

Supporting information for

**ENANTIOSELECTIVE EPOXIDE RING OPENING CATALYZED BY
BIS(TETRAHYDROISOQUINOLYL) *N,N'*-DIOXIDES.**

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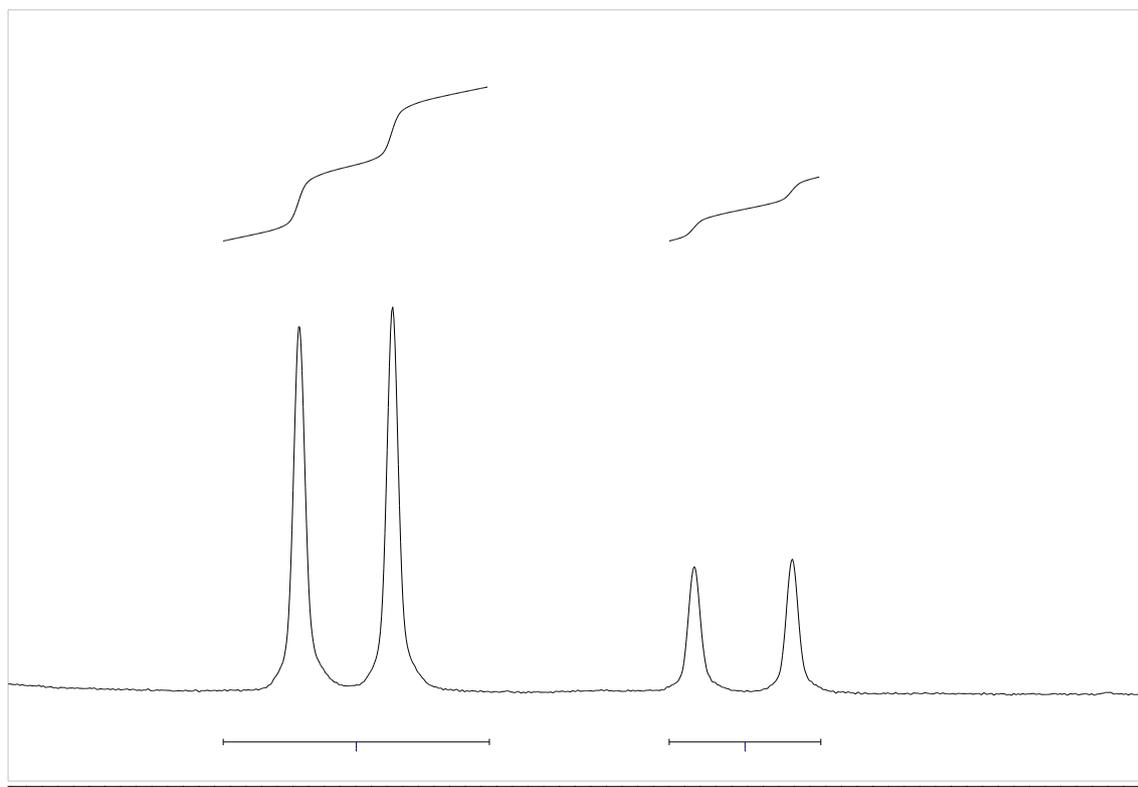
1. General methods

General procedure for the preparation of Mosher's esters. To a solution of a chlorohydrine (0.04 mmol) and DMAP (0.2 mmol, 24 mg) in CH₂Cl₂ (2 mL) (*R*)-(-)- α -methoxy- α -(trifluoromethyl)phenylacetic chloride (0.04 mmol, 10.1 mg) was added under argon at room temperature and the reaction mixture was stirred overnight. Then the reaction was quenched with a saturated aqueous solution of NH₄Cl (5 mL), washed with a saturated aqueous solution of NaHCO₃, and extracted by ether (3 \times 5 mL). The combined organic fractions were dried over MgSO₄ and volatiles were removed under reduced pressure. The crude product was used for determination of the diastereoisomeric ratio without further purification to avoid possible amplification of the ee.

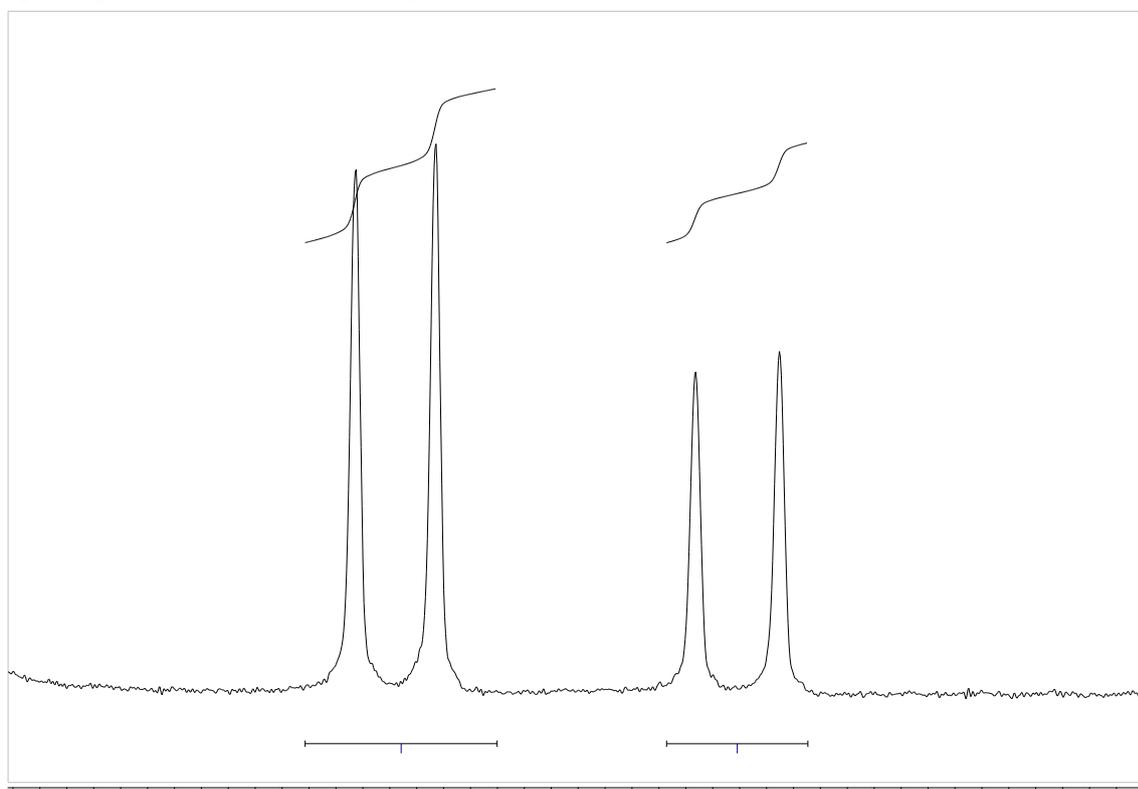
2. Copies of ^1H or ^{19}F spectra showing enantiomer ratio

2.1 Opening of **3a** to **4a** catalyzed by (*R,R*_{ax})-**1a** or (*R,S*_{ax})-**1b**

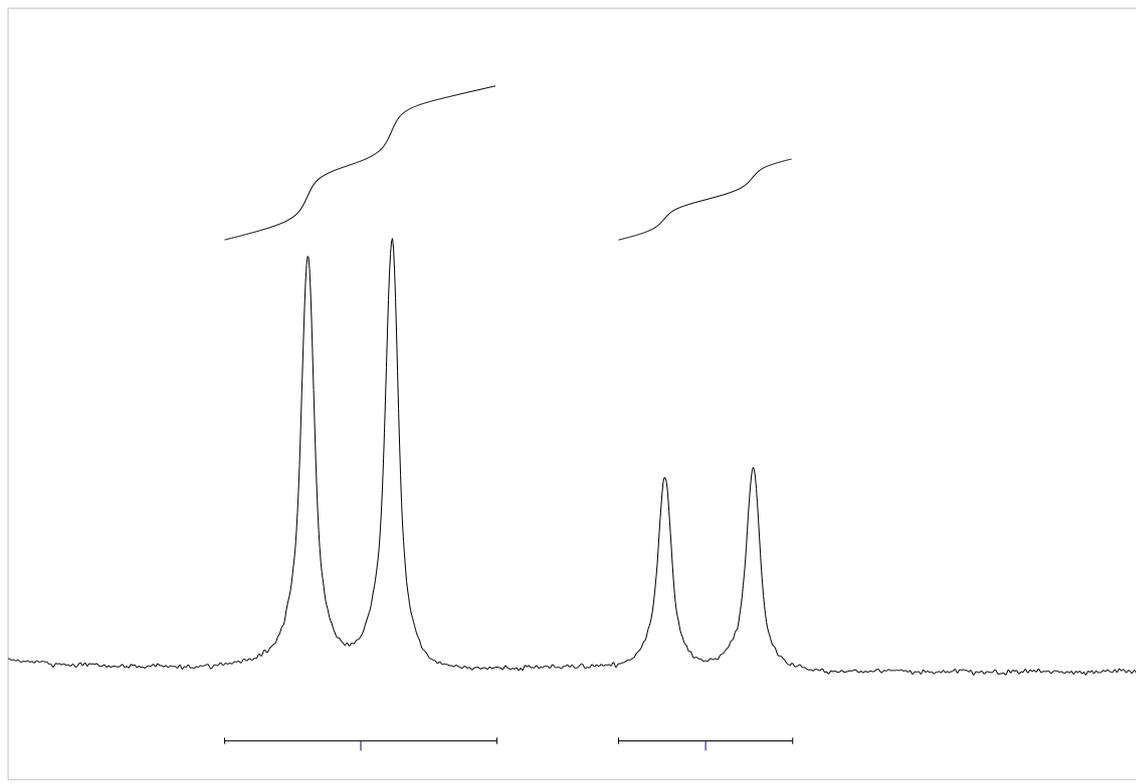
Opening of **3a** to **4a** catalyzed by (*R,R*_{ax})-**1a** in CH_2Cl_2 (^1H NMR)



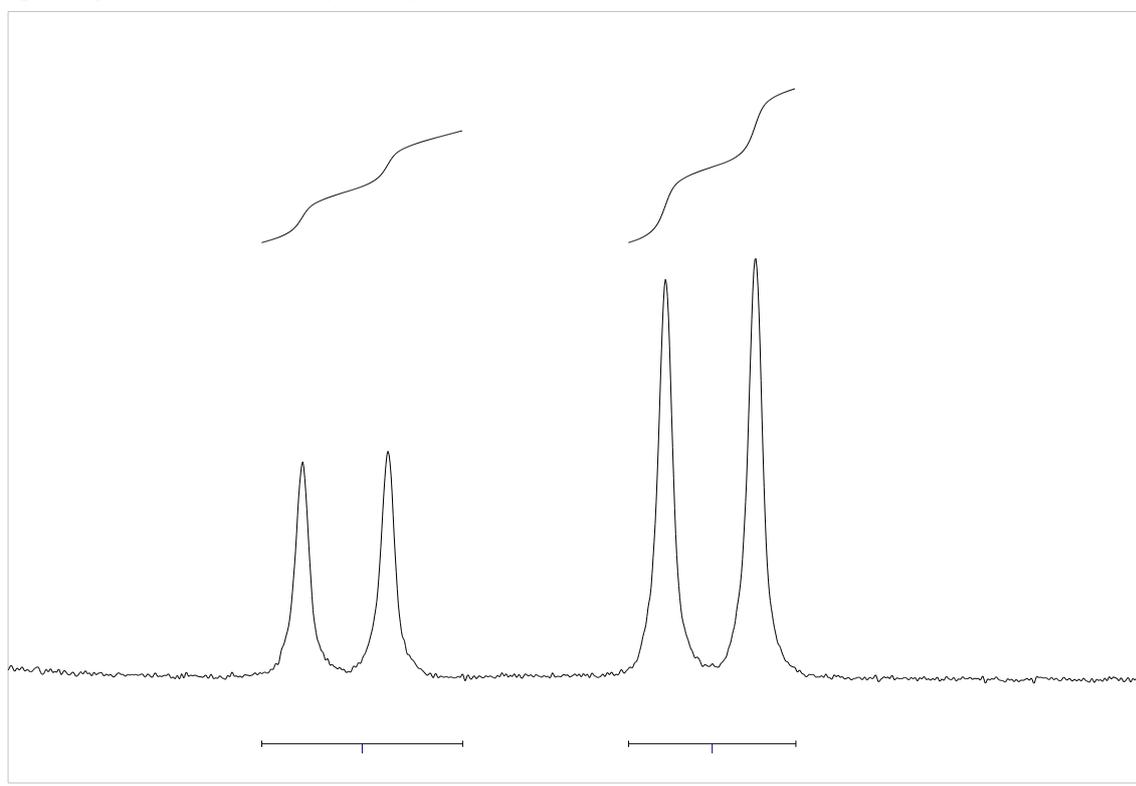
Opening of **3a** to **4a** catalyzed by (*R,R*_{ax})-**1a** in MeCN (^1H NMR)



