Enantioselective Friedel-Crafts Alkylation of Indole Derivatives Catalysed by new $Yb(OTf)_3$-Pyridylalkylamine Complexes as Chiral Lewis Acids

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SUPPORTING INFORMATION

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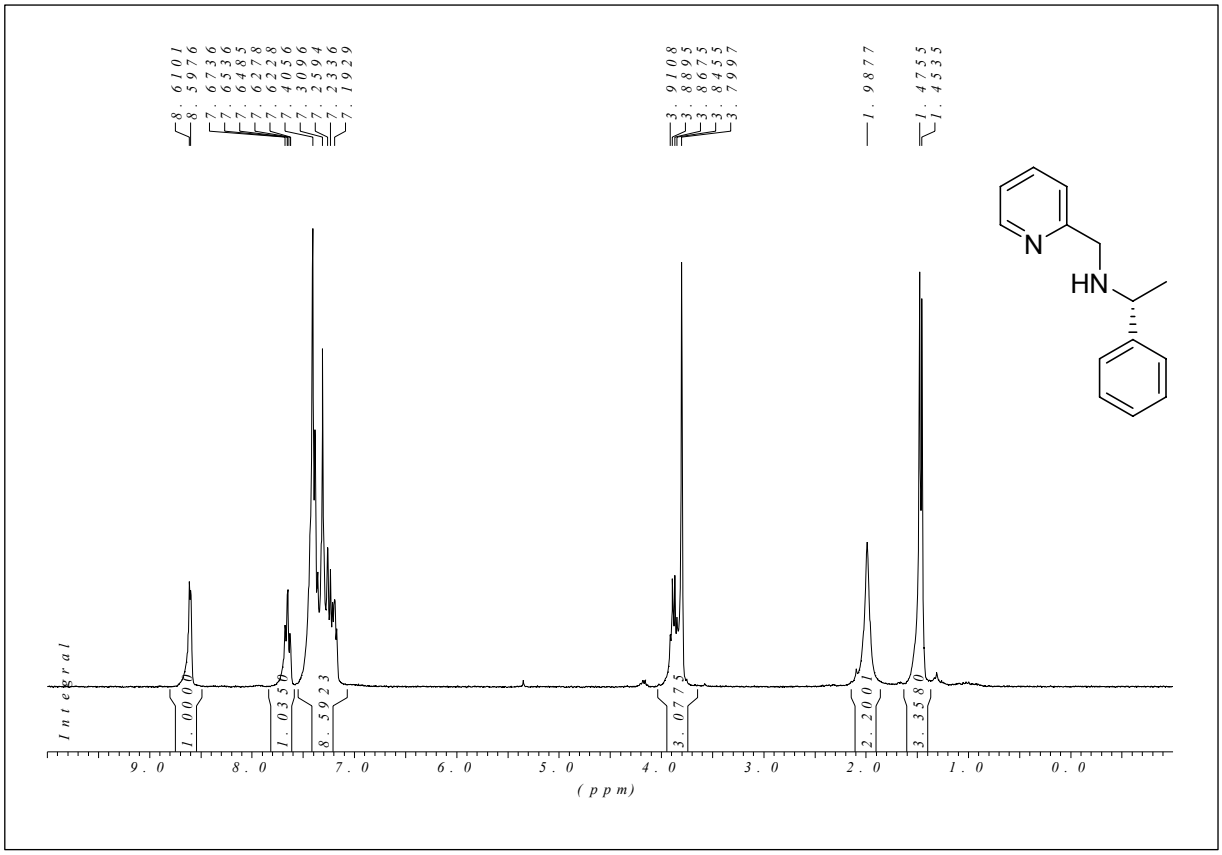
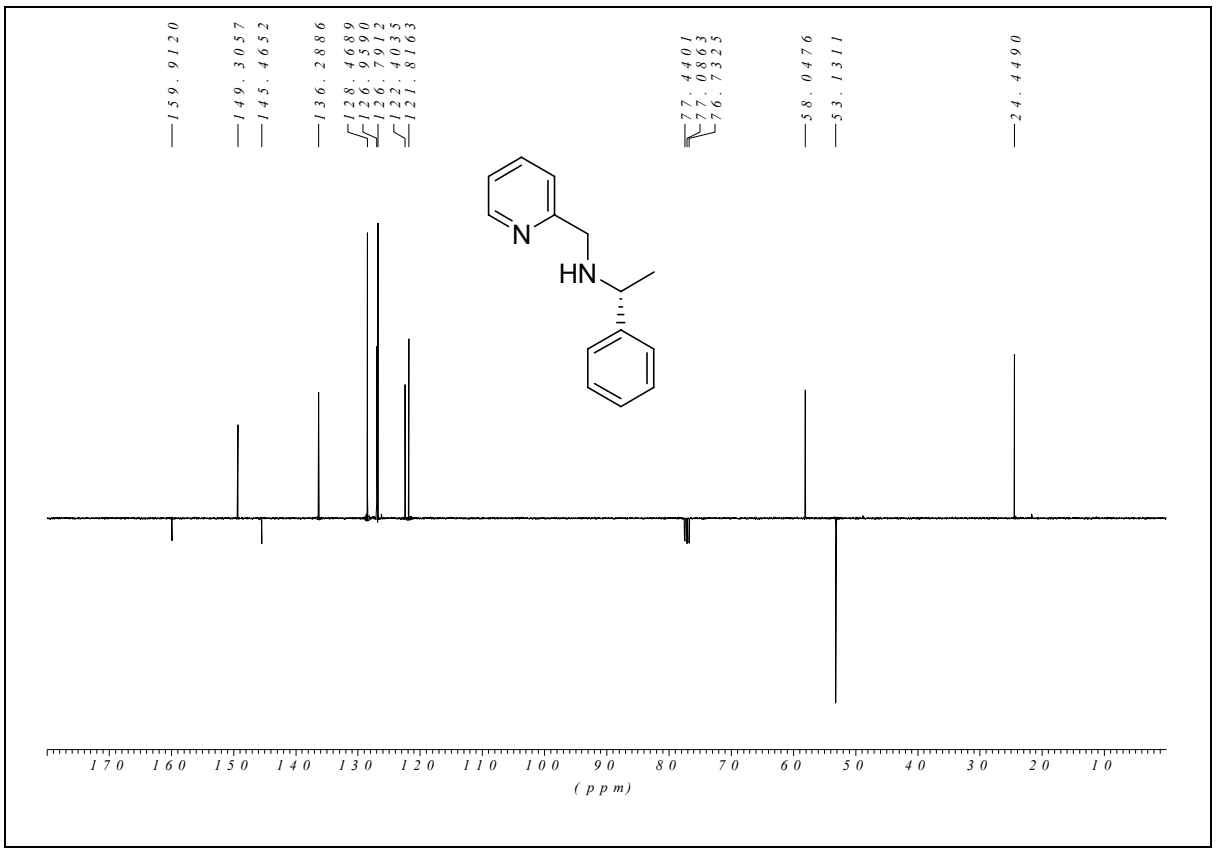
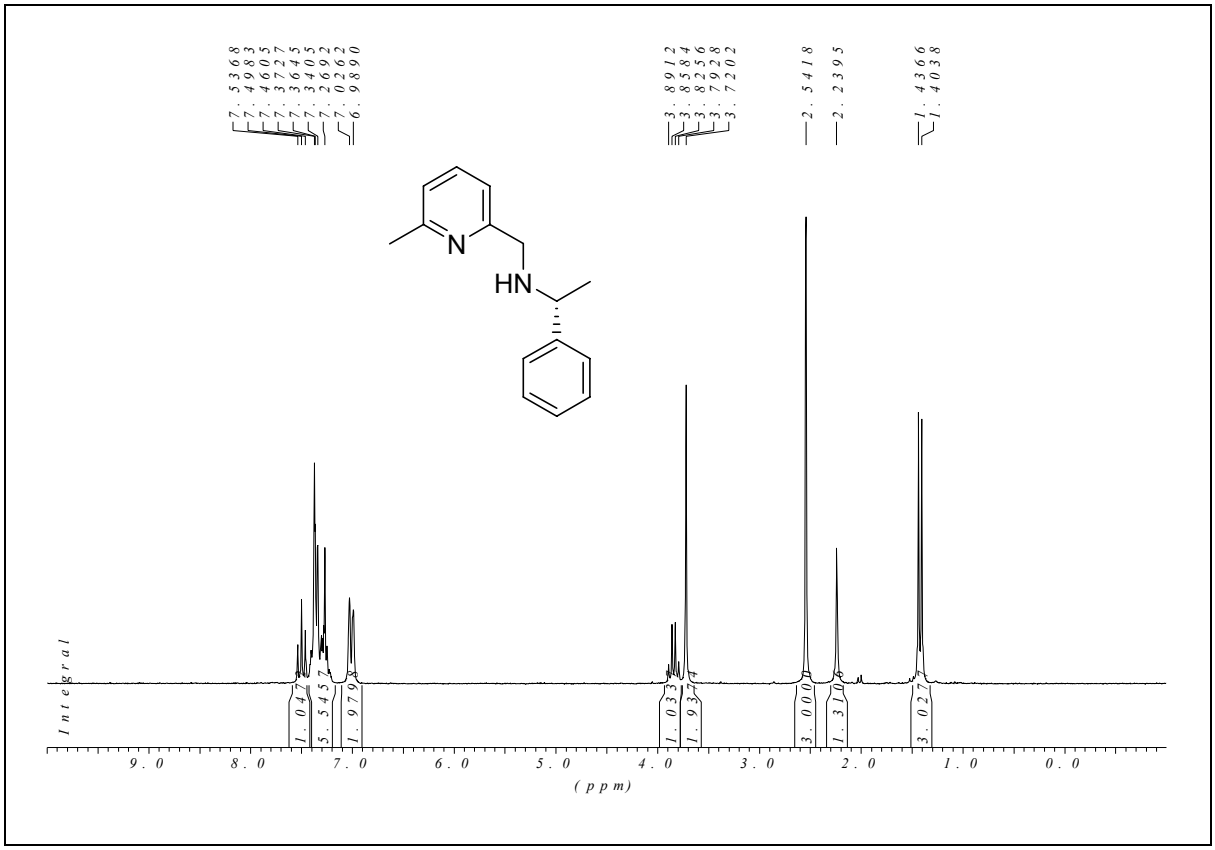
^{1}H NMR ($CDCl_3$, 300 MHz) of L1



^{13}C NMR ($CDCl_3$, 90 MHz) of L1



^{1}H NMR ($CDCl_3$, 200 MHz) of L4



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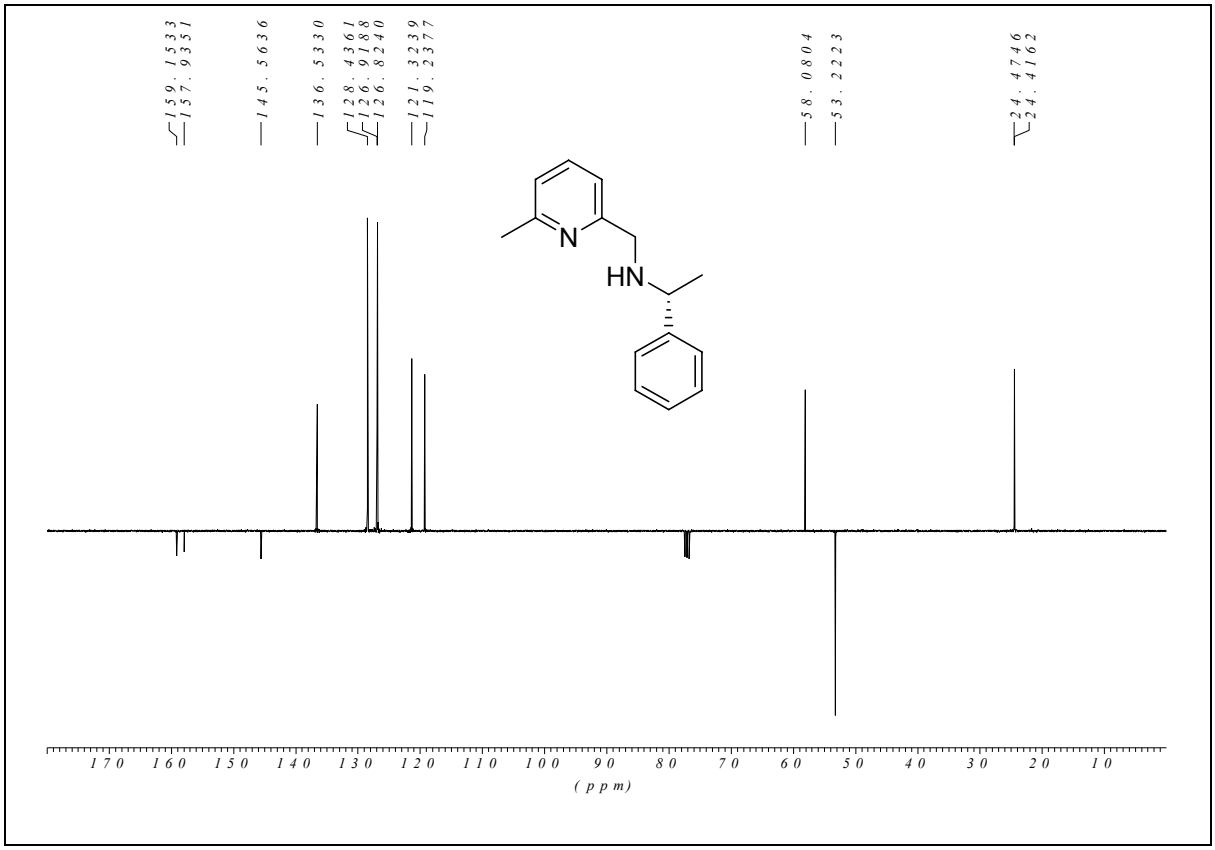
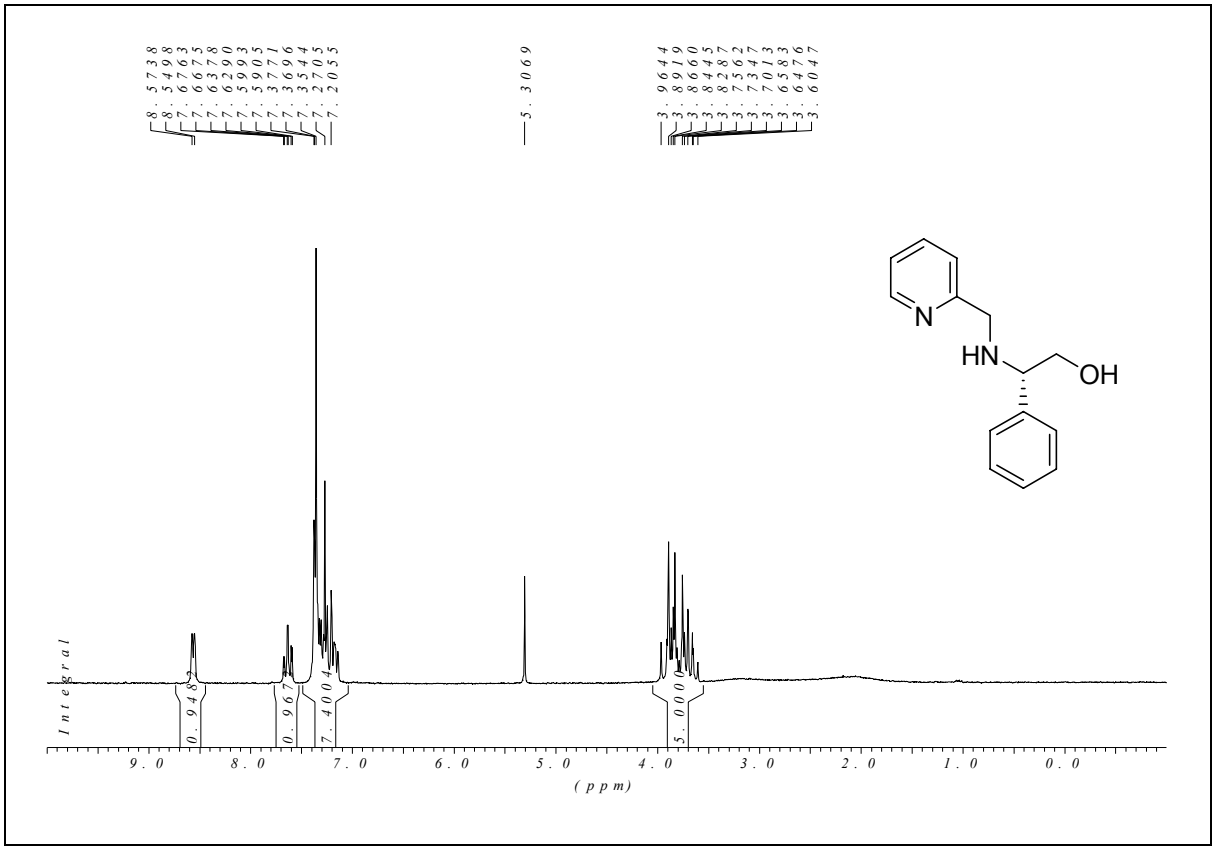


