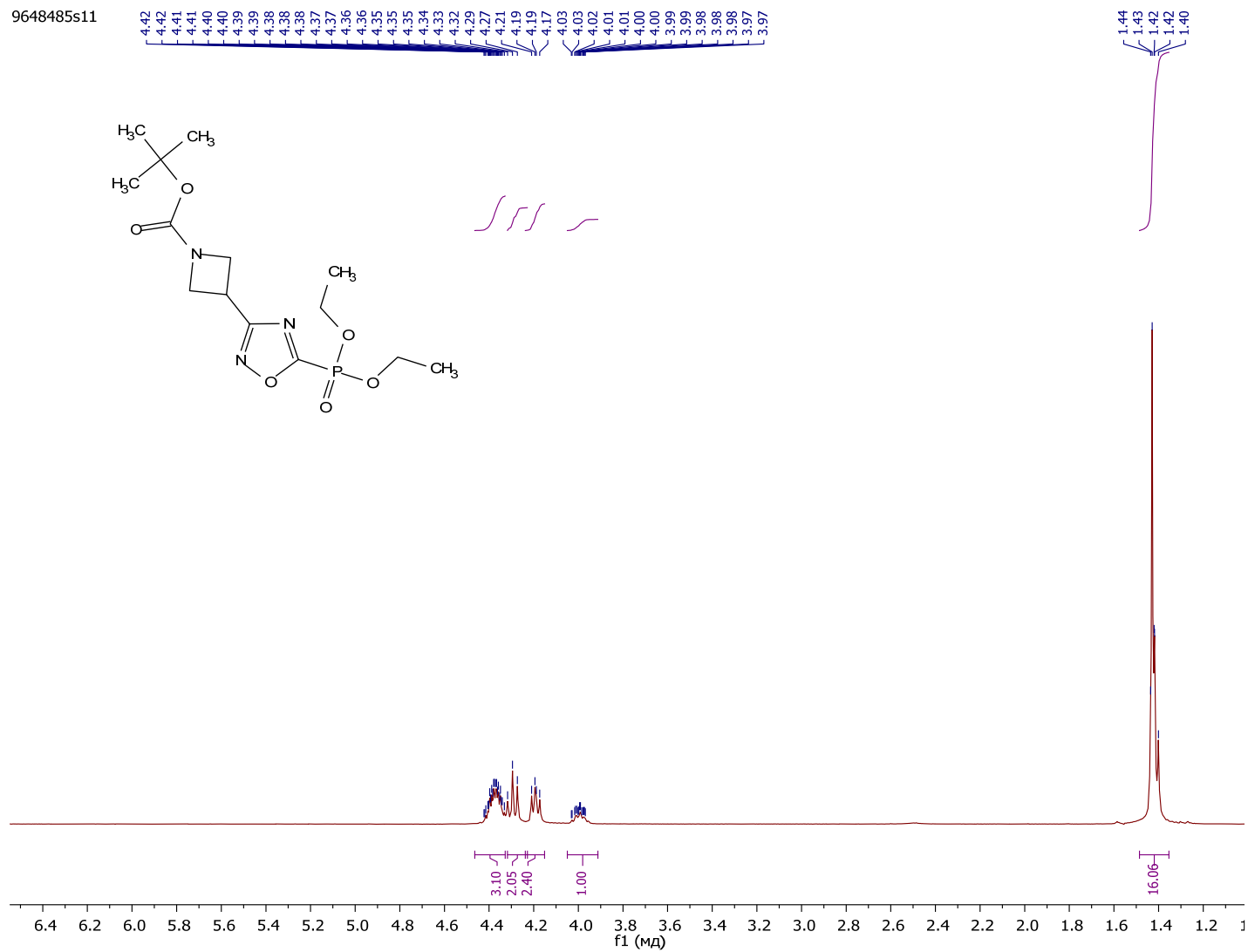


Figure 91 ¹H NMR spectrum of 3j

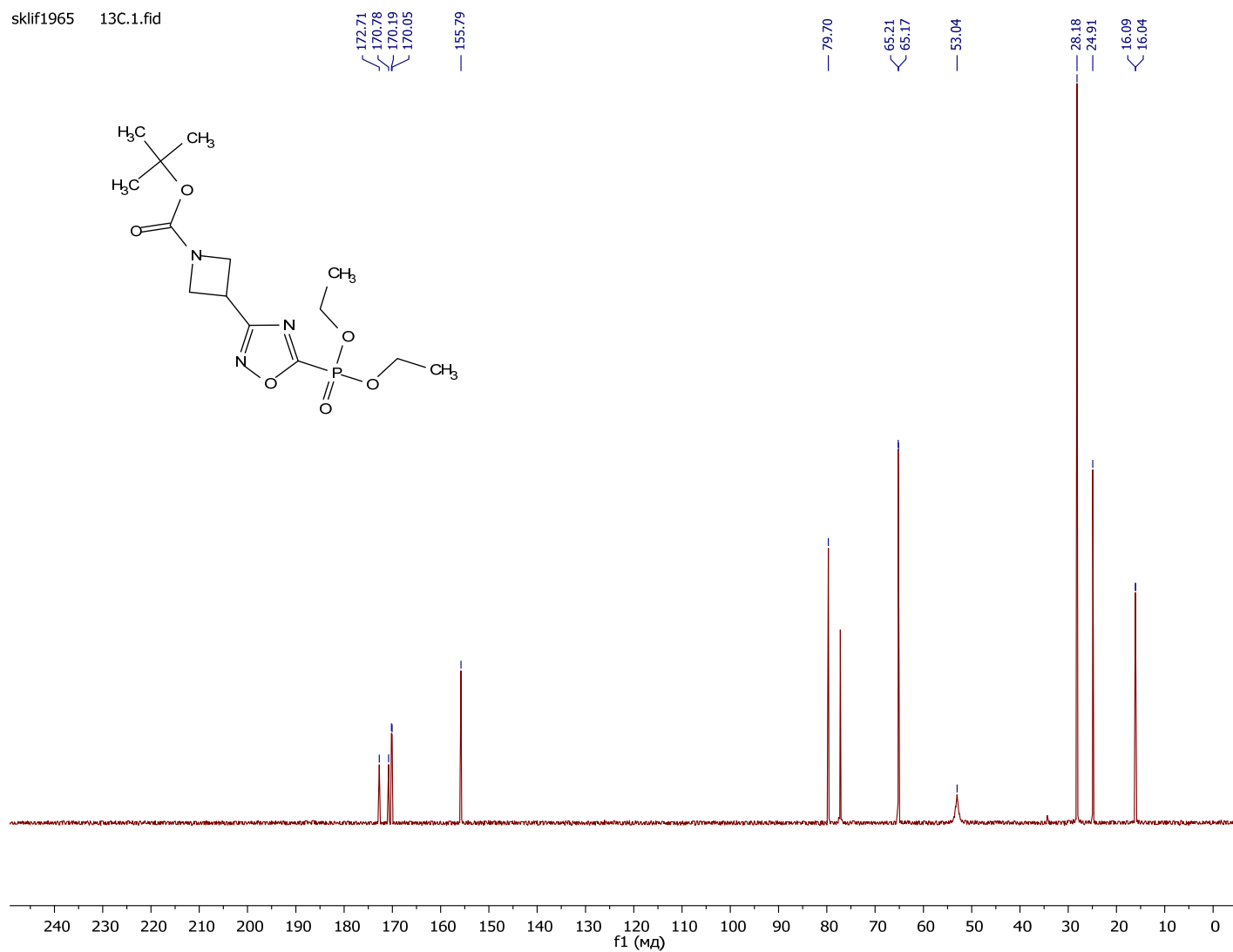


Figure 92 ¹³C NMR spectrum of 3j

sklif1965_P31.1.fid

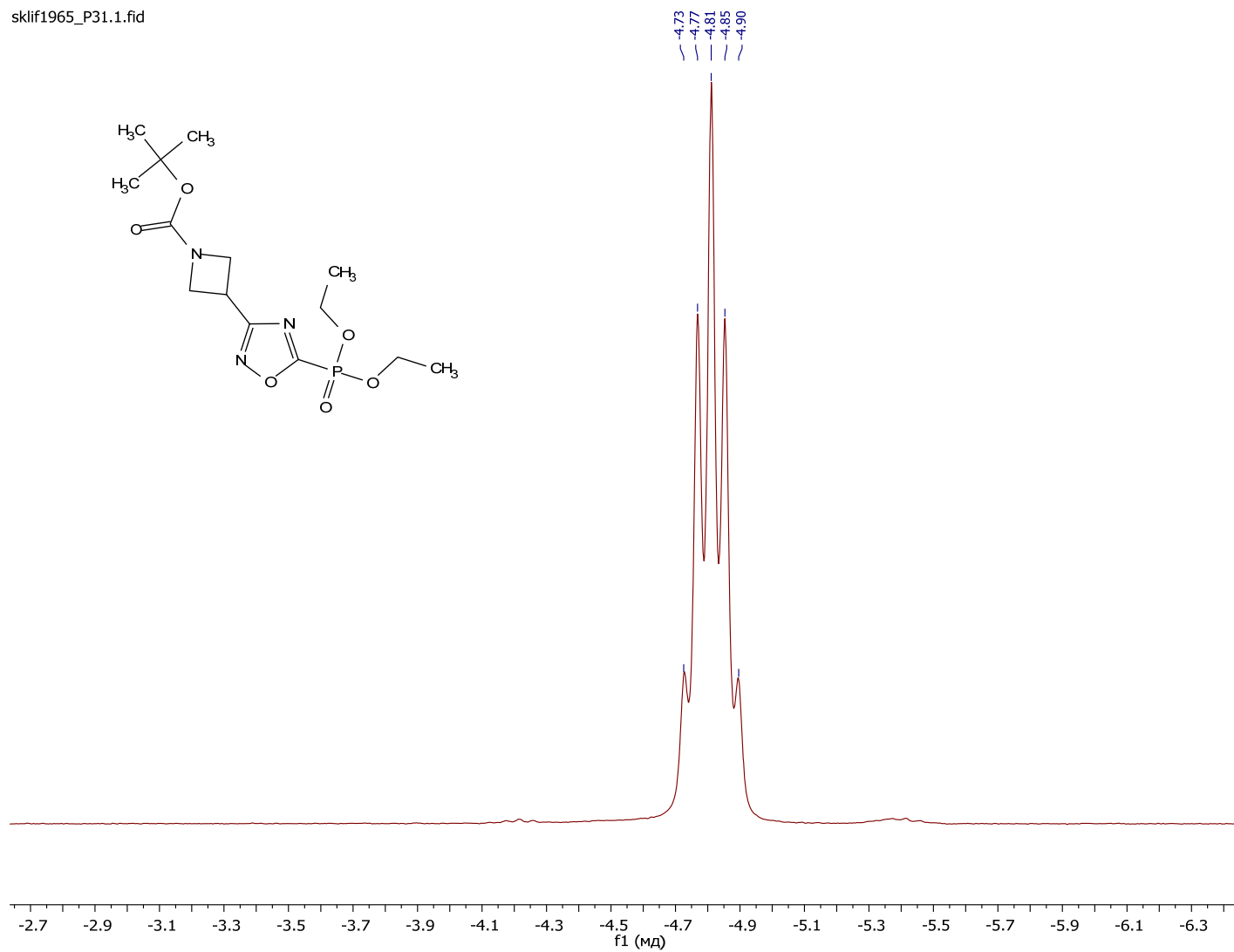


Figure 93 ^{31}P NMR spectrum of 3j

9832715s2

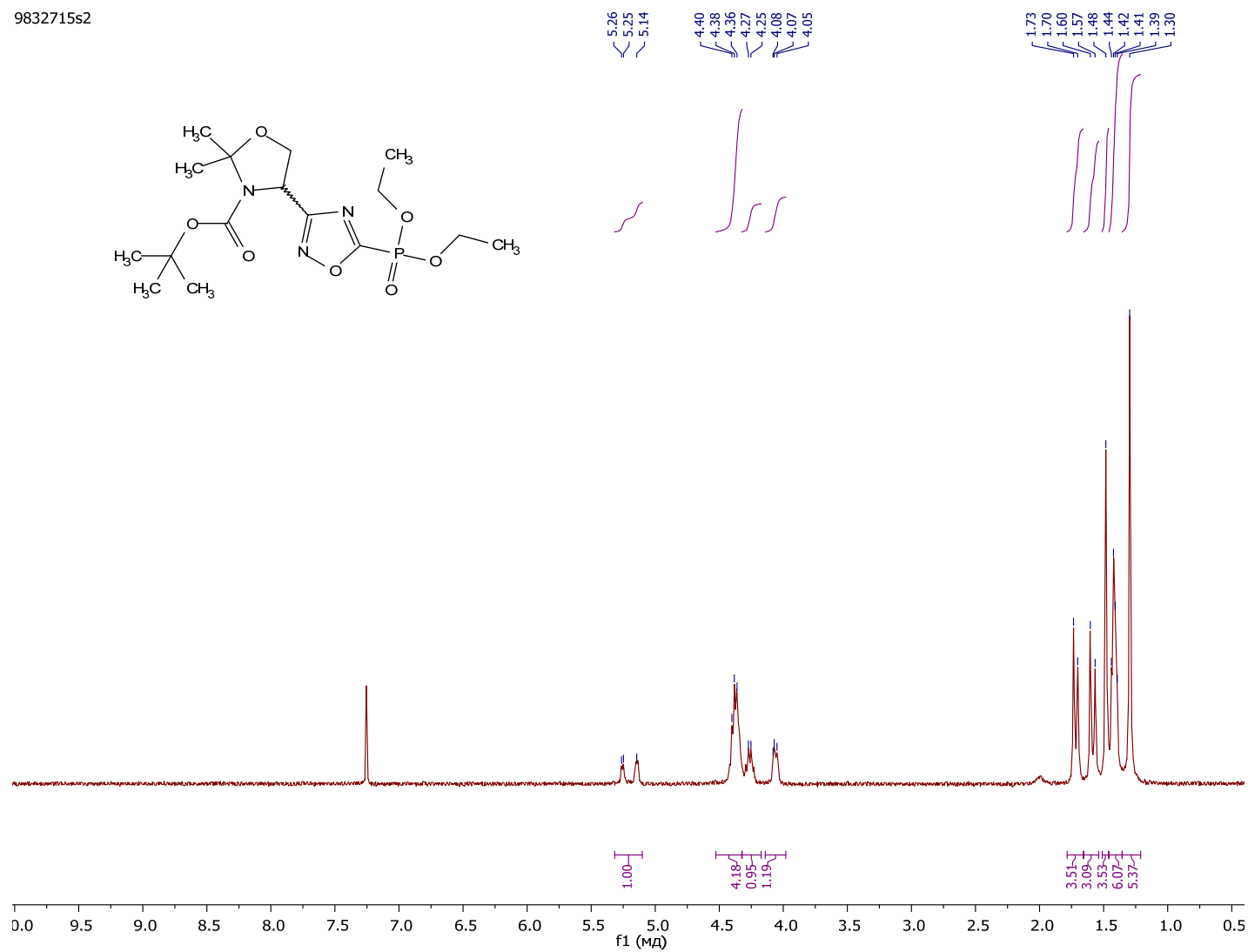


Figure 94 ¹H NMR spectrum of 3k and 3l (*R*-isomer)

sklif1966 13C.1.fid

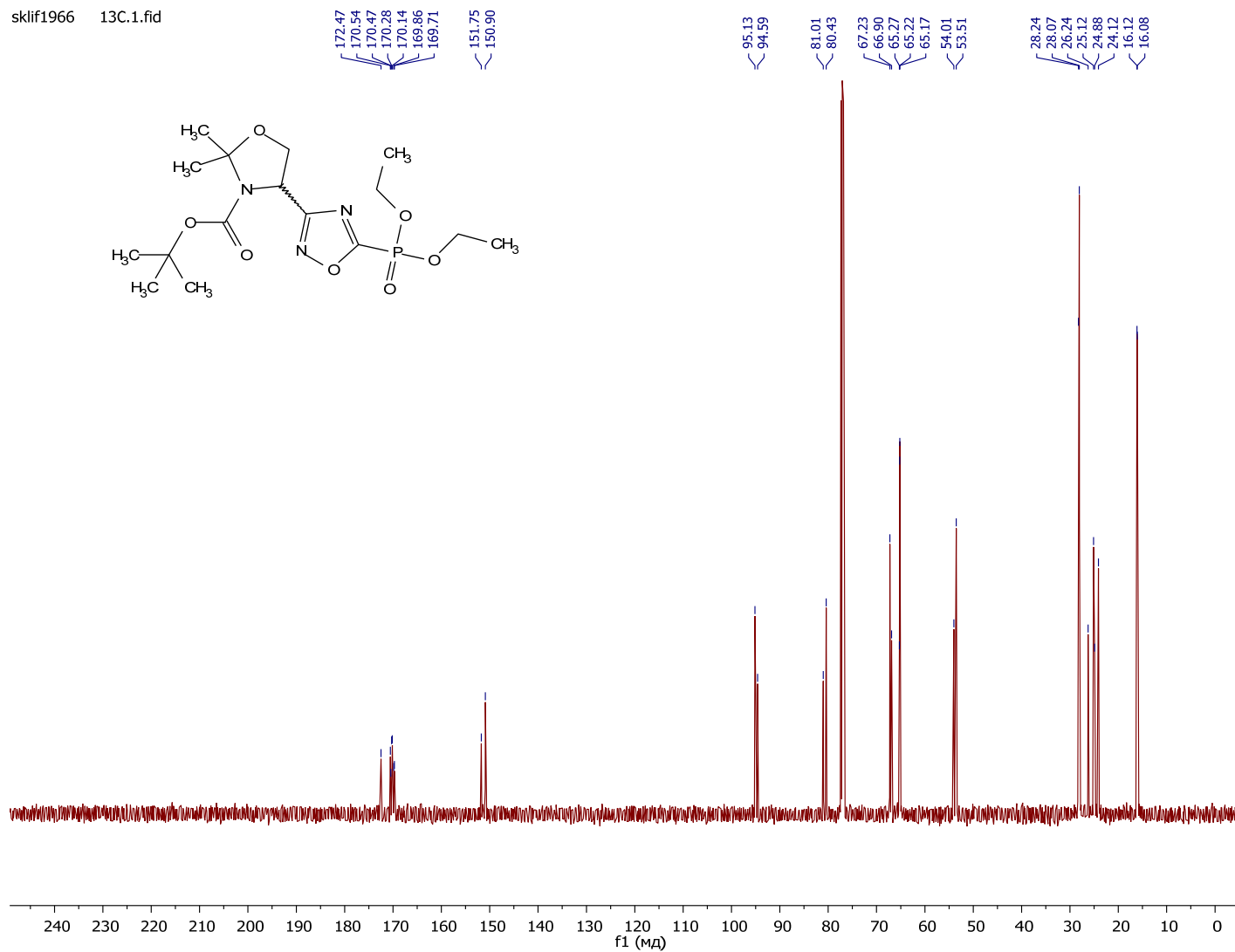


Figure 95 ¹³C NMR spectrum of 3k and 3l (*R*-isomer)

sklif1966_P31.1.fid

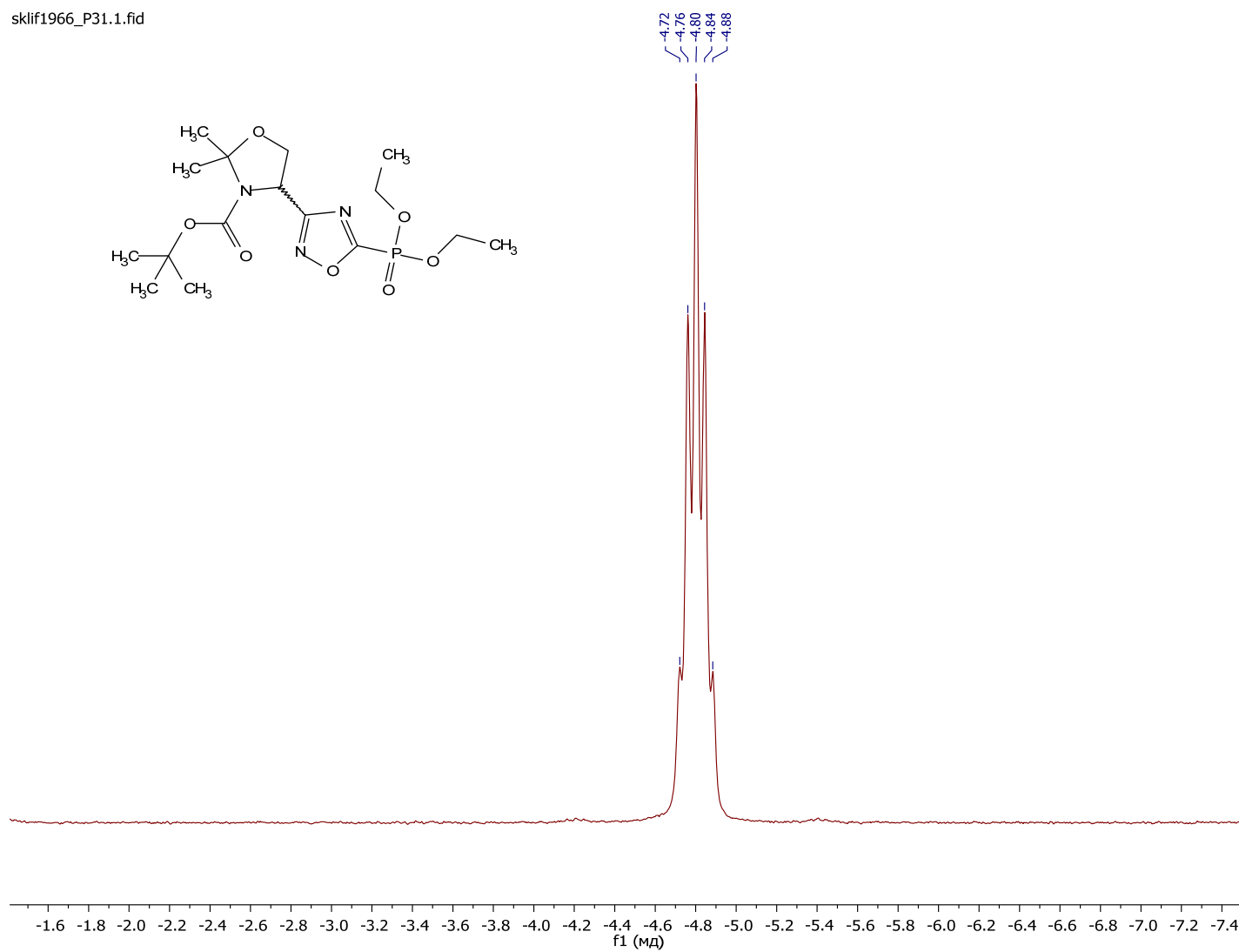


Figure 96 ^{31}P NMR spectrum of 3k and 3l (*R*-isomer)