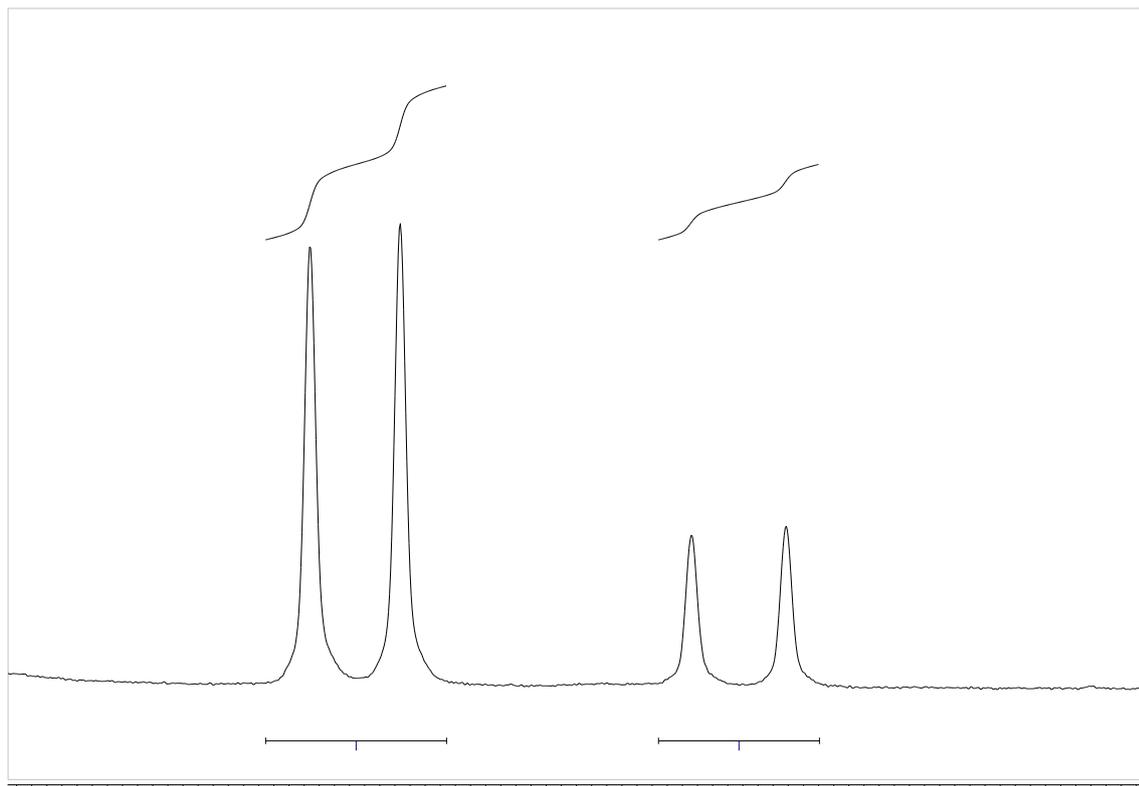
Opening of **3a** to **4a** catalyzed by (*R,R*_{ax})-**1a** in THF (¹H NMR)



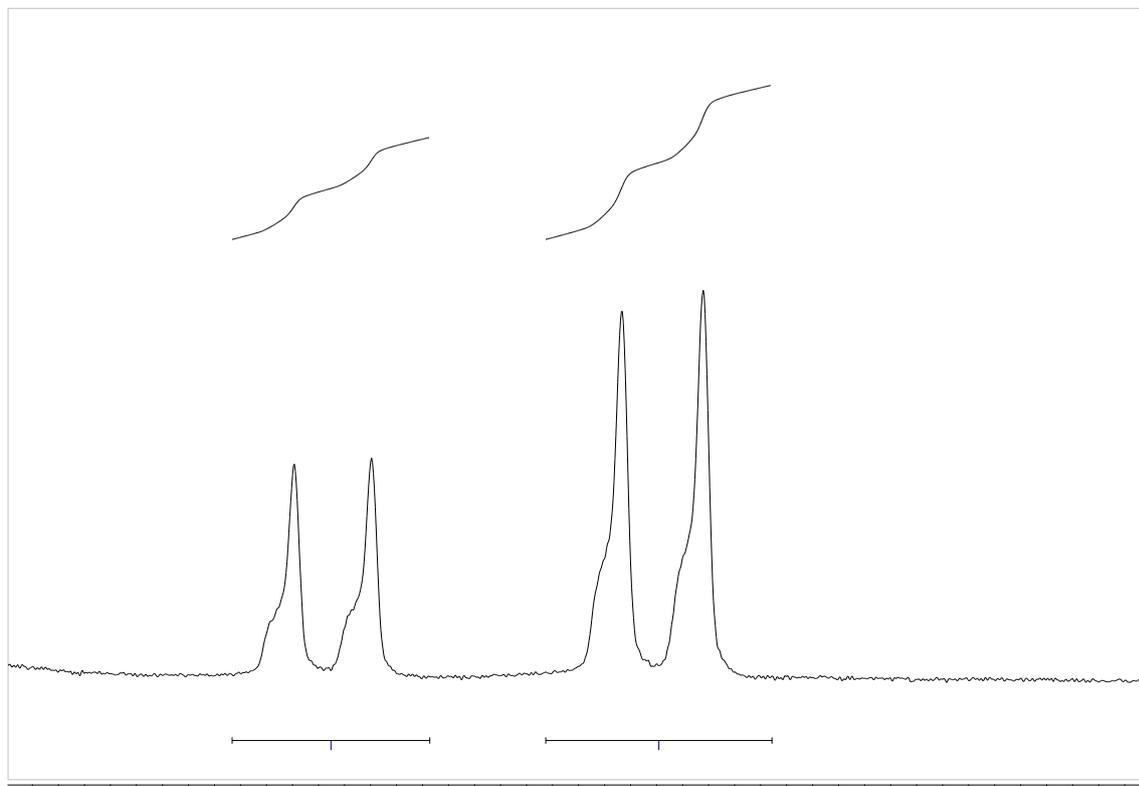
Opening of **3a** to **4a** catalyzed by (*R,R*_{ax})-**1a** in toluene (¹H NMR)



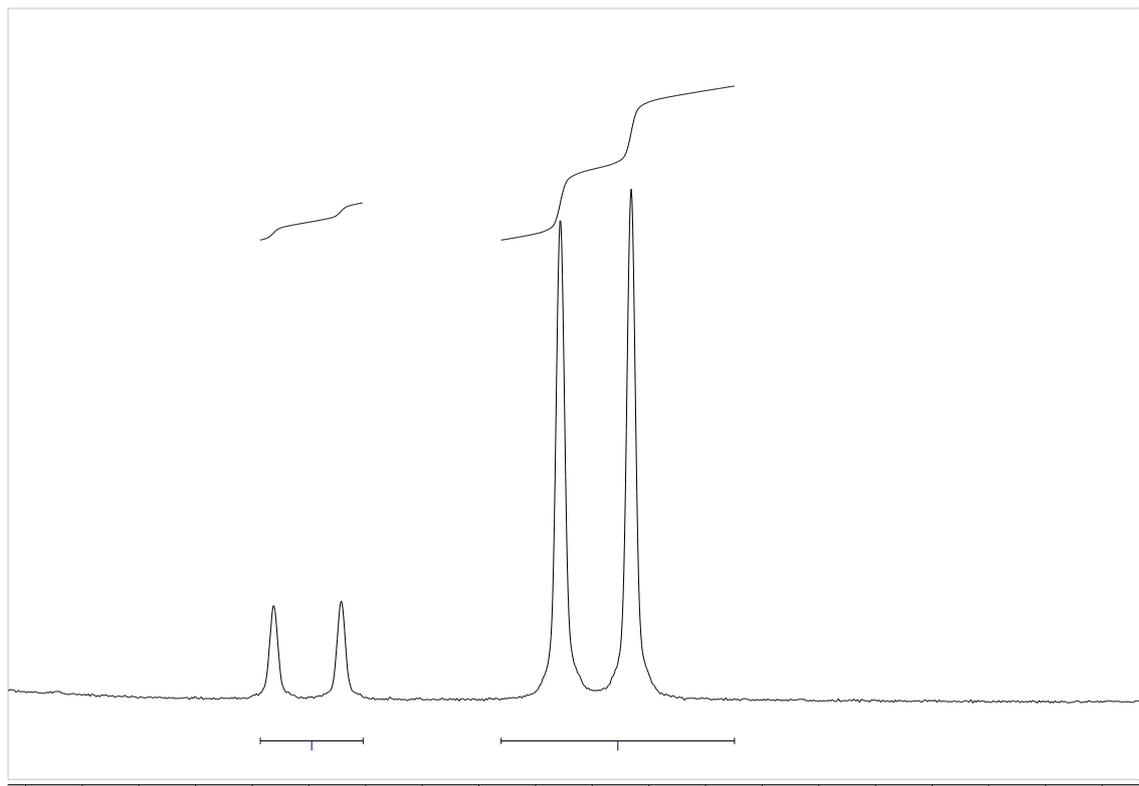
Opening of **3a** to **4a** catalyzed by (*R,R*_{ax})-**1a** in PhCl (¹H NMR)



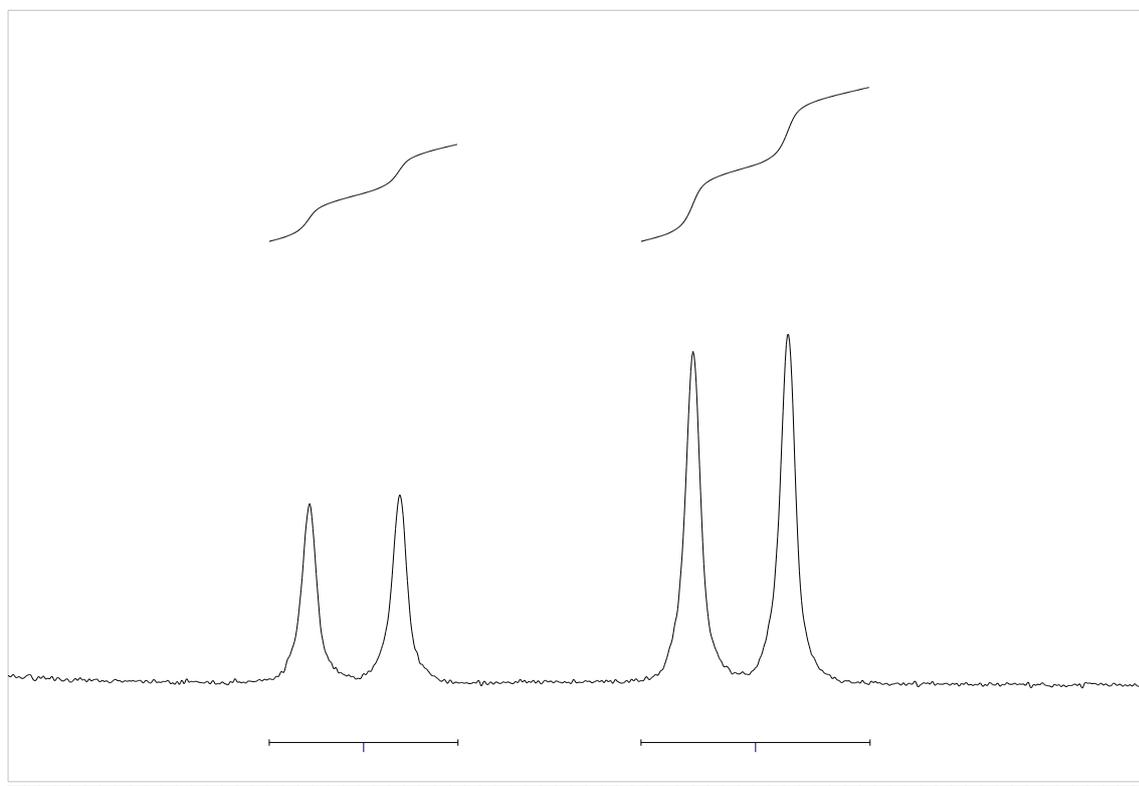
Opening of **3a** to **4a** catalyzed by (*R,S*_{ax})-**1b** in CH₂Cl₂ (¹H NMR)



Opening of **3a** to **4a** catalyzed by (*R,S*_{ax})-**1b** in MeCN (¹H NMR)