^{1}H NMR ($CDCl_3$, 200 MHz) of L6



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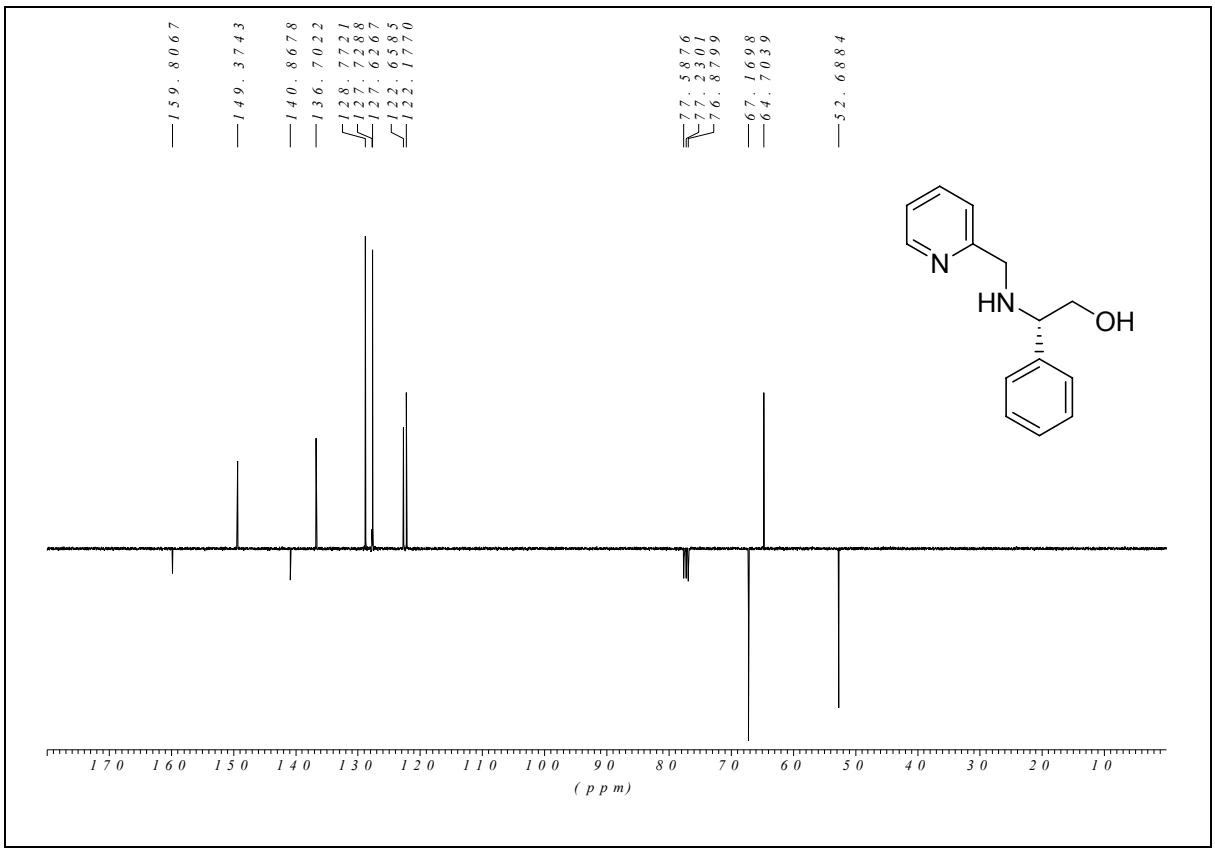
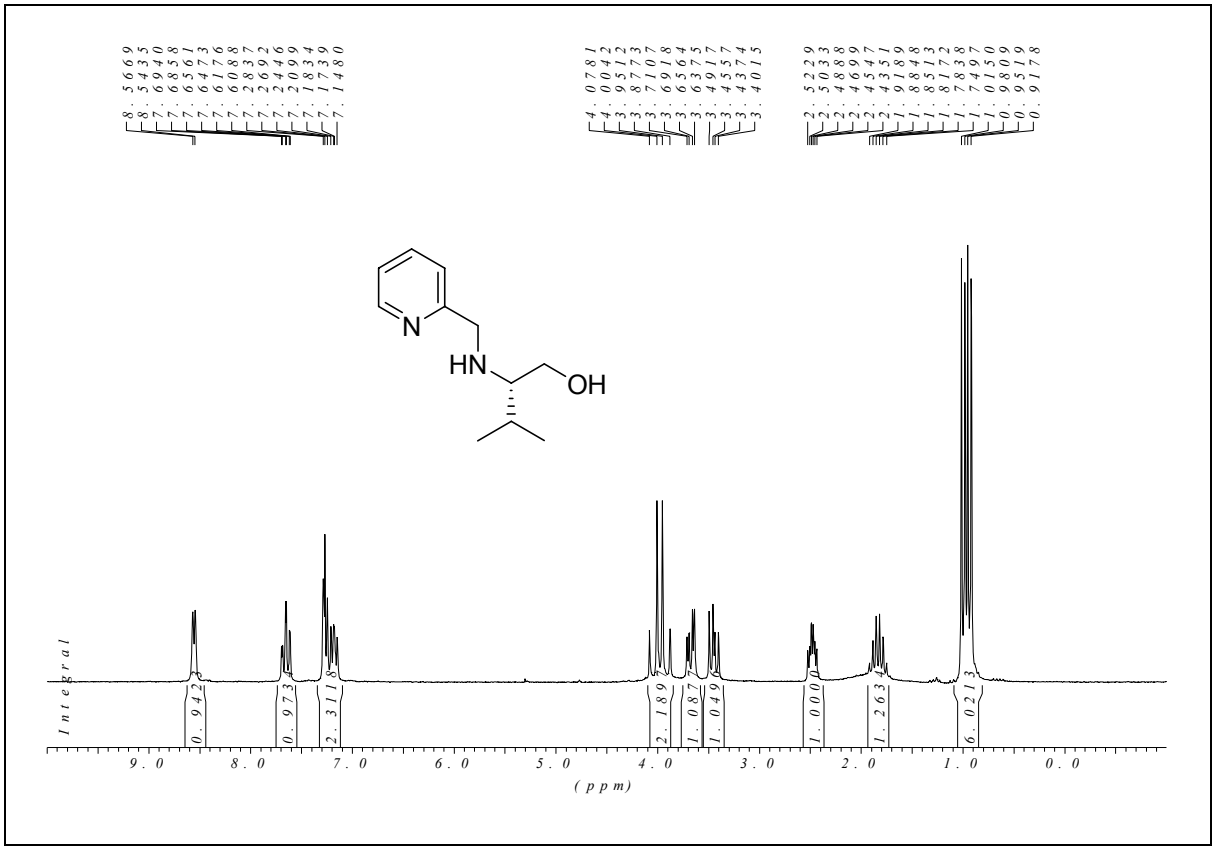


^{1}H NMR ($CDCl_3$, 200 MHz) of L8



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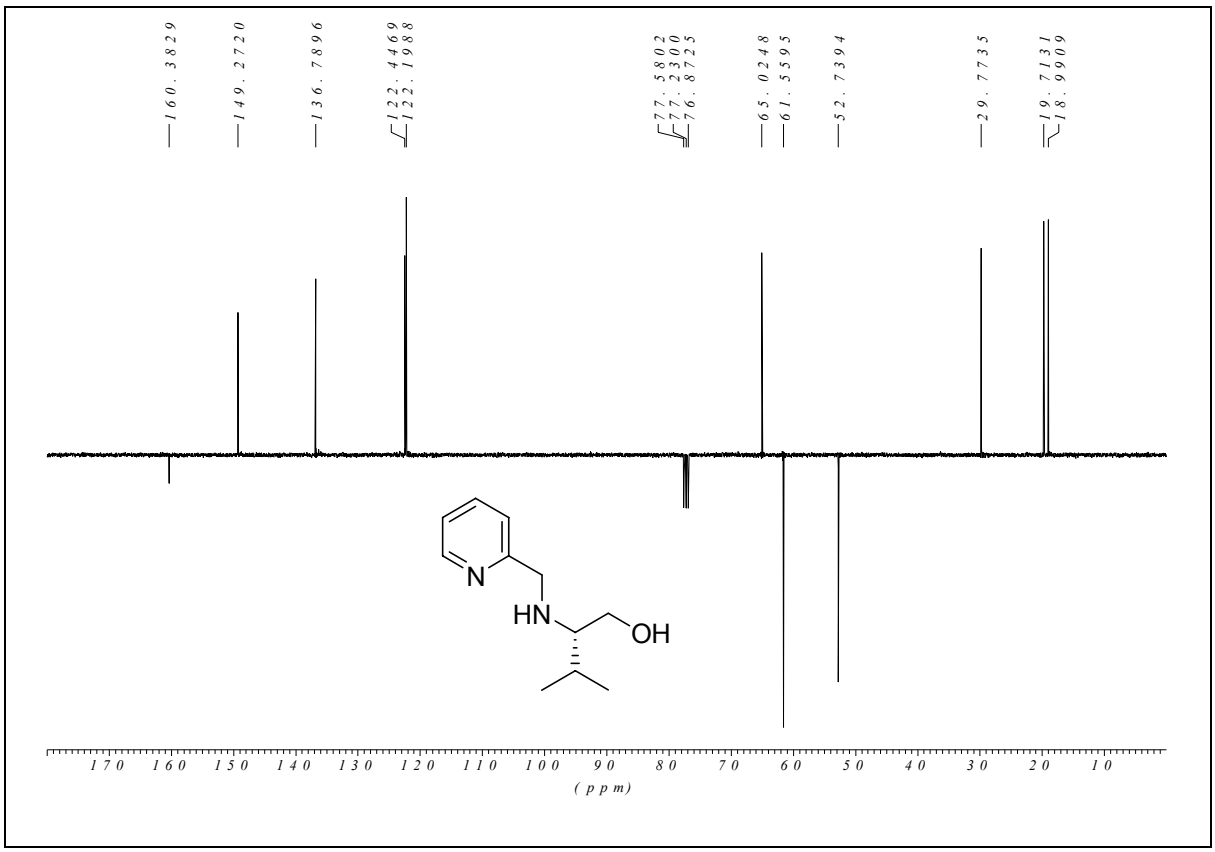
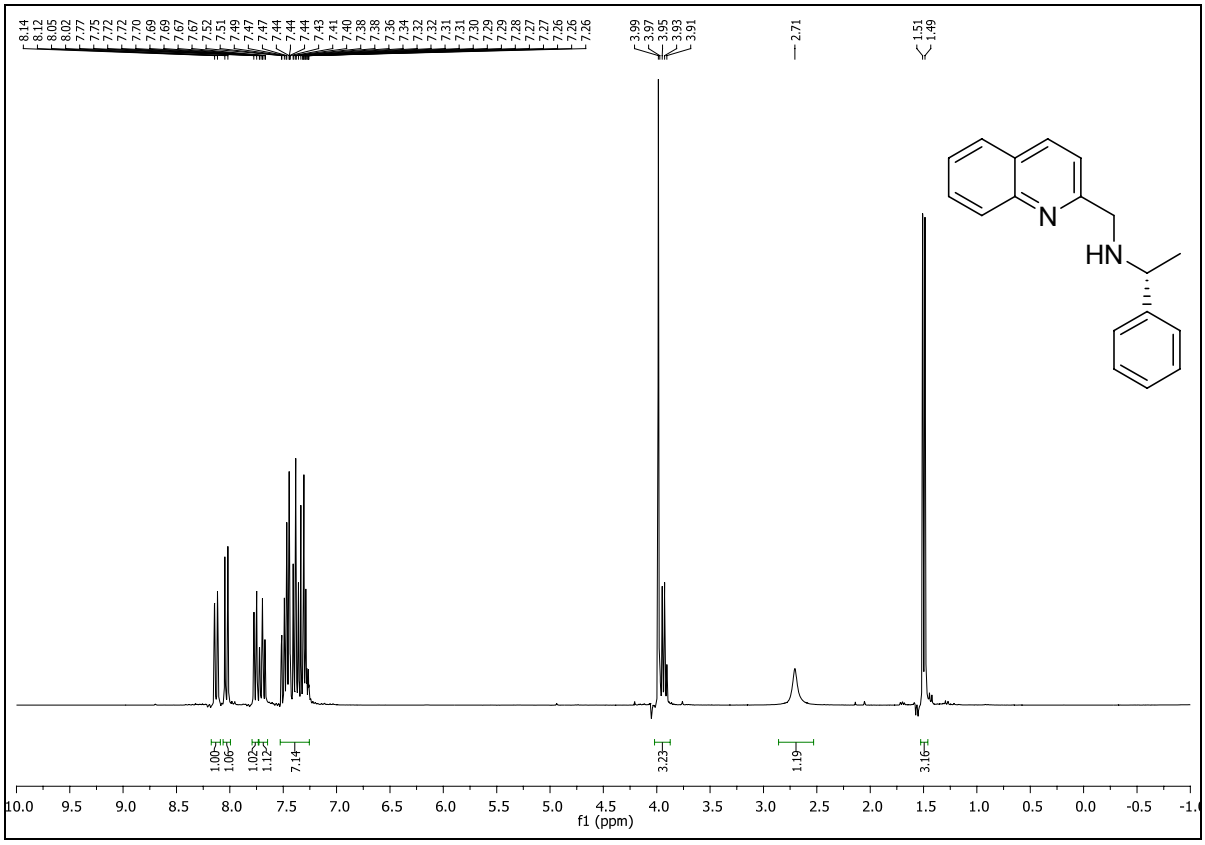
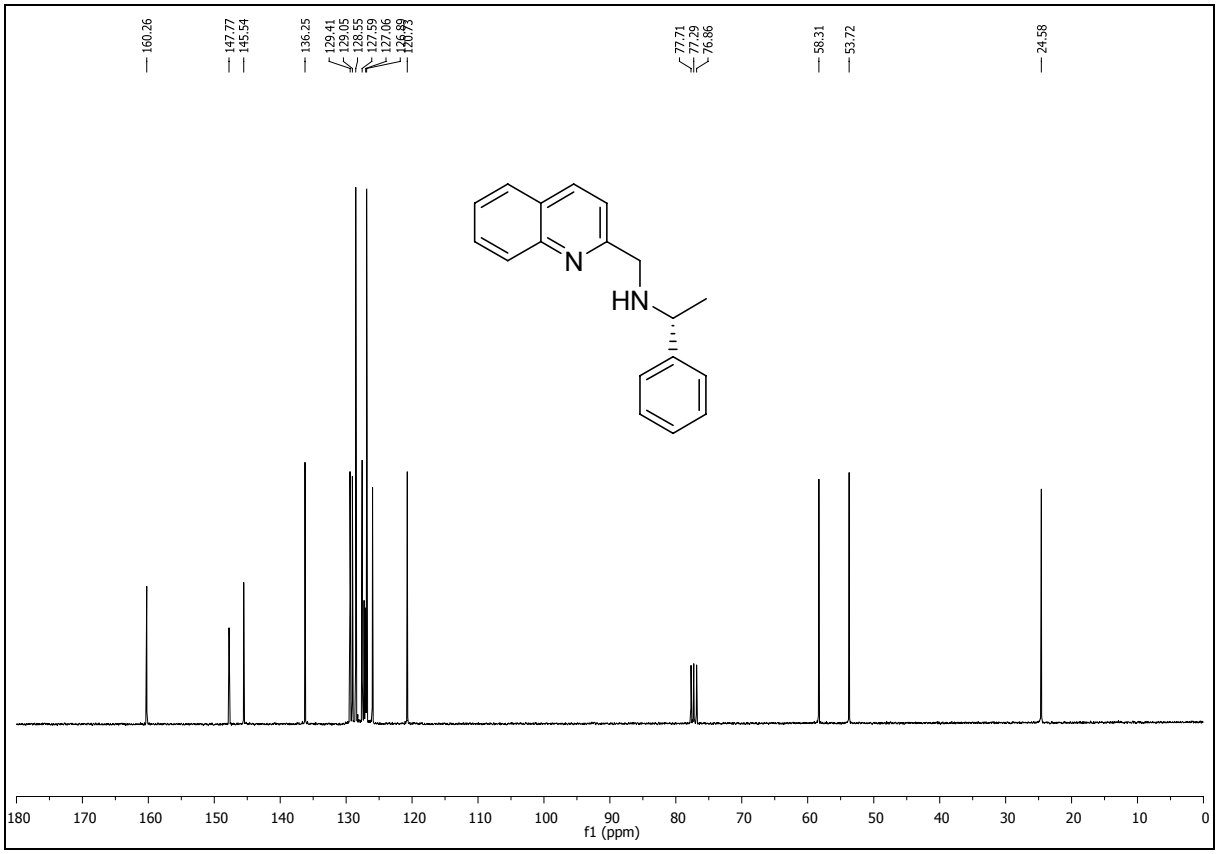