sklif577.1.fid

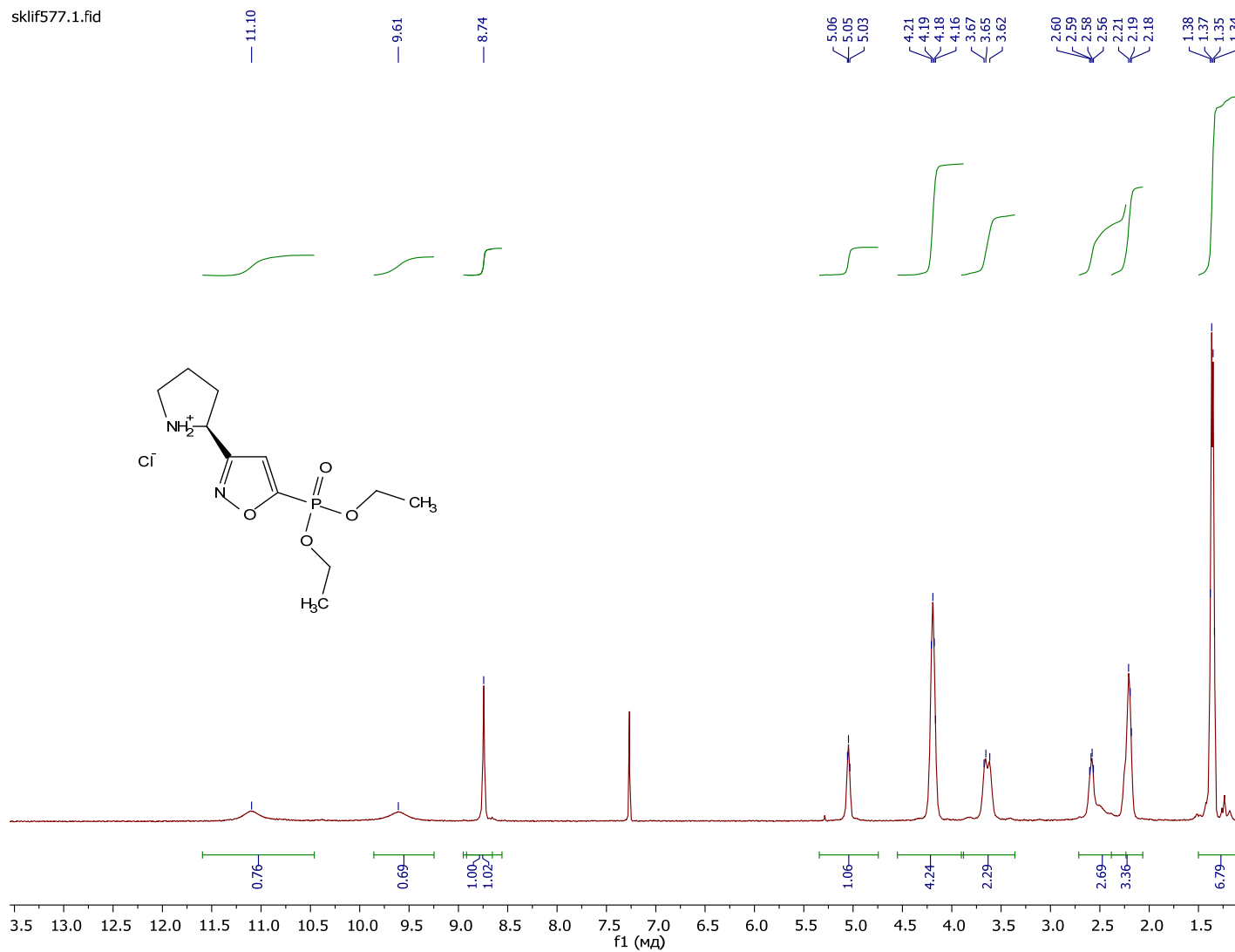


Figure 97 ¹H NMR spectrum of 19a-HCl and 19b-HCl (S-isomer)

sklif577_C13.1.fid

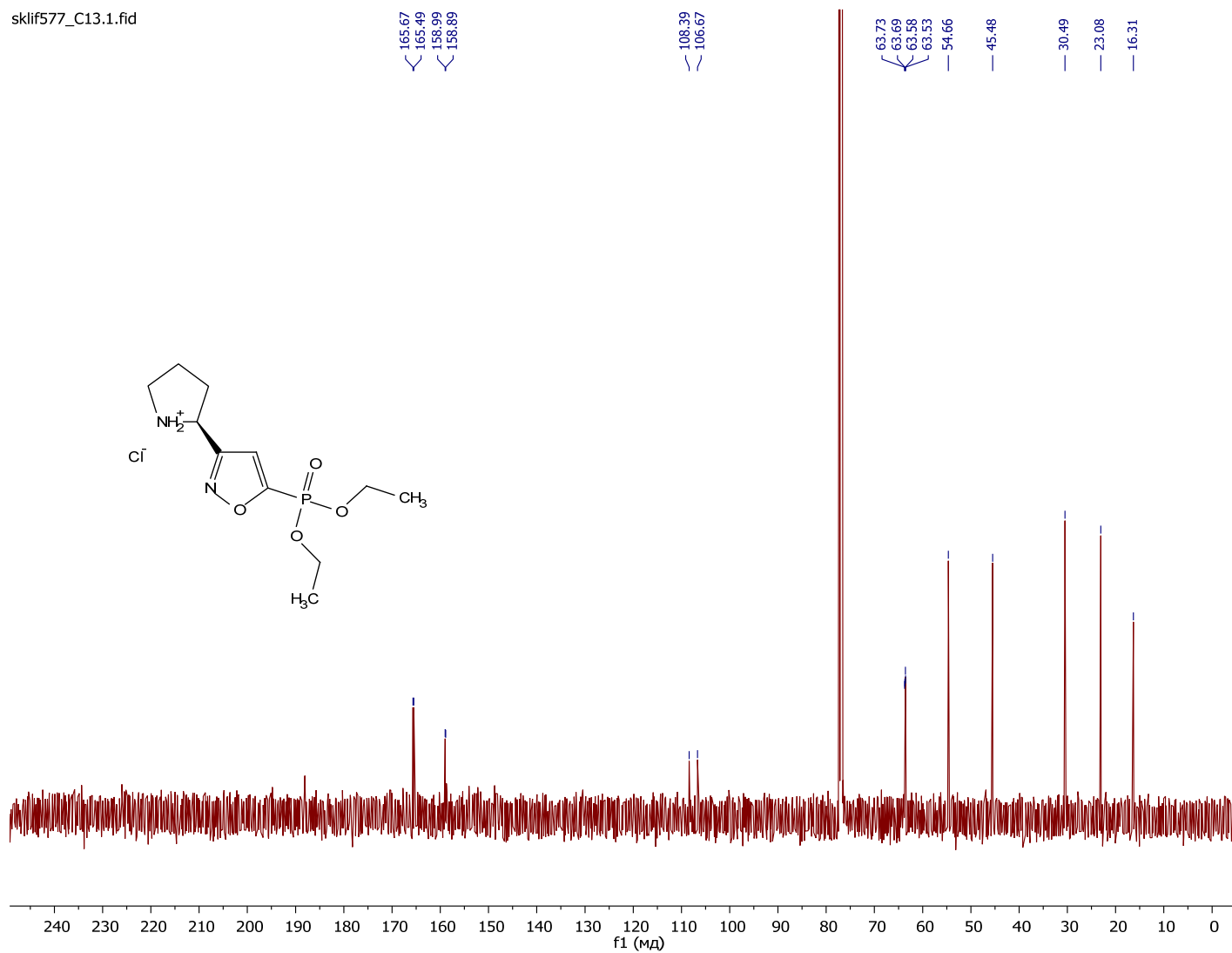


Figure 98 ¹³C NMR spectrum of 19a-HCl and 19b-HCl (S-isomer)

sklif577_P31{H}.1.fid

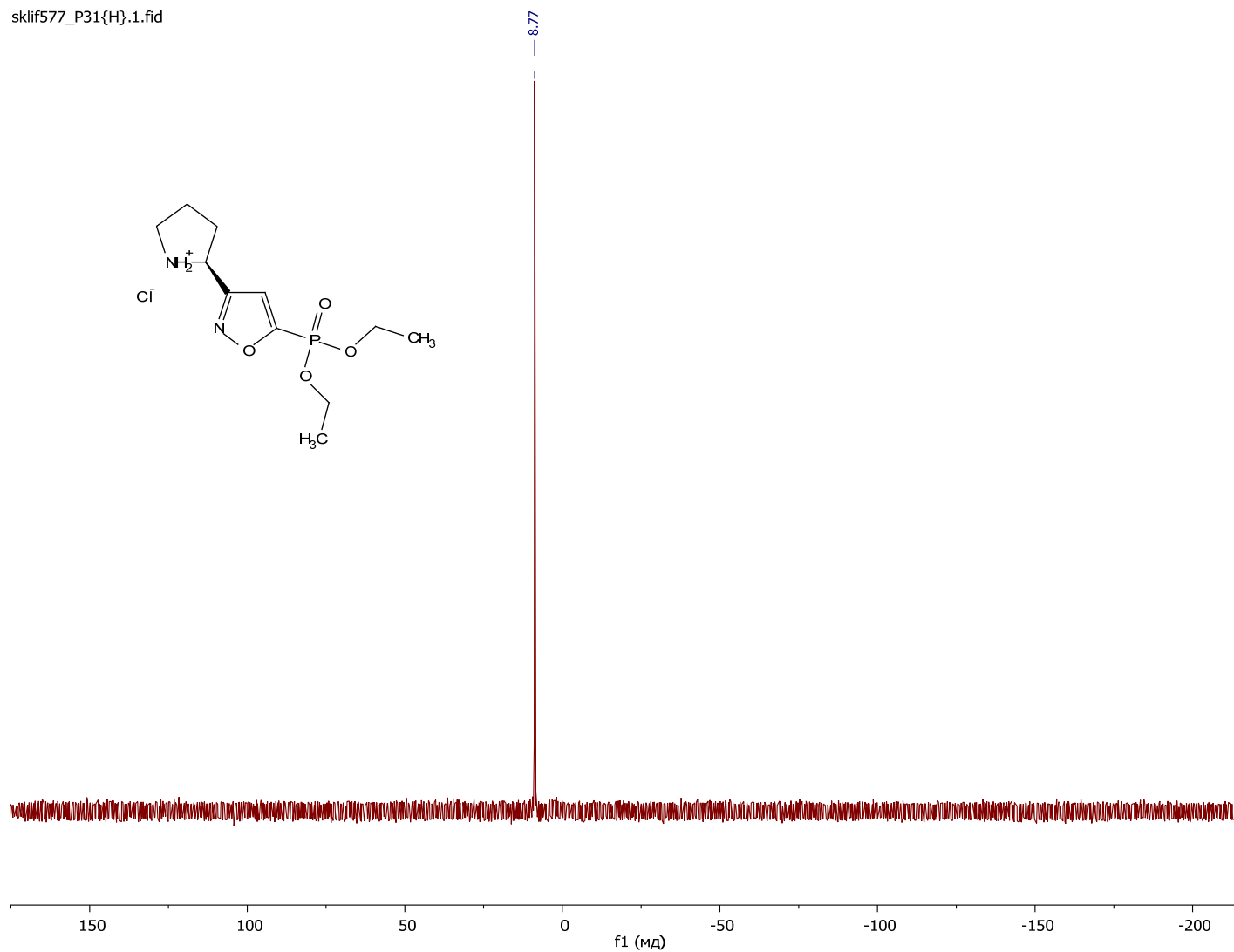


Figure 99 ^{31}P NMR spectrum of 19a-HCl and 19b-HCl (*S*-isomer)

sklif454.1.fid

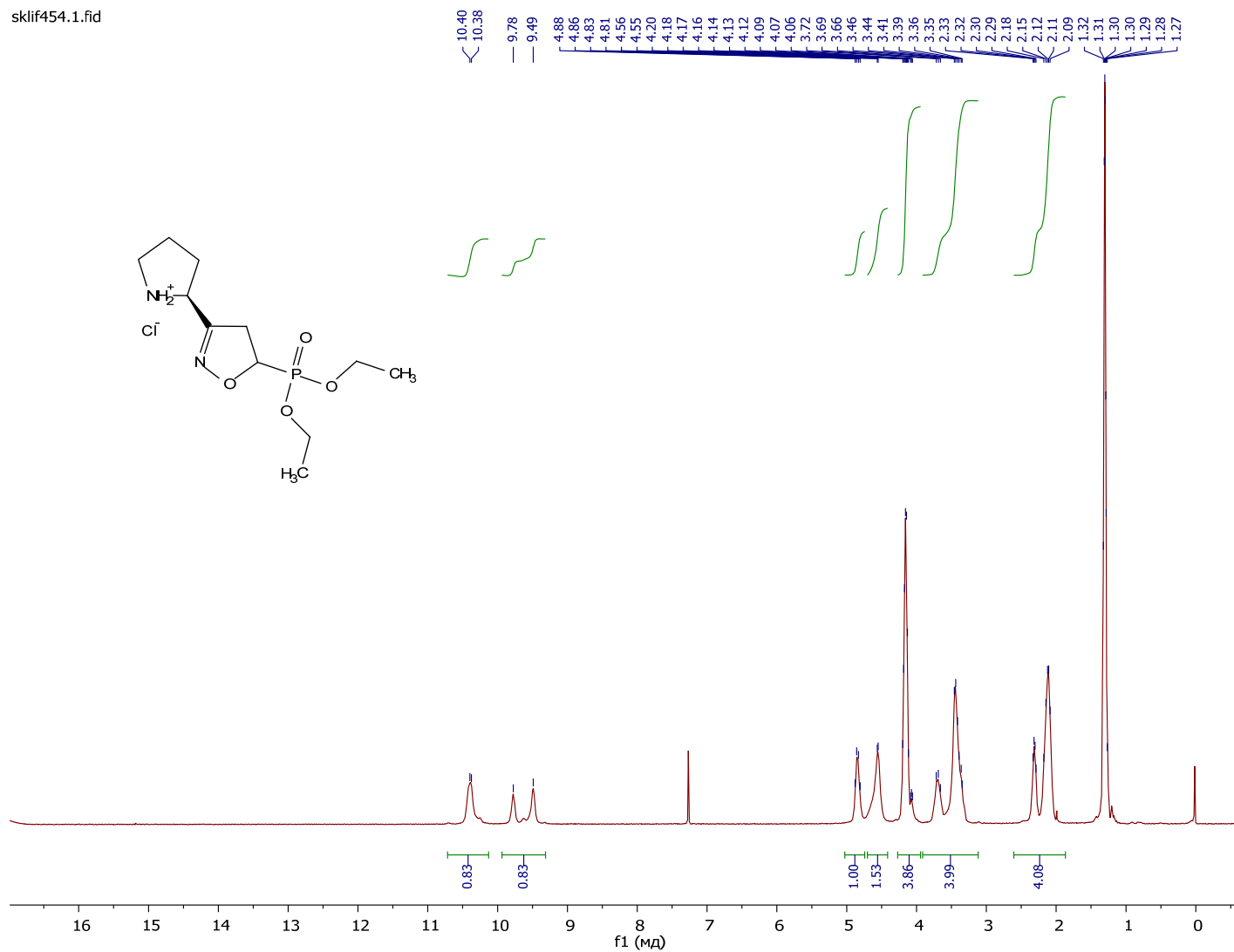


Figure 100 ¹H NMR spectrum of 19c-HCl and 19d-HCl (S-isomer)

sklif454 C13.1.fid

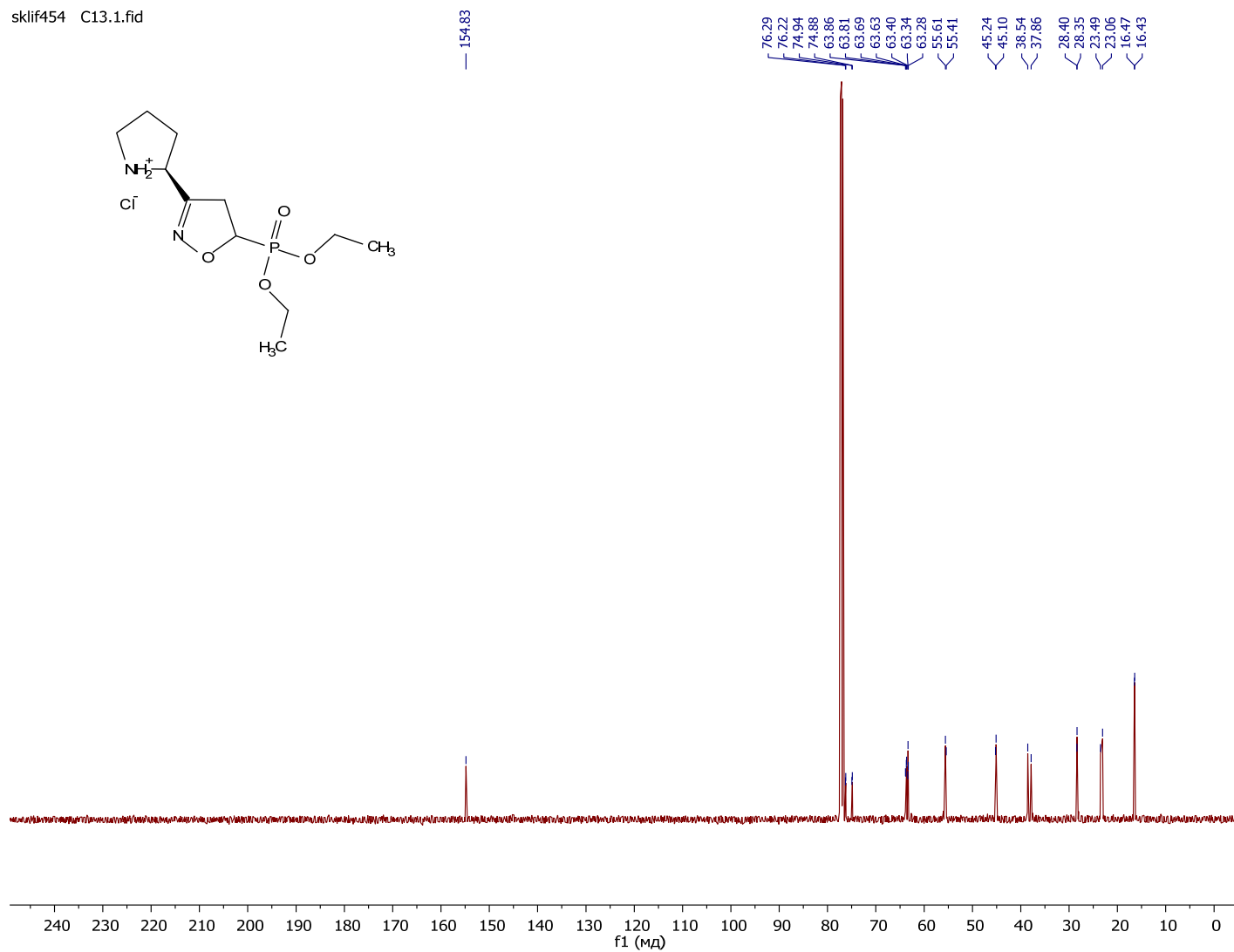


Figure 101 ¹³C NMR spectrum of 19c-HCl and 19d-HCl (S-isomer)