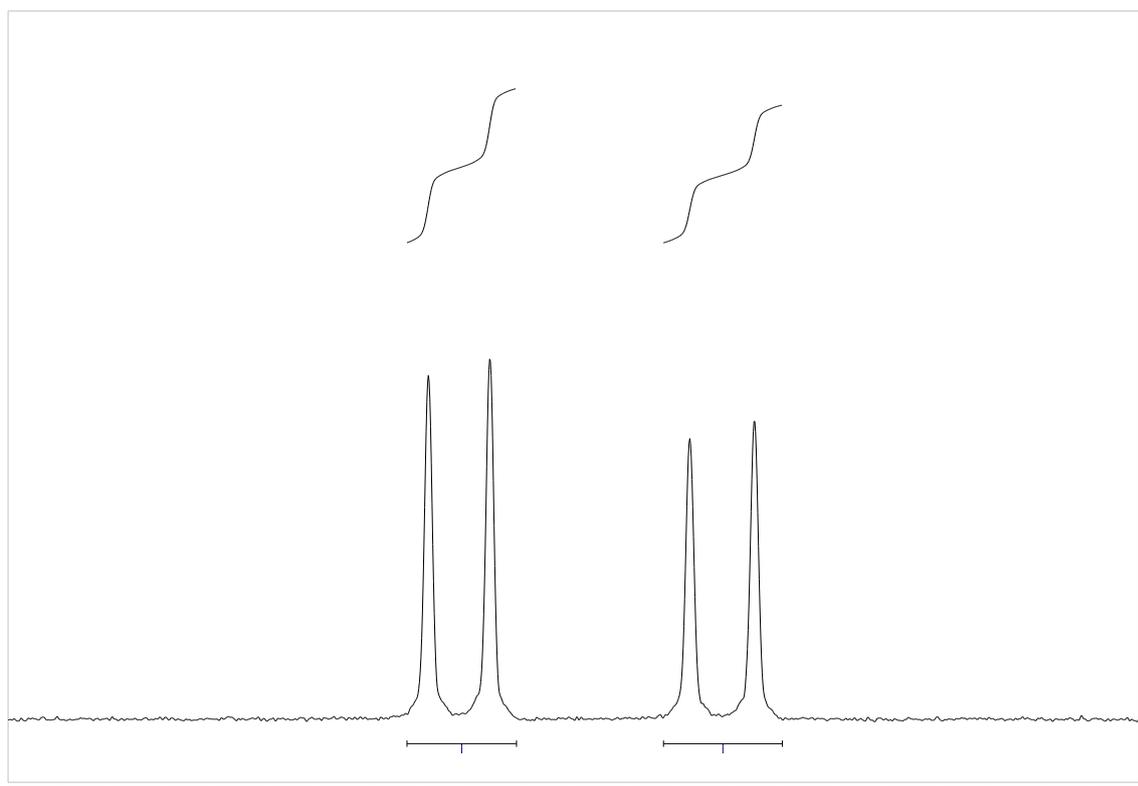


Opening of **3a** to **4a** catalyzed by (*R,S*_{ax})-**1b** in THF (¹H NMR)

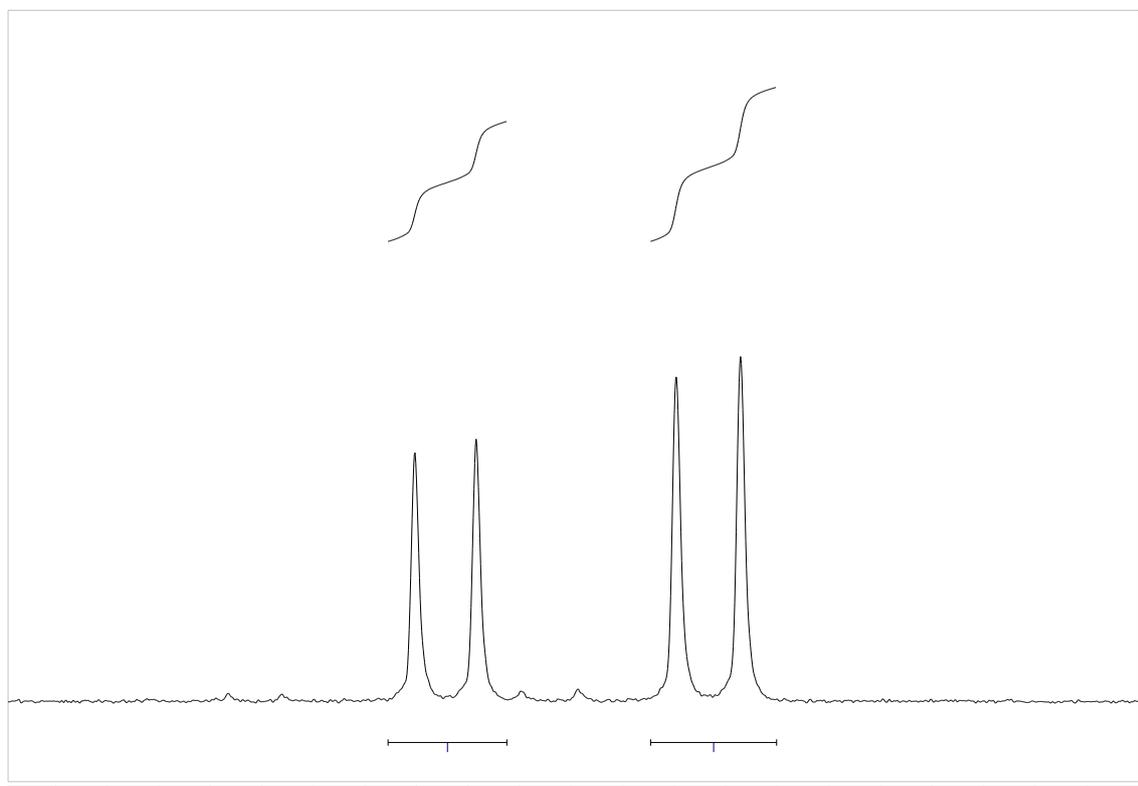


2.2. Opening of **2a** with (*R,R_{ax}*)-**2a** and (*R,S_{ax}*)-**2b**

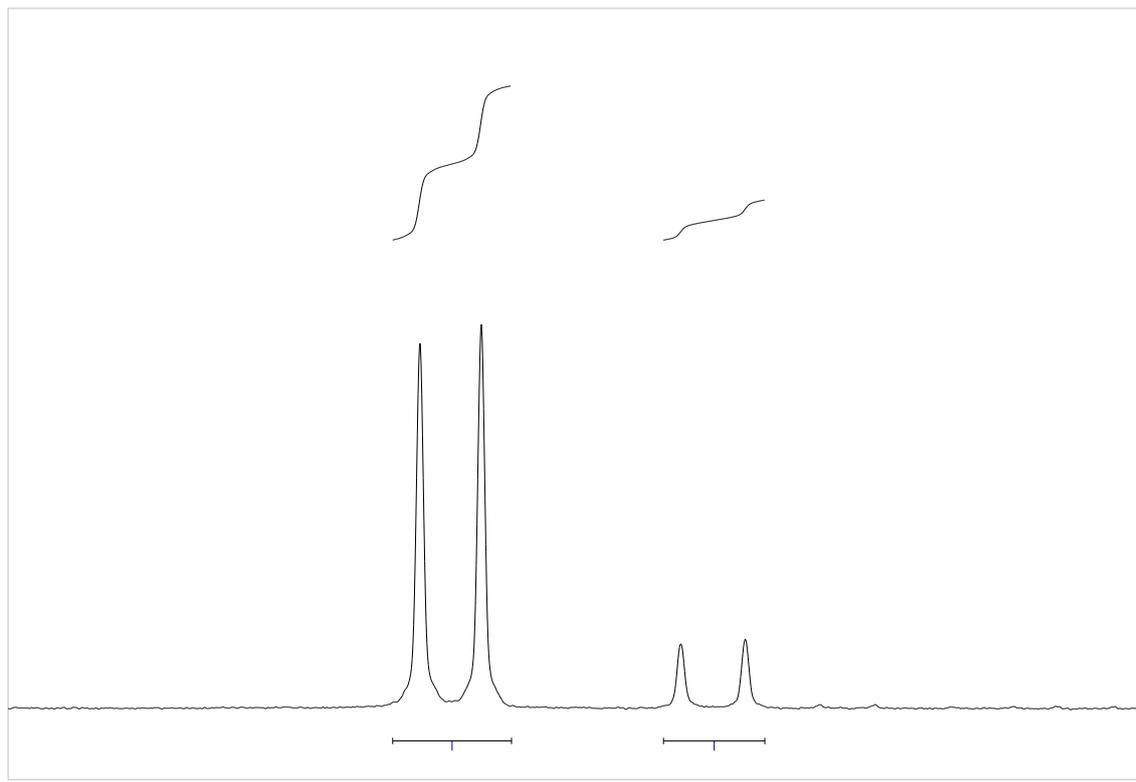
Opening of **3a** to **4a** catalyzed by (*R,R_{ax}*)-**2a** in CH₂Cl₂ (¹H NMR)



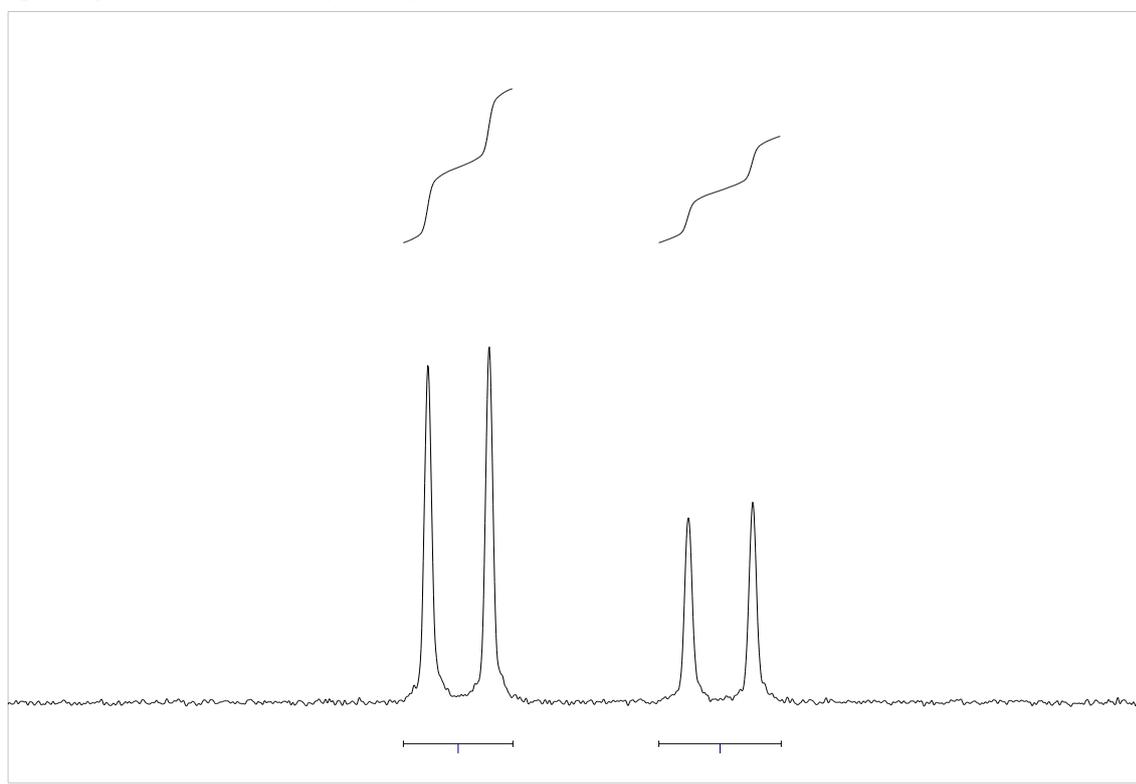
Opening of **3a** to **4a** catalyzed by (*R,R_{ax}*)-**2a** in MeCN (¹H NMR)



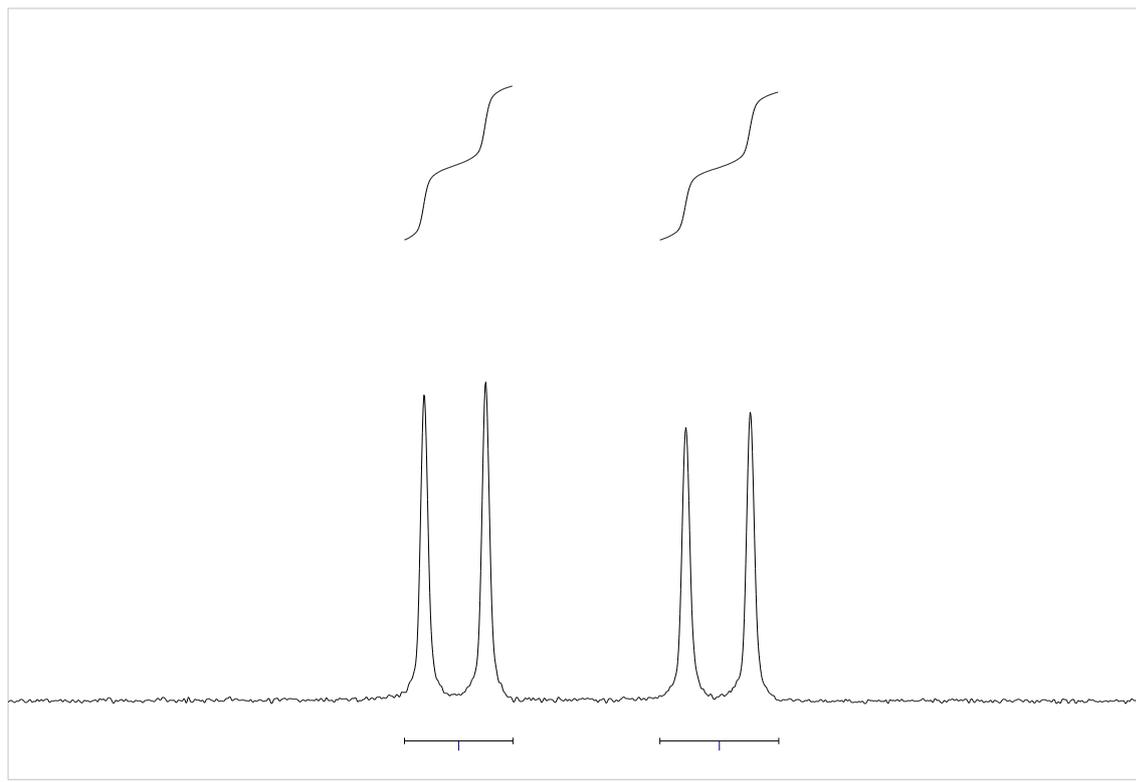
Opening of **3a** to **4a** catalyzed by (*R,R*,*ax*,*R*,)-**2a** in THF (^1H NMR)