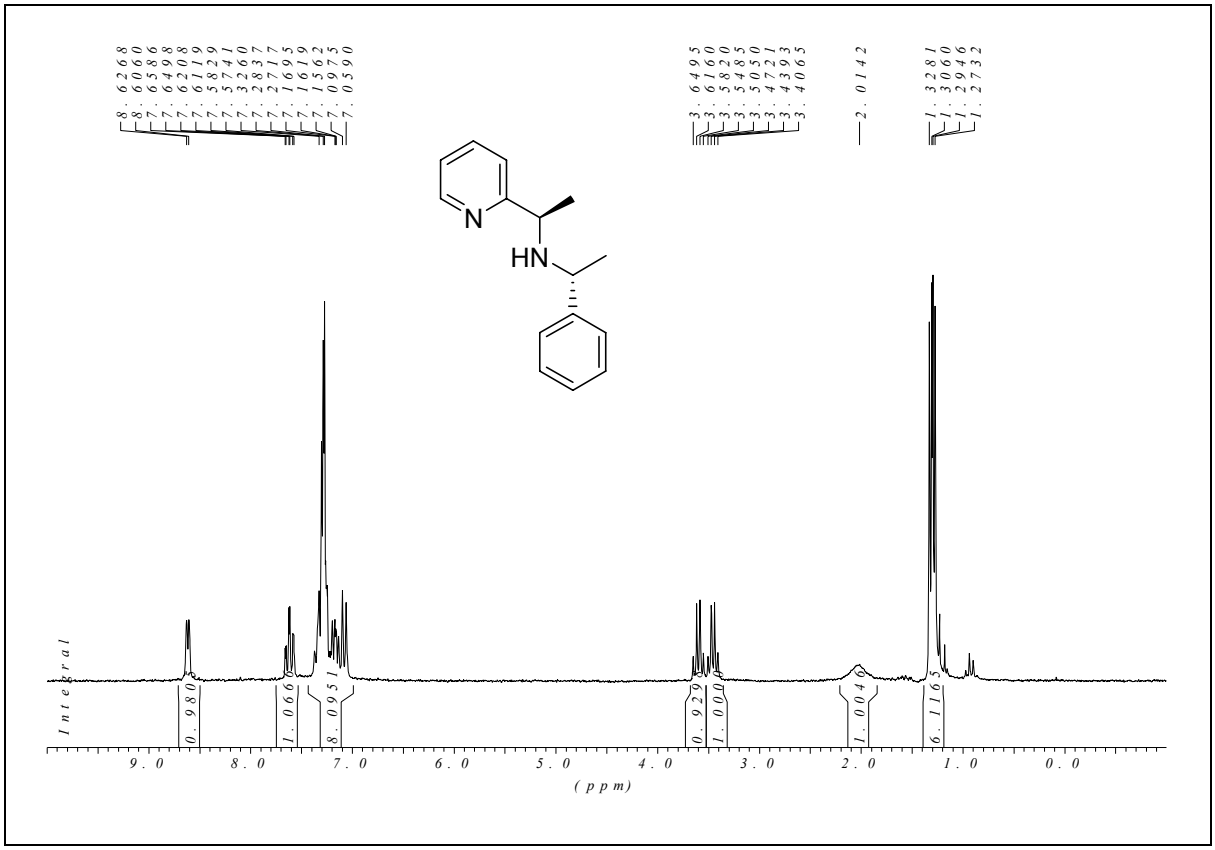
^{1}H NMR ($CDCl_3$, 300 MHz) of L9



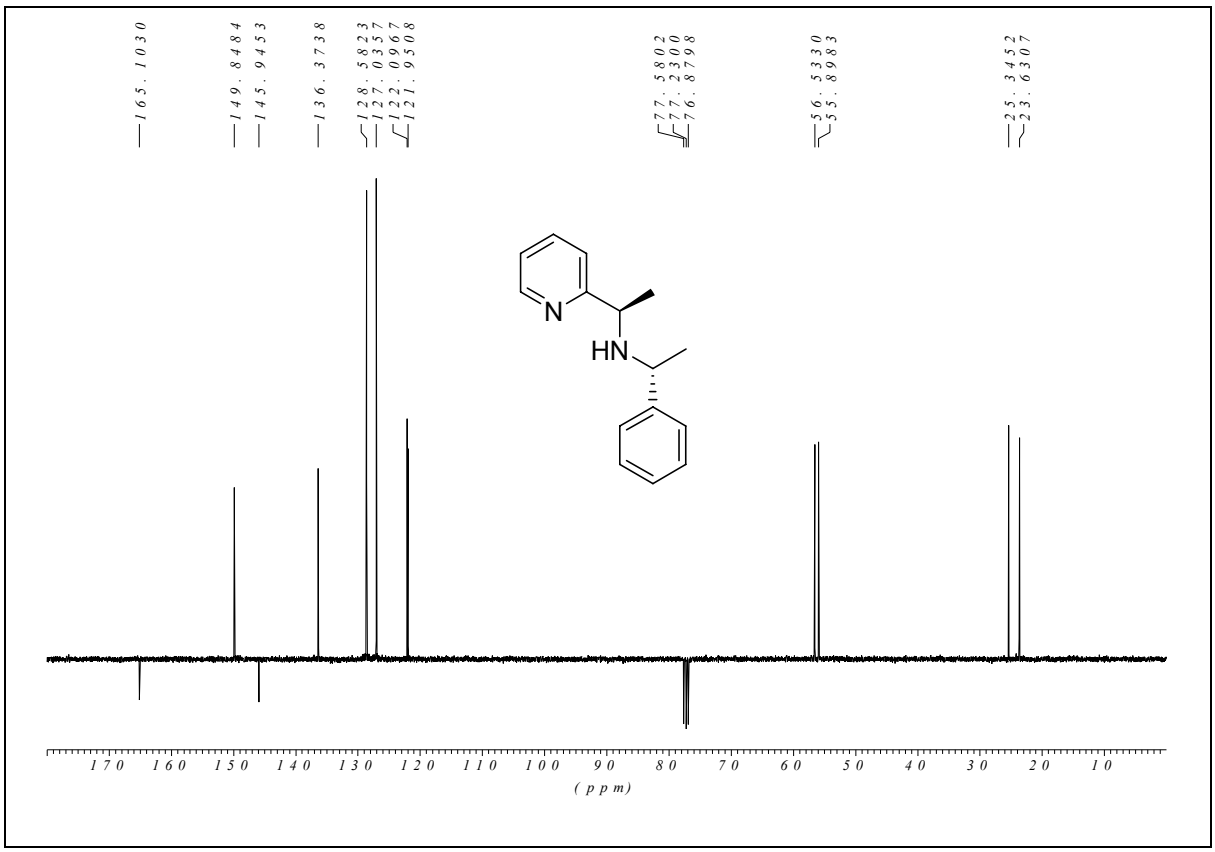
^{13}C NMR ($CDCl_3$, 75 MHz) of L9



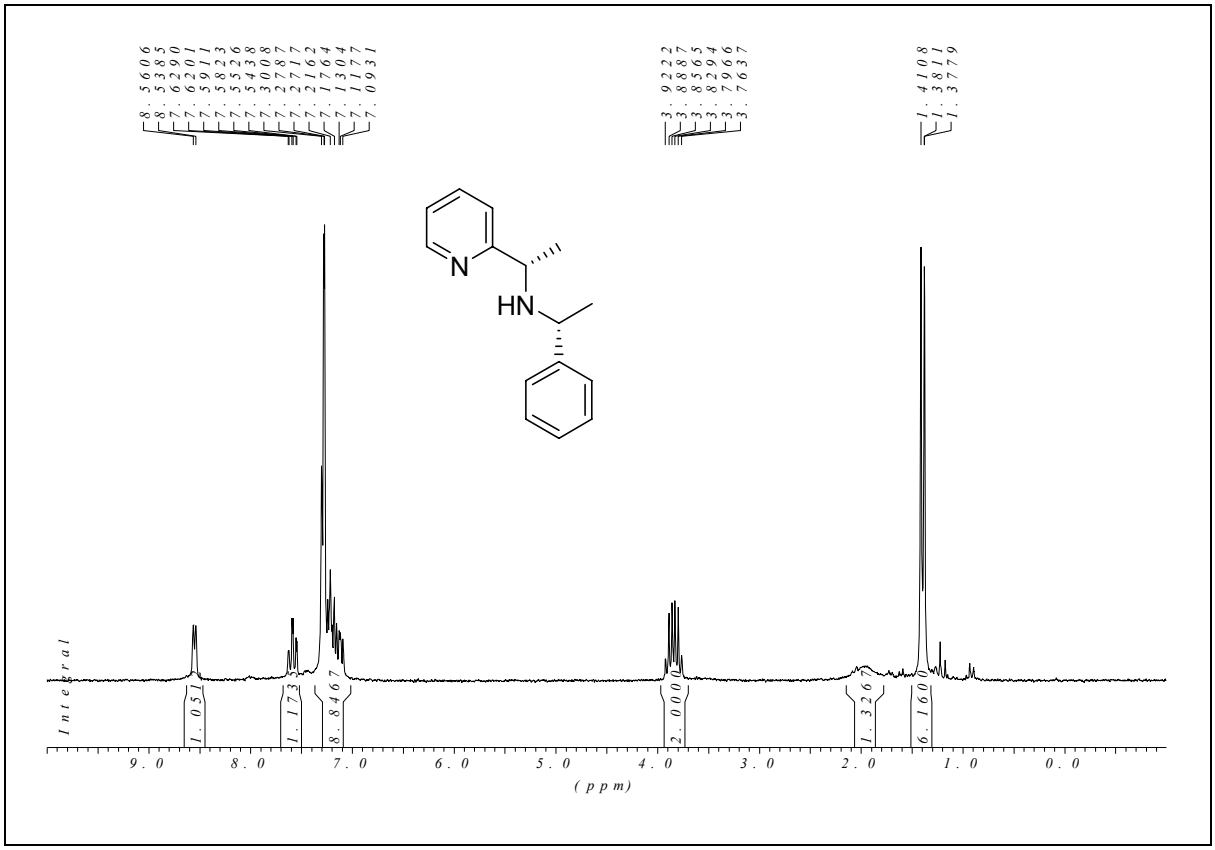
^{1}H NMR ($CDCl_3$, 200 MHz) of (1*R*,1'*R*)-L2



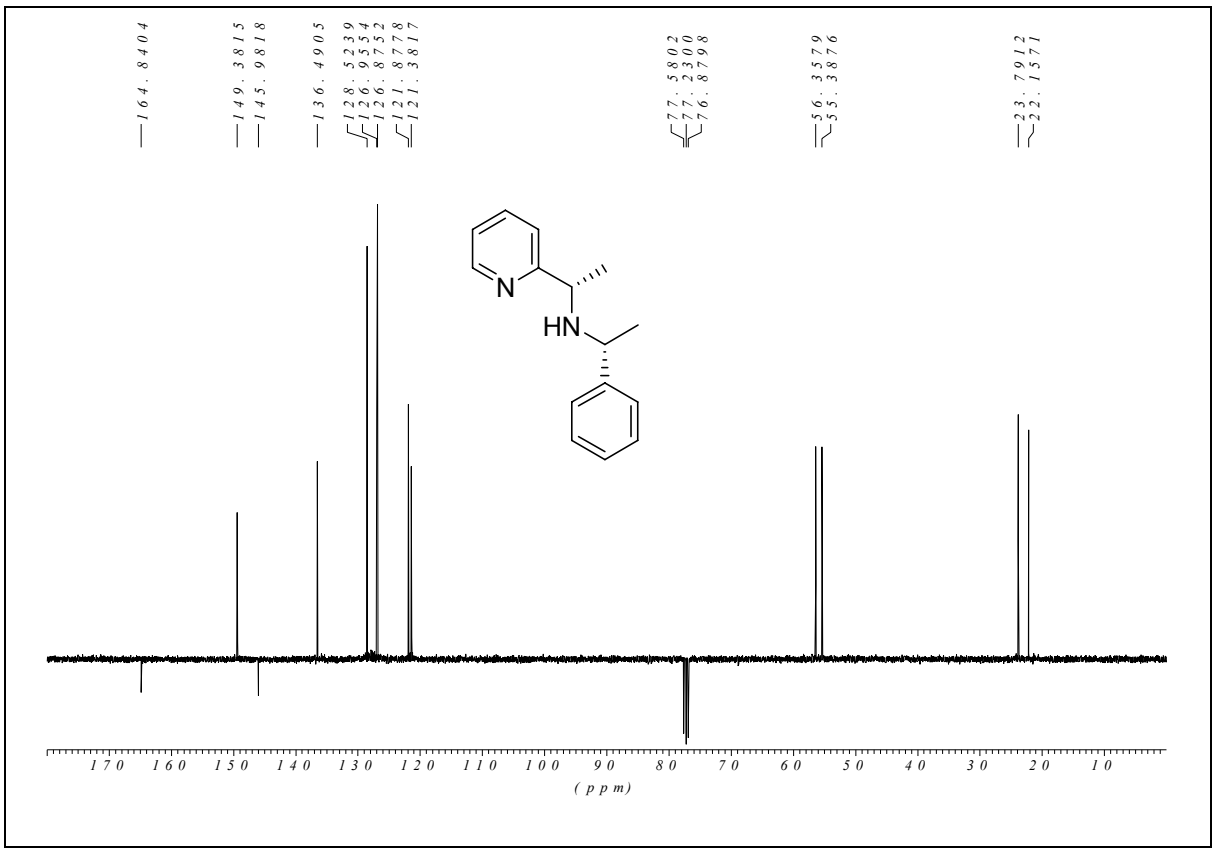
^{13}C NMR ($CDCl_3$, 90 MHz) of (1*R*,1'*R*)-L2



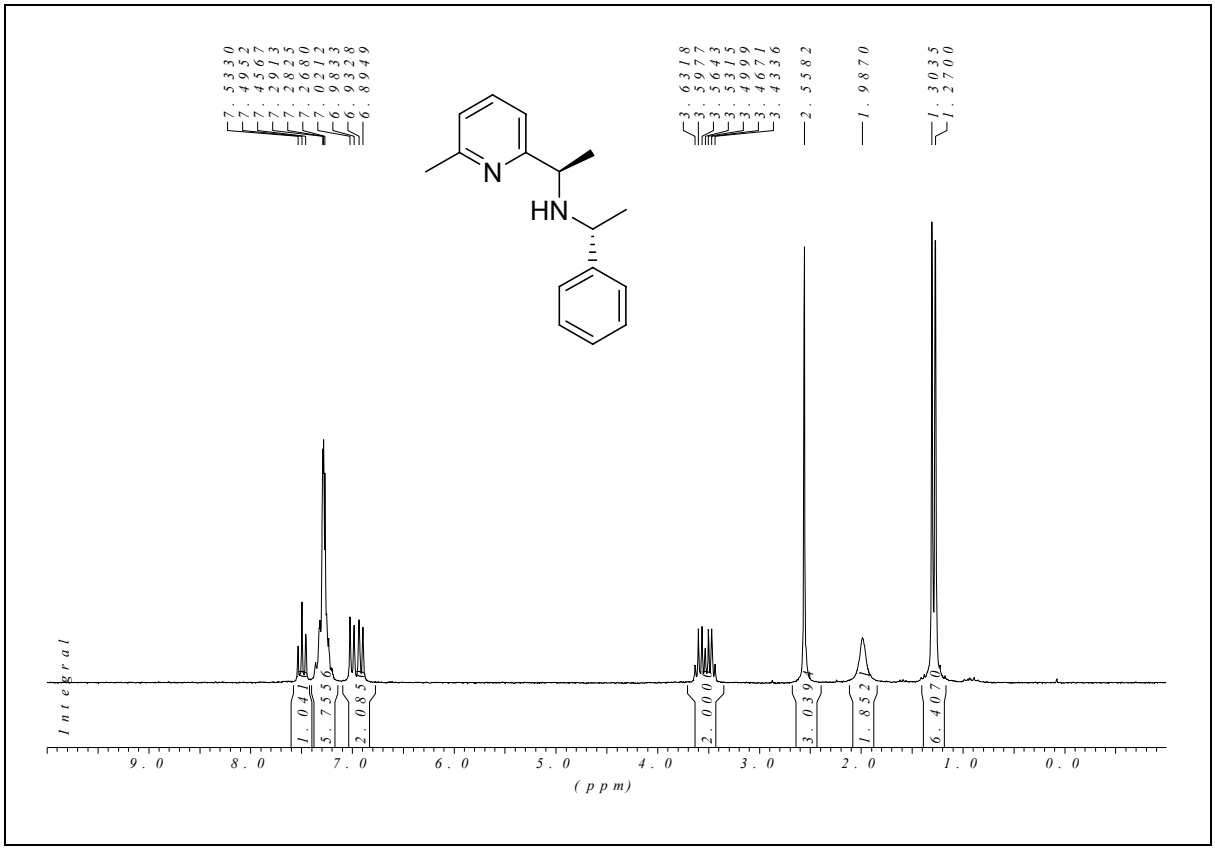
^{1}H NMR ($CDCl_3$, 200 MHz) of (1*S*,1'*R*)-L2



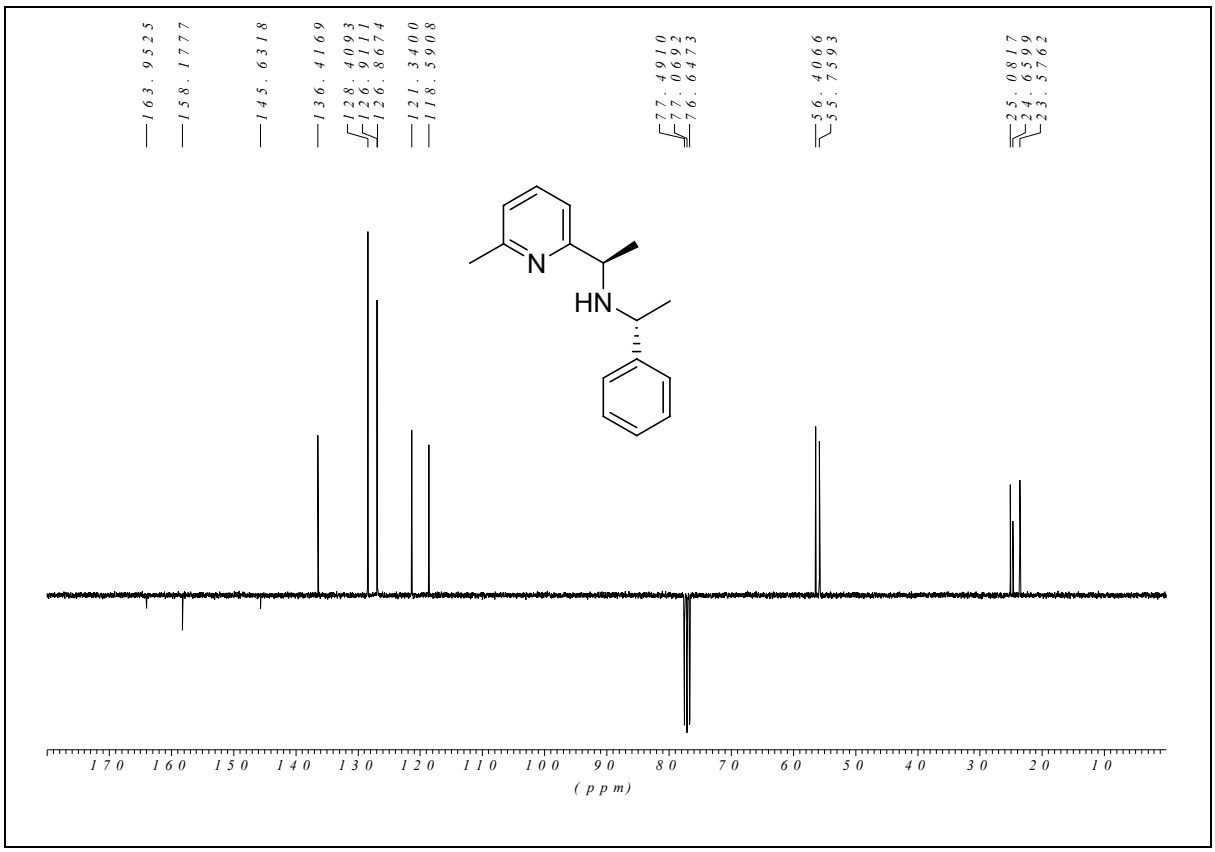
^{13}C NMR ($CDCl_3$, 90 MHz) of (1*S*,1'*R*)-L2