Sklif454_P31.1.fid
31P-{1H}

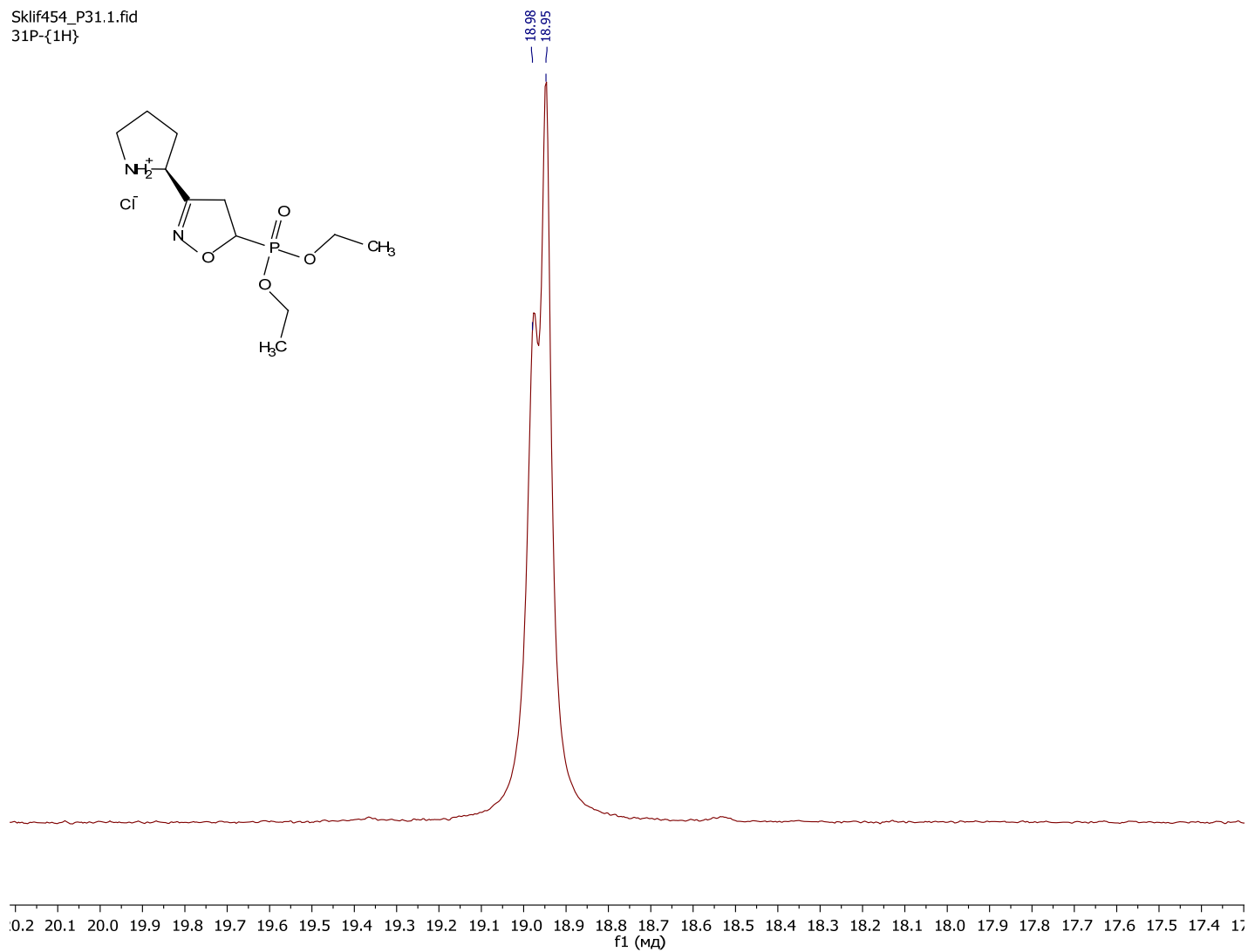
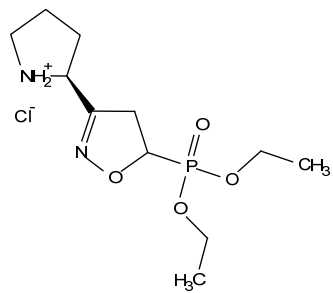


Figure 102 ³¹P NMR spectrum of 19c-HCl and 19d-HCl (S-isomer)

Sklif809.1.fid

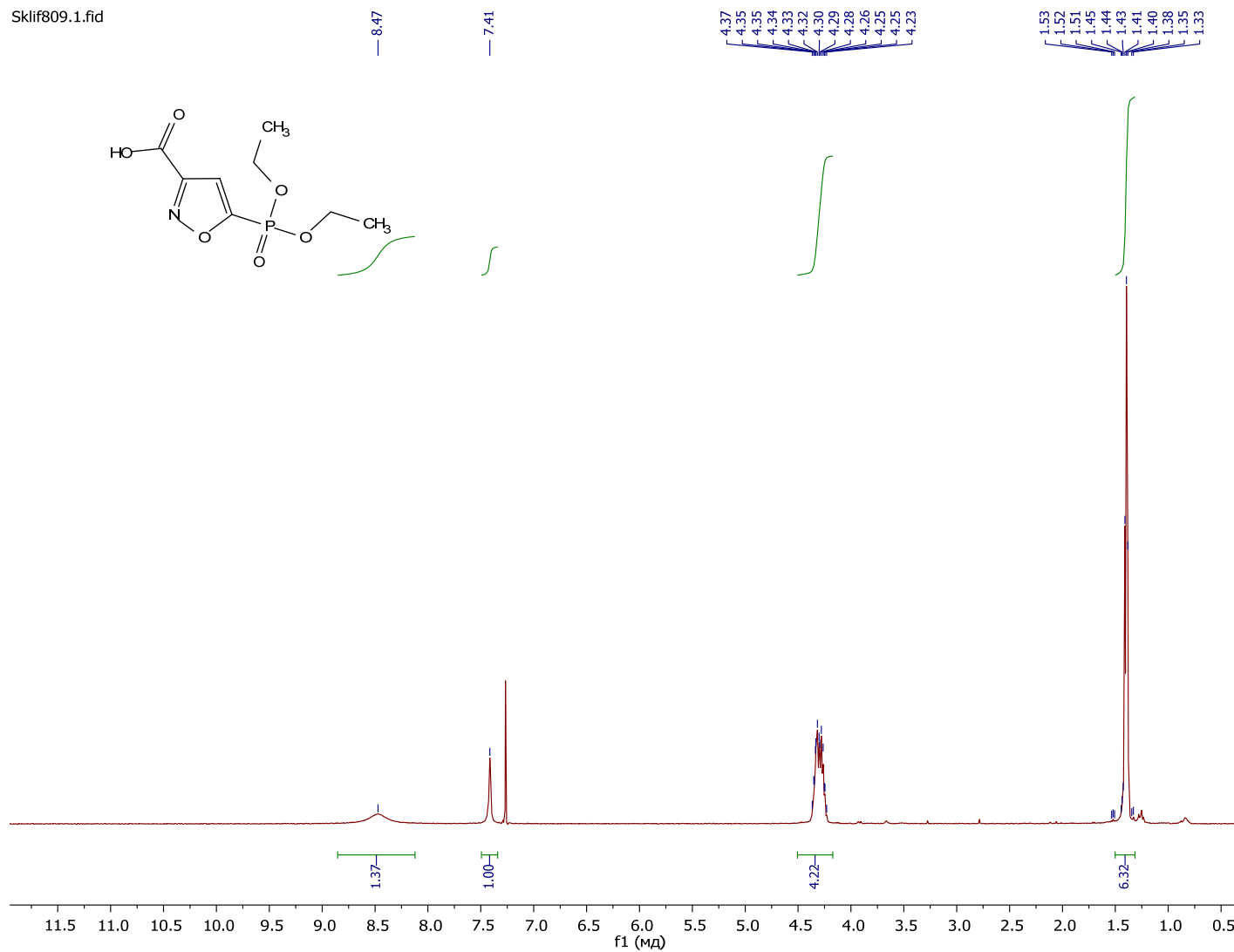


Figure 103 ¹H NMR spectrum of 20

Sklif809_C13.1.fid

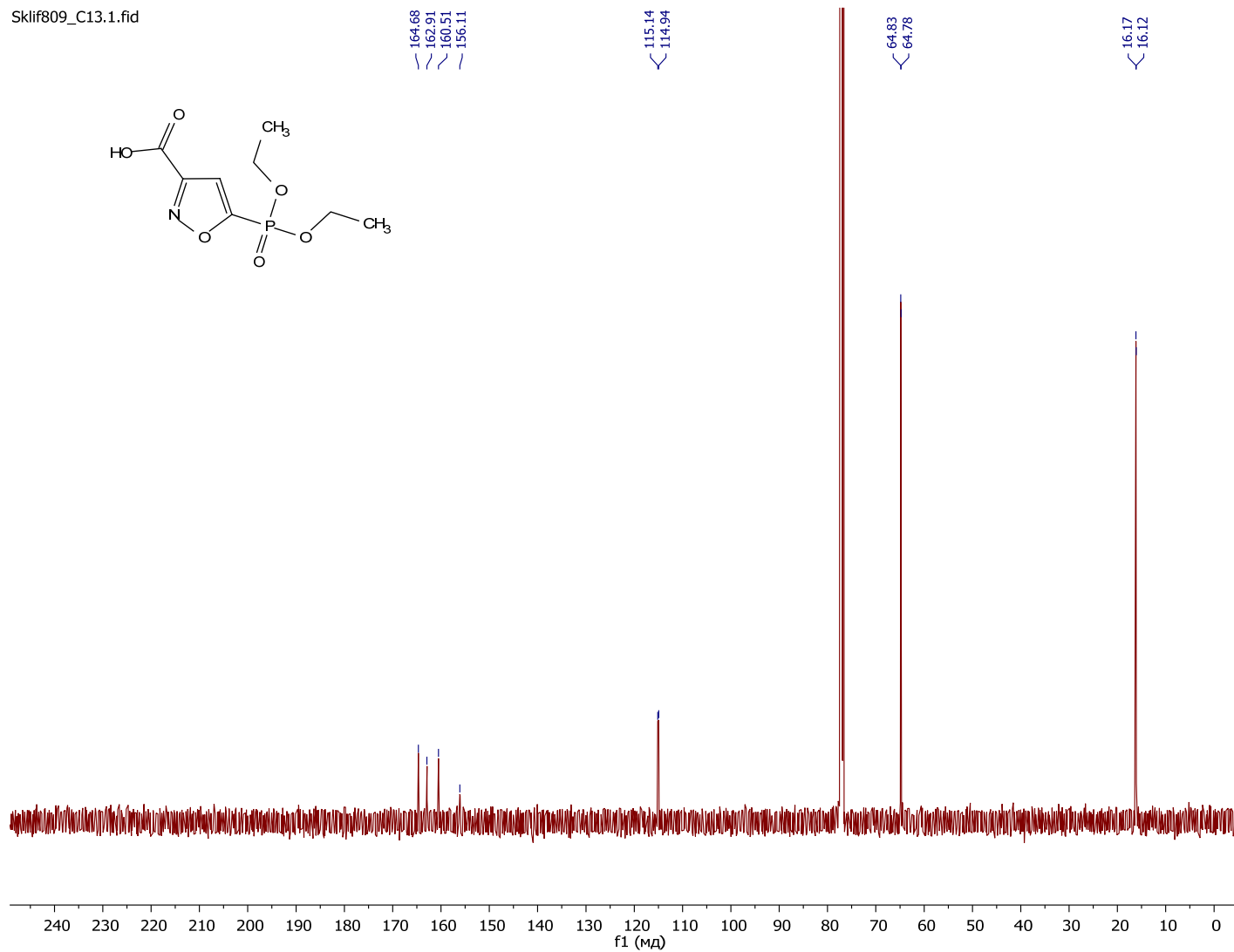


Figure 104 ¹³C NMR spectrum of 20

Sklif809_P31.1.fid
31P-{1H}

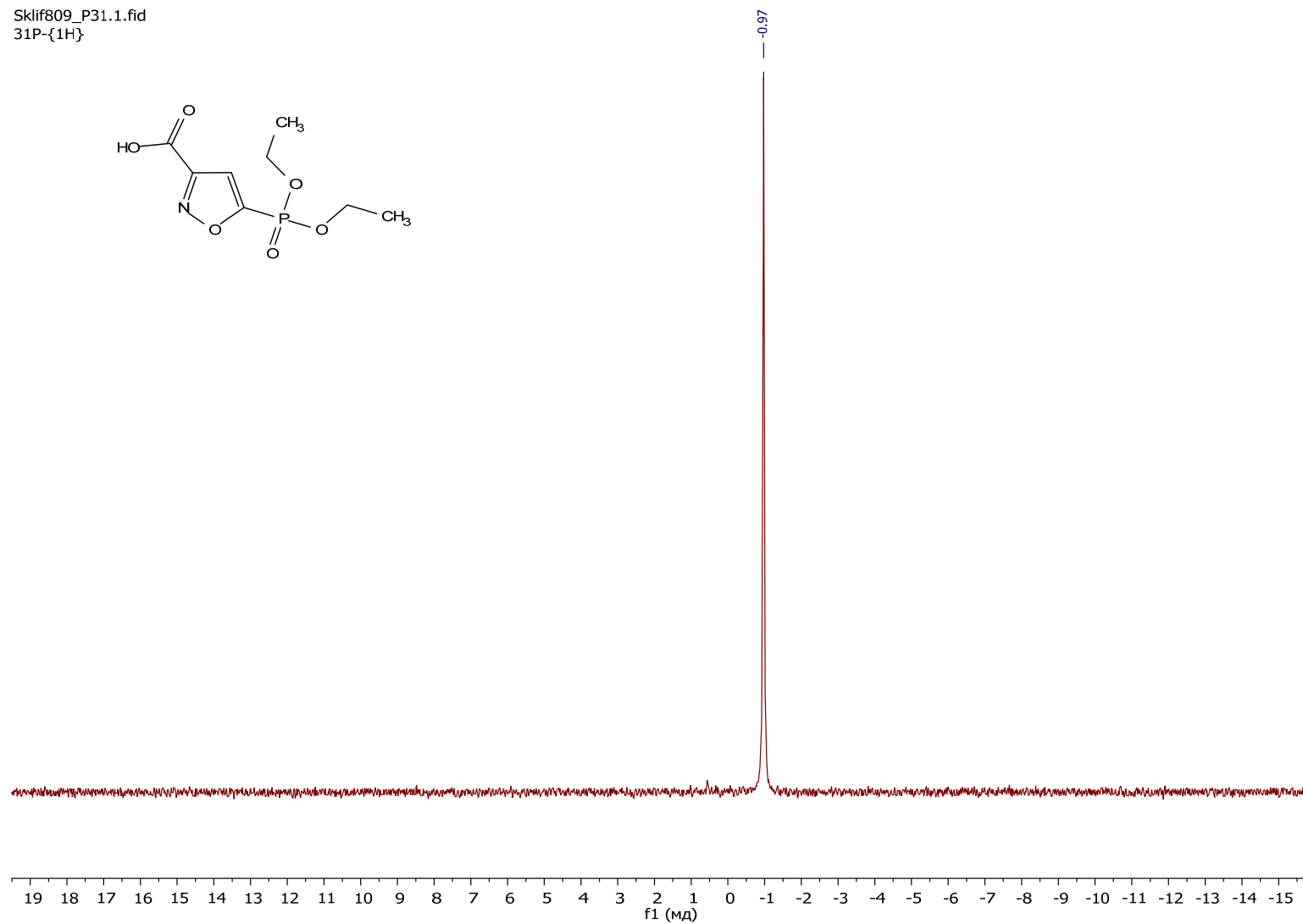
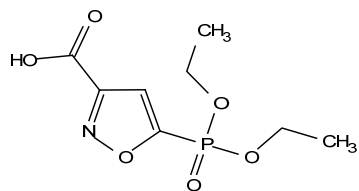