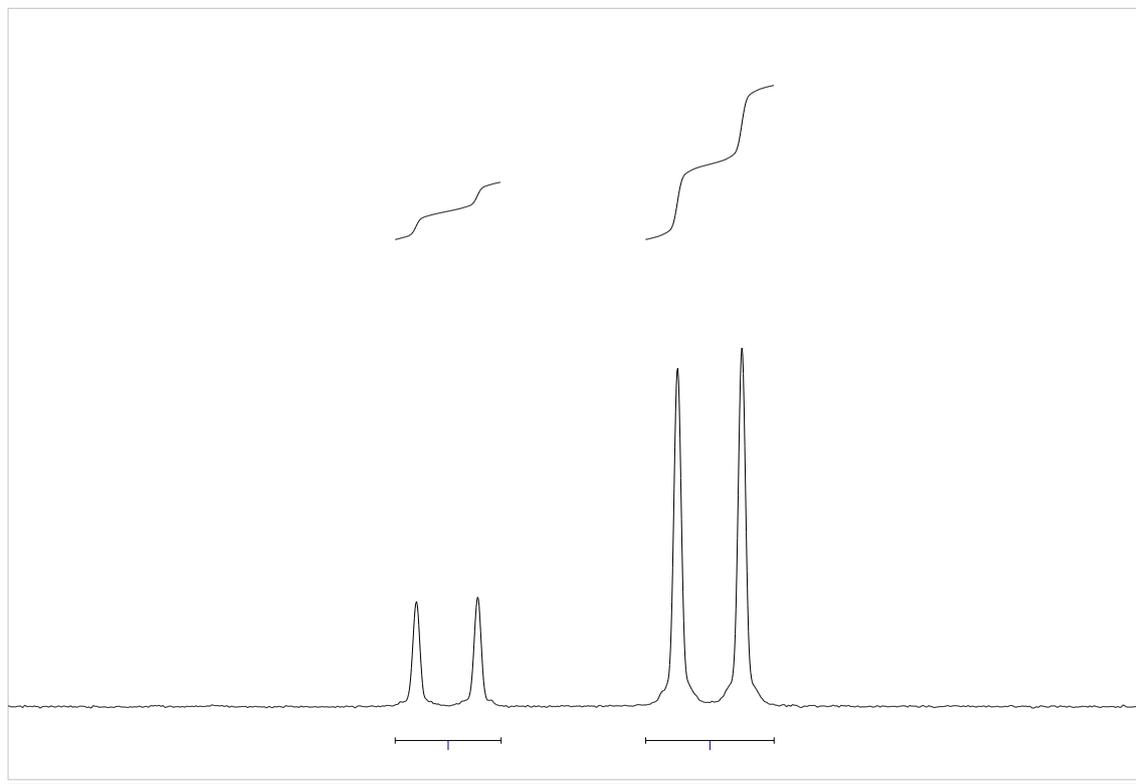
Opening of **3a** to **4a** catalyzed by (*R,R*,*ax*,*R*,)-**2a** in toluene (^1H NMR)



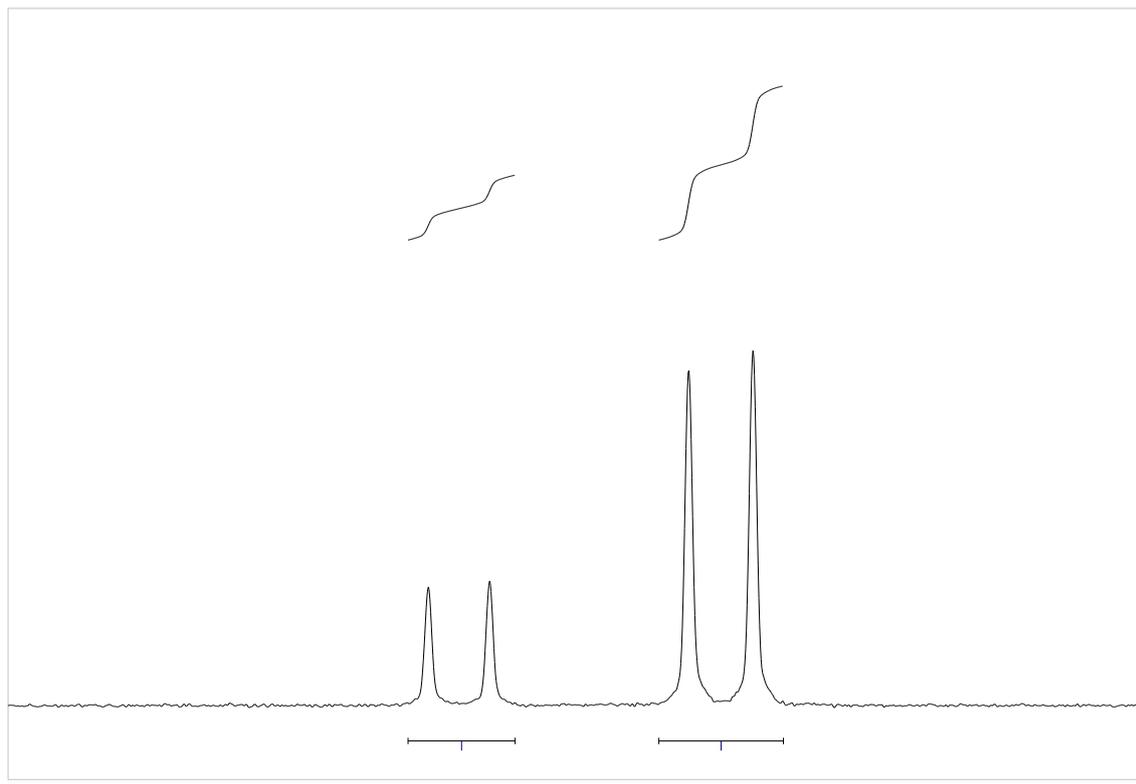
Opening of **3a** to **4a** catalyzed by (*R,R_{ax}*,*R*)-**2a** in PhCl (¹H NMR)



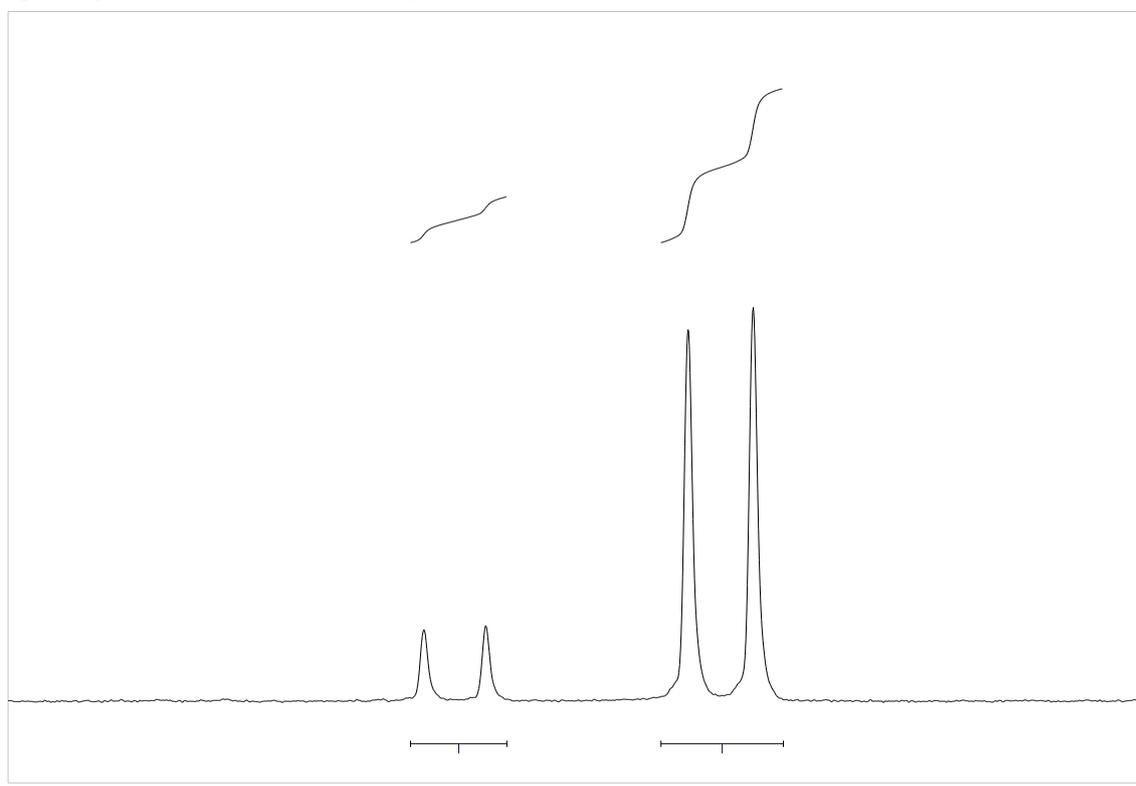
Opening of **3a** to **4a** catalyzed by (*R,S_{ax}*,*R*)-**2b** in CH₂Cl₂ (¹H NMR)



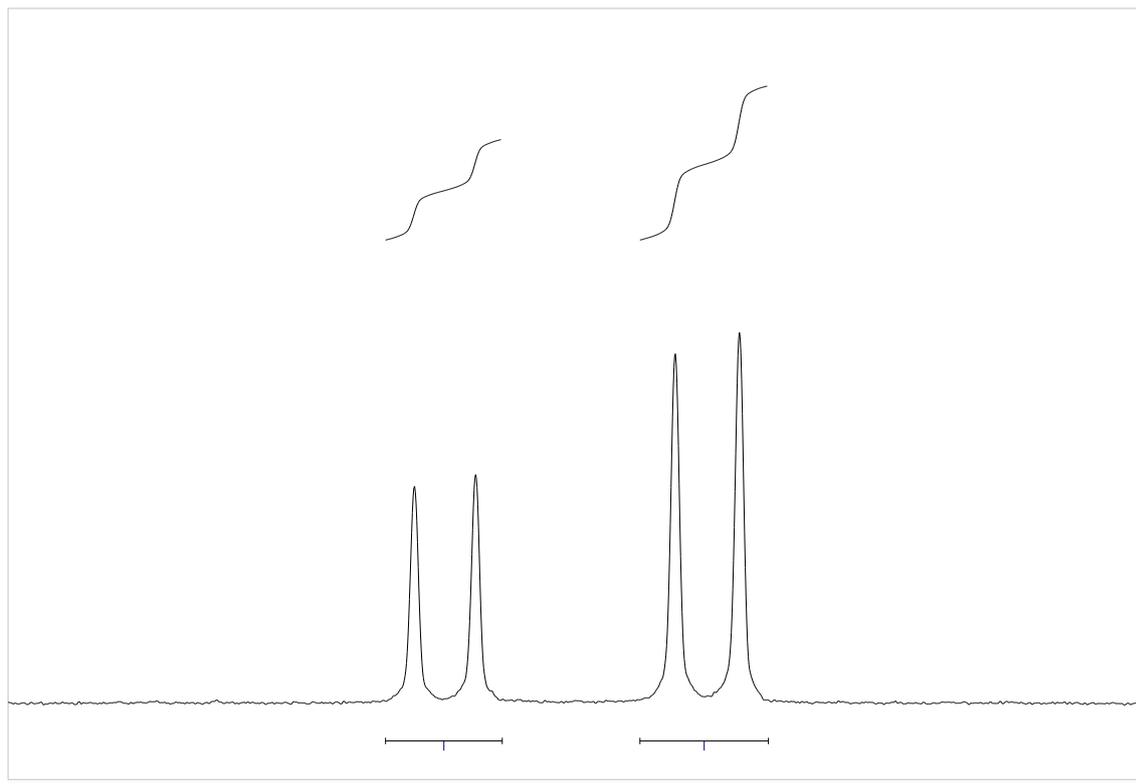
Opening of **3a** to **4a** catalyzed by (*R,S_{ax}*,*R*)-**2b** in MeCN (¹H NMR)