^{1}H NMR ($CDCl_3$, 200 MHz) of (1*R*,1'*R*)-L5



^{13}C NMR ($CDCl_3$, 90 MHz) of (1*R*,1'*R*)-L5



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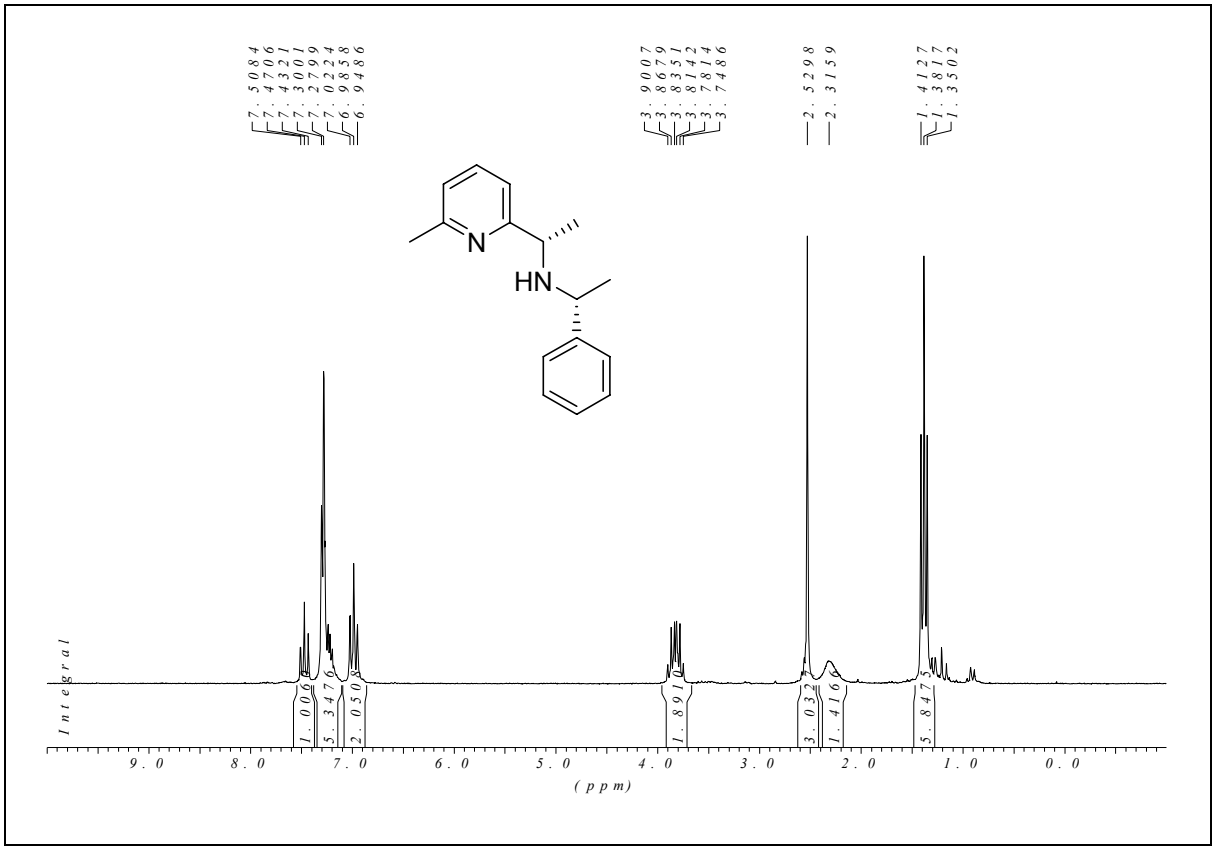
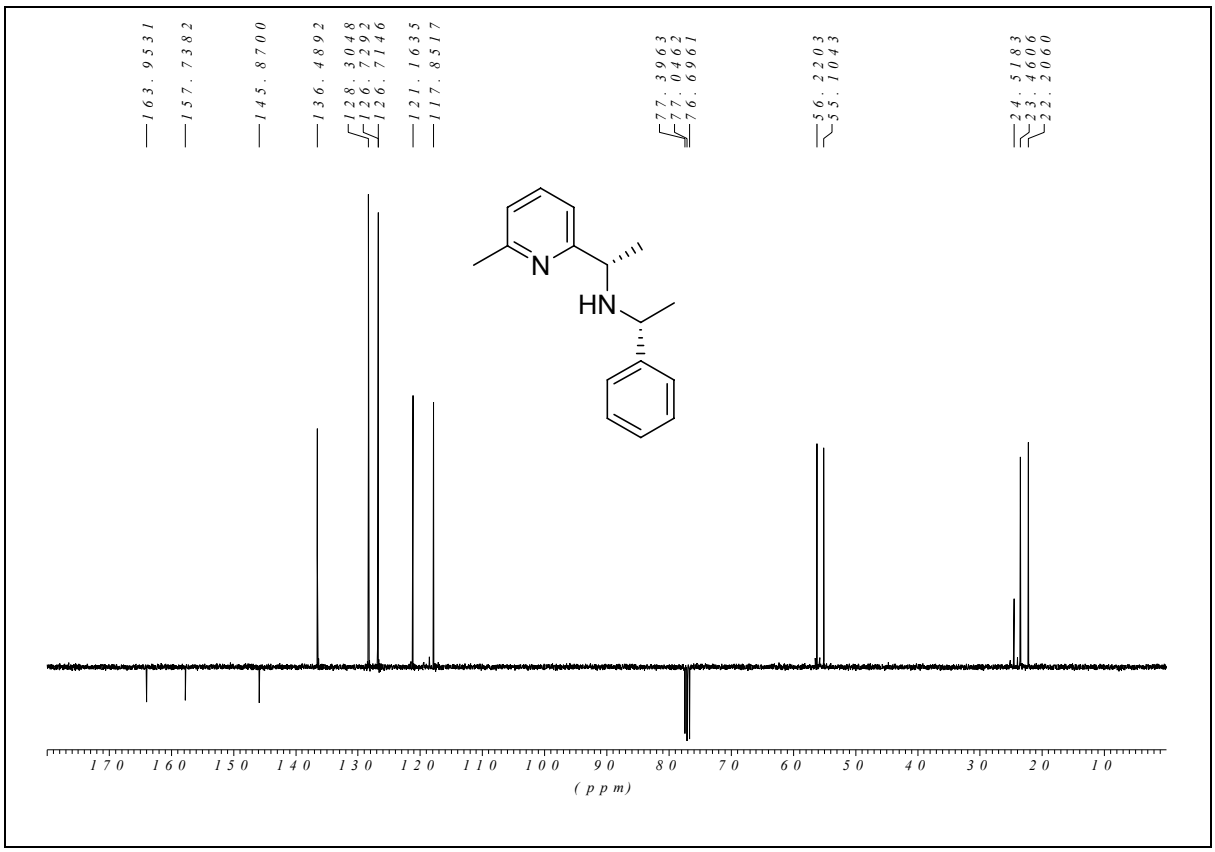
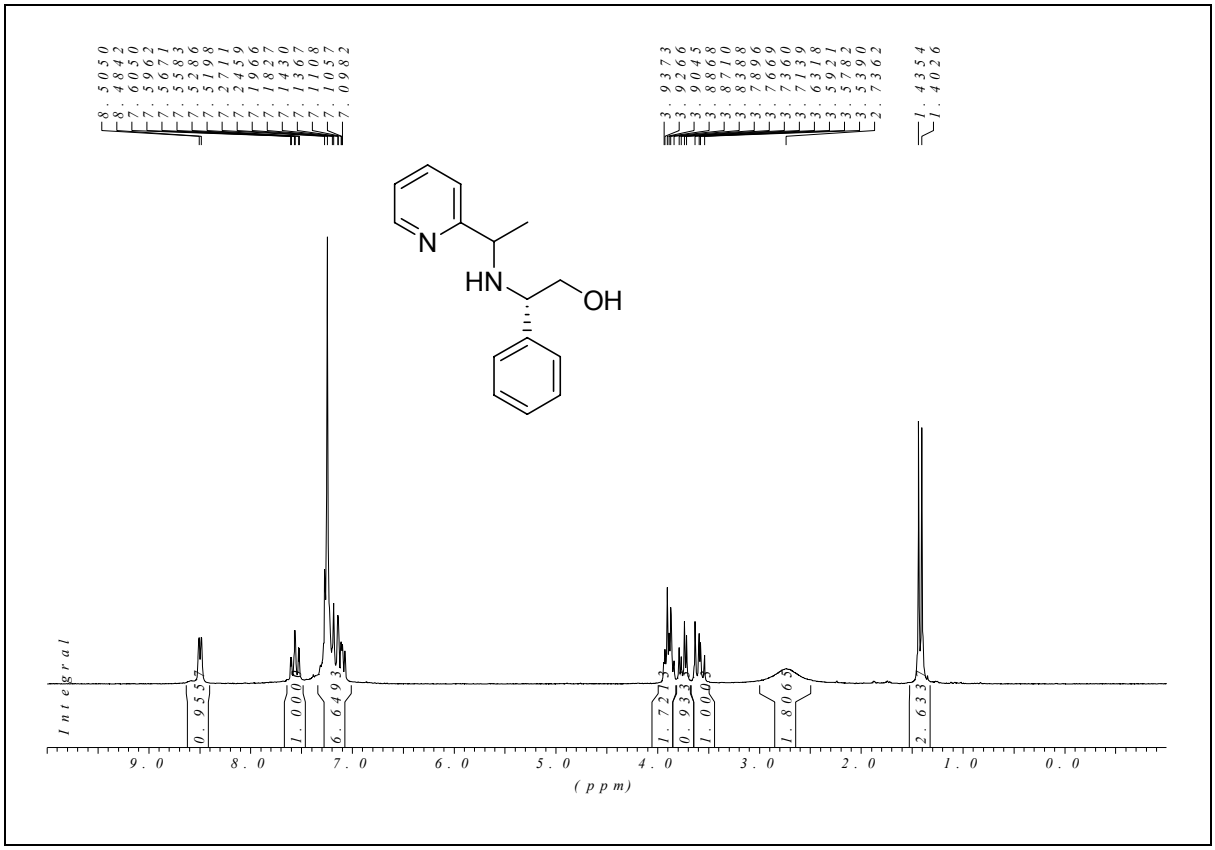


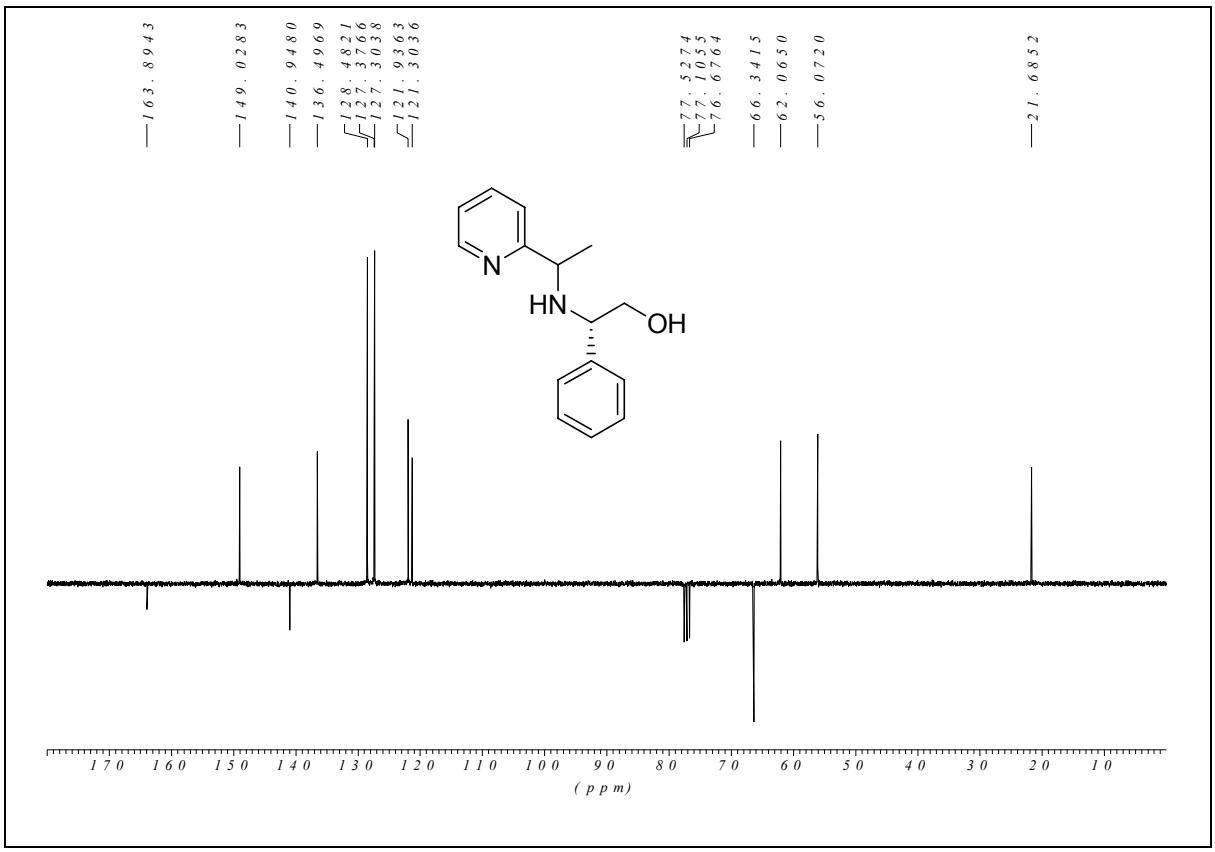
^{13}C NMR ($CDCl_3$, 90 MHz) of (1*S*,1'*R*)-L5



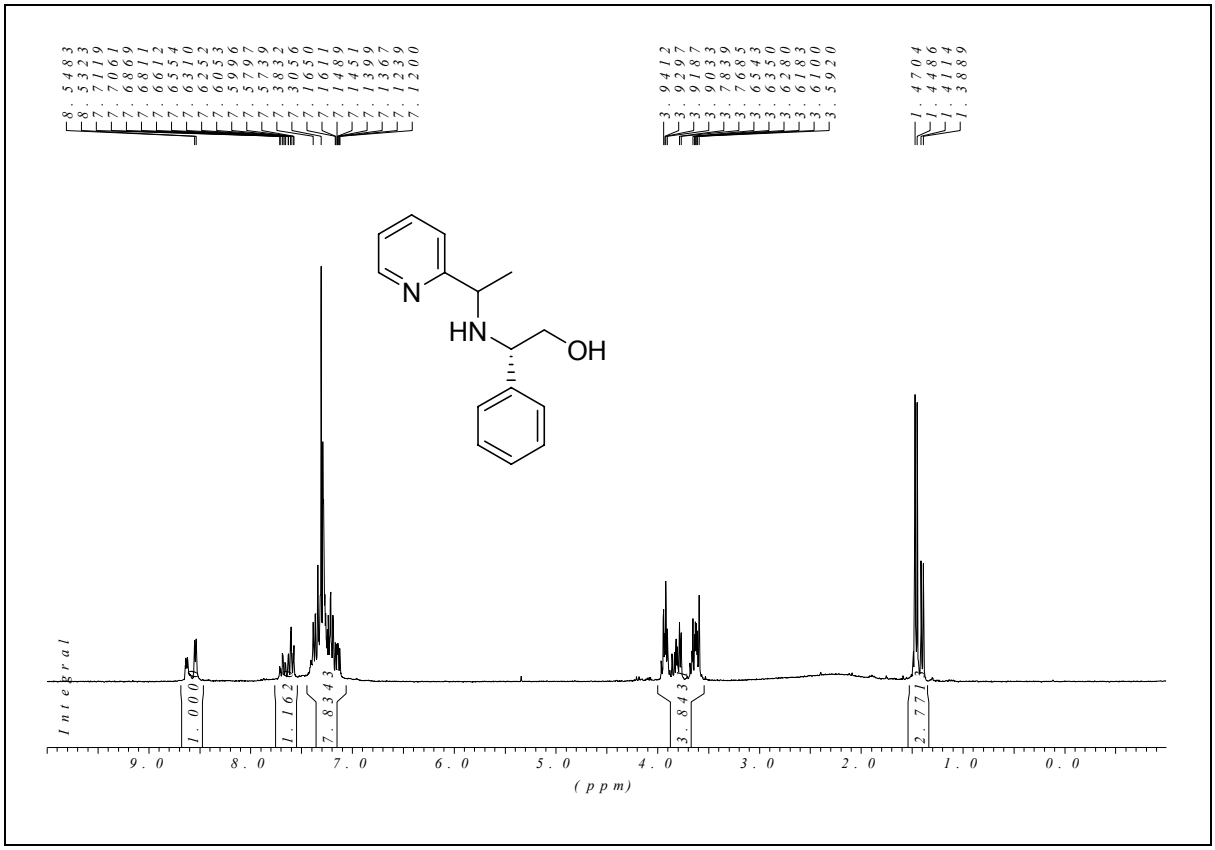
^{1}H NMR ($CDCl_3$, 200 MHz) of (1'*S*)-L7 (first eluted diastereoisomer)