Figure 105 ^{31}P NMR spectrum of 20

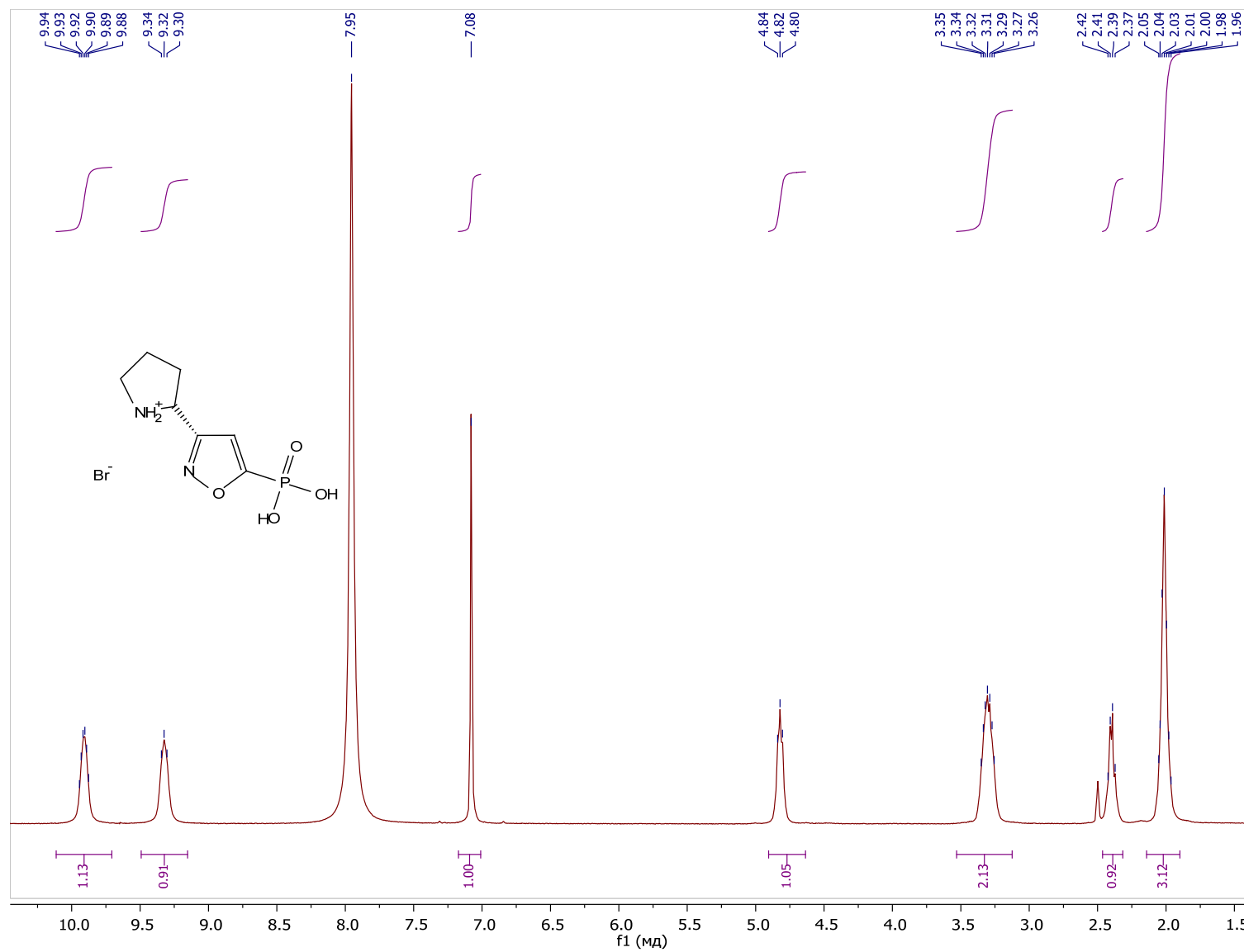


Figure 106. ¹H NMR spectrum of 21a and 21b

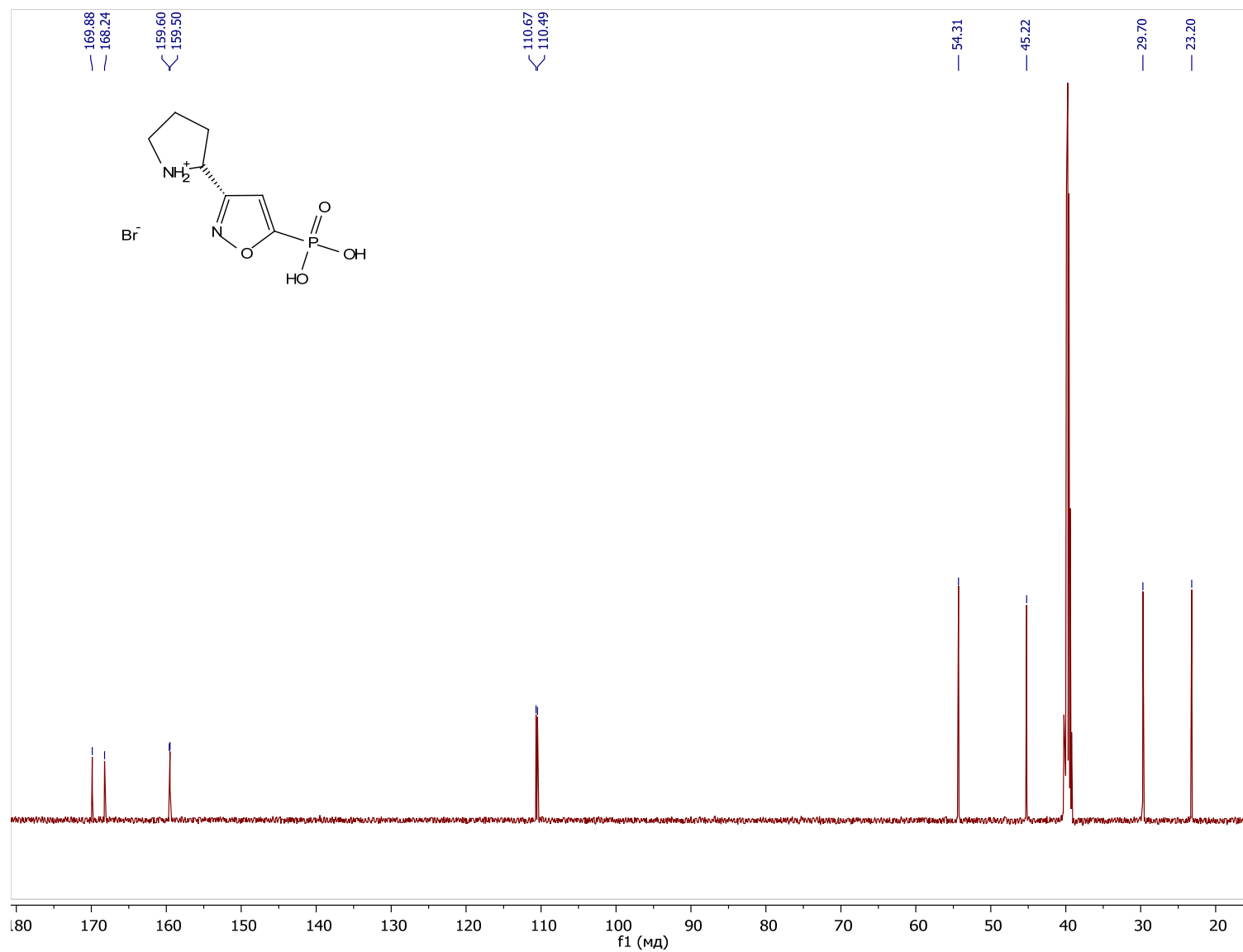


Figure 107. ^{13}C NMR spectrum of 21a and 21b

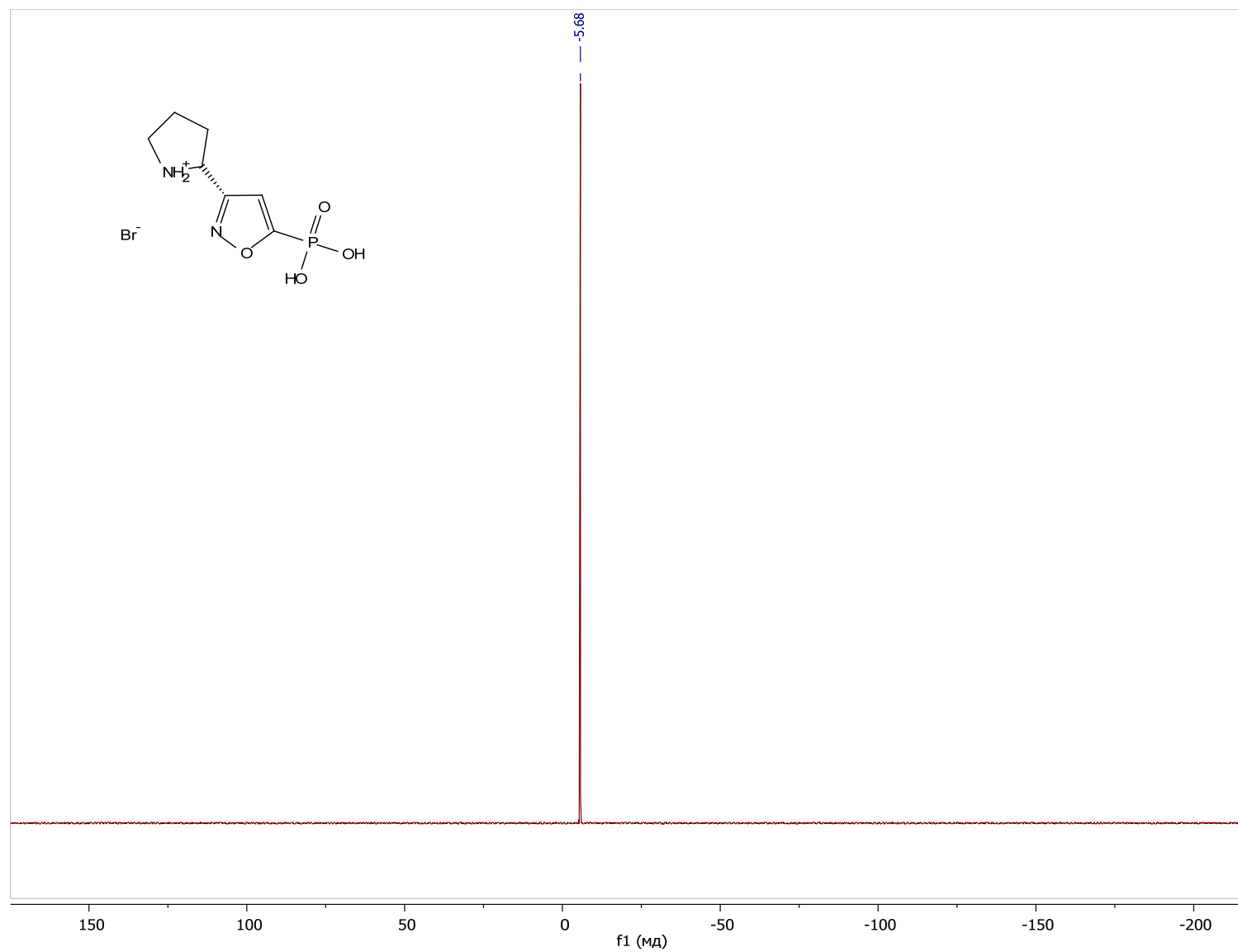


Figure 108. ^{31}P NMR spectrum of 21a and 21b

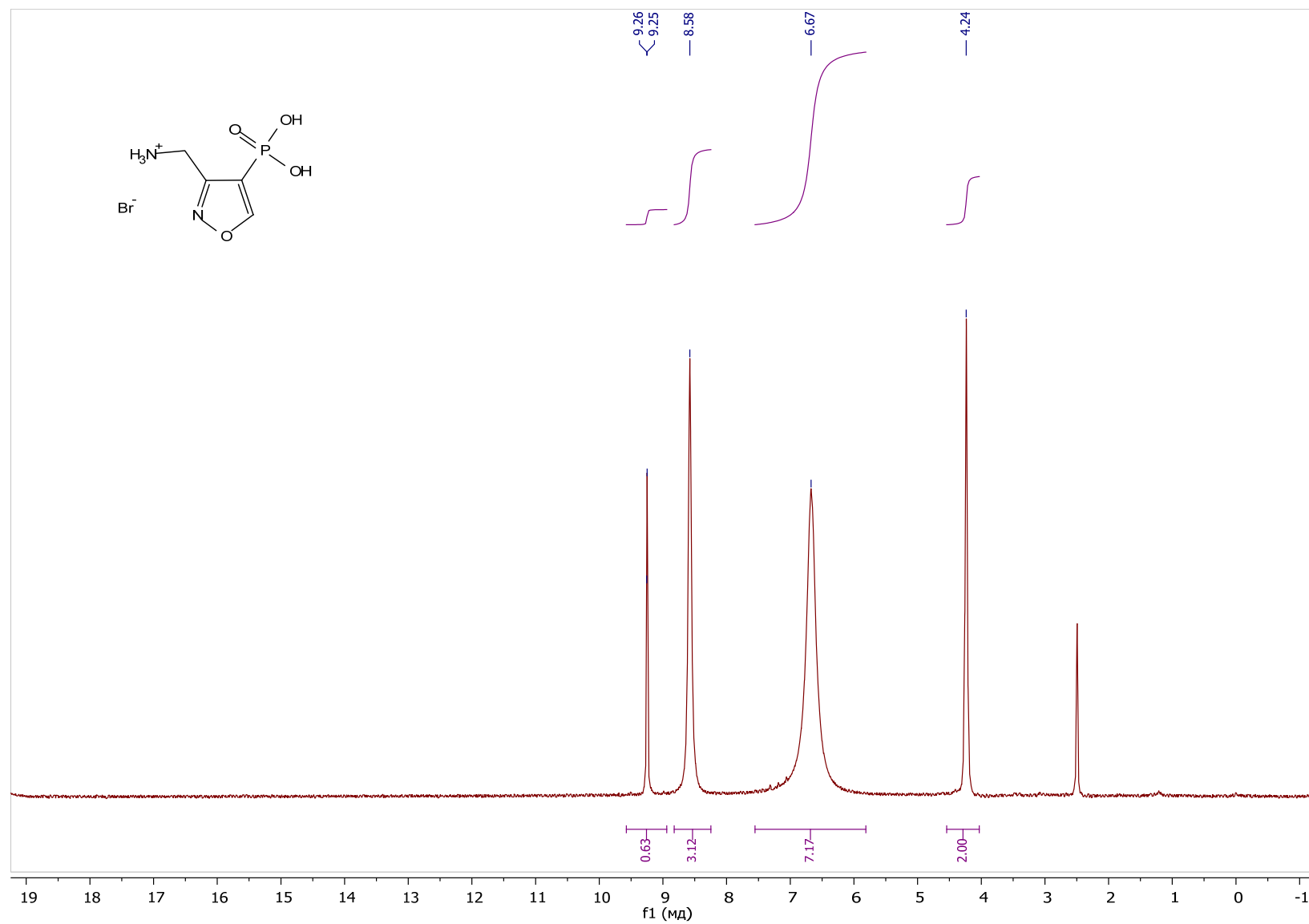


Figure 109. ^1H NMR spectrum of 21c

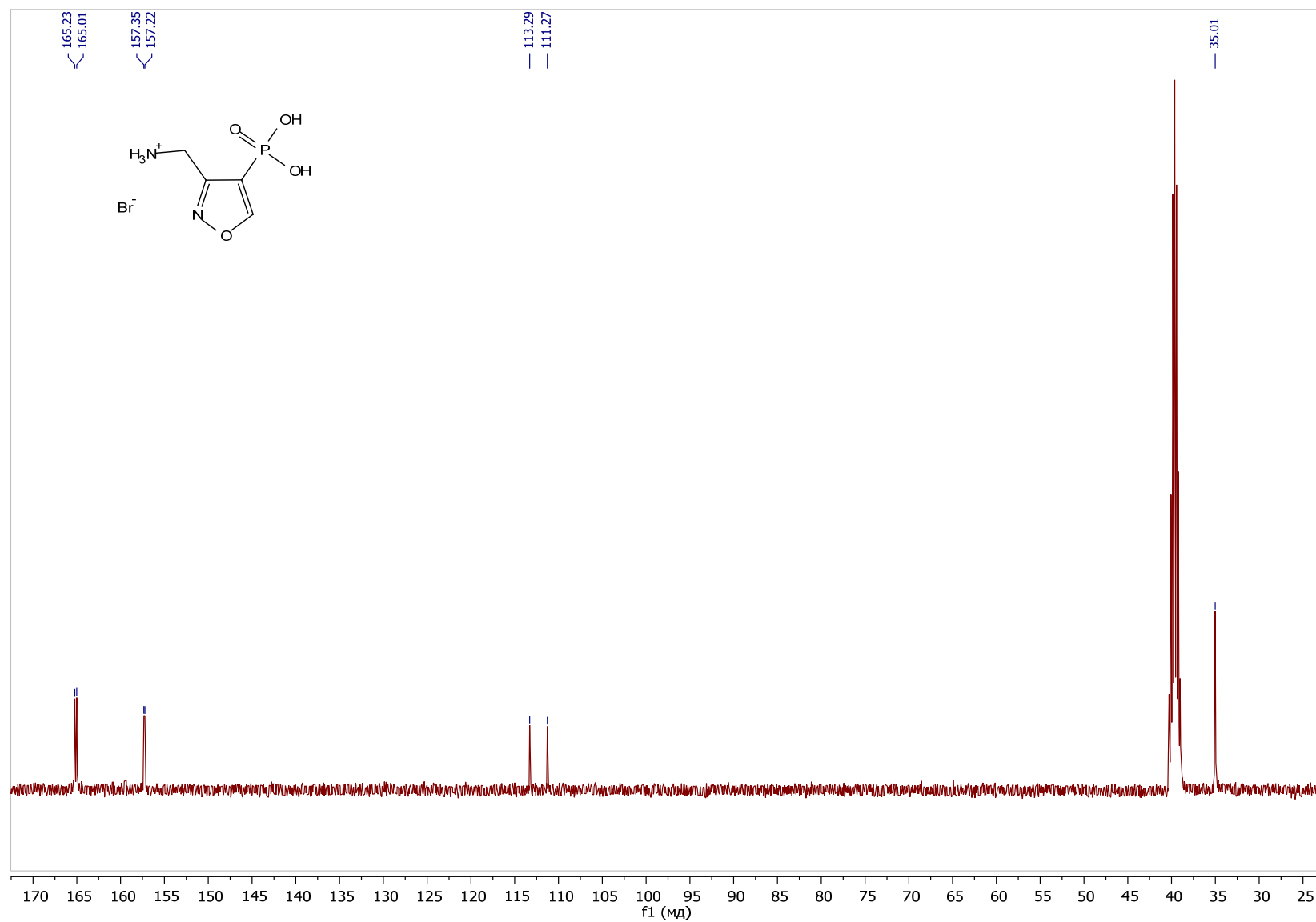


Figure 110. ^{13}C NMR spectrum of 21c

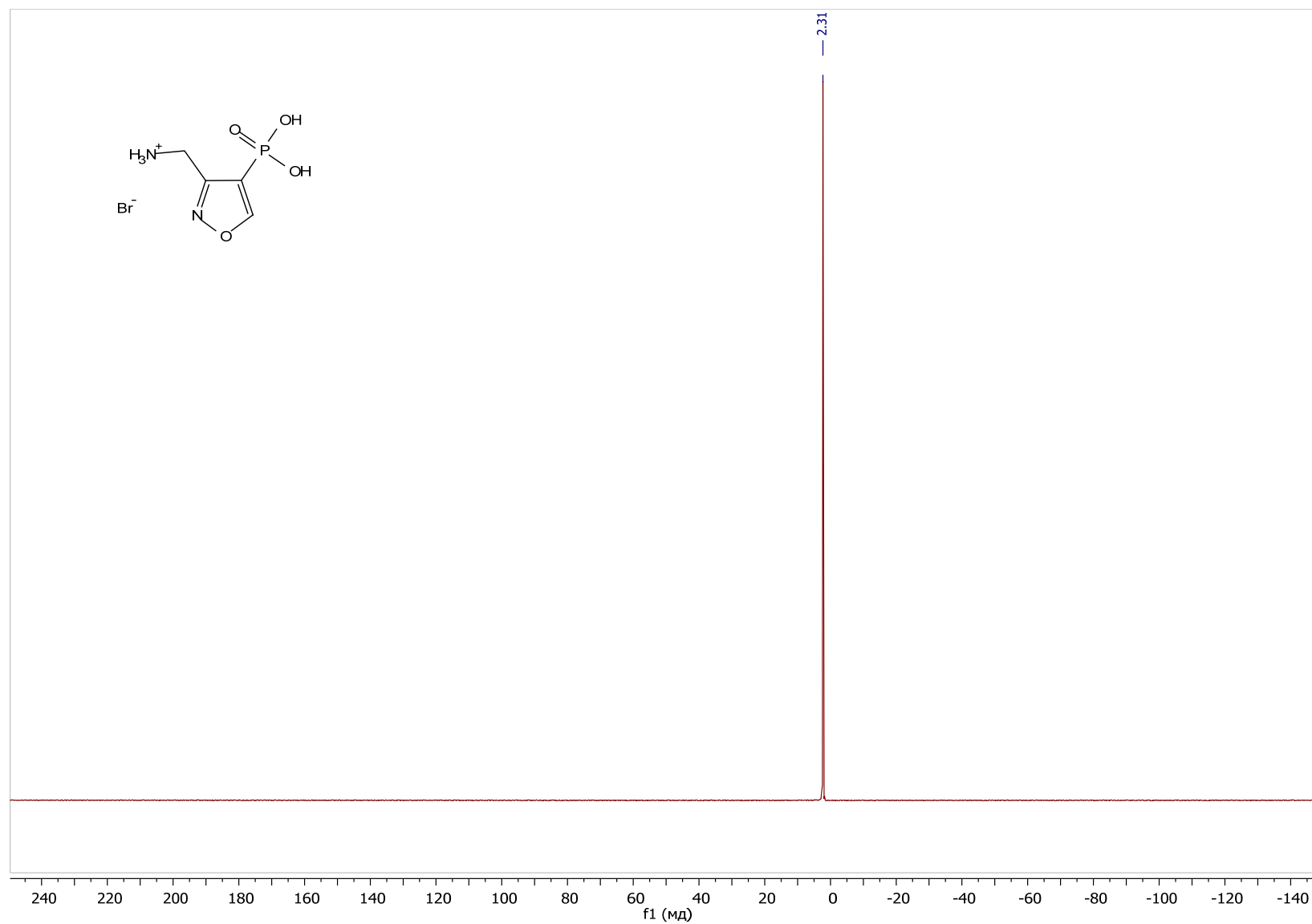


Figure 111. ^{31}P NMR spectrum of 21c

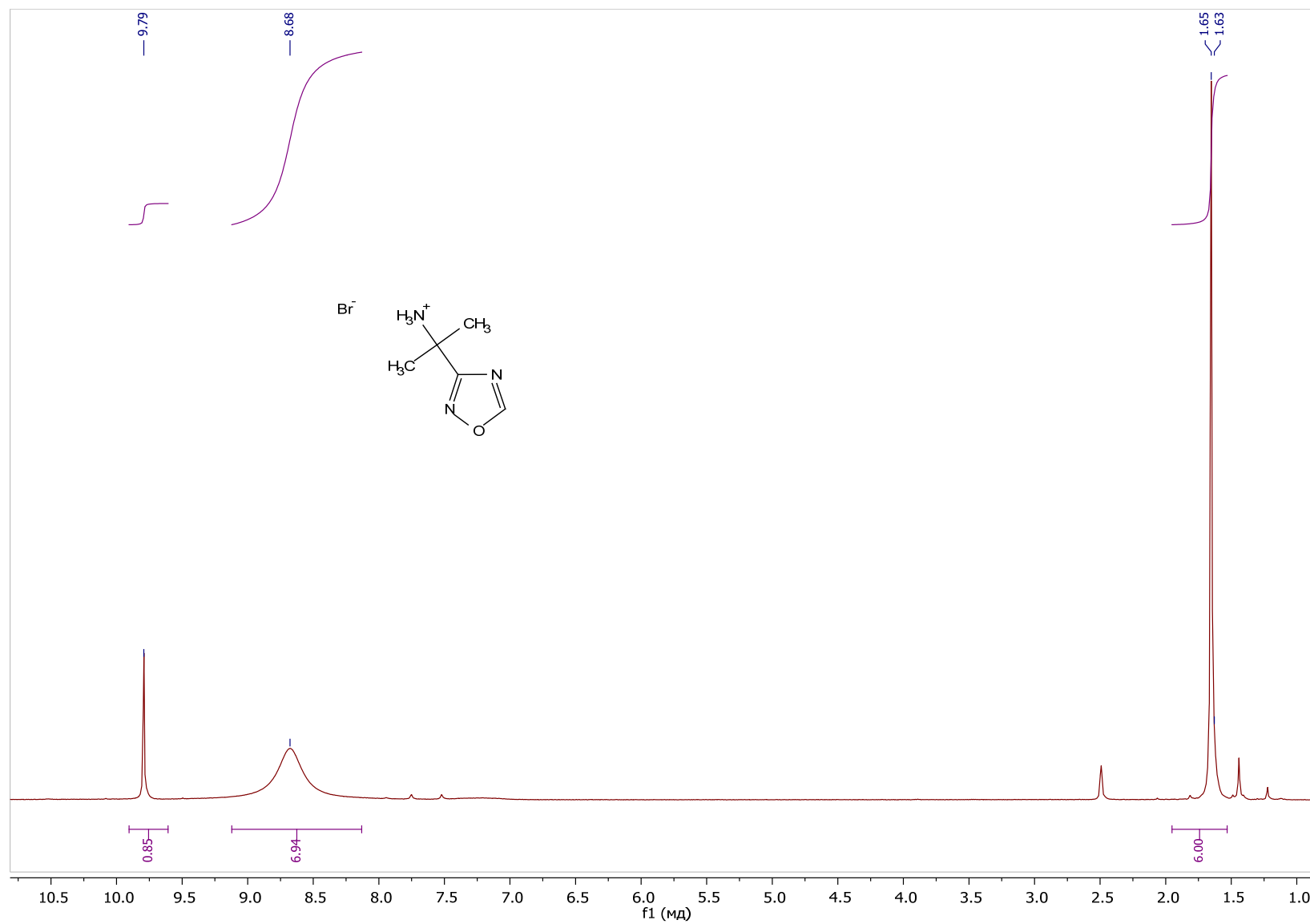