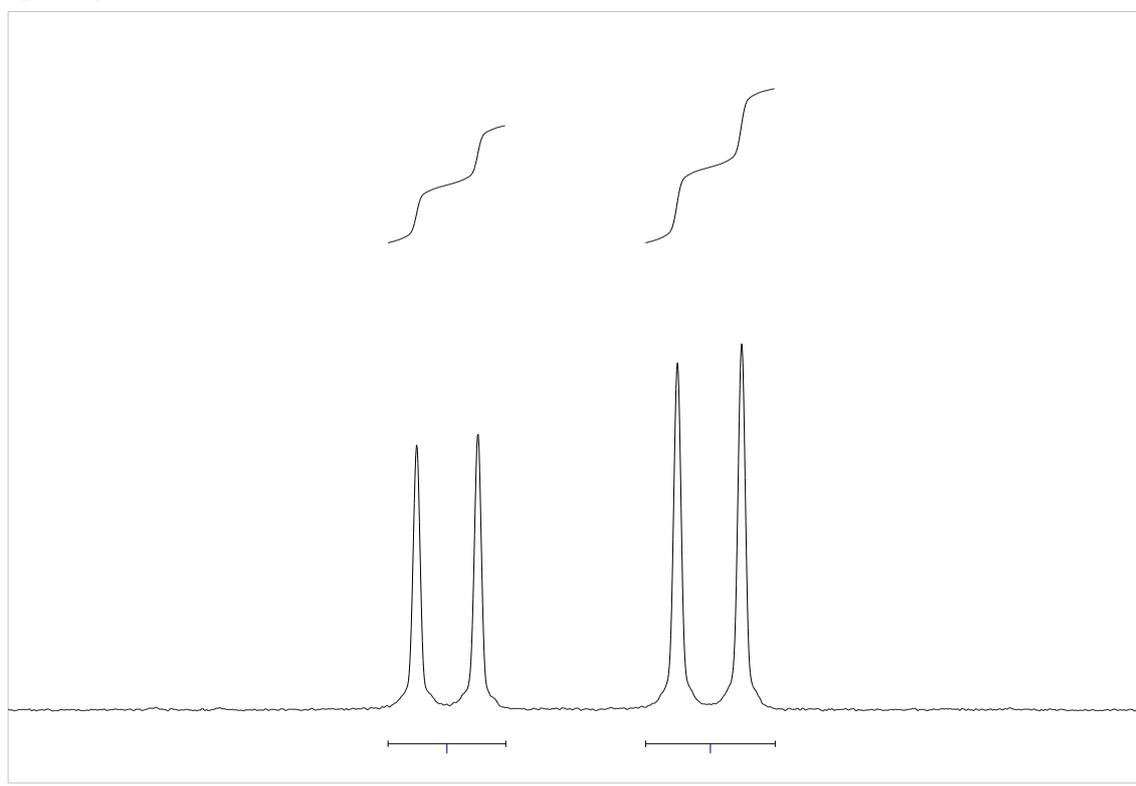
Opening of **3a** to **4a** catalyzed by (*R,S_{ax}*,*R*)-**2b** in THF (¹H NMR)



Opening of **3a** to **4a** catalyzed by (*R,S_{ax}*,*R*)-**2b** in toluene (¹H NMR)

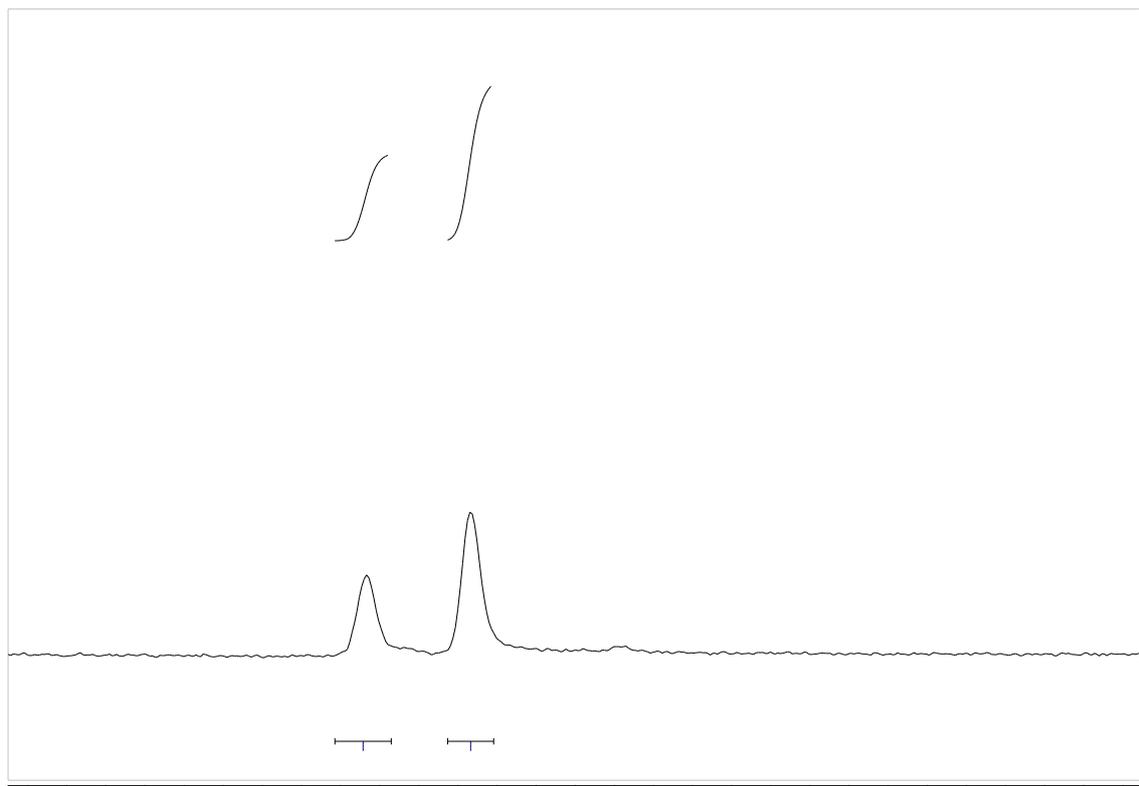


Opening of **3a** to **4a** catalyzed by (*R,S_{ax}*,*R*)-**2b** in PhCl (¹H NMR)

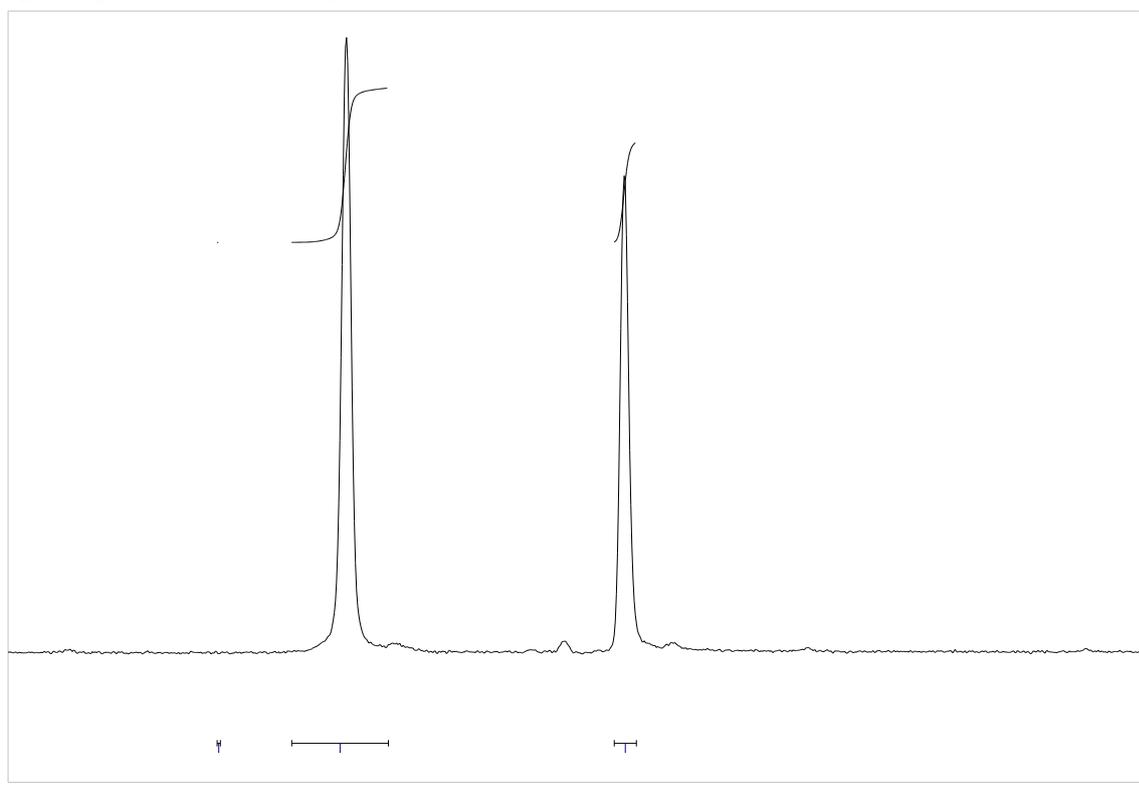


2.3. Opening of **3b-3e** with (*R,R*)-**2a** and (*R,S*)-**2b**

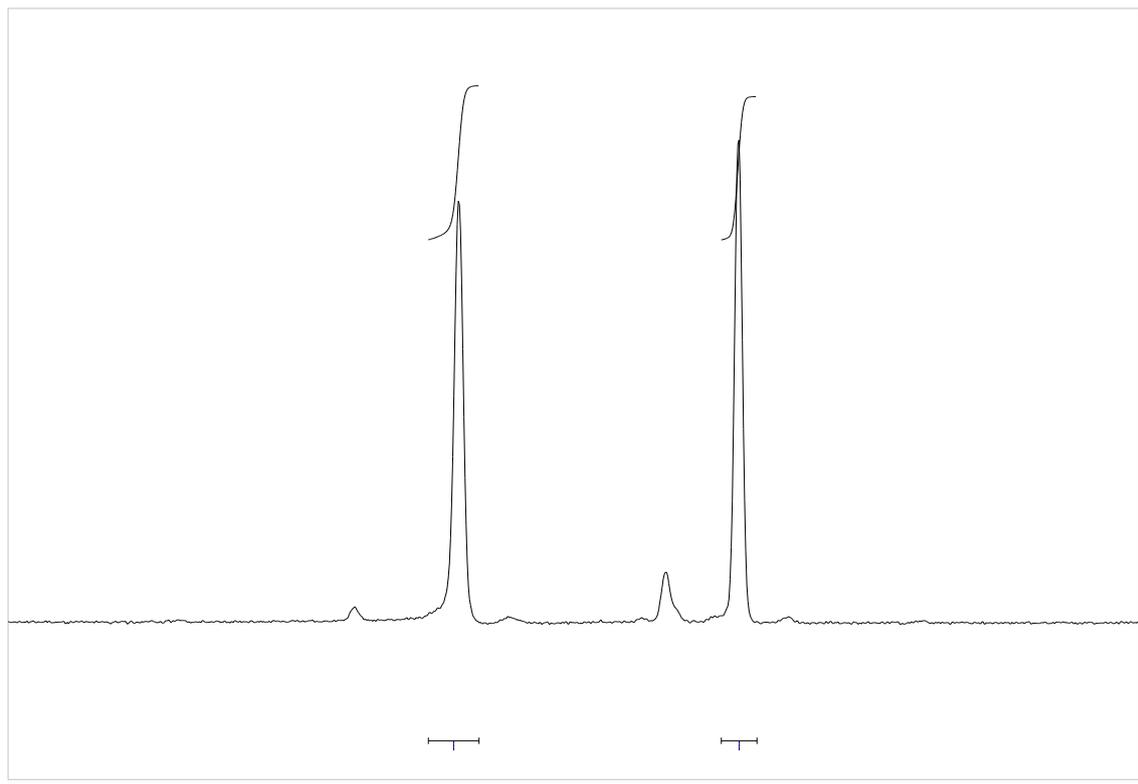
Opening of **3b** to **4b** catalyzed by (*R,R_{ax}*)-**2a** in MeCN (¹⁹F NMR)



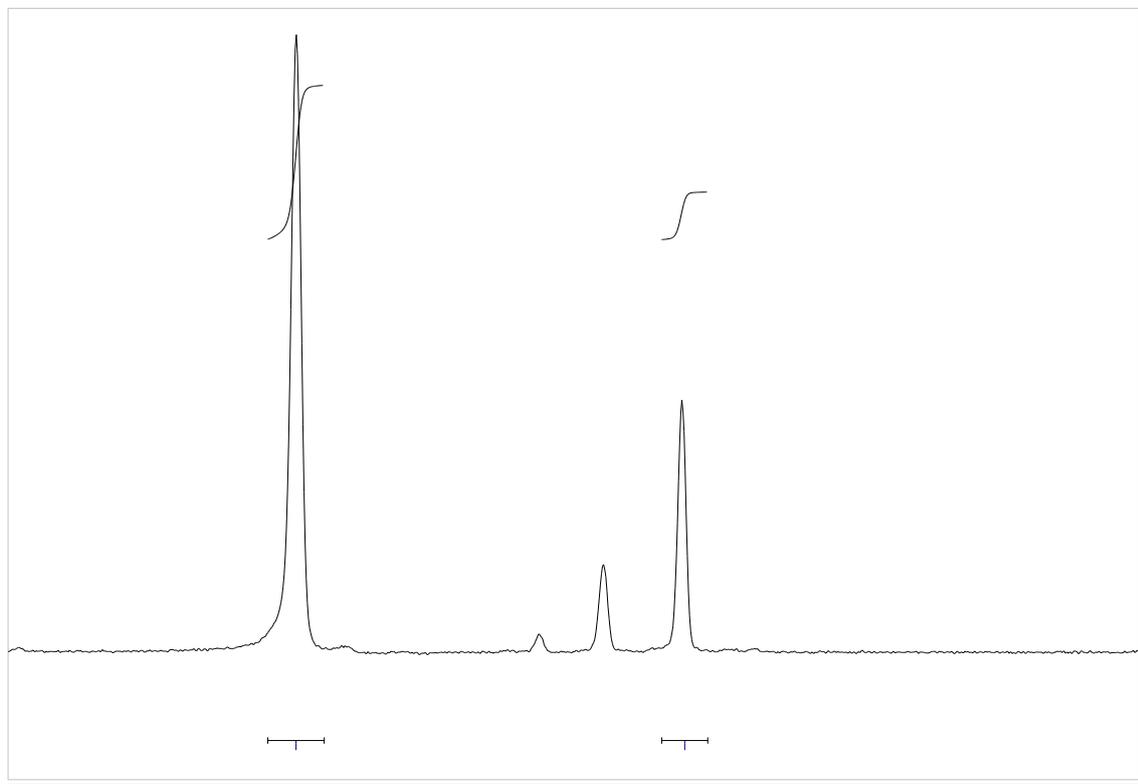
Opening of **3d** to **4d** catalyzed by (*R,R_{ax}*)-**2a** in CH₂Cl₂ (¹⁹F NMR)