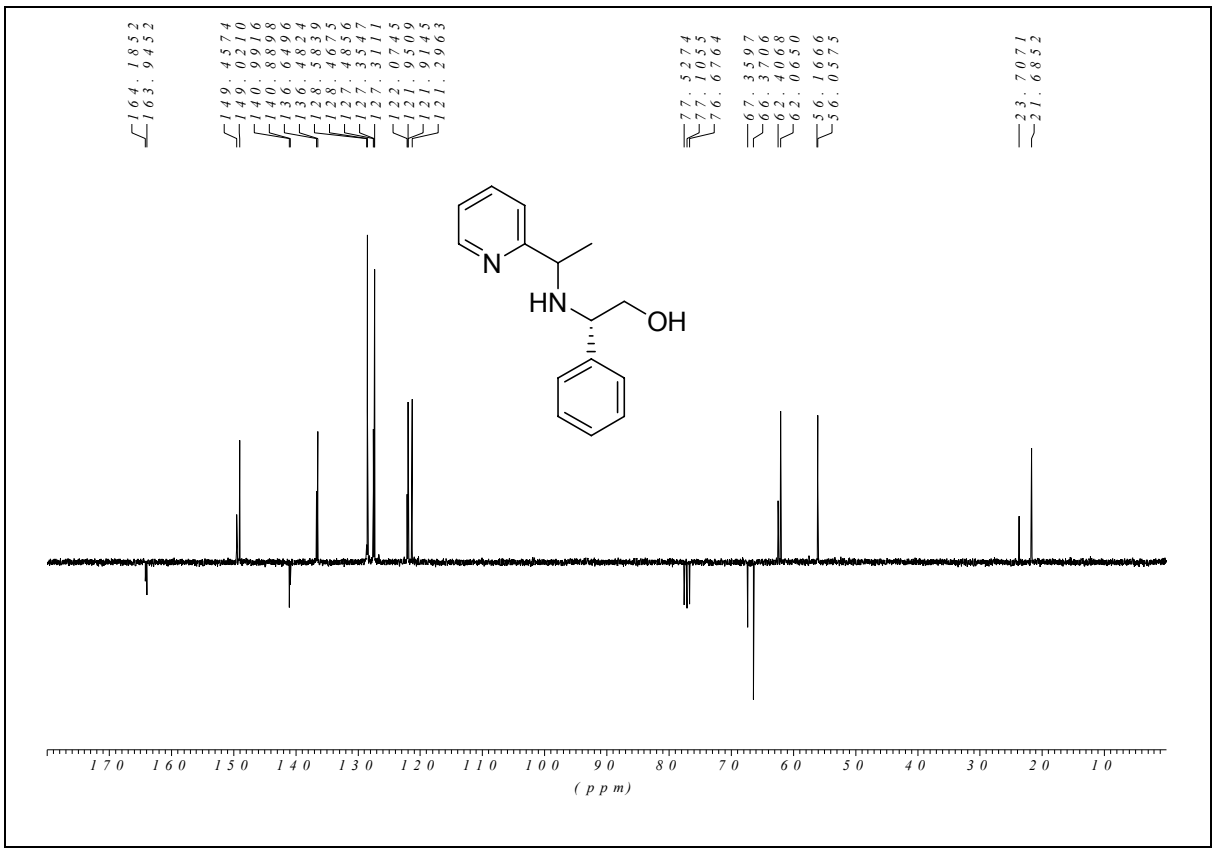
^{13}C NMR ($CDCl_3$, 90 MHz) of (1'*S*)-L7 (first eluted diastereoisomer)



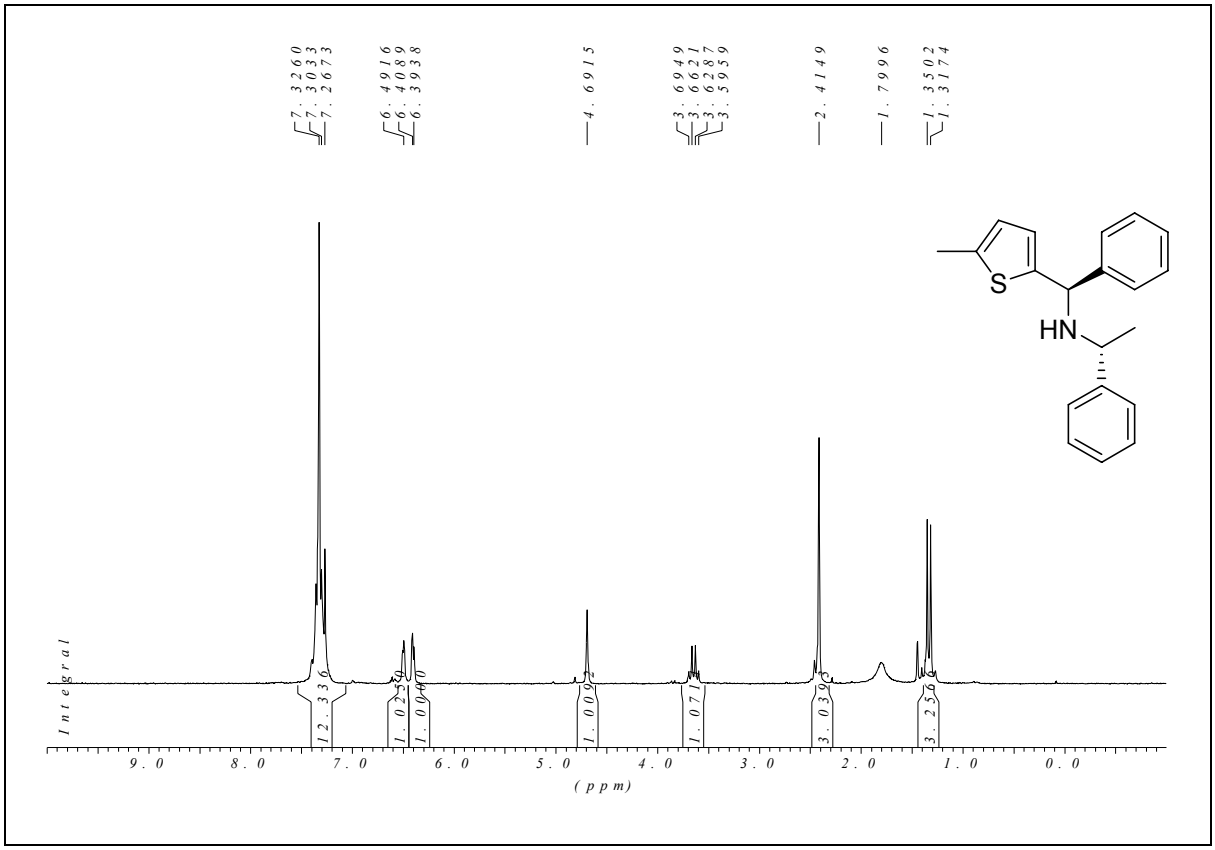
^{1}H NMR ($CDCl_3$, 300 MHz) of (1'*S*)-L7 (mixture of diastereoisomers)



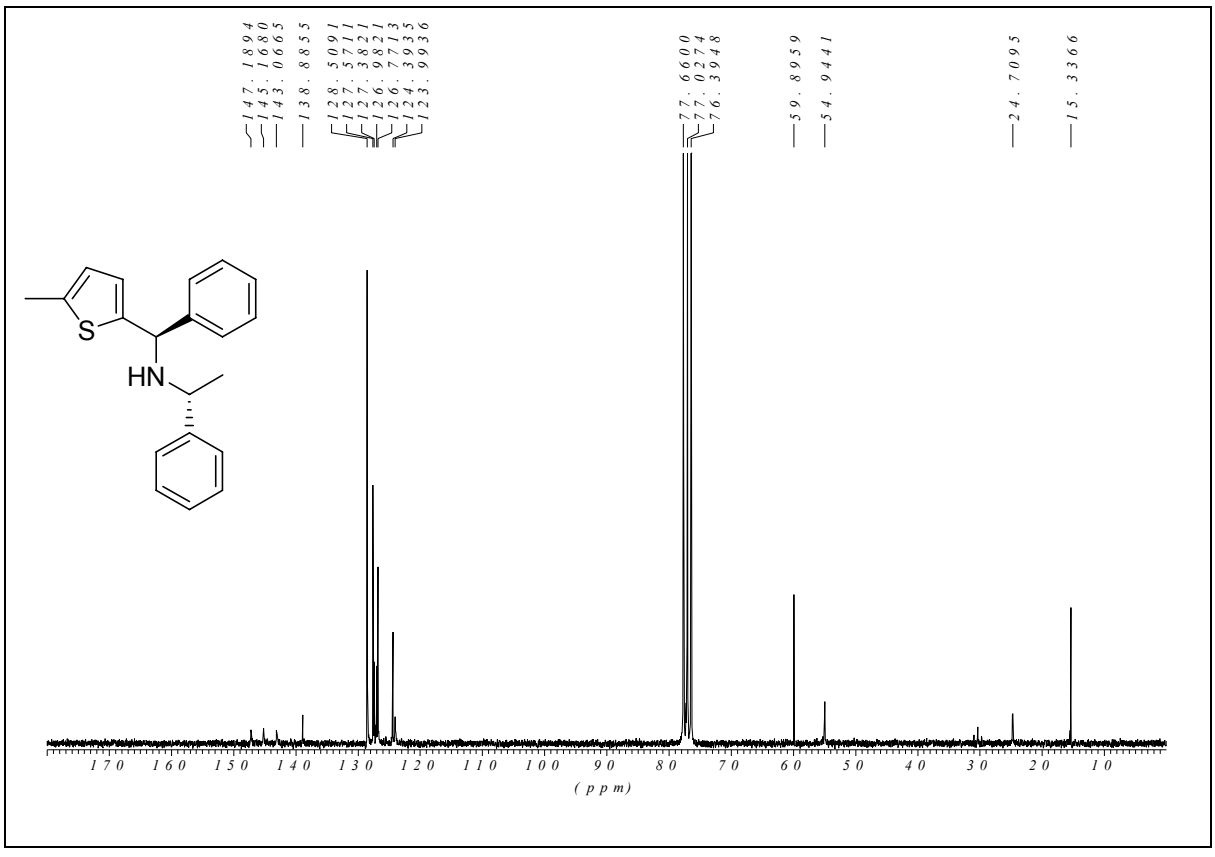
^{13}C NMR ($CDCl_3$, 90 MHz) of (1'*S*)-L7 (mixture of diastereoisomers)



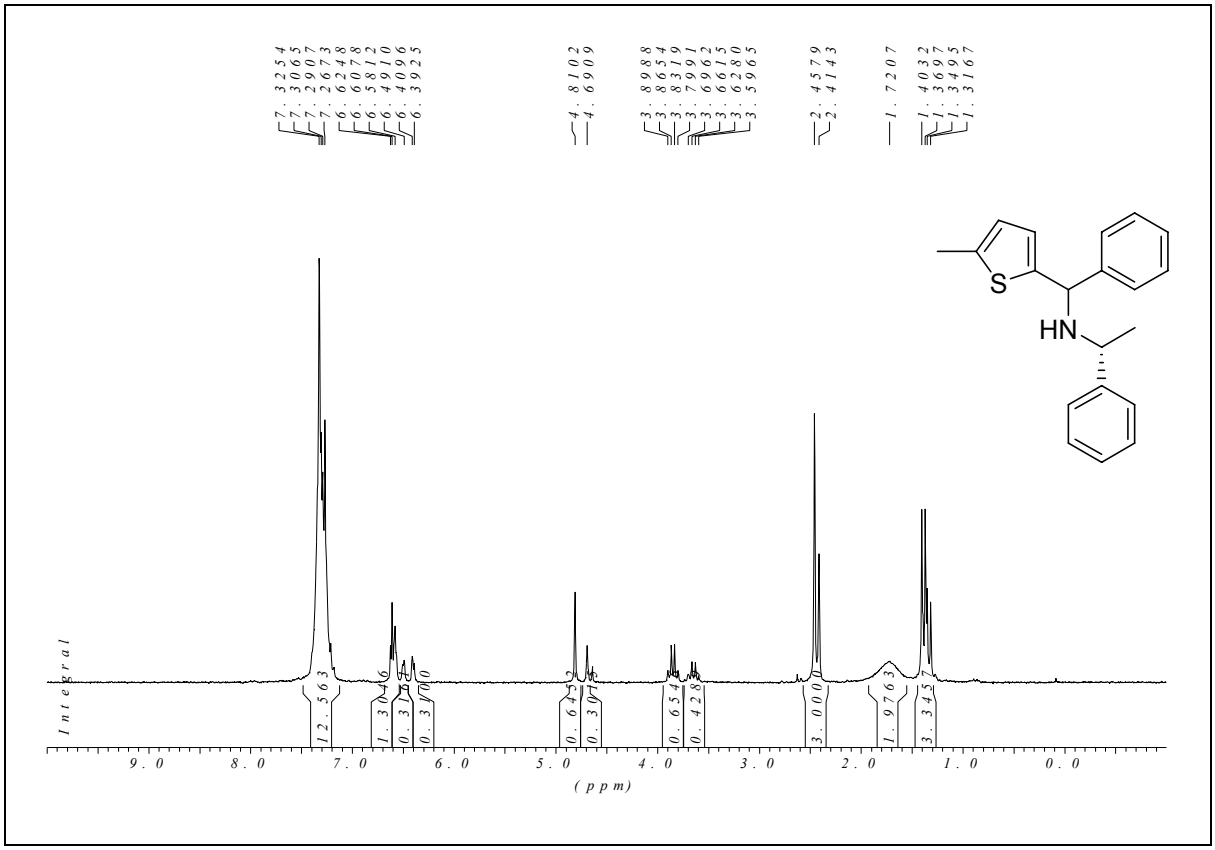
^{1}H NMR ($CDCl_3$, 200 MHz) of (1*R*,1'*R*)-L10



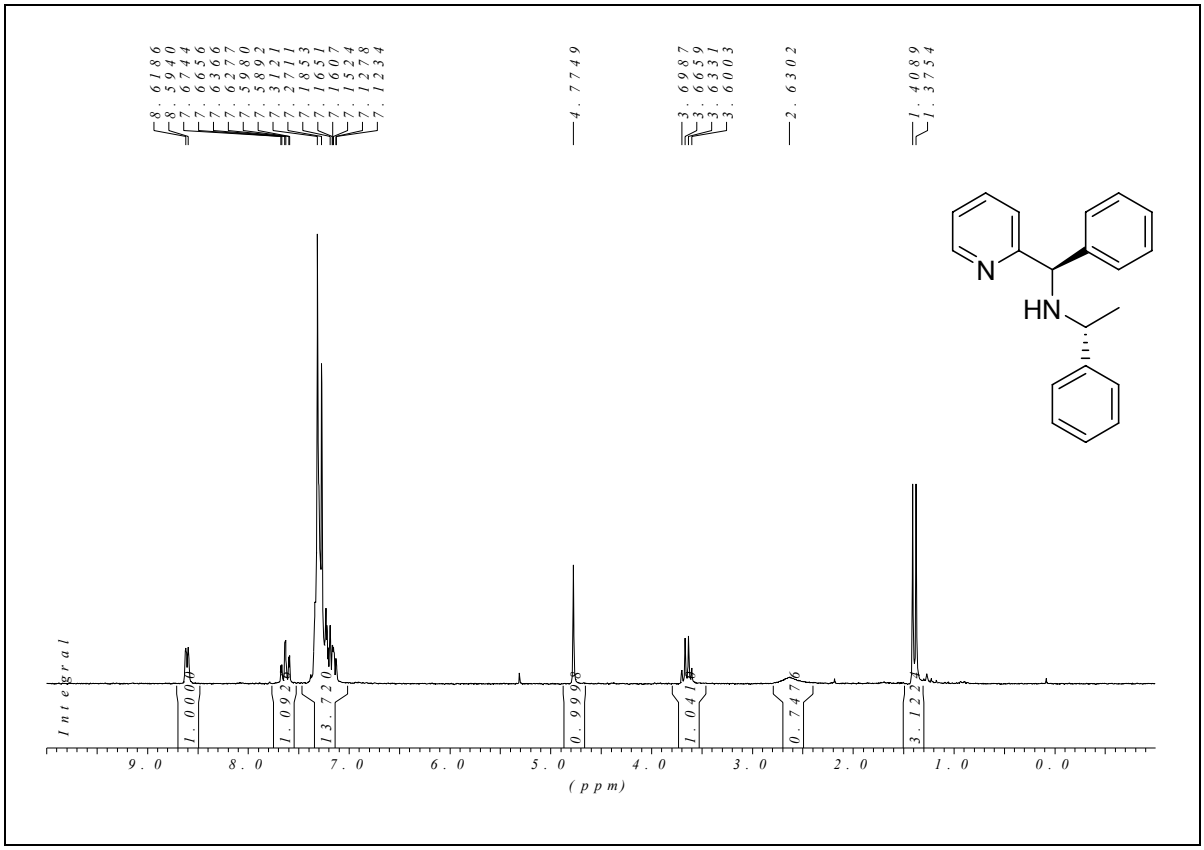
^{13}C NMR ($CDCl_3$, 75 MHz) of (1*R*,1'*R*)-L10



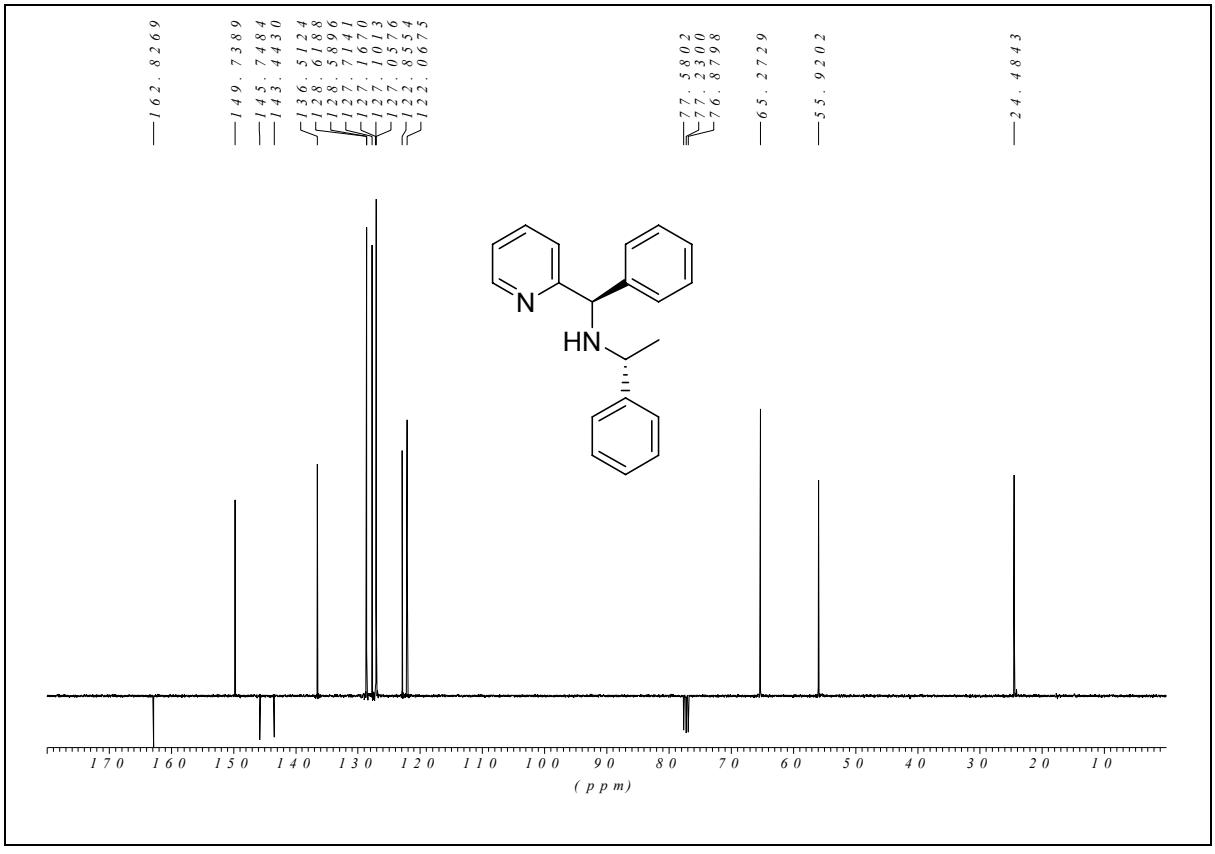
^{1}H NMR ($CDCl_3$, 200 MHz) of L10 (mixture of diastereoisomers)