Figure 112. ^1H NMR spectrum of 21d

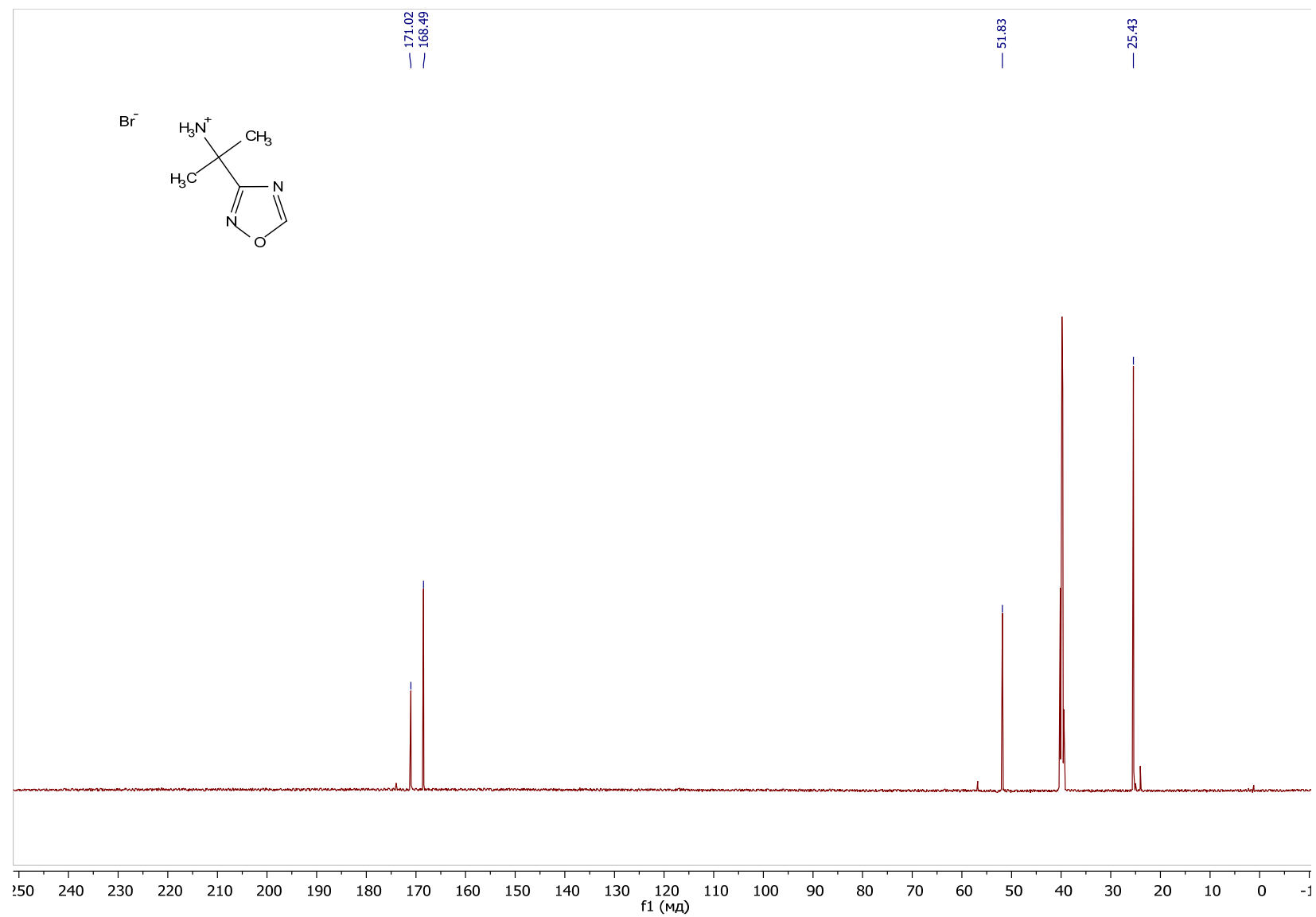


Figure 113. ^{13}C NMR spectrum of 21d

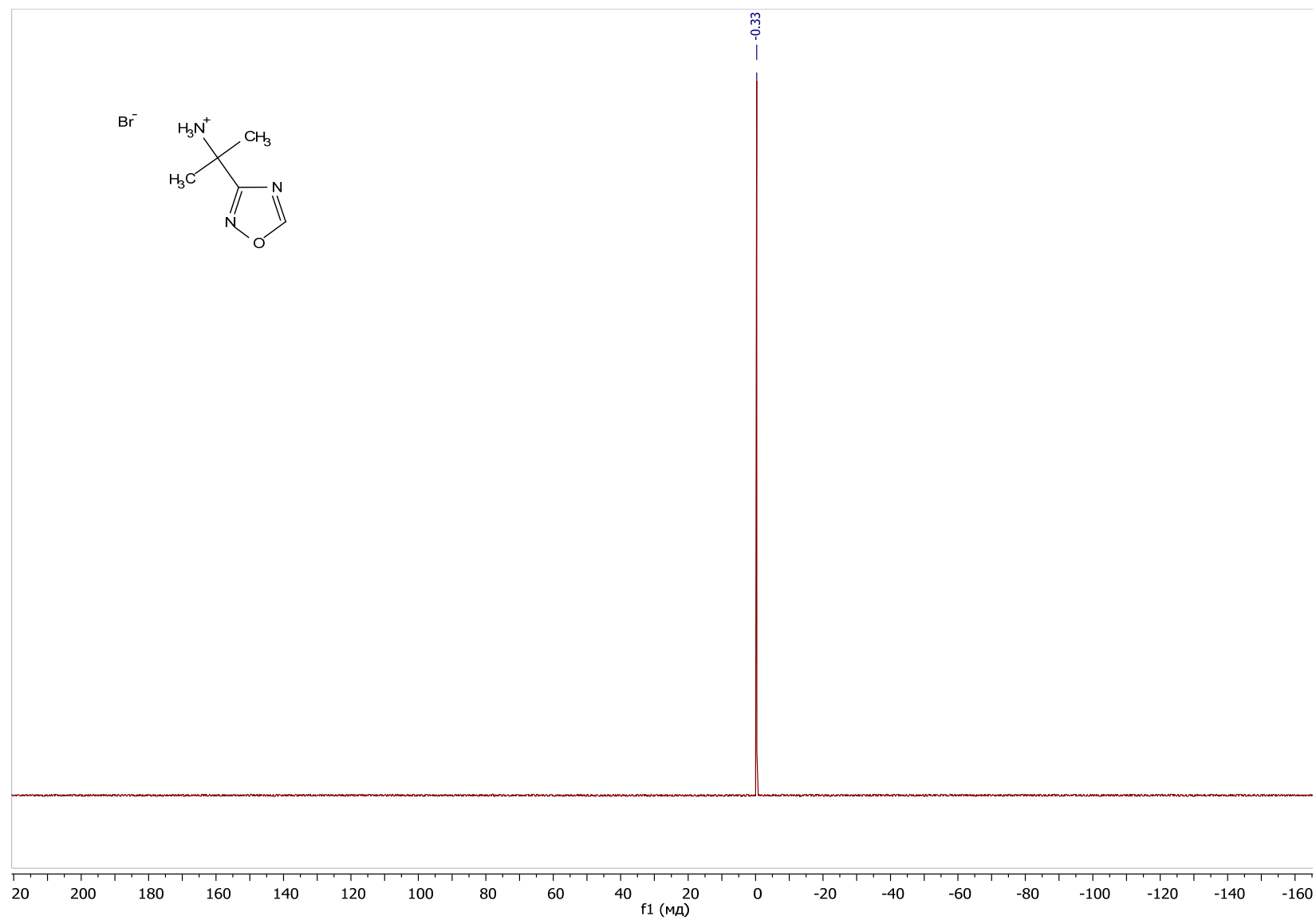


Figure 114. ^{31}P NMR spectrum of 21d

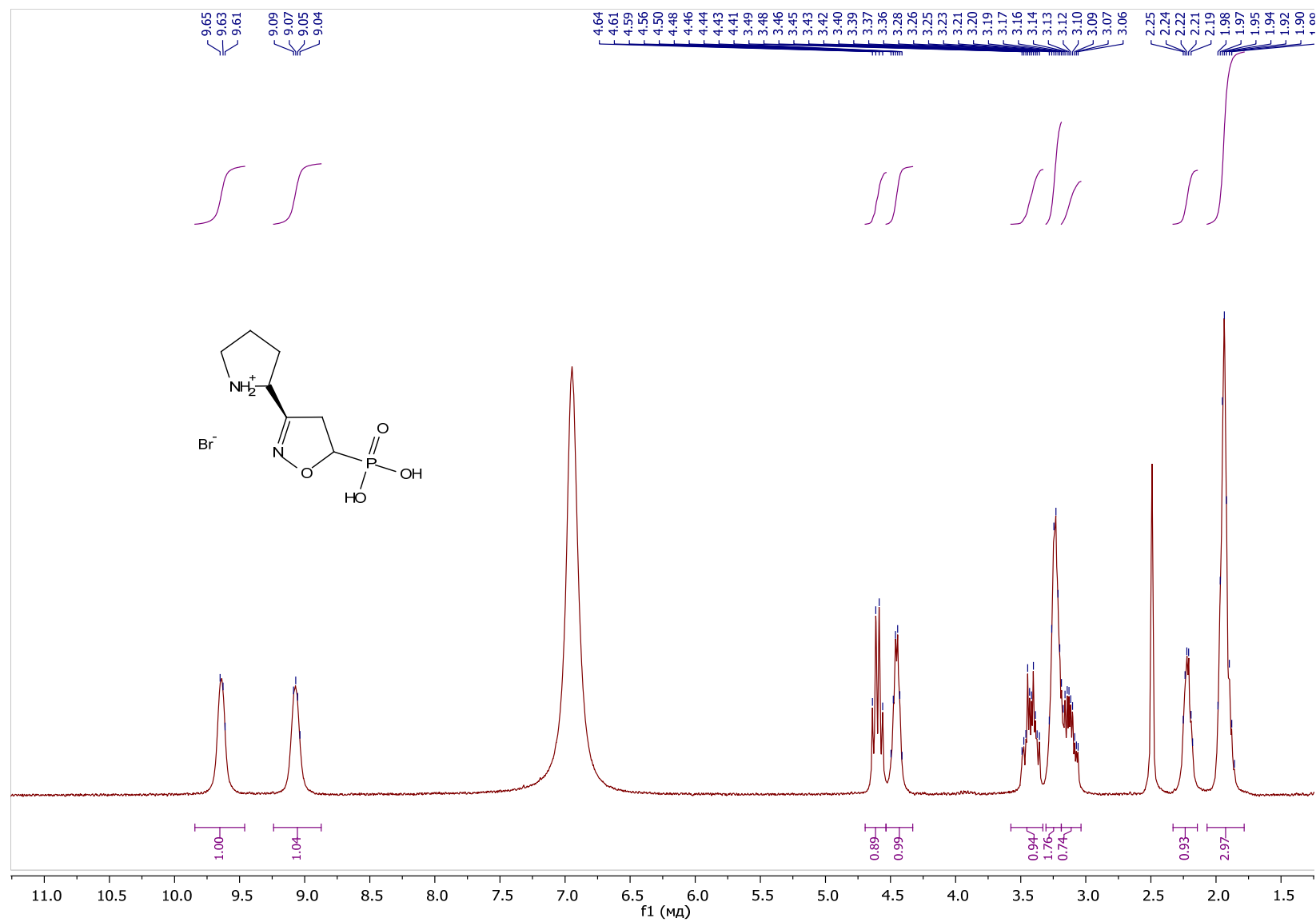


Figure 115. ¹H NMR spectrum of 21e and 21f

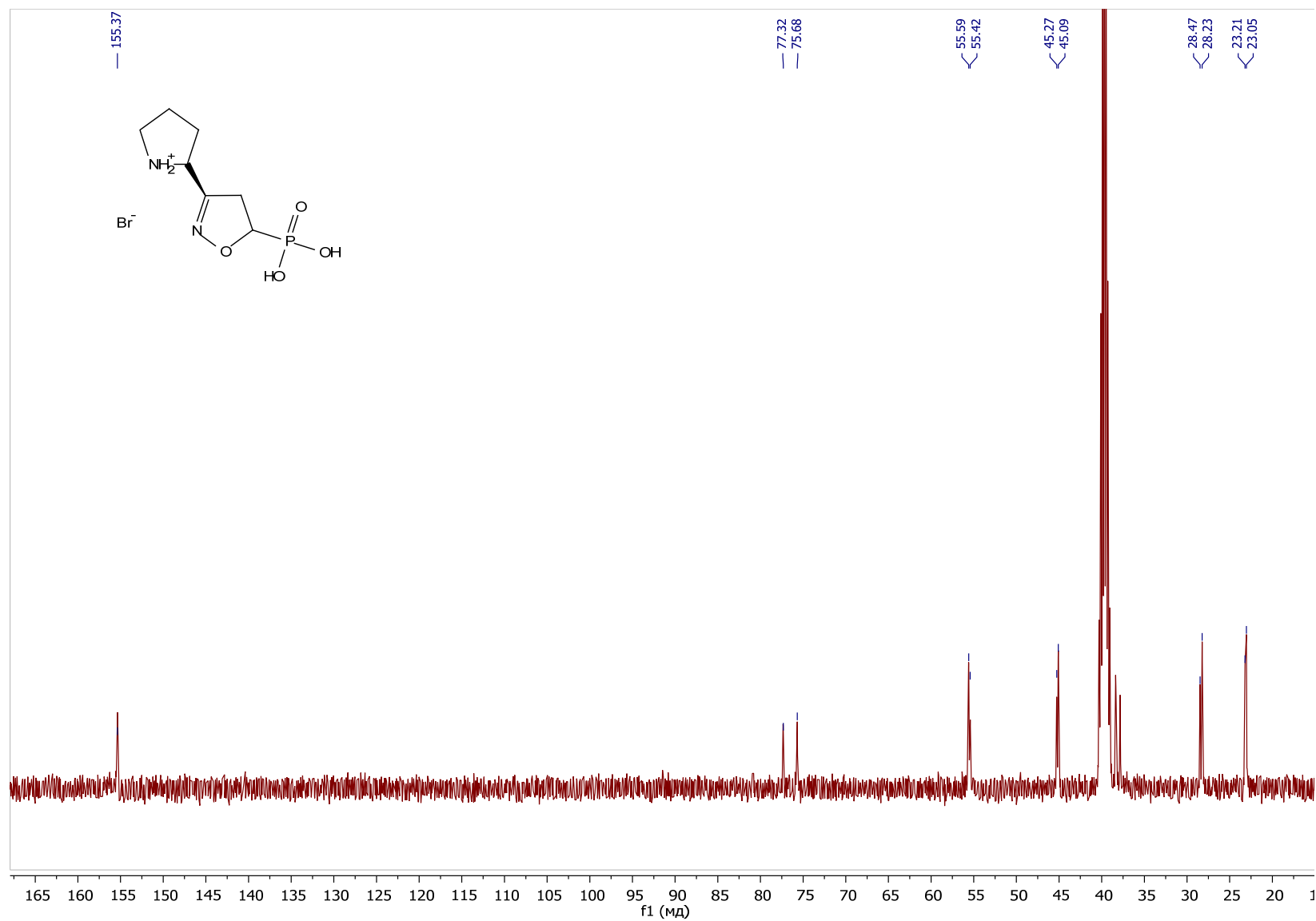


Figure 116. ^{13}C NMR spectrum of 21e and 21f

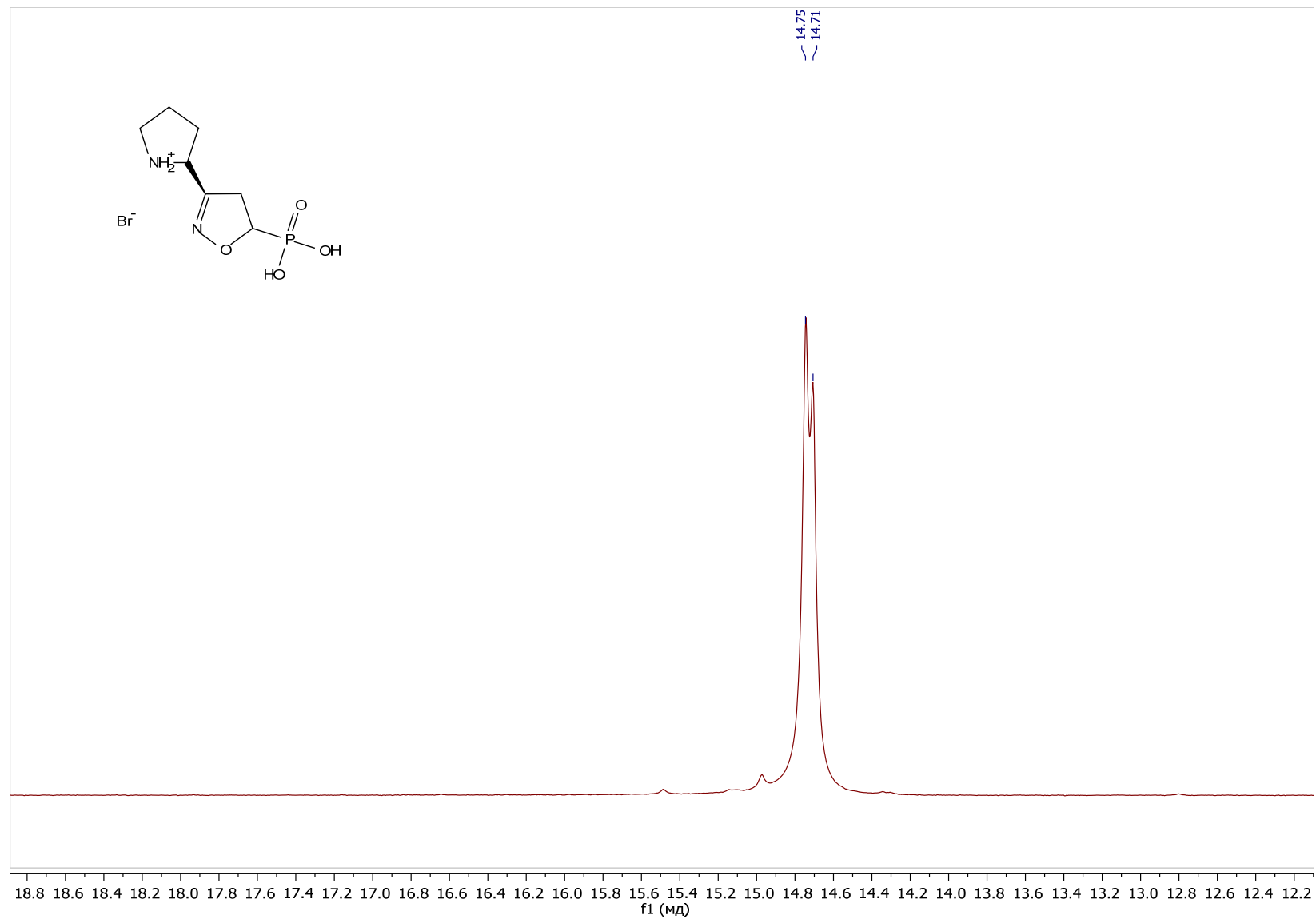


Figure 117. ^{31}P NMR spectrum of 21e and 21f

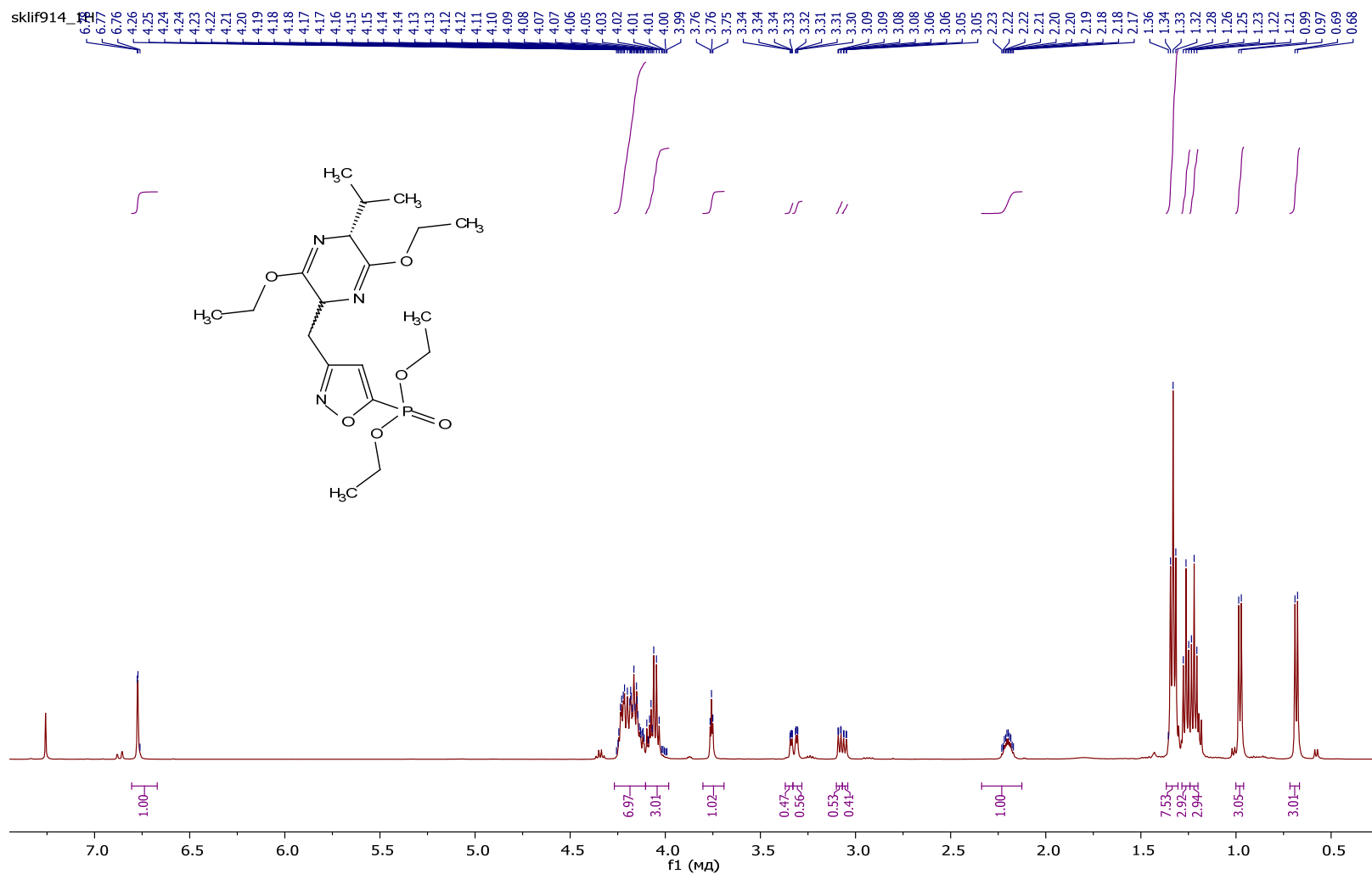


Figure 118. ¹H NMR spectrum of 23

sklif914_C13
Automated Probe tuning parameter

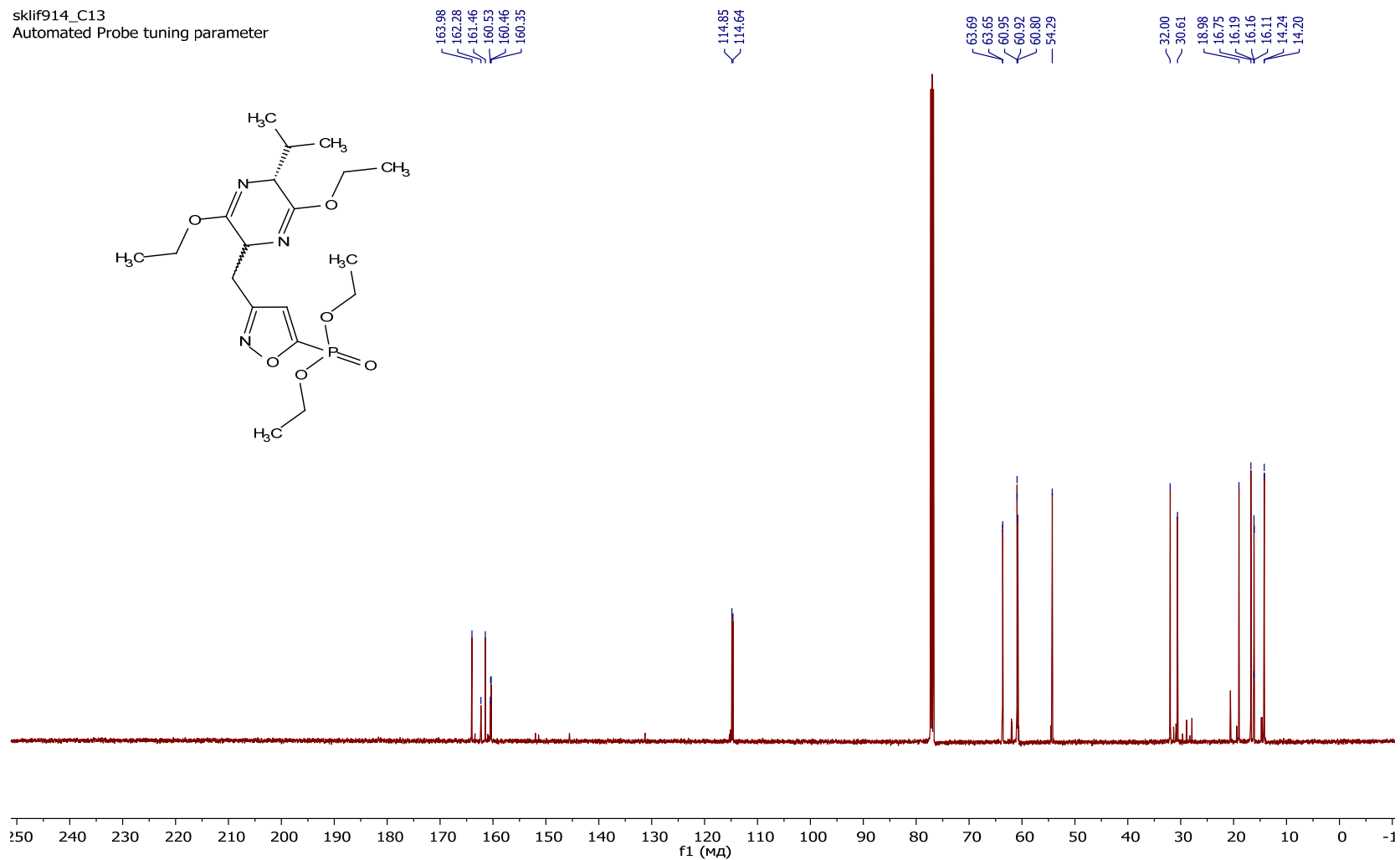