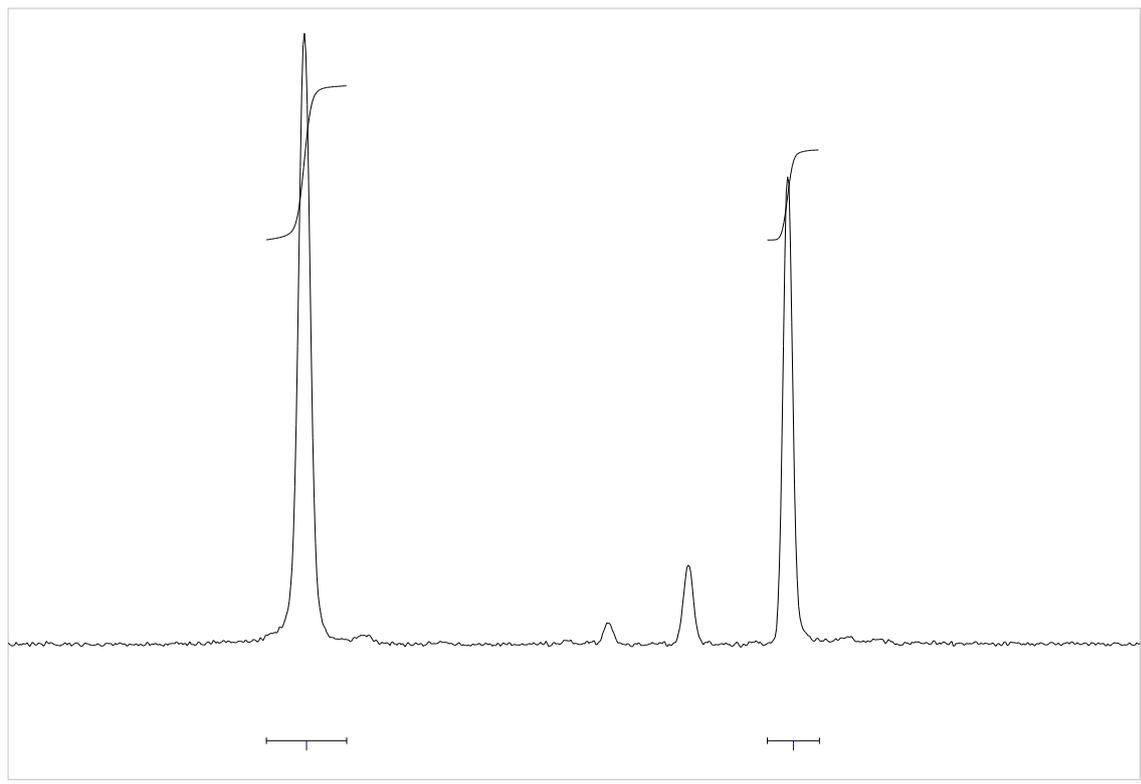
Opening of **3d** to **4d** catalyzed by (*R,R*_{ax})-**2a** in MeCN (¹⁹F NMR)



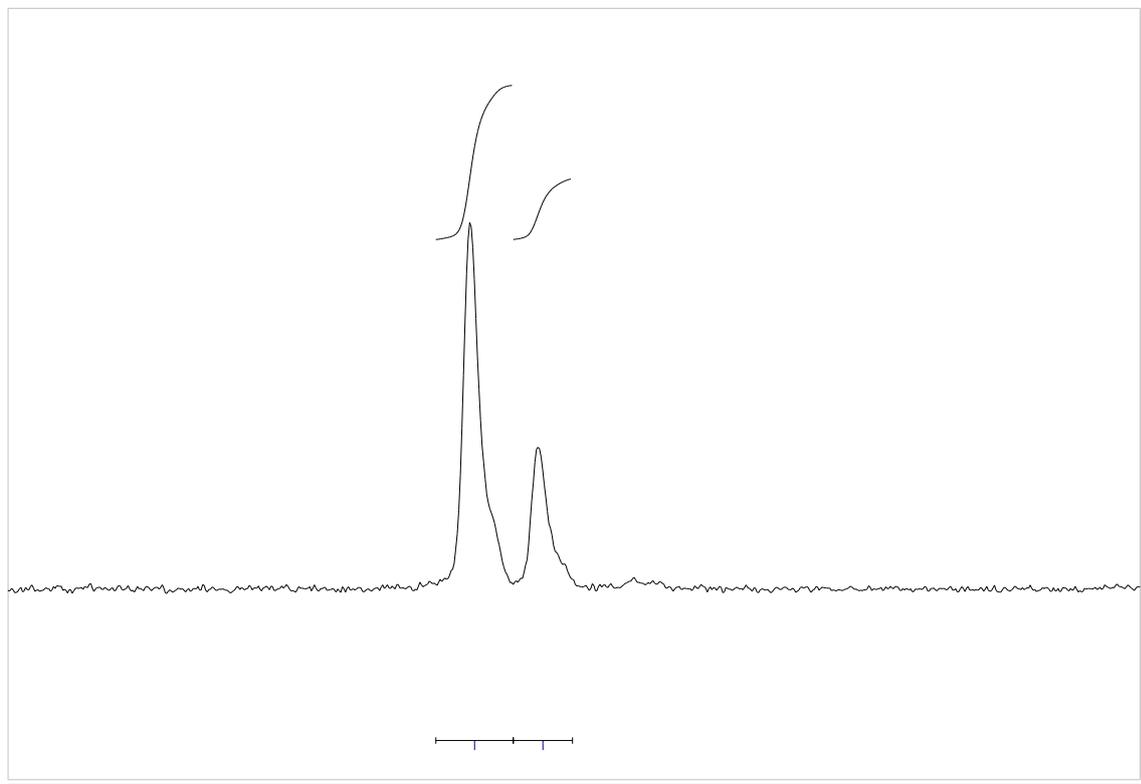
Opening of **3e** to **4e** catalyzed by (*R,R*_{ax})-**2a** in CH₂Cl₂ (¹⁹F NMR)



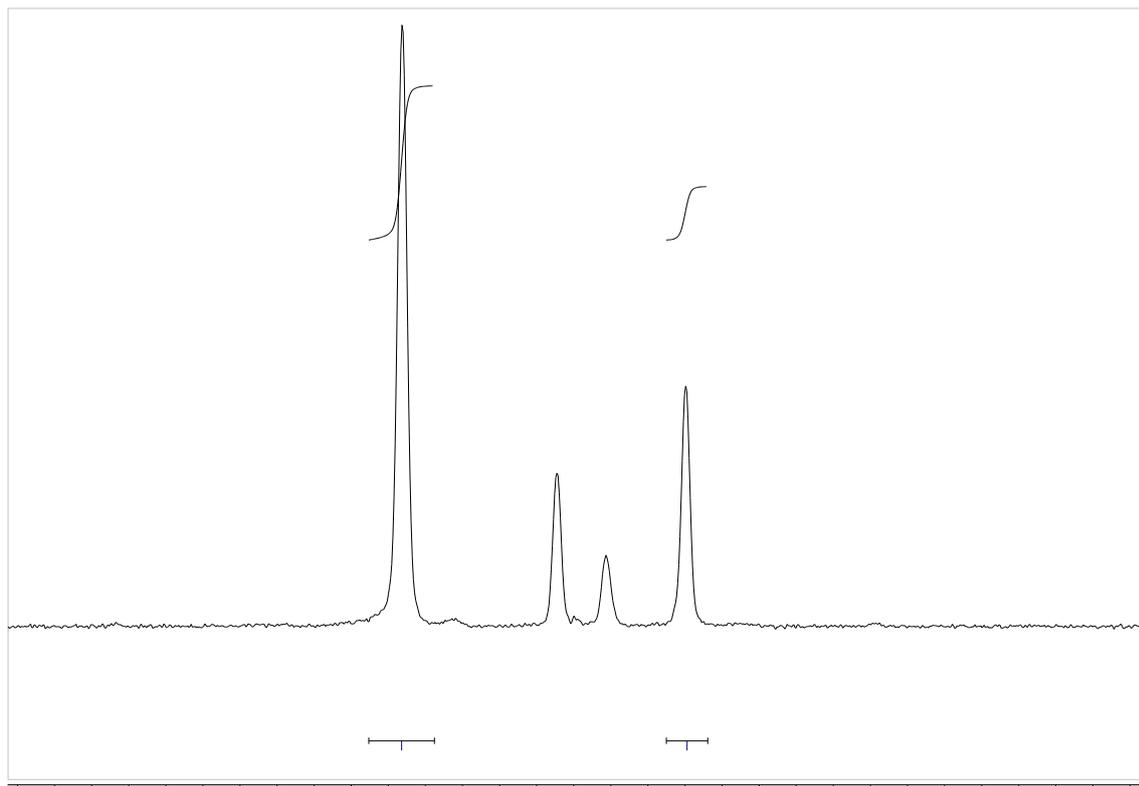
Opening of **3e** to **4e** catalyzed by (*R,R*_{ax})-**2a** in MeCN (¹⁹F NMR)



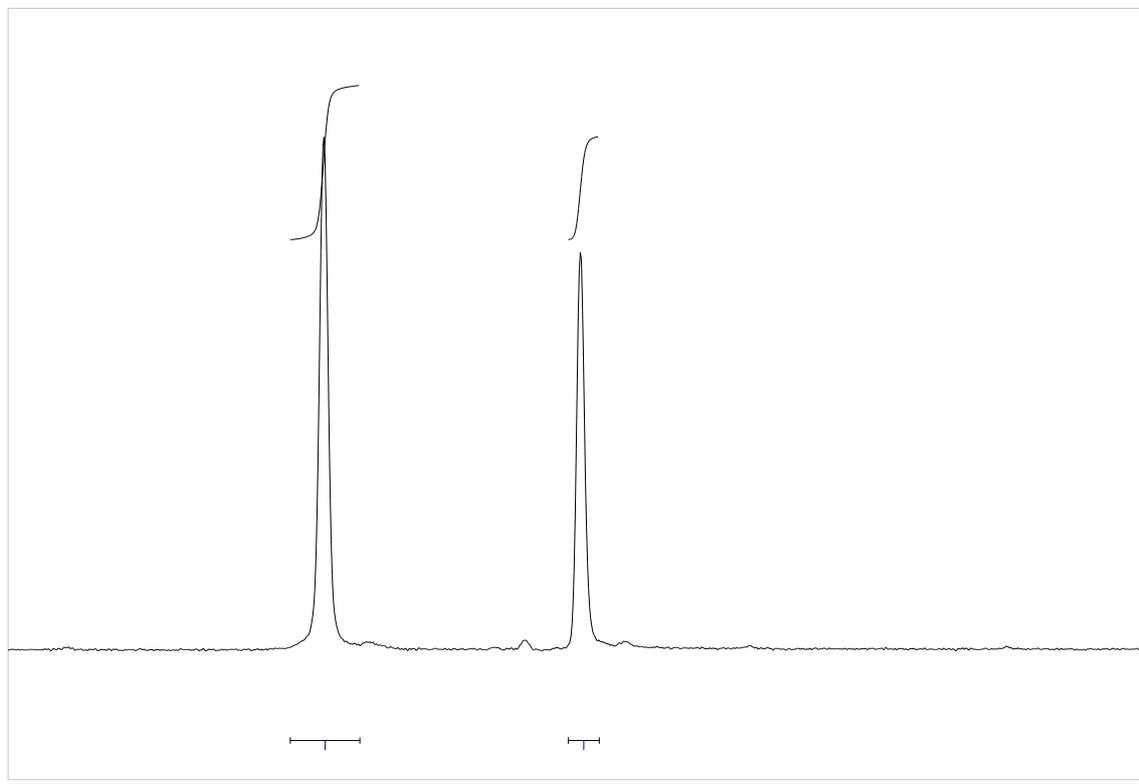
Opening of **3b** to **4b** catalyzed by (*R,S*_{ax})-**2b** in MeCN (¹⁹F NMR)