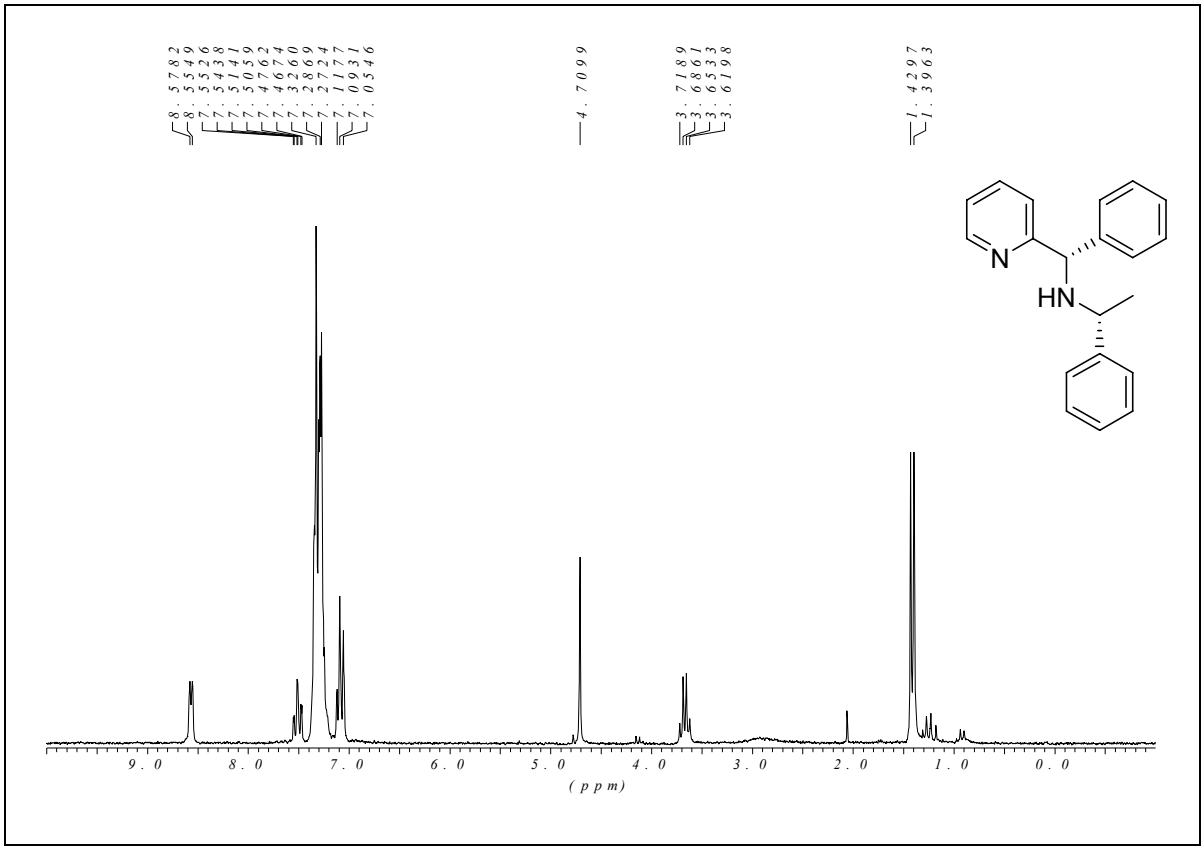
^{1}H NMR ($CDCl_3$, 200 MHz) of (1*R*,1'*R*)-L3



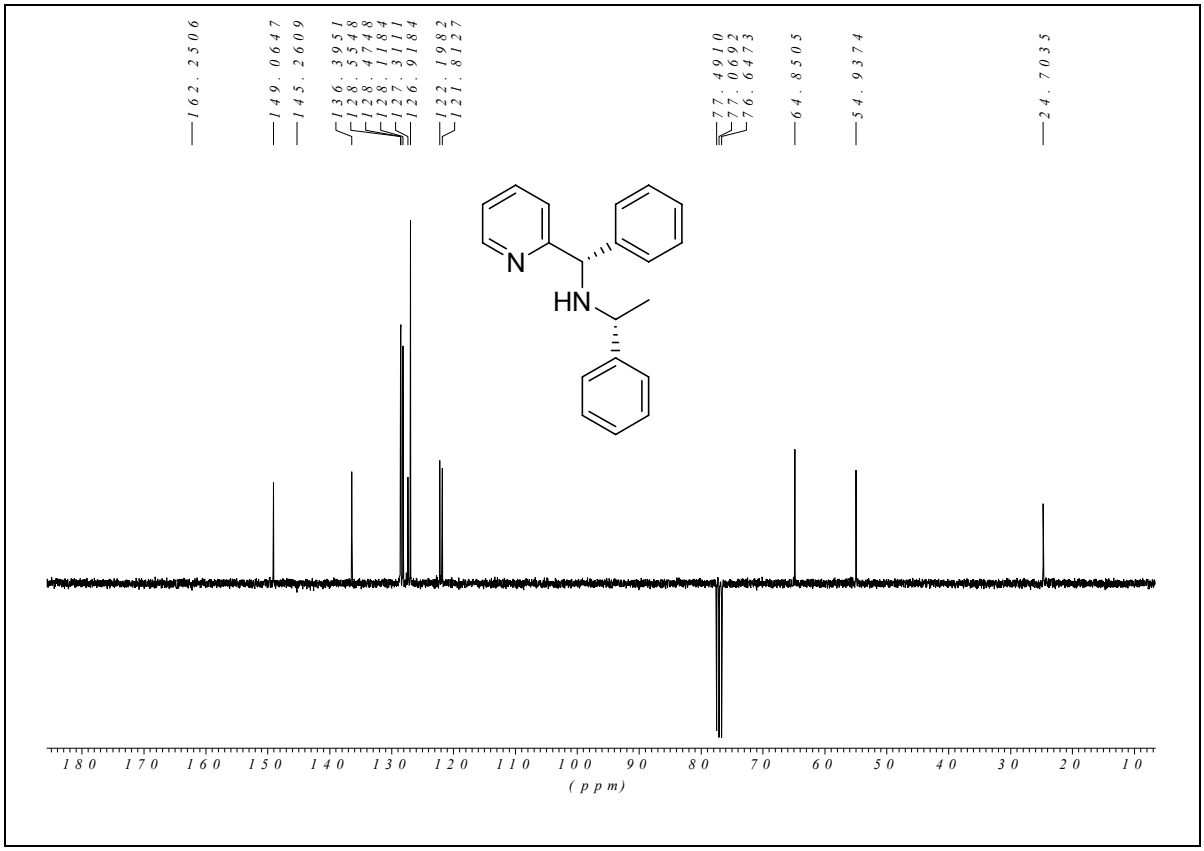
^{13}C NMR ($CDCl_3$, 90 MHz) of (1*R*,1'*R*)-L3



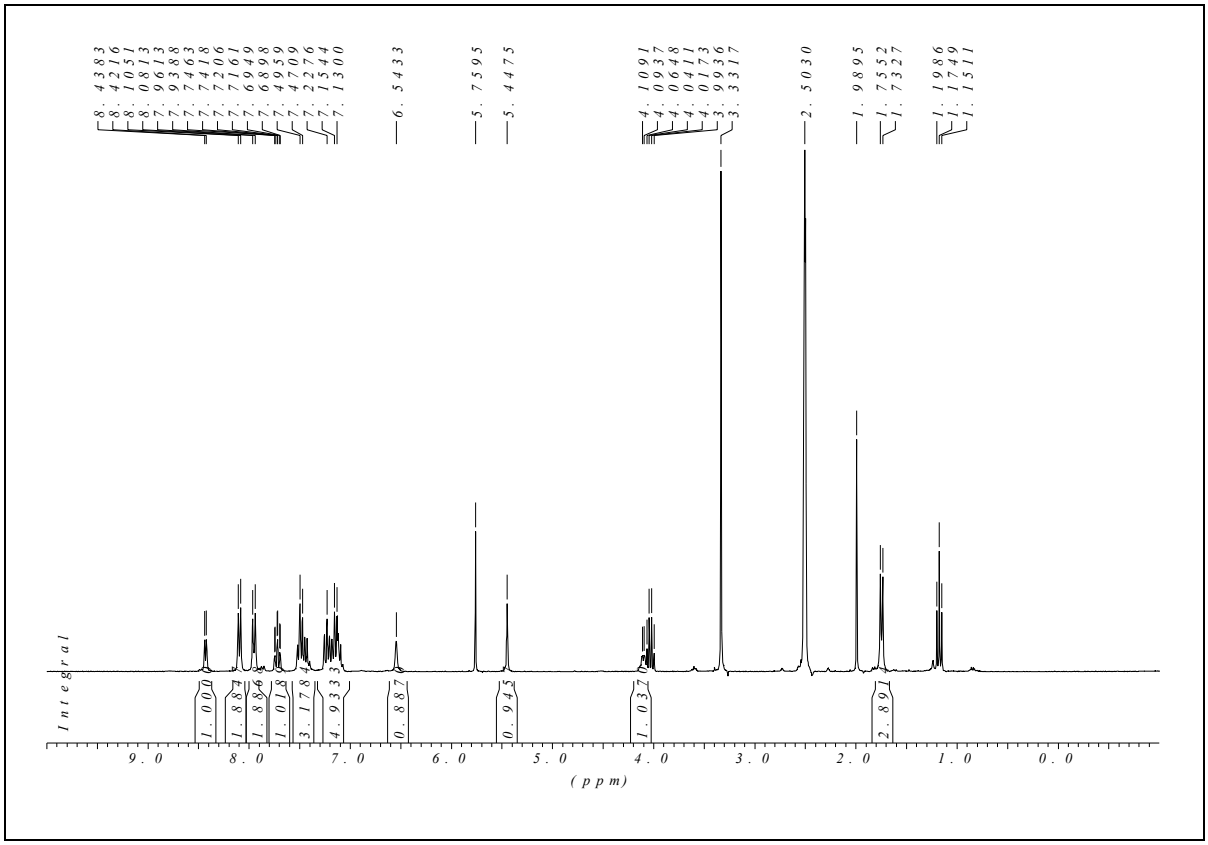
^{1}H NMR ($CDCl_3$, 200 MHz) of (1*S*,1'*R*)-L3



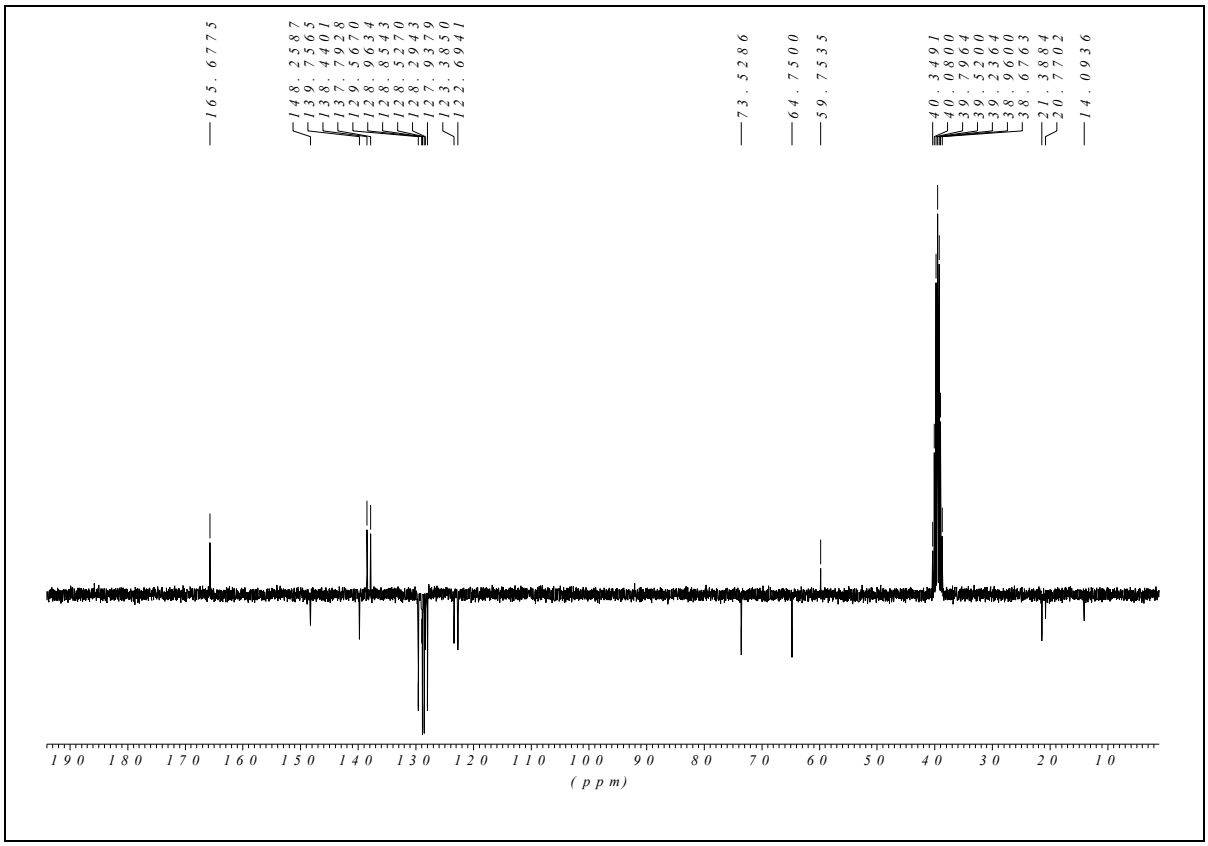
^{13}C NMR ($CDCl_3$, 75 MHz) of (1*S*,1'*R*)-L3



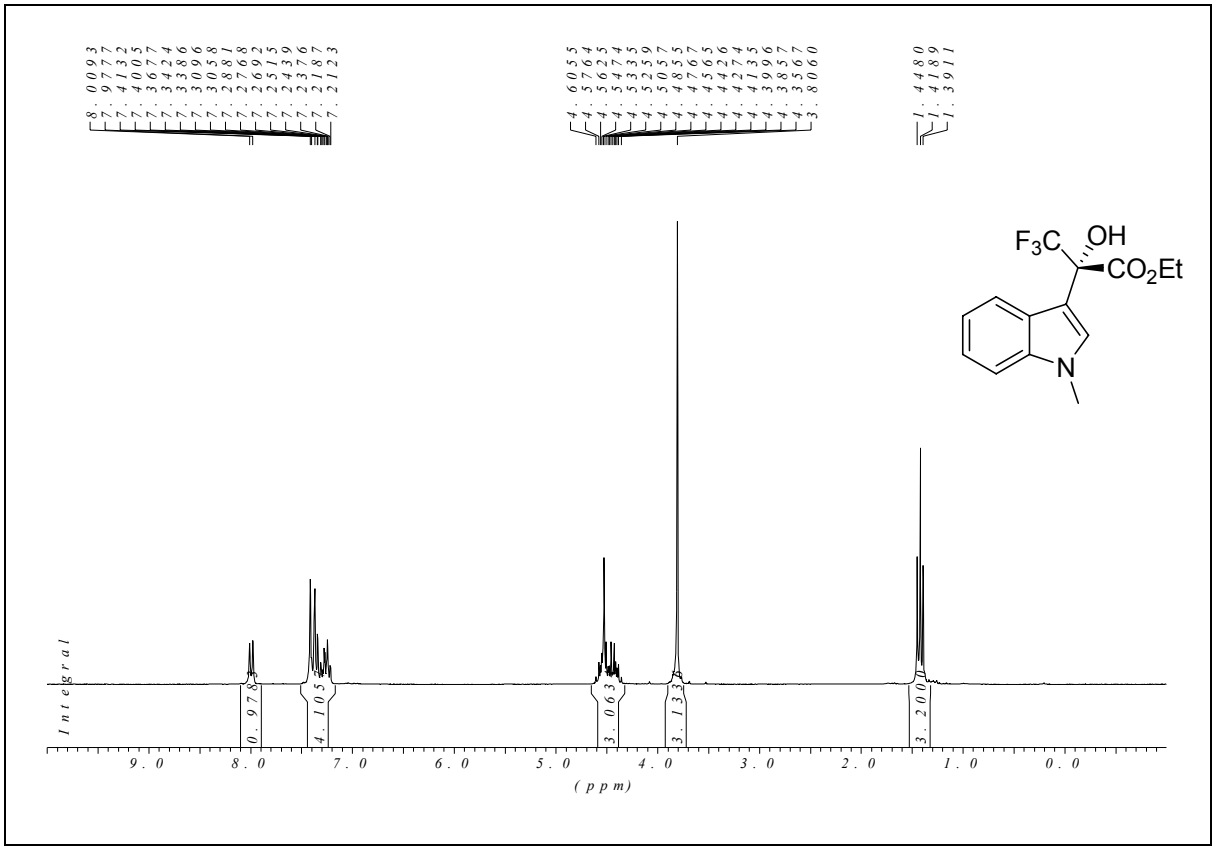
^{1}H NMR ([D$_6$]dmso, 300 MHz) of PdCl$_2$-(1*S*,1'*R*)-L3 complex