Figure 119. ^{13}C NMR spectrum of 23

sklif702_P31.1.fid

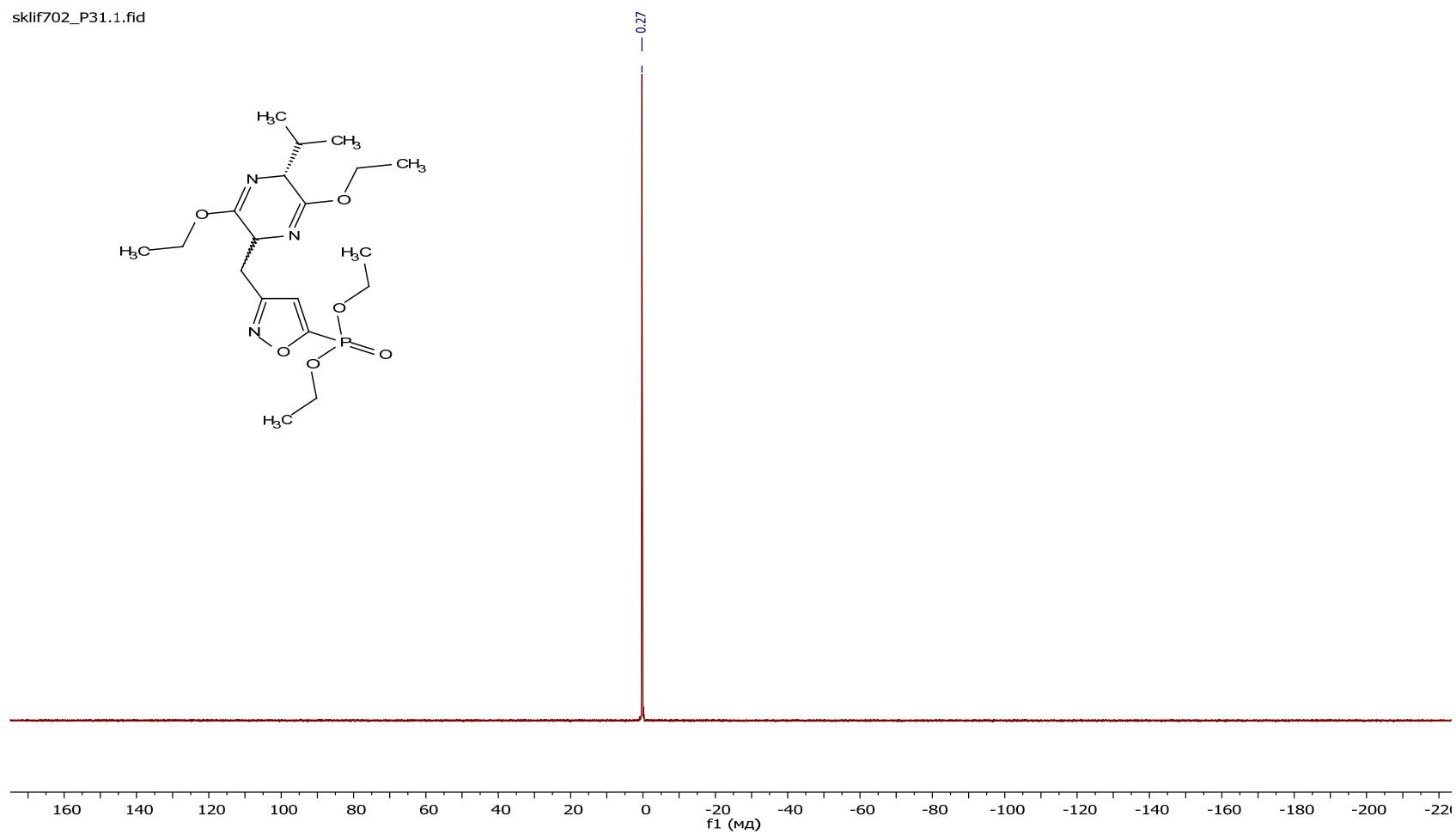


Figure 120. ^{31}P NMR spectrum of 23

L984449s1

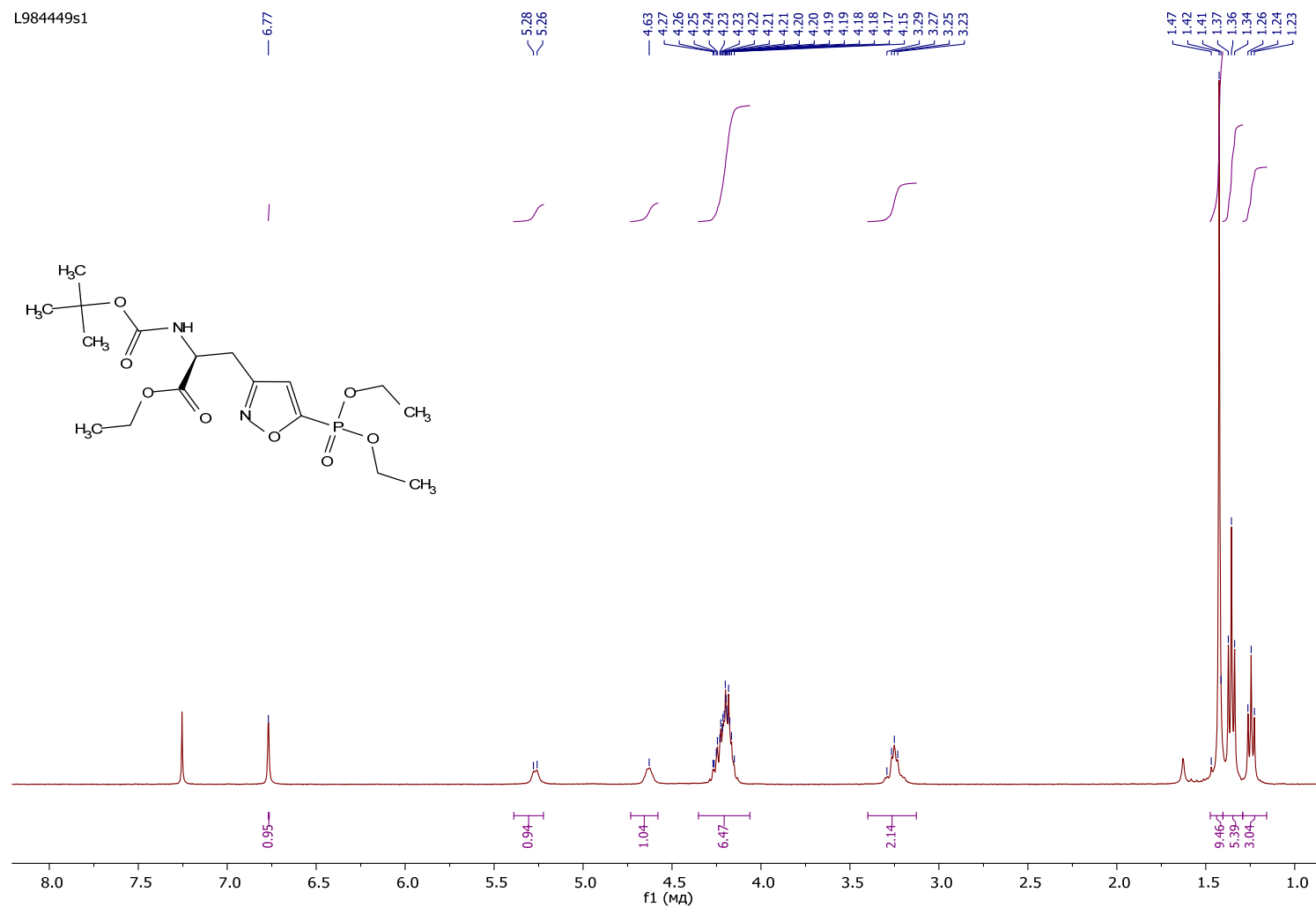


Figure 121. ¹H NMR spectrum of 24

sklif1869___13C.1.fid

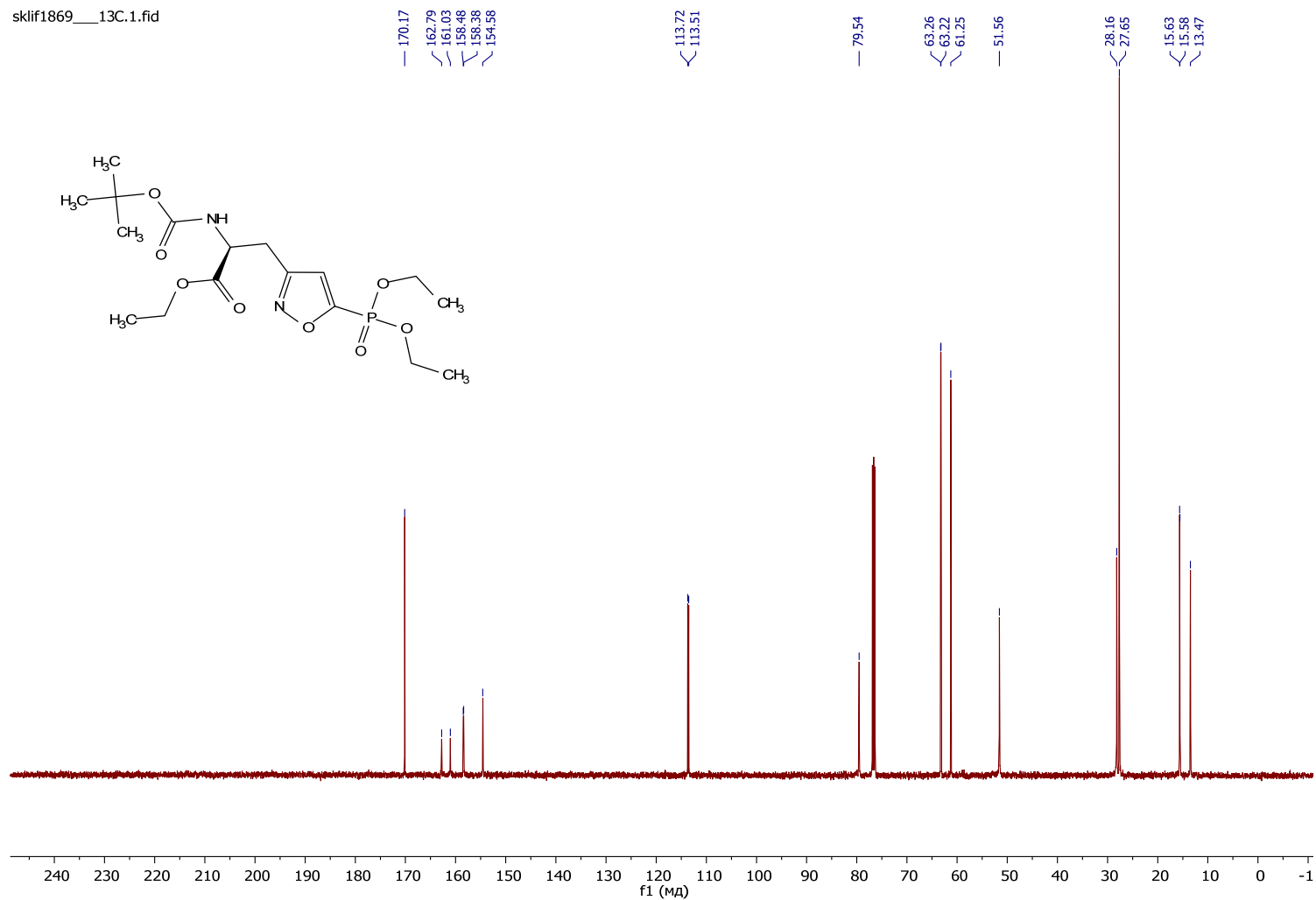


Figure 122. ¹³C NMR spectrum of 24

sklif1869___31P.1.fid

— -0.27

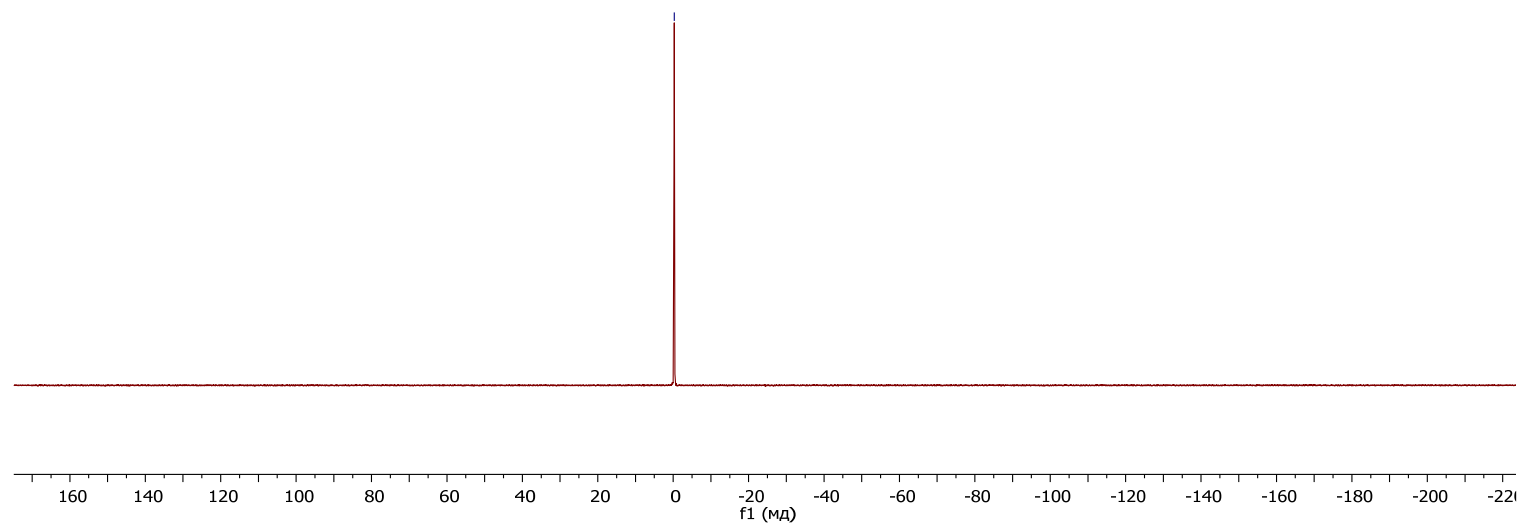
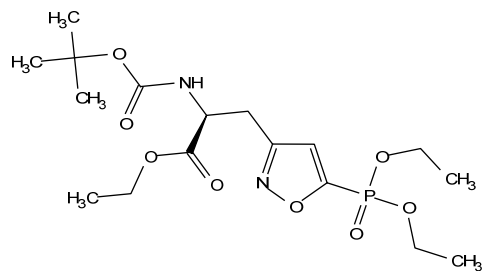


Figure 123. ^{31}P NMR spectrum of 24

M127601s3

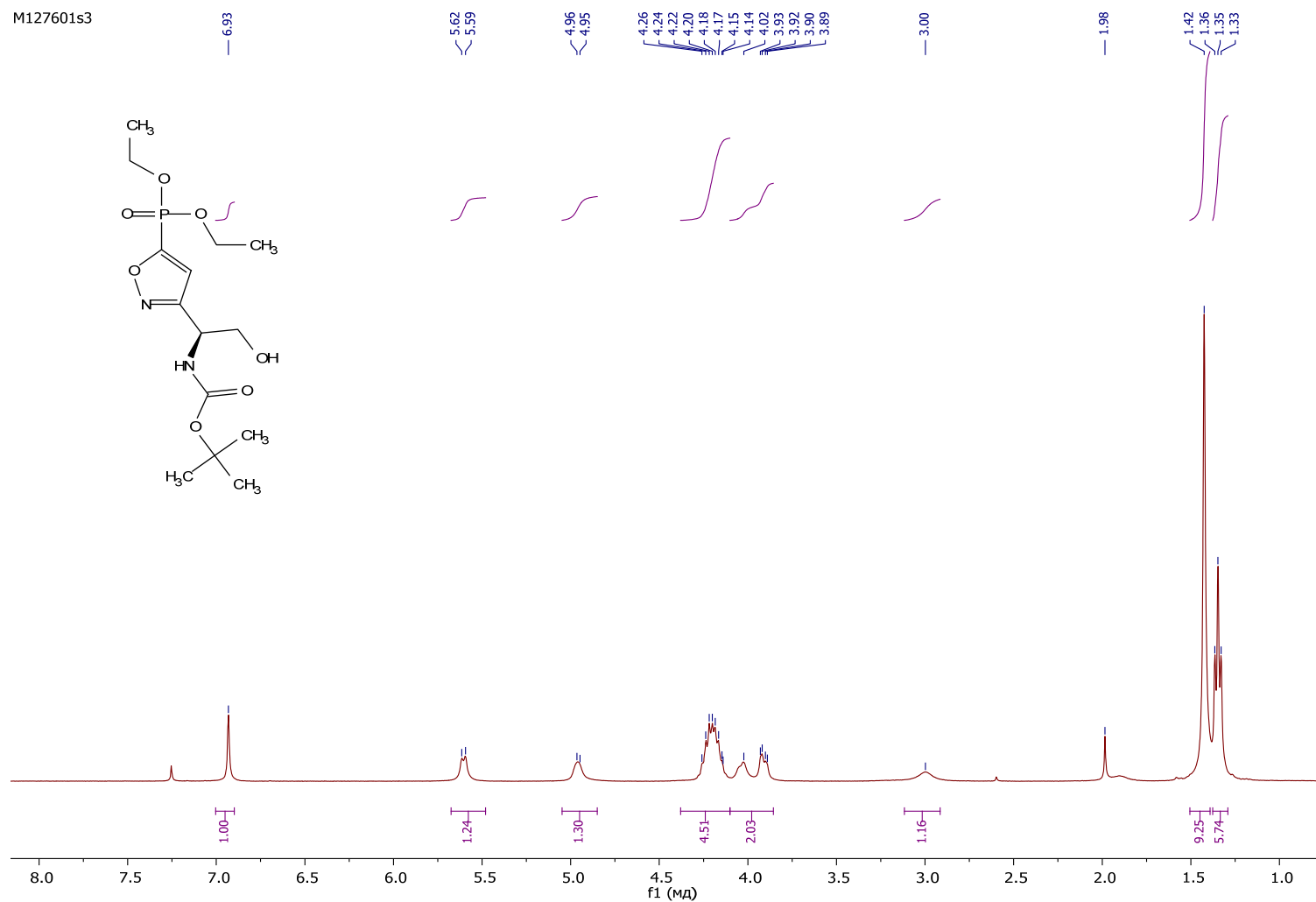


Figure 124. ¹H NMR spectrum of 25 and 26 (S-isomer)