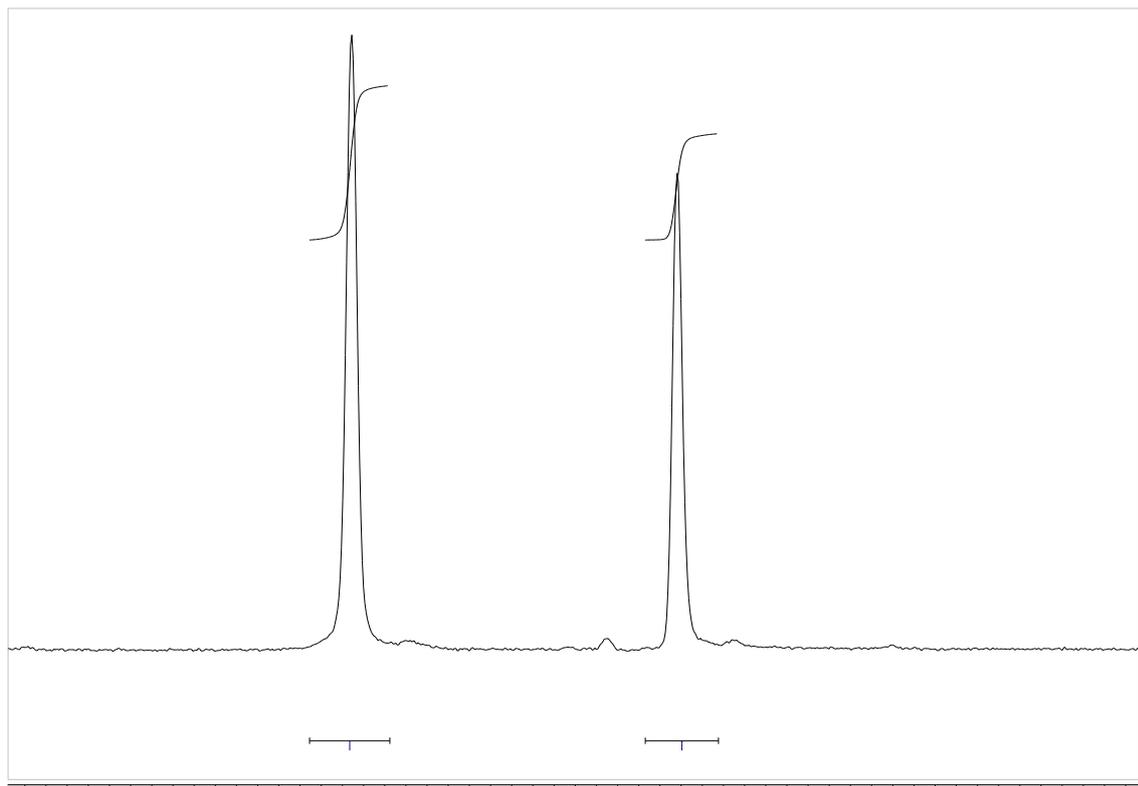
Opening of **3c** to **4c** catalyzed by (*R,S_{ax}*)-**2b** in MeCN (¹⁹F NMR)



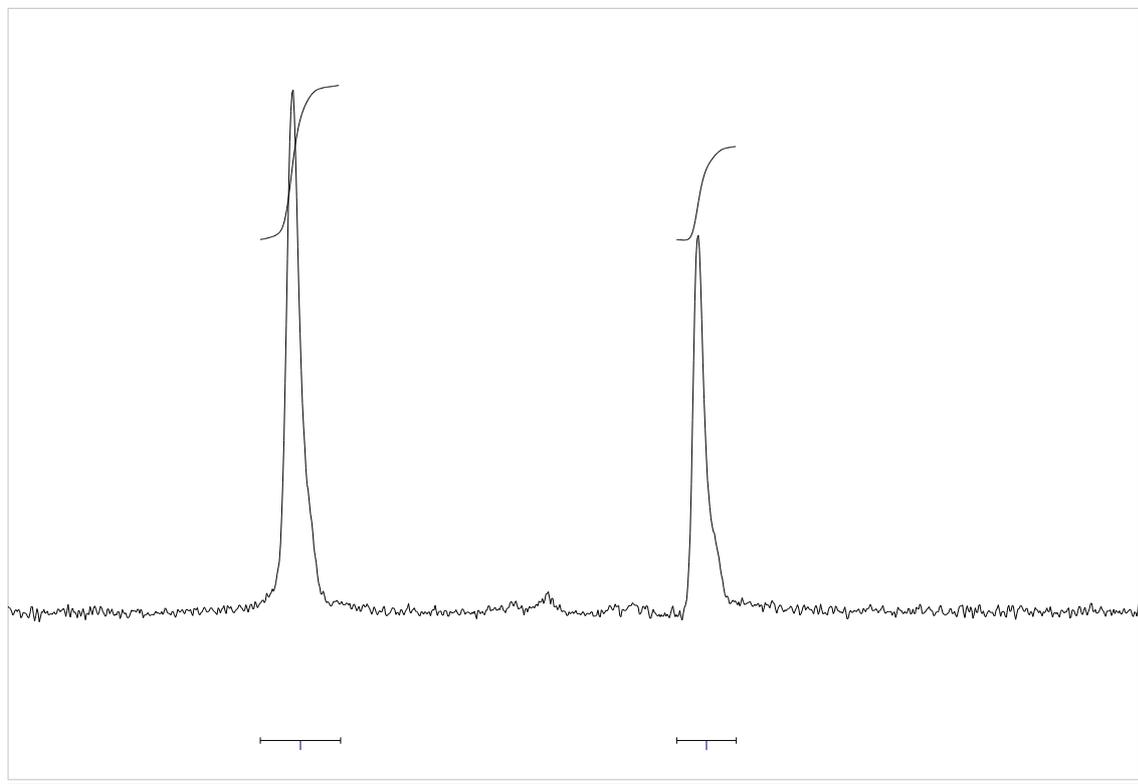
Opening of **3d** to **4d** catalyzed by (*R,S_{ax}*)-**2b** in CH₂Cl₂ (¹⁹F NMR)



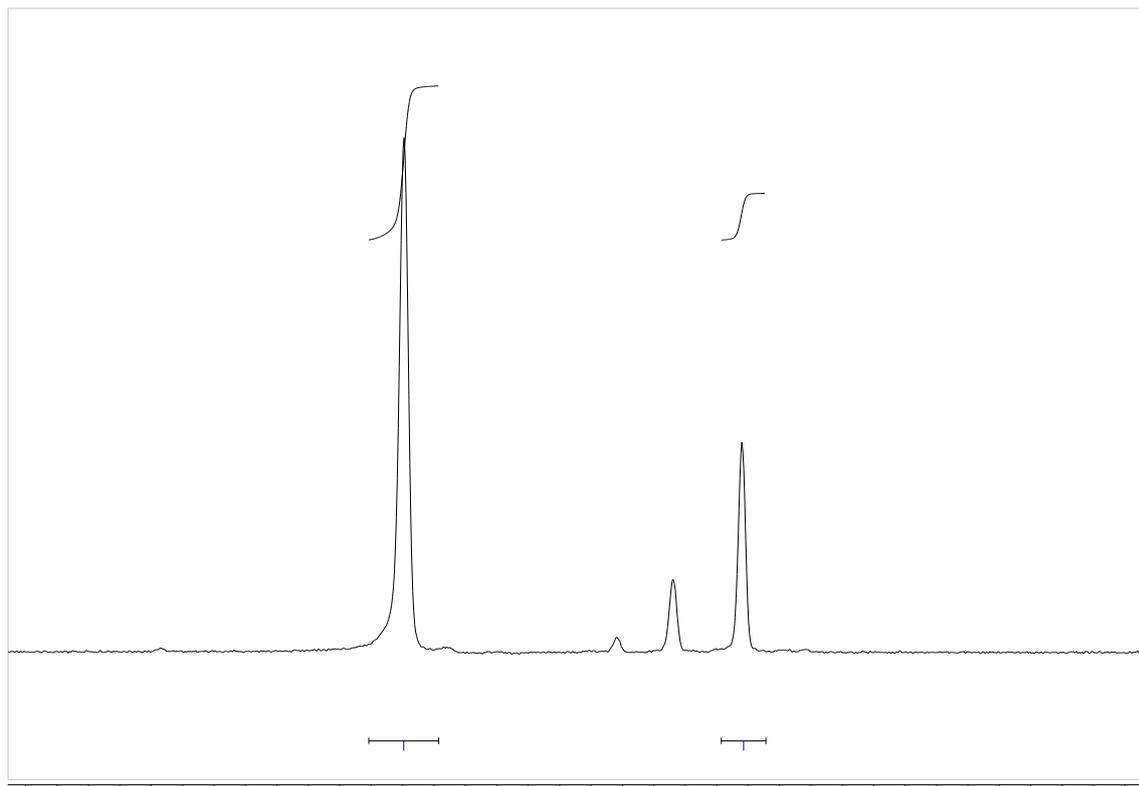
Opening of **3d** to **4d** catalyzed by (*R,S*_{ax})-**2b** in MeCN (¹⁹F NMR)



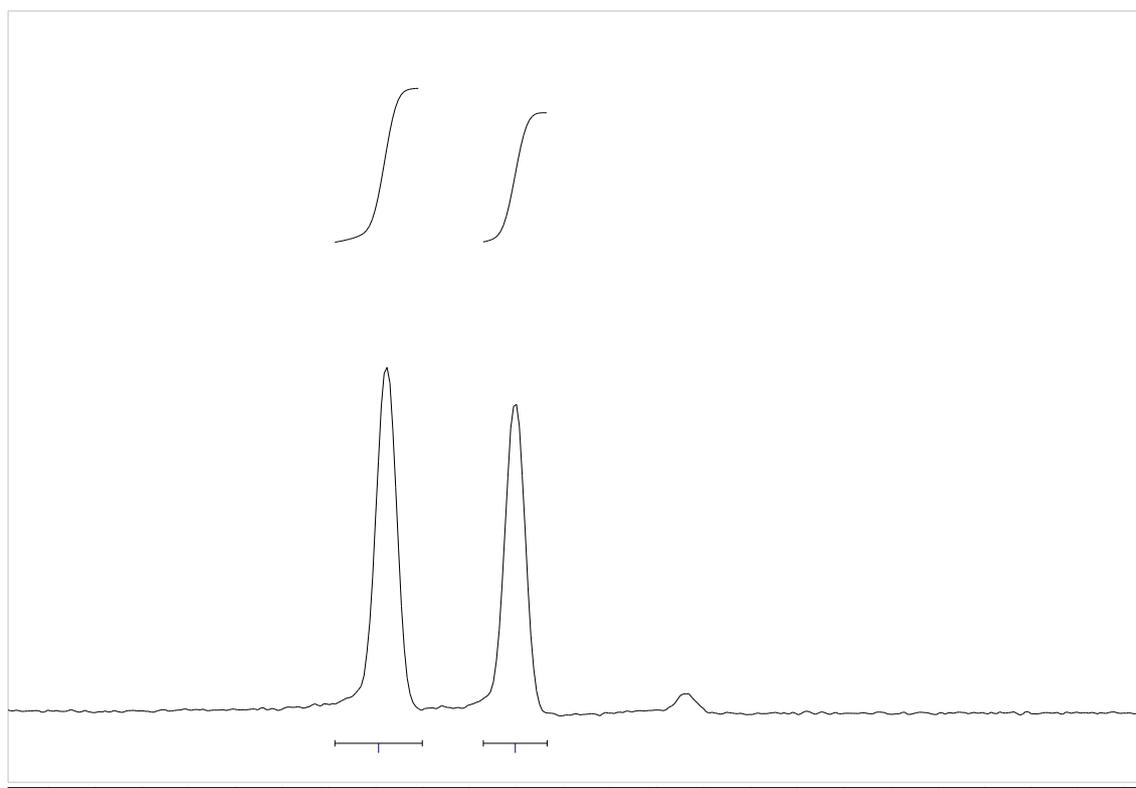
Opening of **3e** to **4e** catalyzed by (*R,S*_{ax})-**2b** in CH₂Cl₂ (¹⁹F NMR)



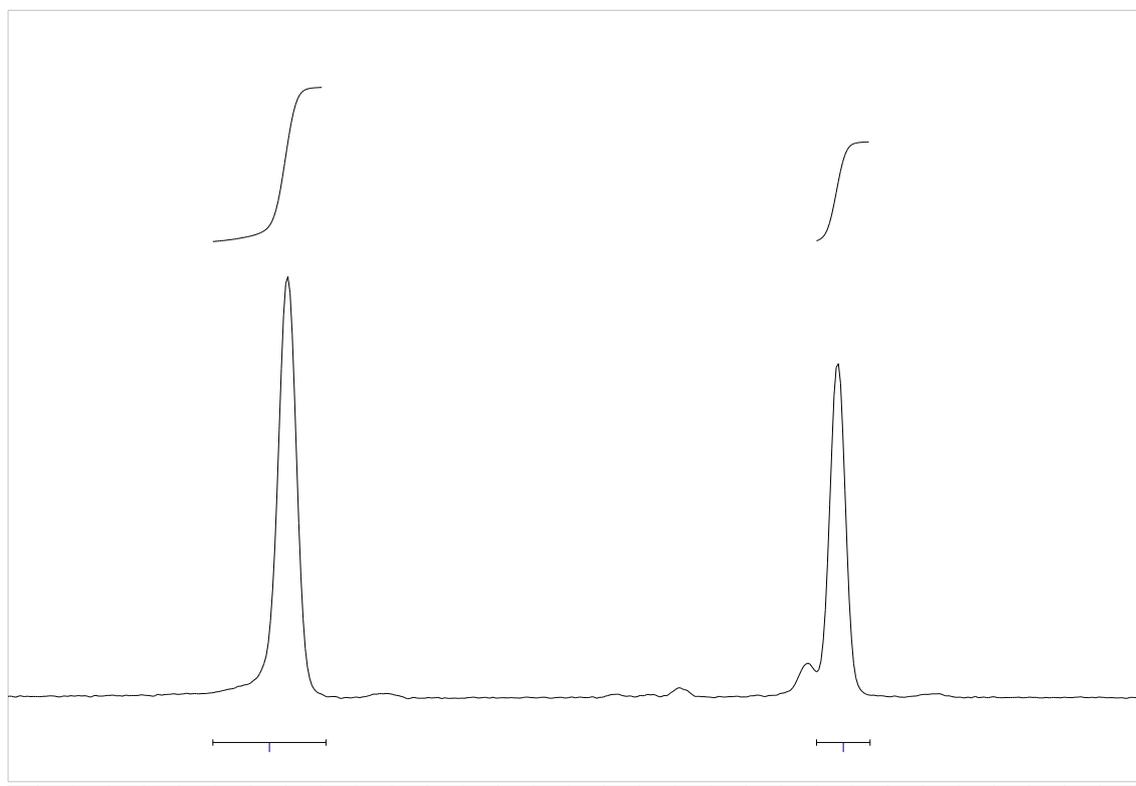
Opening of **3e** to **4e** catalyzed by (*R,S_{ax}*)-**2b** in MeCN (¹⁹F NMR)