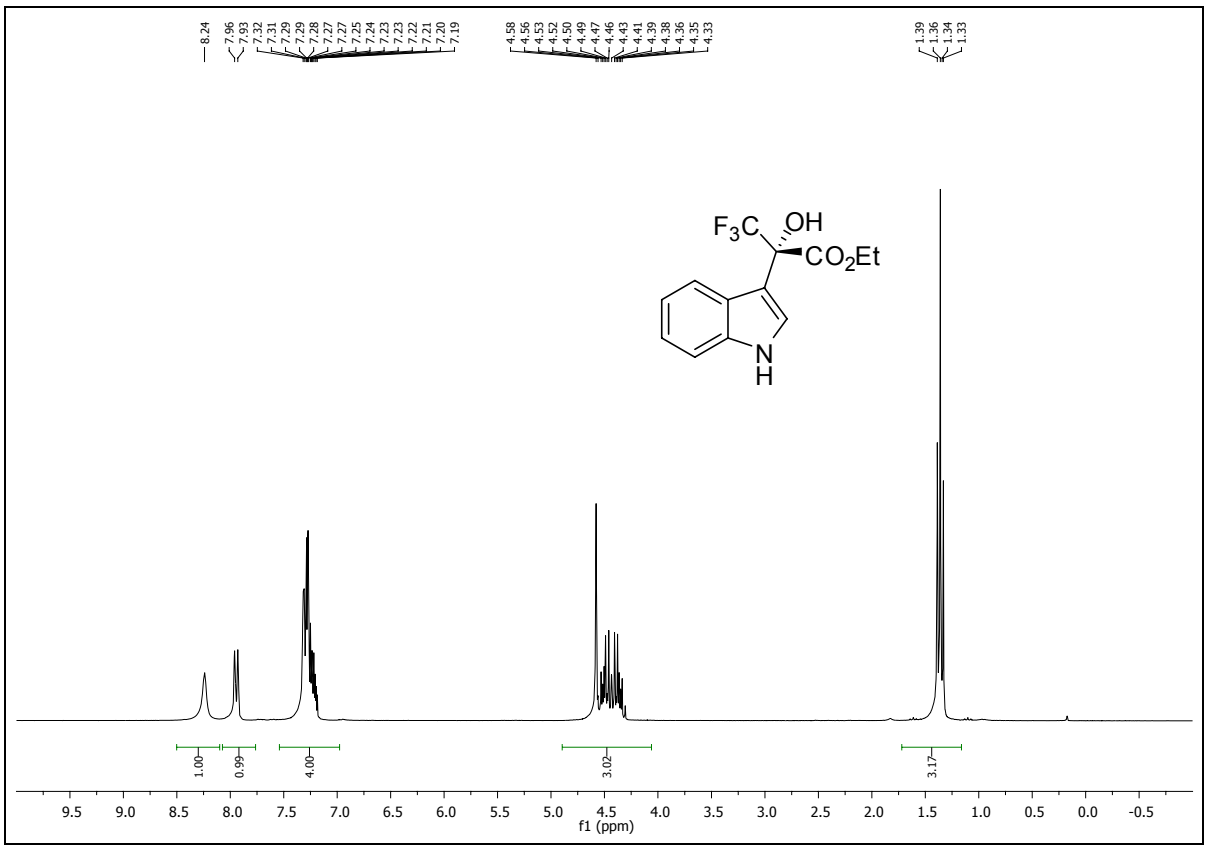
^{13}C NMR ([D$_6$]dmso, 300 MHz) of PdCl$_2$-(1*S*,1'*R*)-L3 complex