sklif2024_C13.1.fid

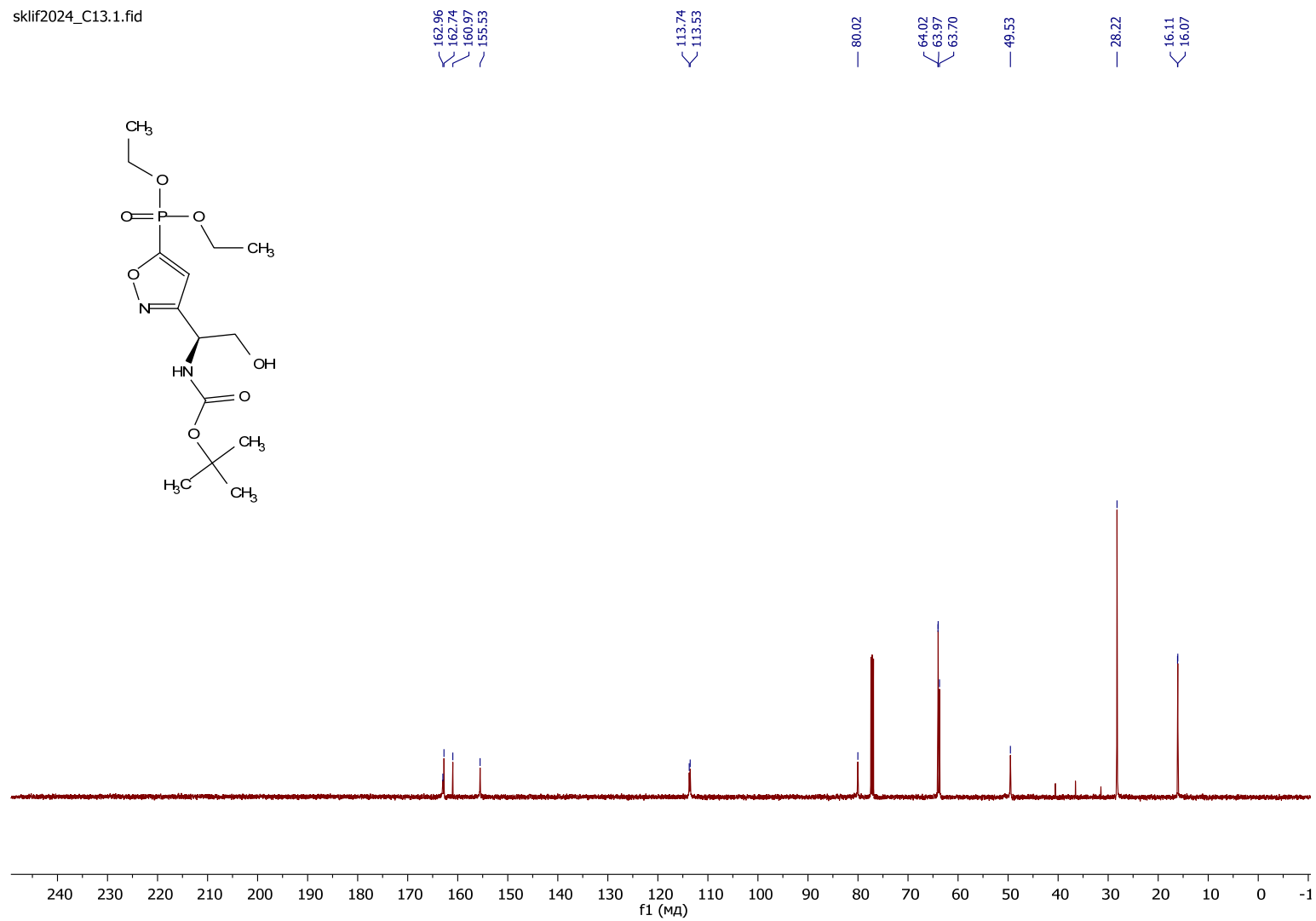


Figure 125. ¹³C NMR spectrum of 25 and 26 (S-isomer)

sklif2024_P31.1.fid
31P-{1H}

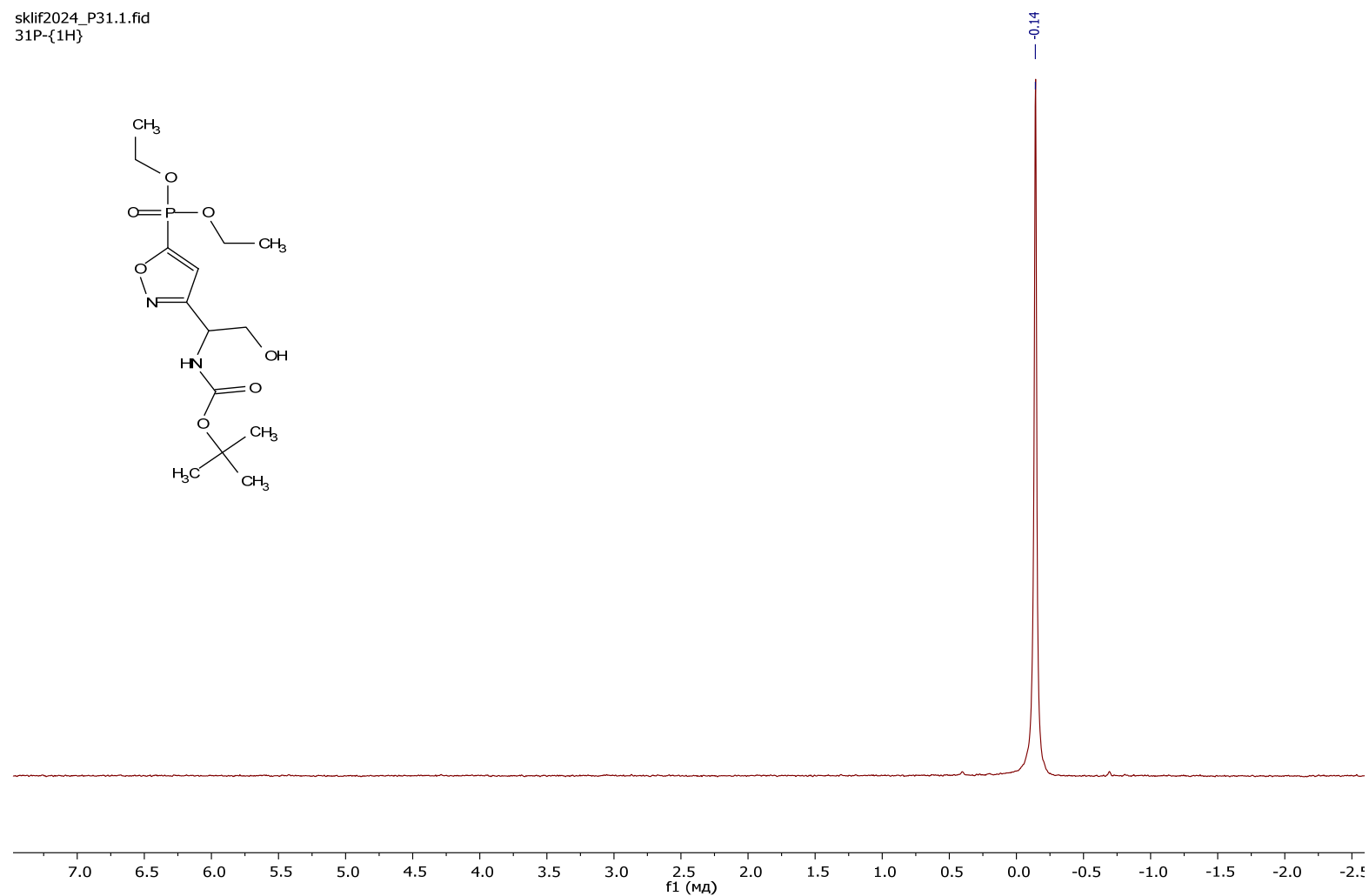


Figure 126. ^{31}P NMR spectrum of 25 and 26 (*S*-isomer)

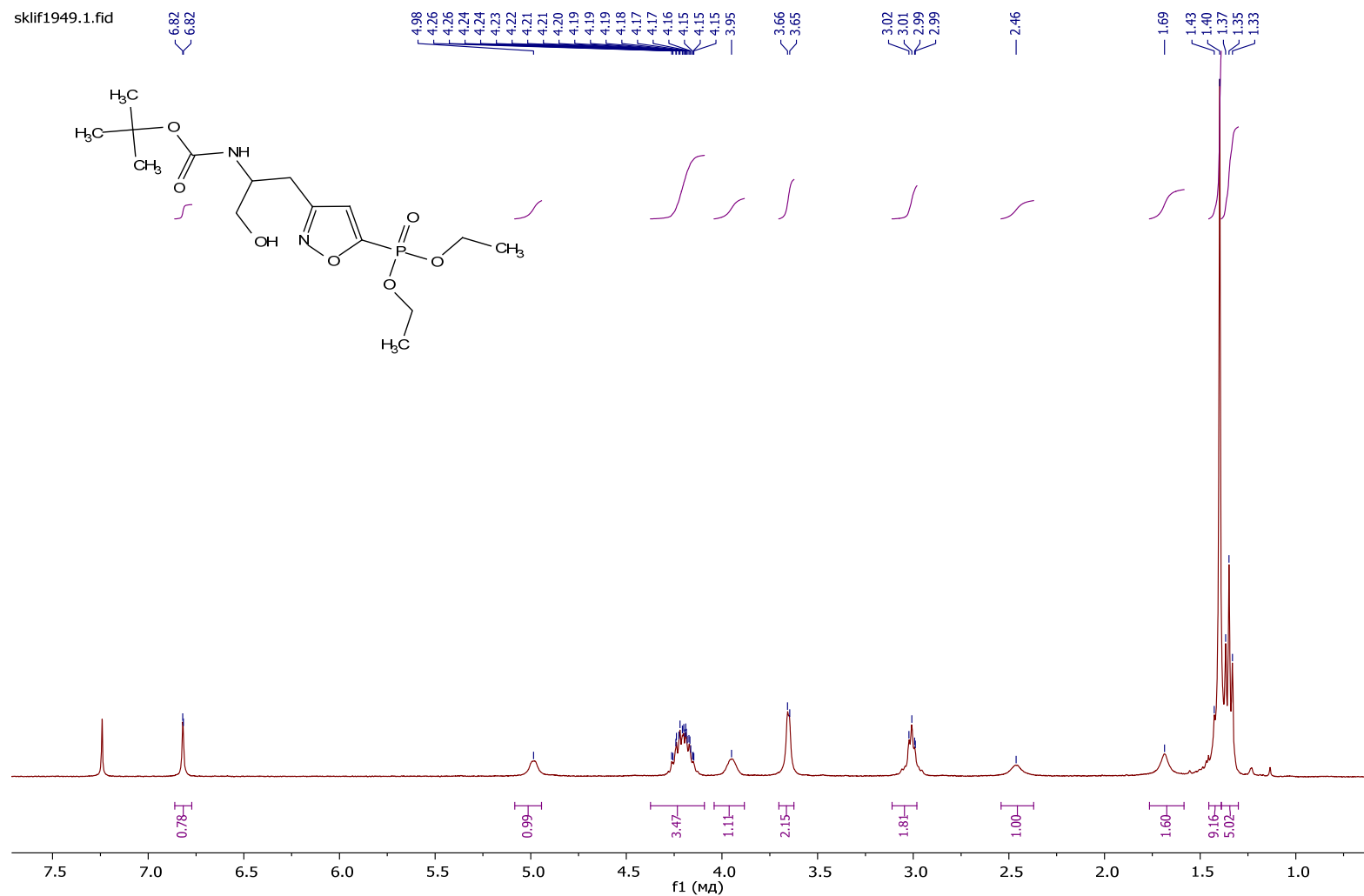


Figure 127. ^1H NMR spectrum of 27 and 28 (S-isomer)

sklif1939_C13.1.fid

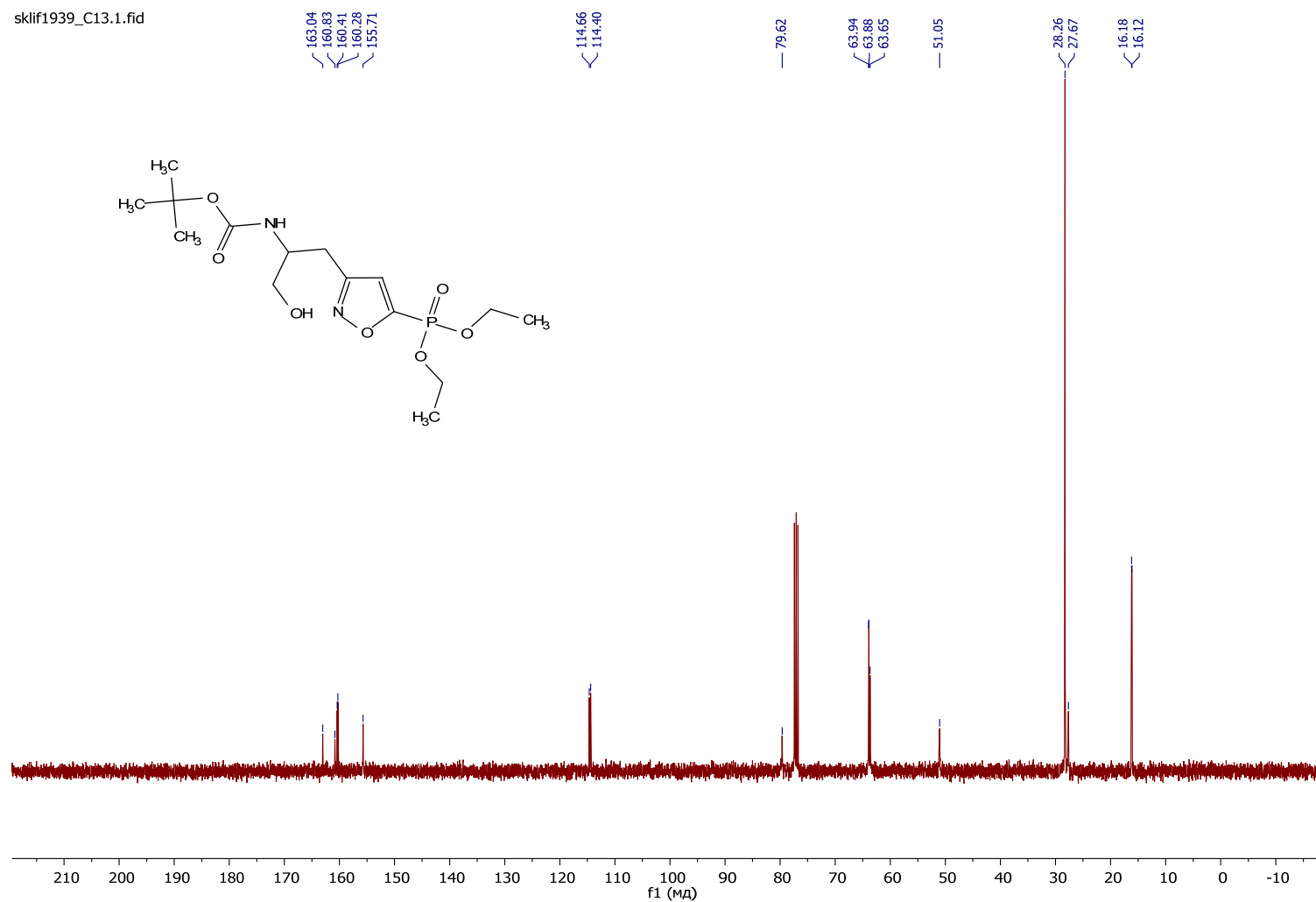


Figure 128. ¹³C NMR spectrum of 27 and 28 (S-isomer)

sklif1939_P31.1.fid
31P-{1H}

— 0.12

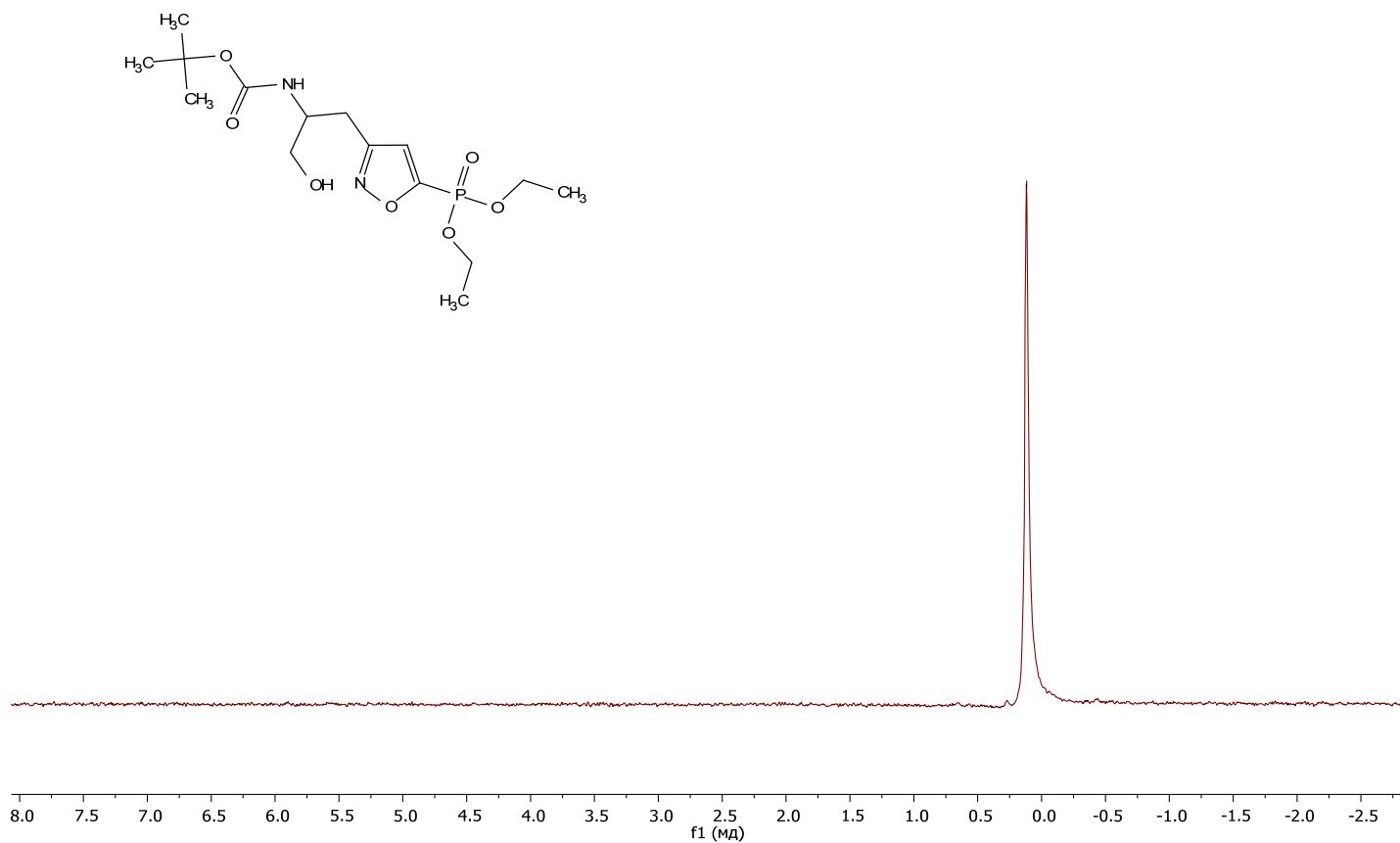


Figure 129. ^{31}P NMR spectrum of 27 and 28 (*S*-isomer)