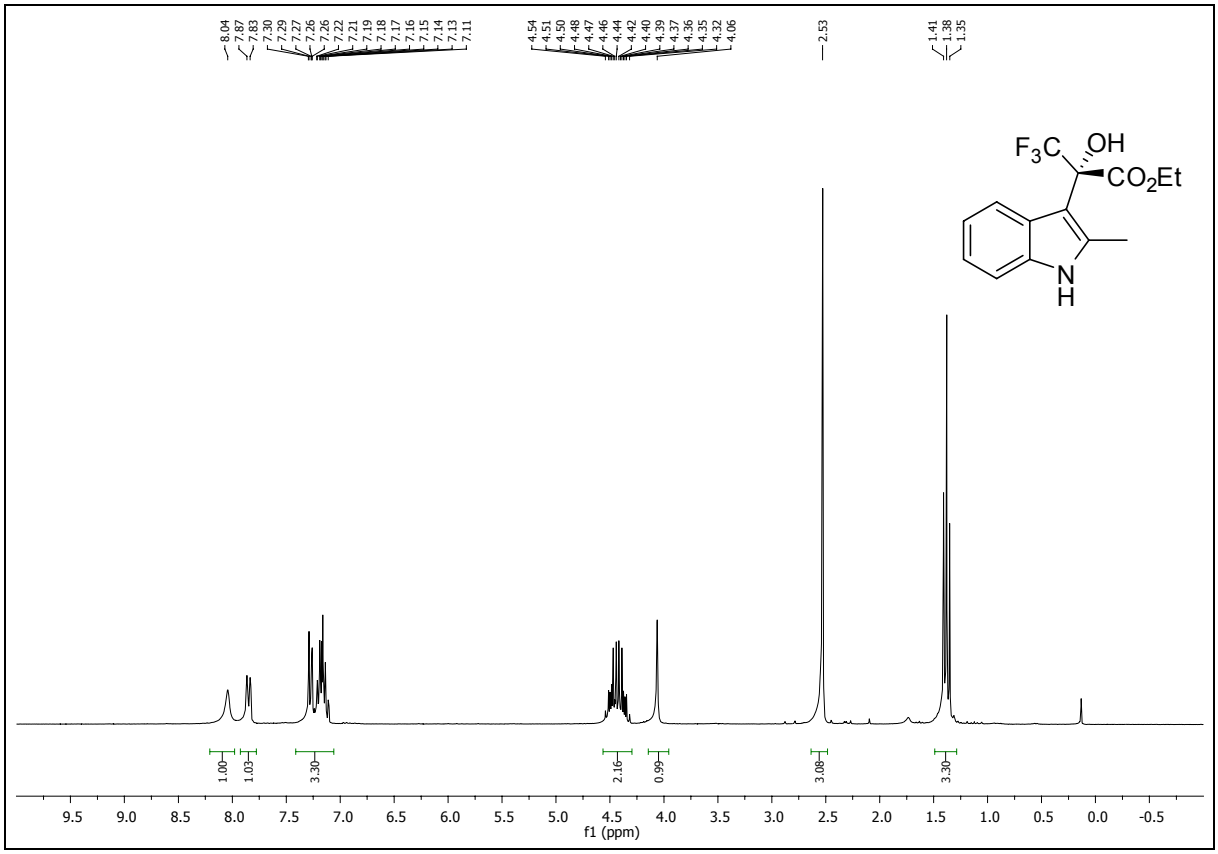
^{1}H NMR ($CDCl_3$, 250 MHz) of 3a



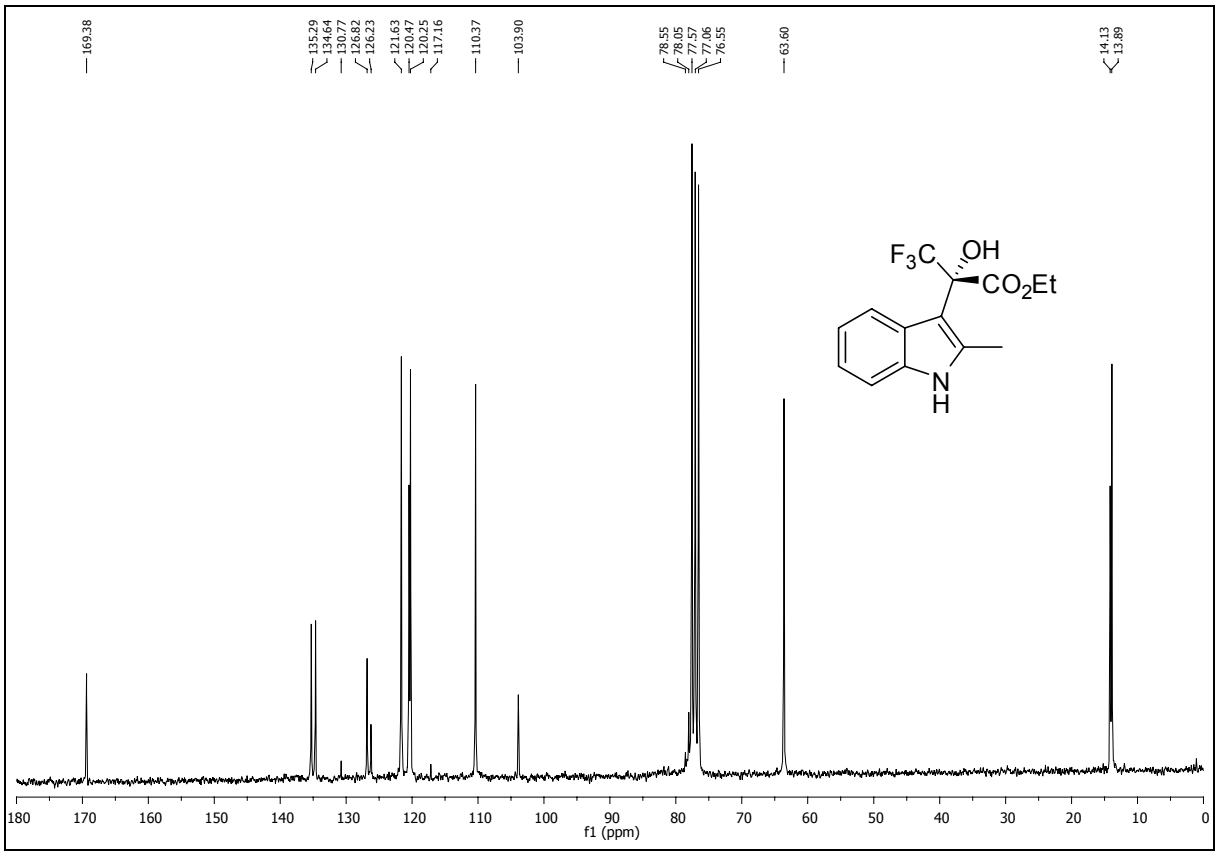
^{1}H NMR ($CDCl_3$, 250 MHz) of 3b



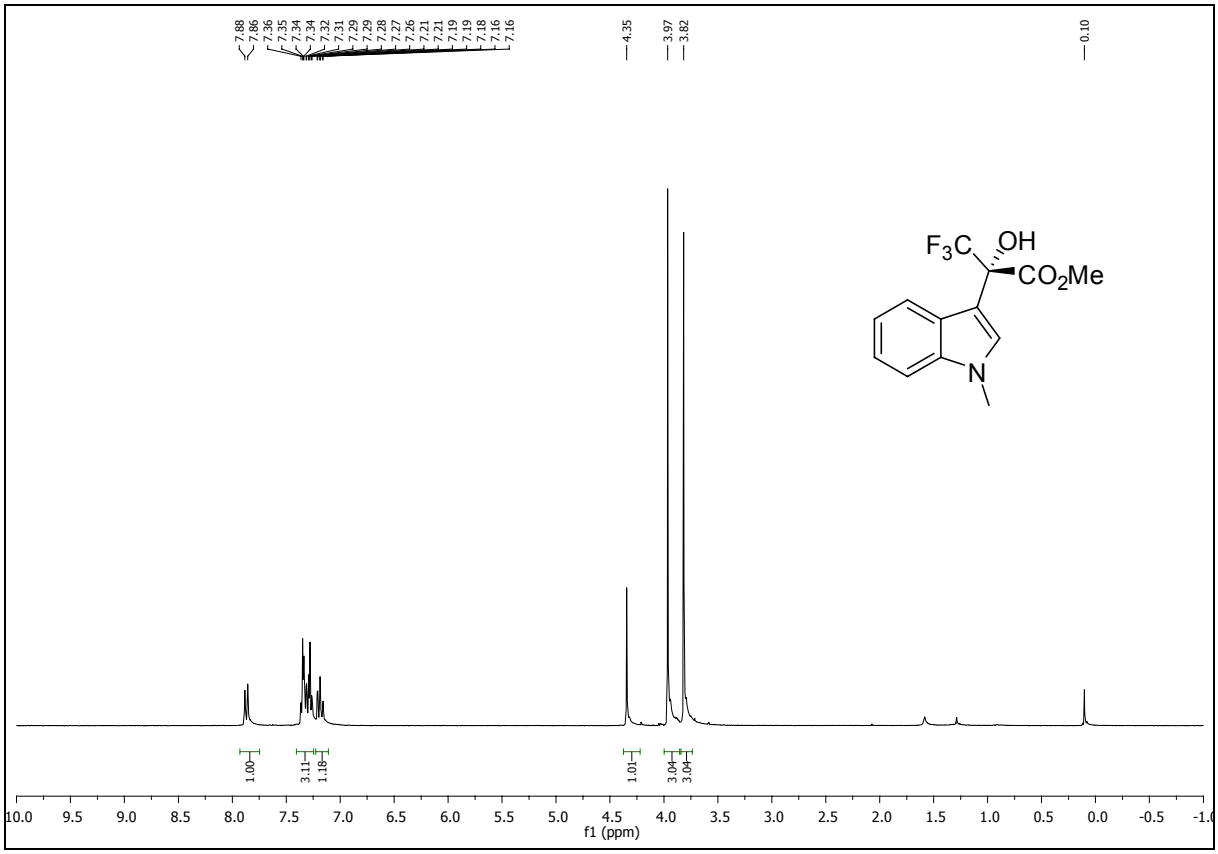
^{1}H NMR ($CDCl_3$, 250 MHz) of 3c



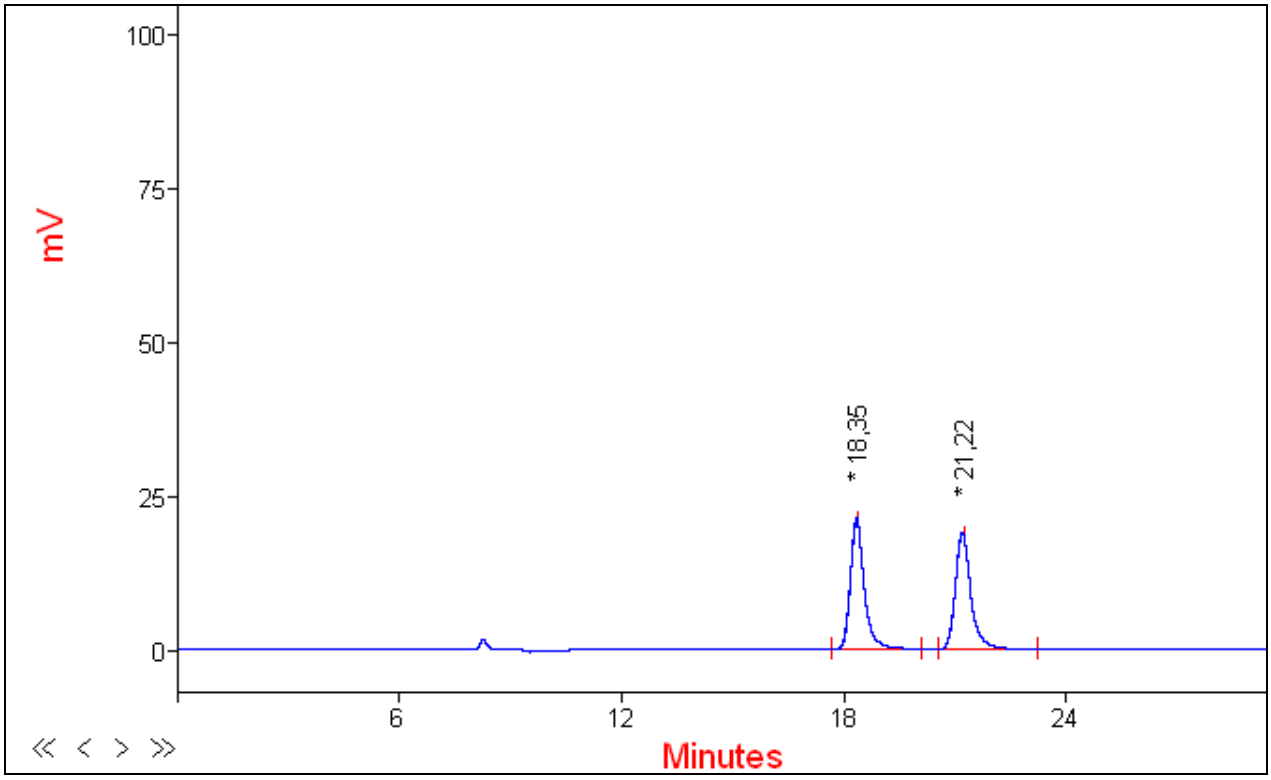
^{13}C NMR ($CDCl_3$, 63 MHz) of 3c



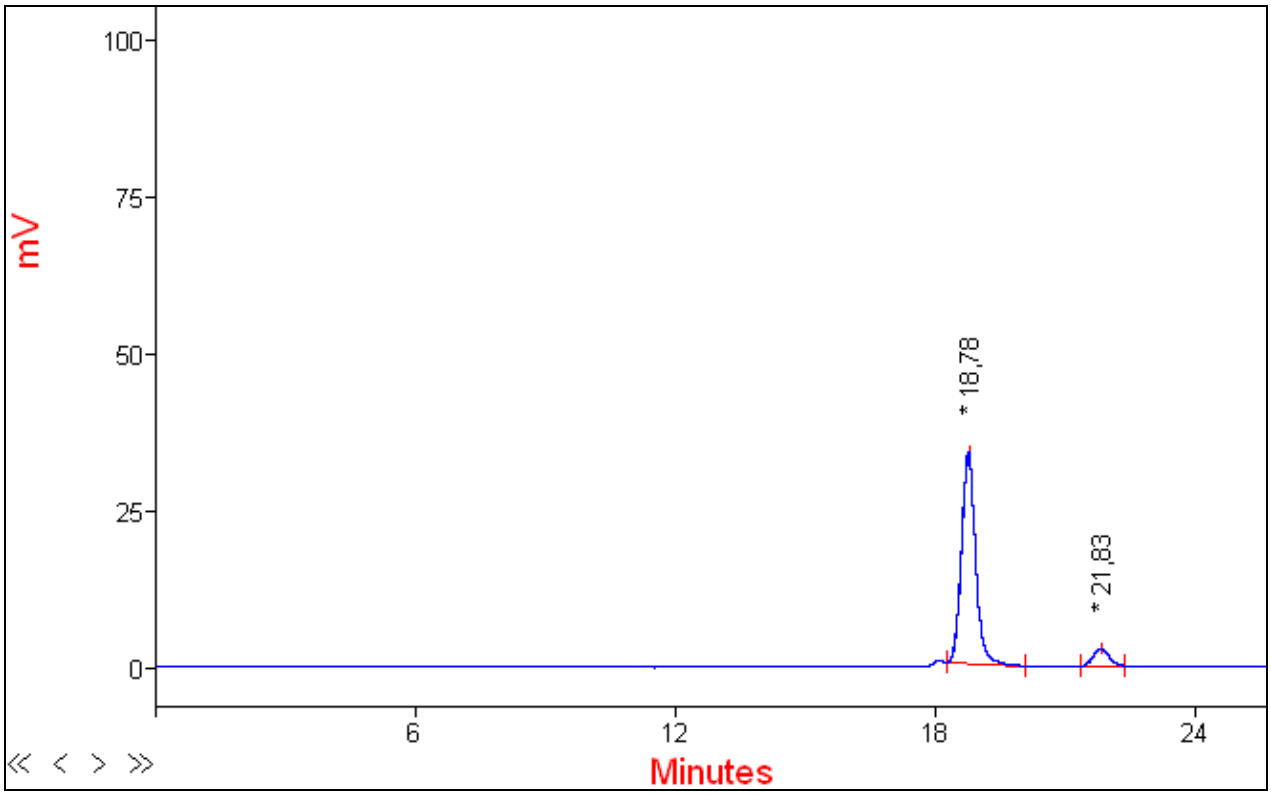
^{1}H NMR ($CDCl_3$, 300 MHz) of 3d



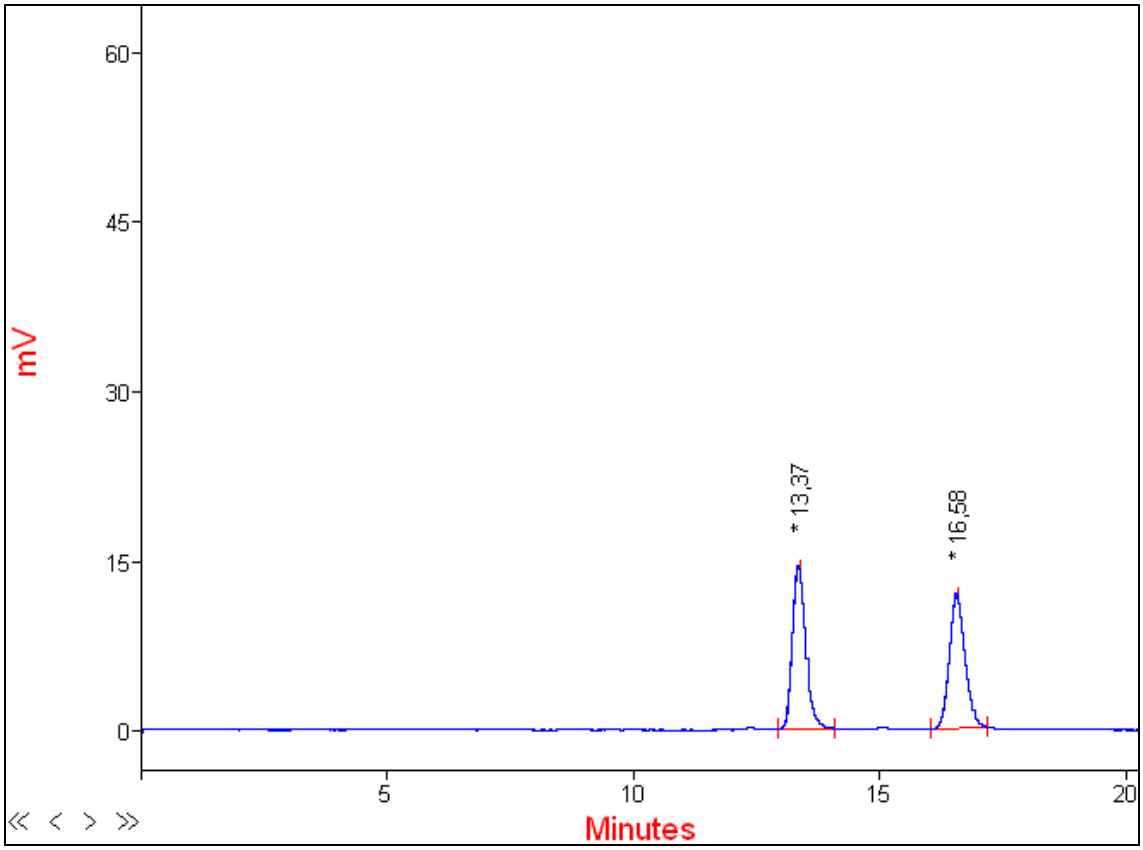
HPLC of 3a (racemic mixture)



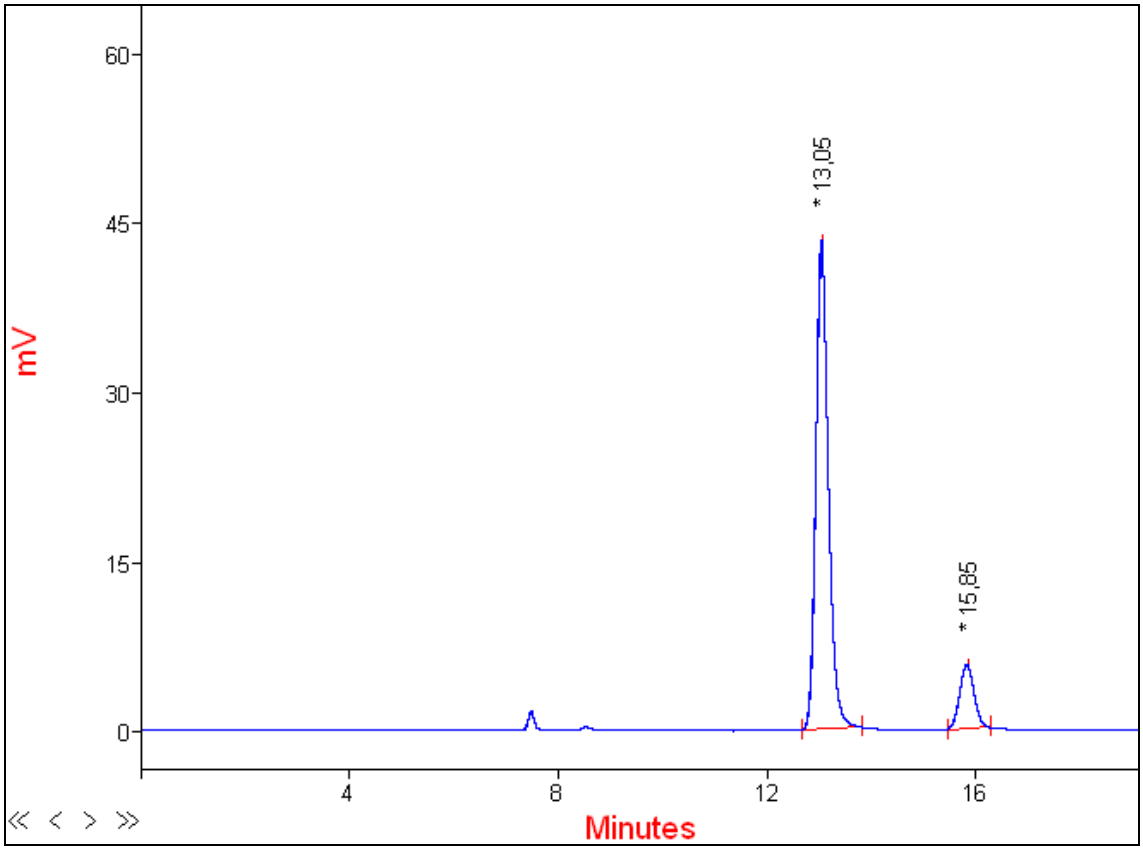
HPLC of (*S*)-3a (82% ee)



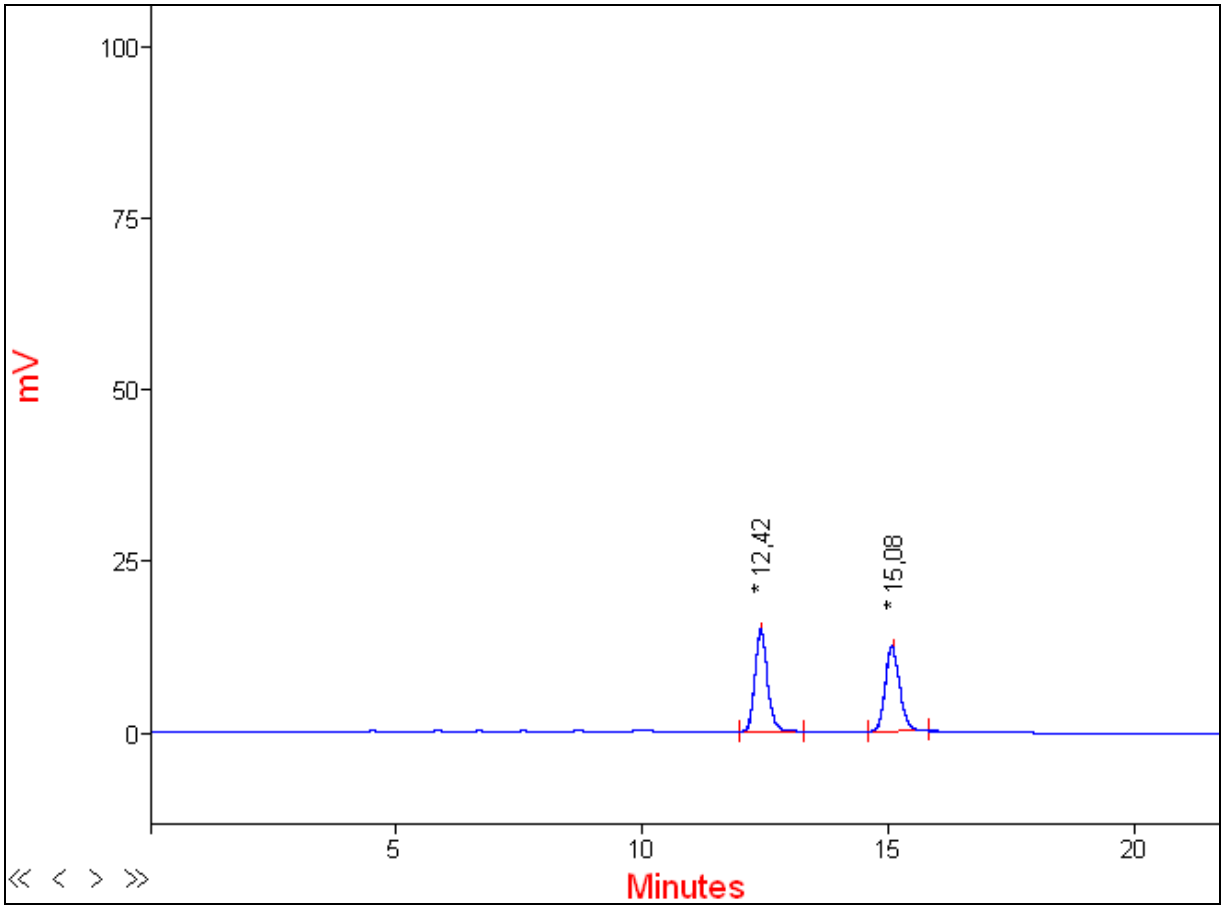
HPLC of 3b (racemic mixture)



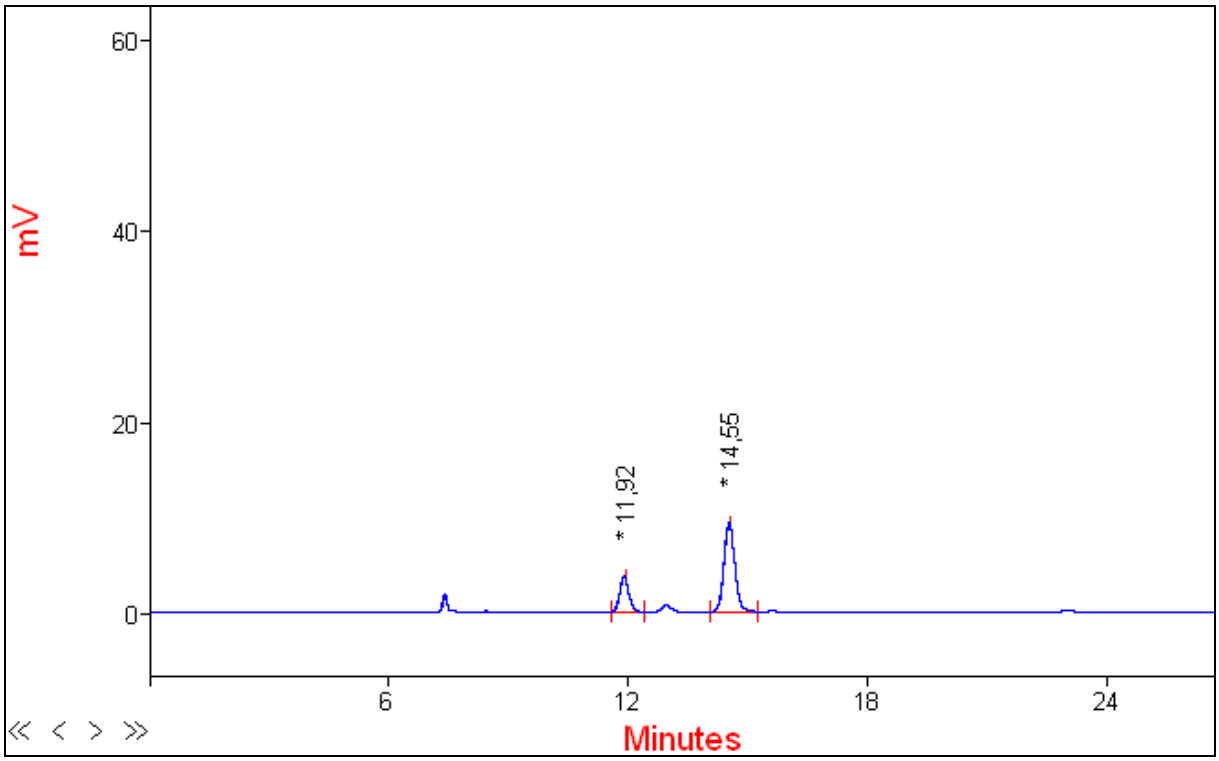
HPLC of (*S*)-3b (74% ee)



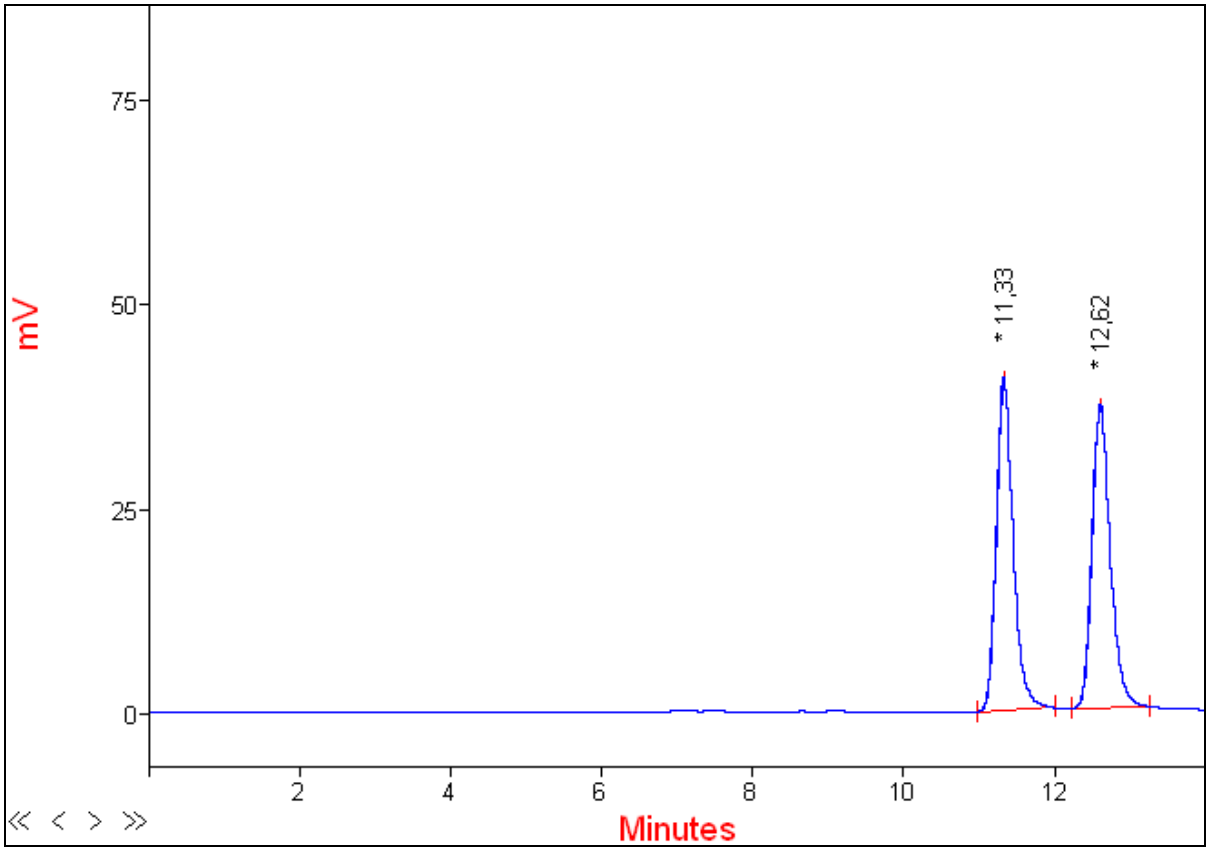
HPLC of 3c (racemic mixture)



HPLC of 3c (51% ee)



HPLC of 3d (racemic mixture)



HPLC of (*S*)-3d (79% ee)