M158553s1

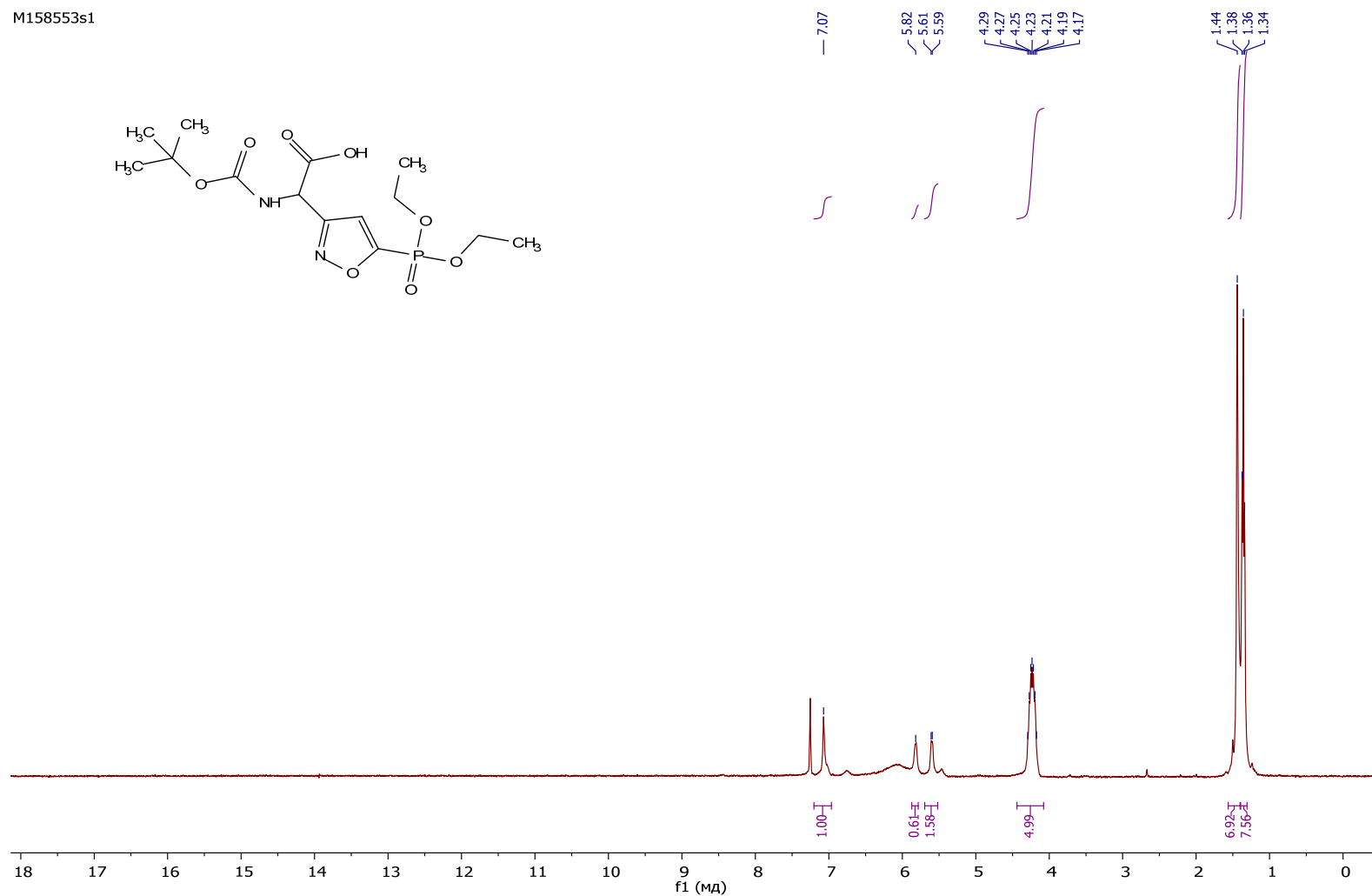


Figure 130. ¹H NMR spectrum of 29 and 30 (S-isomer)

sklif2155_C13.1.fid

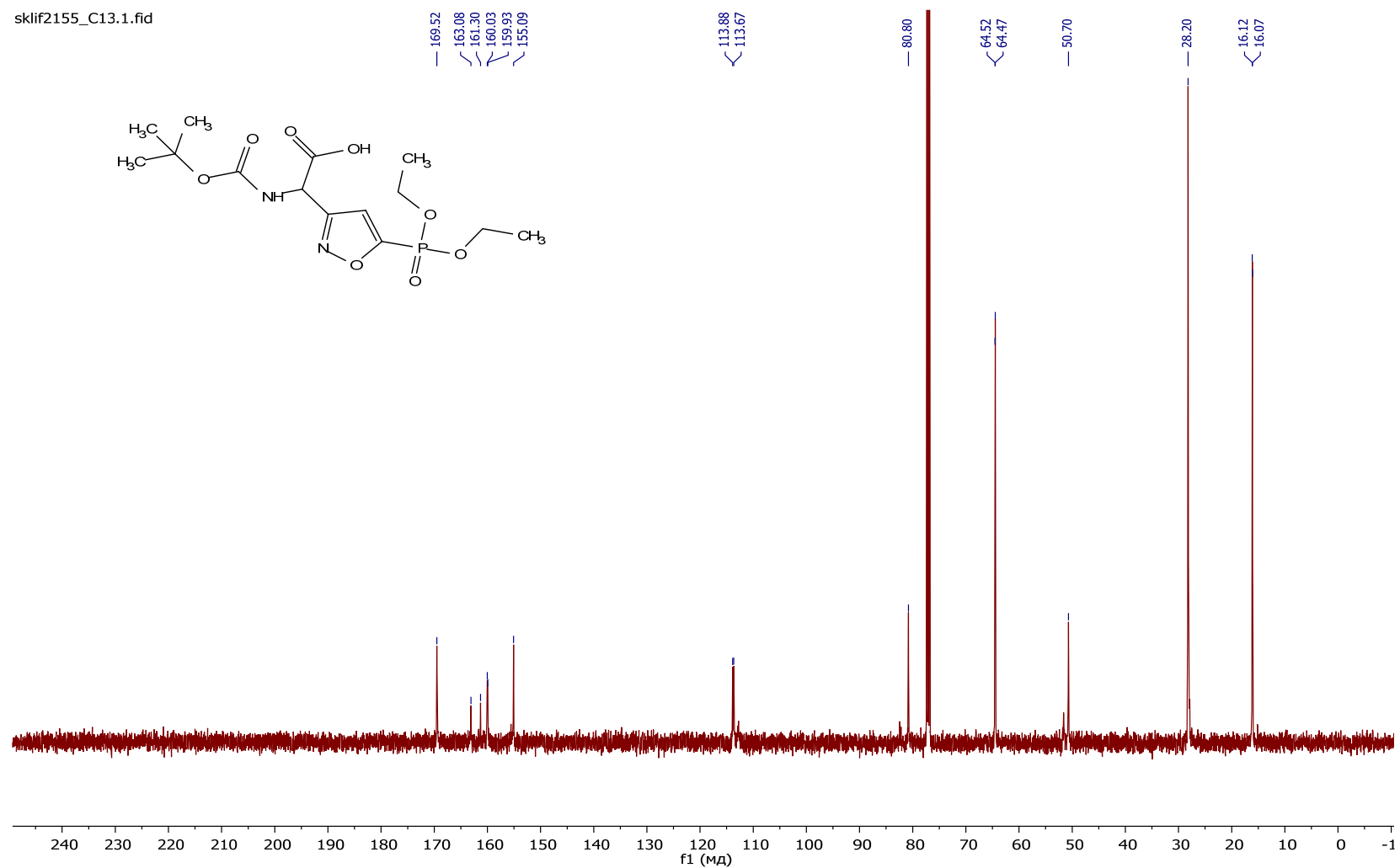


Figure 131. ^{13}C NMR spectrum of 29 and 30 (S-isomer)

sklif2155_P31{H}.1.fid

— -0.56

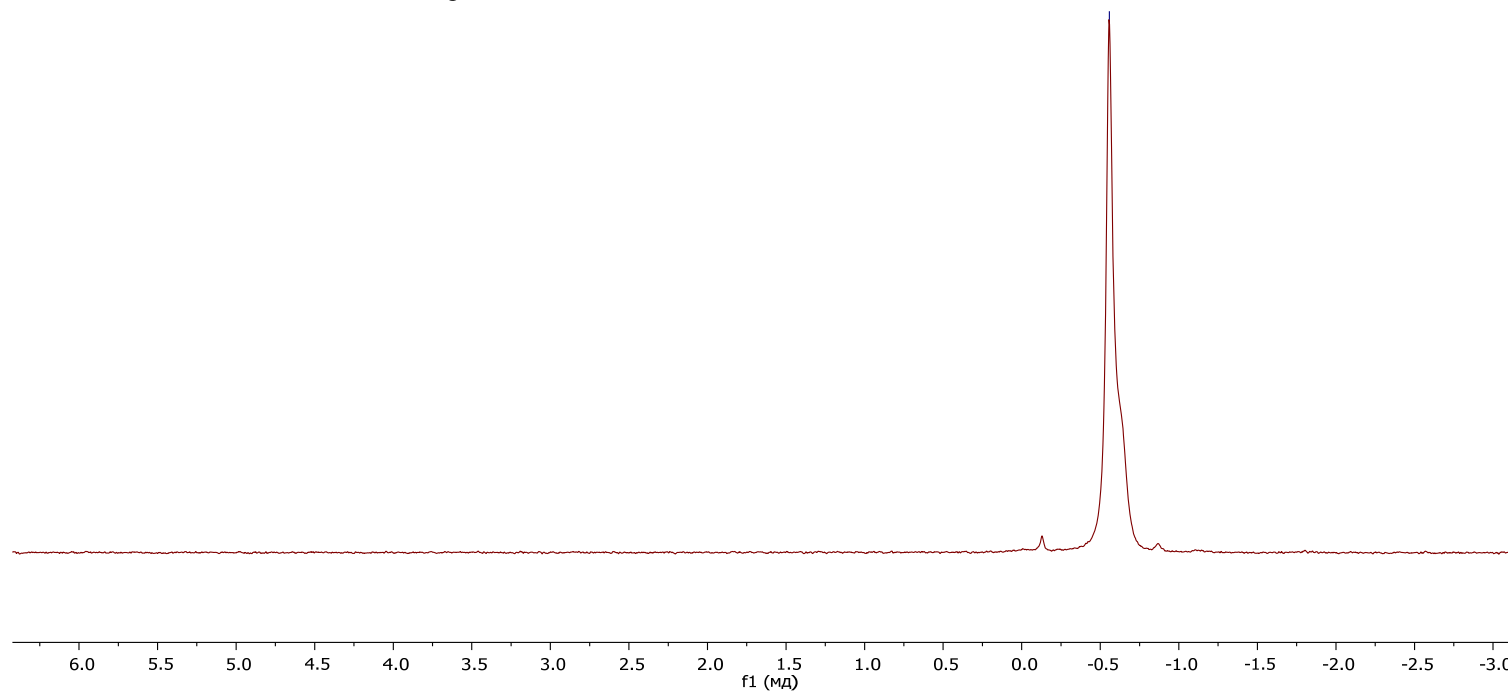
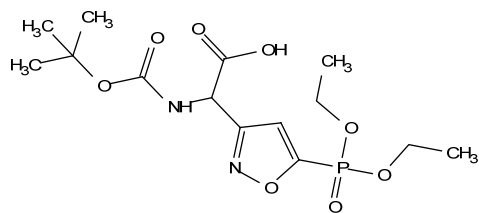


Figure 132. ^{31}P NMR spectrum of 29 and 30 (*S*-isomer)

M158552s2

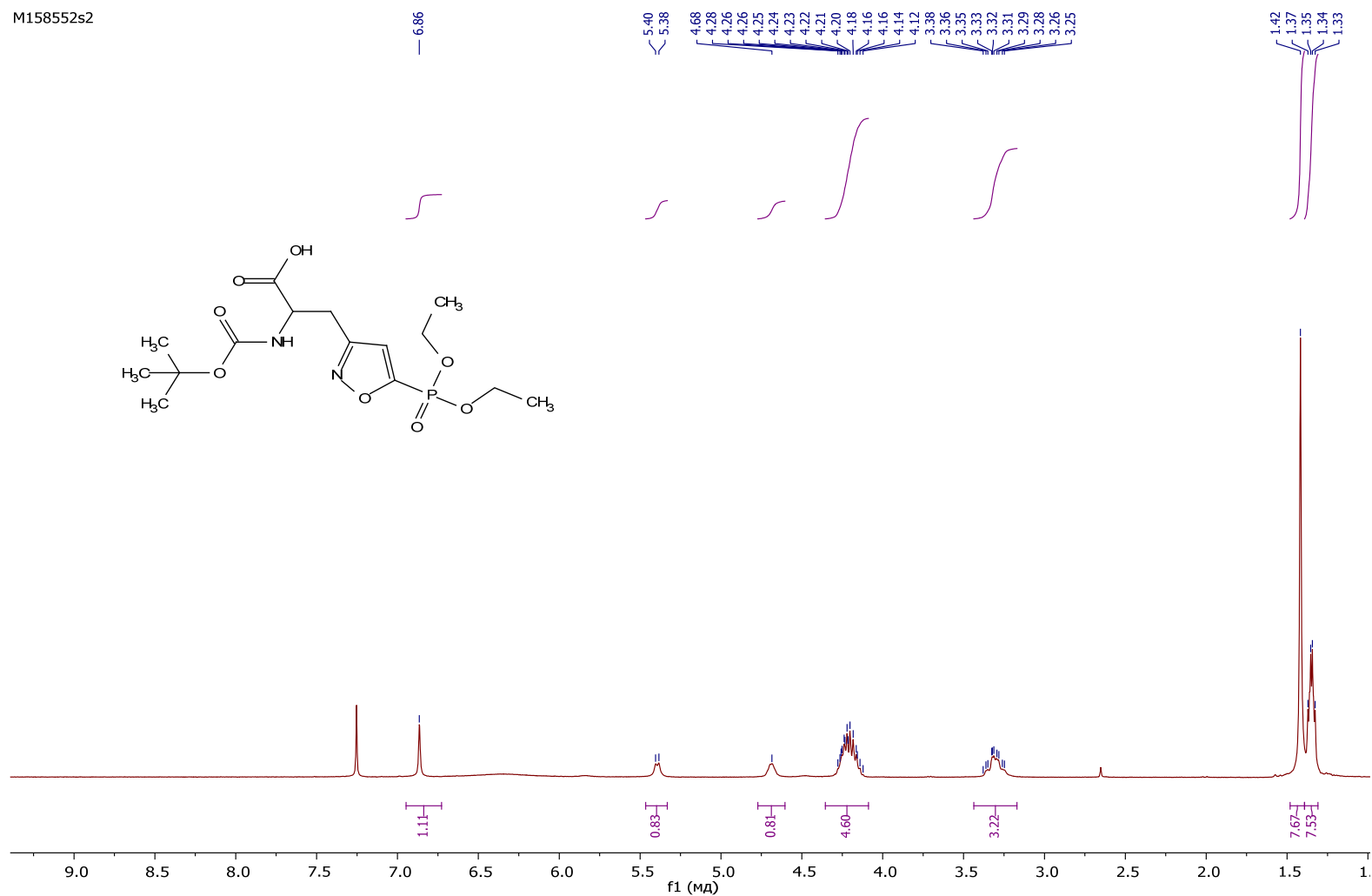


Figure 133. ¹H NMR spectrum of 31 and 32 (S-isomer)

sklif2285_C13
Automated Probe tuning parameter

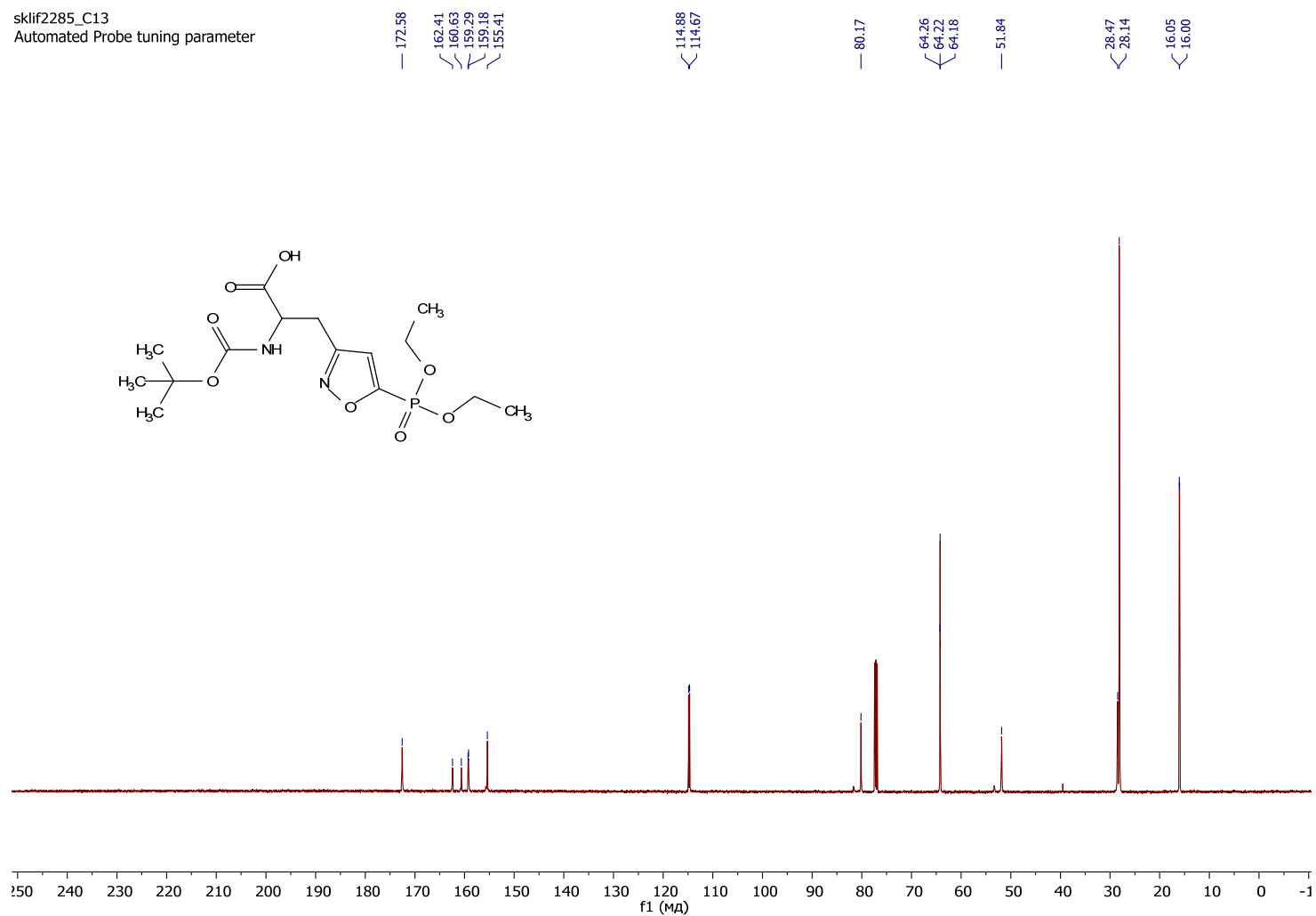


Figure 134. ^{13}C NMR spectrum of 31 and 32 (S-isomer)

sklif2285___31P.1.fid

— 0.07

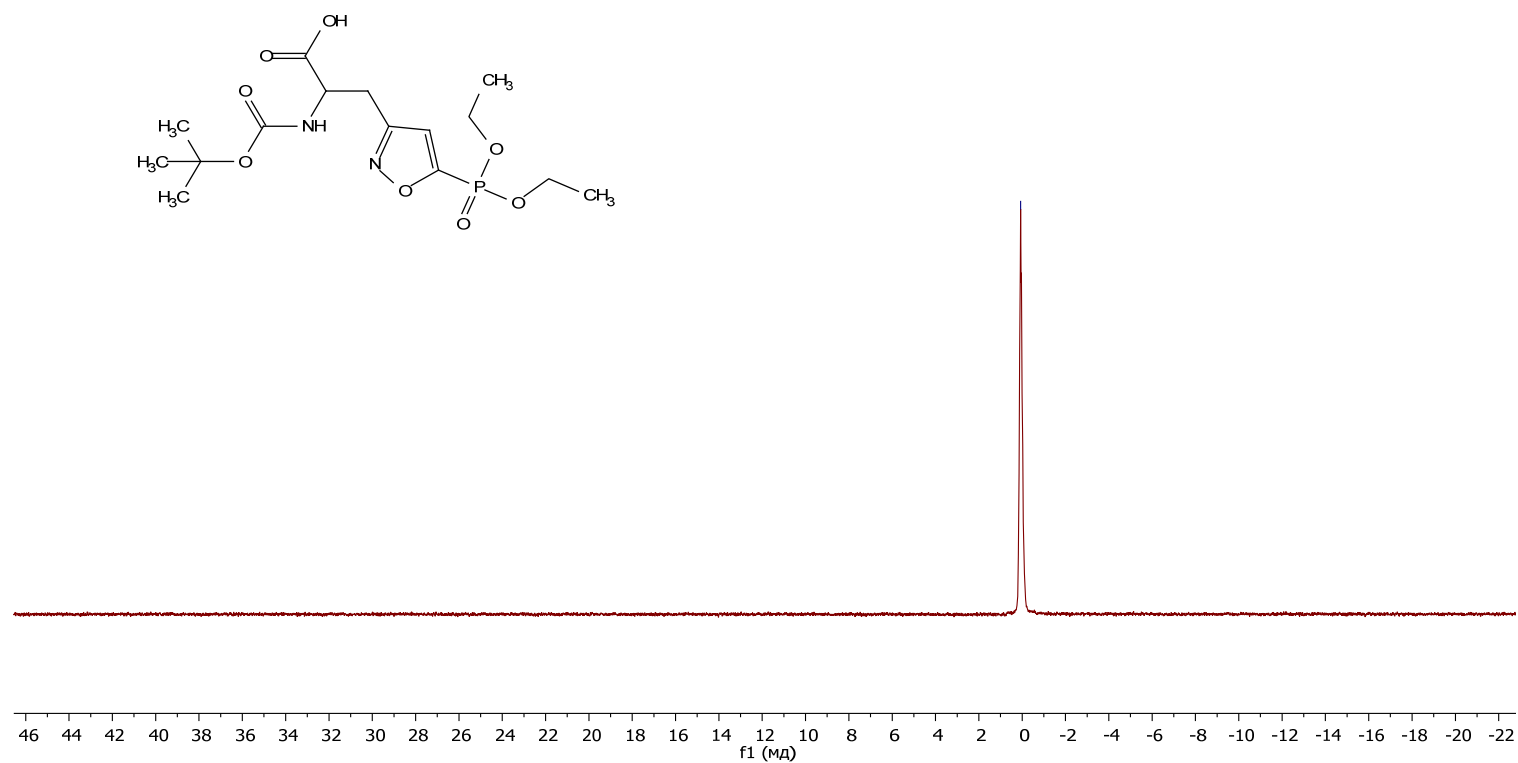


Figure 135. ^{31}P NMR spectrum of 31 and 32 (*S*-isomer)