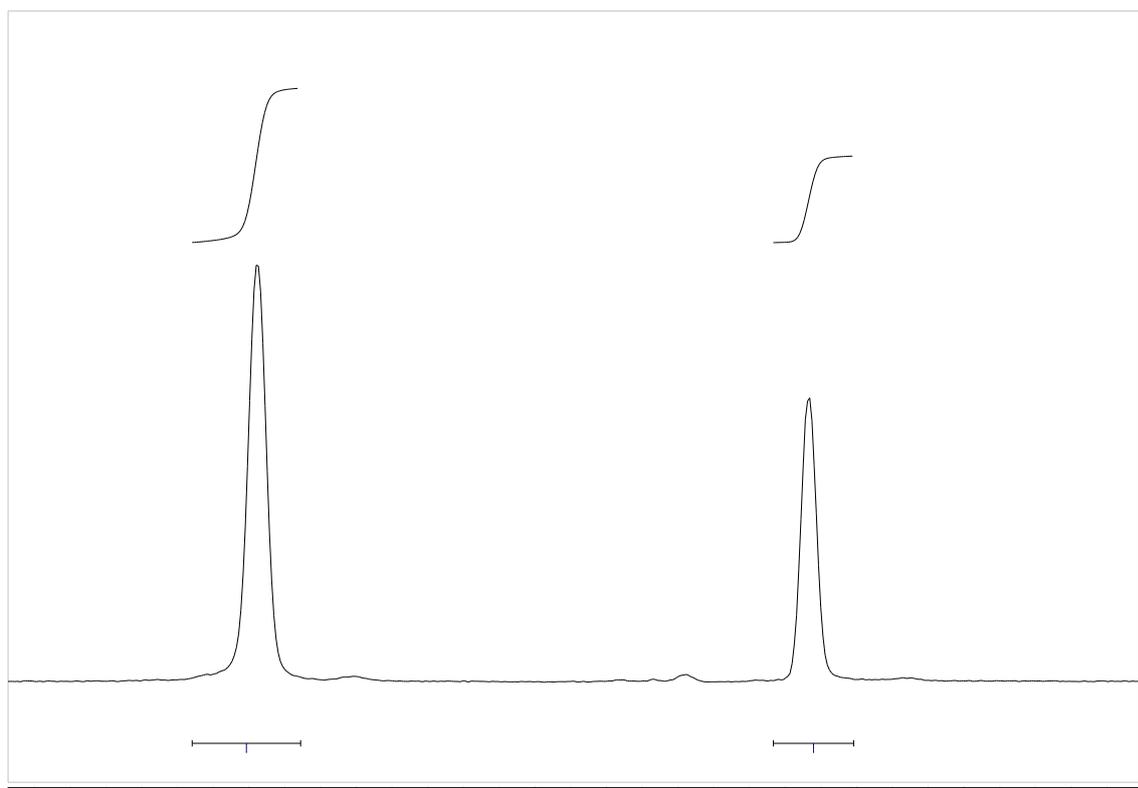
2.4. Opening of 3b-3e with (*R,R*,*R*)-2a and (*R,S*,*R*)-2b
Opening of **3b** to **4b** catalyzed by (*R,R*,*R*)-2a in THF (^{19}F NMR)



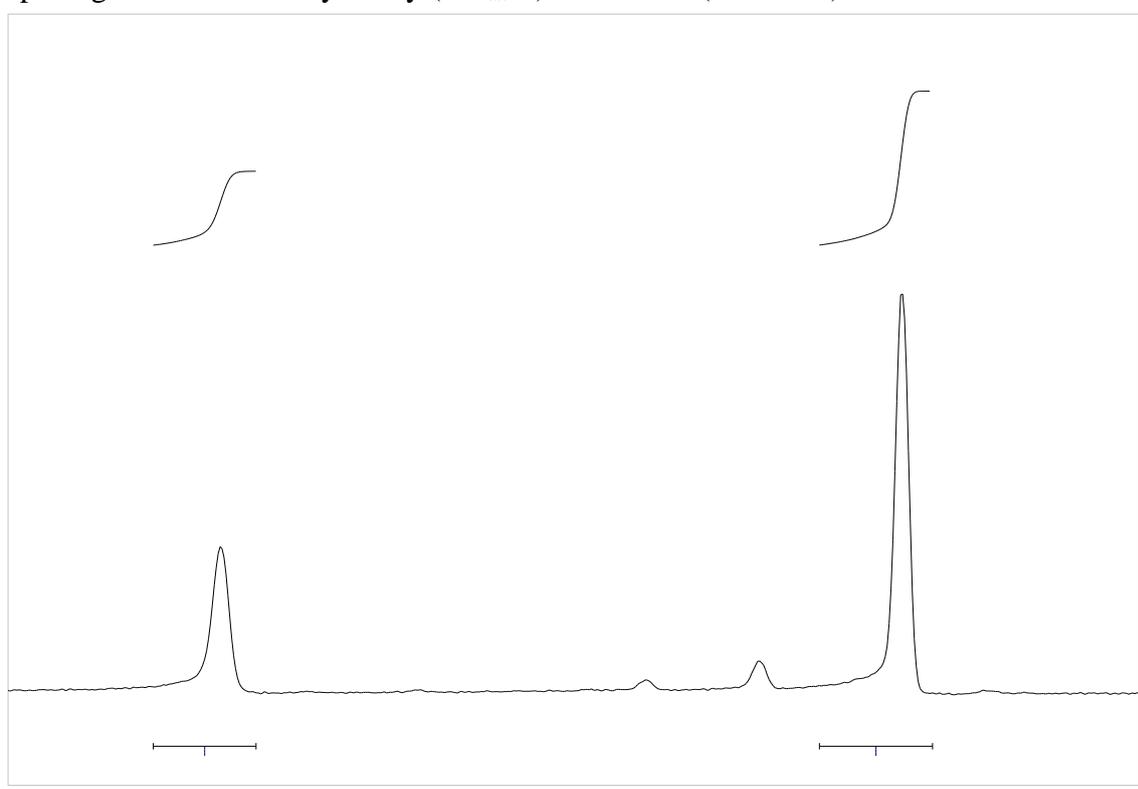
Opening of **3c** to **4c** catalyzed by (*R,R*,*R*)-2c in THF (^{19}F NMR)



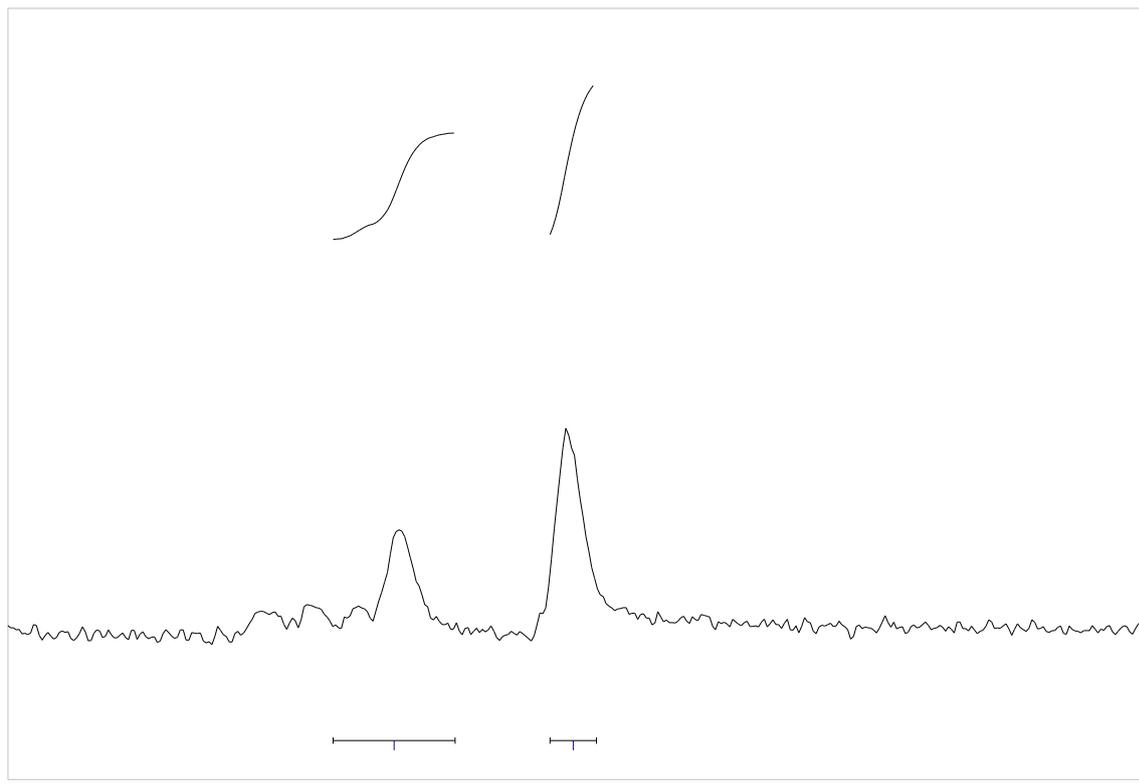
Opening of **3d** to **4d** catalyzed by (*R,R*,*ax*,*R*)-**2a** in THF (^{19}F NMR)



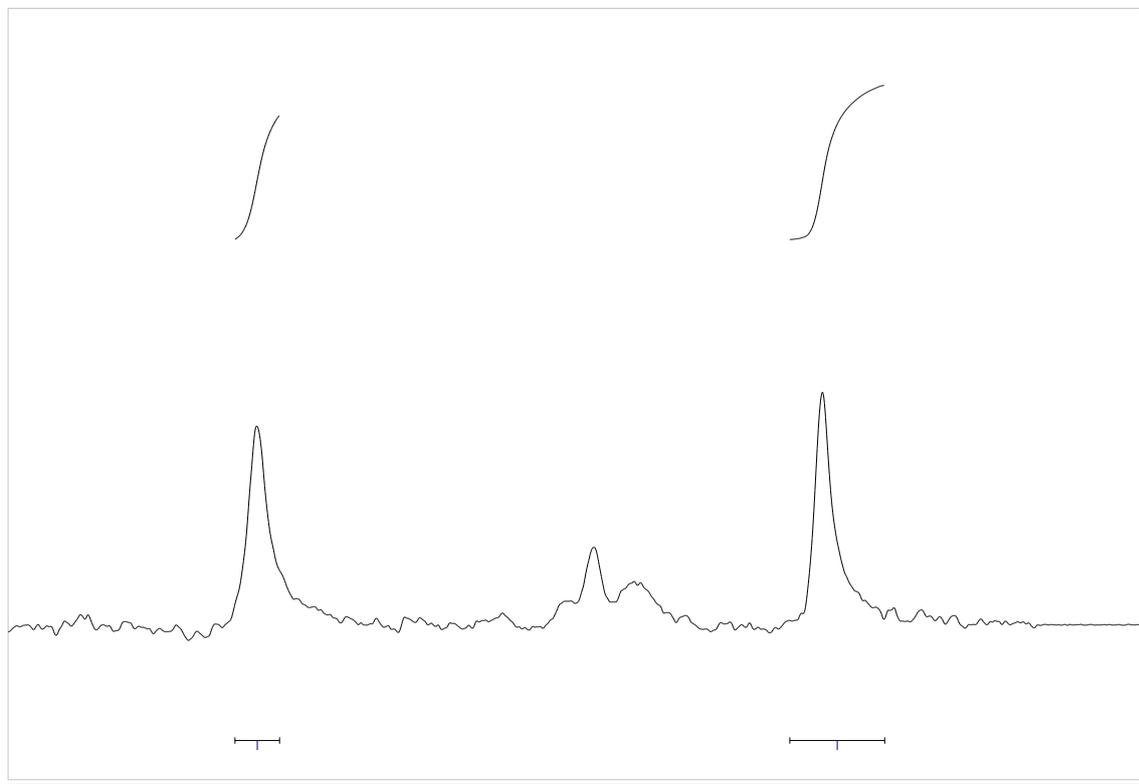
Opening of **3e** to **4e** catalyzed by (*R,R*,*ax*,*R*)-**2a** in THF (^{19}F NMR)



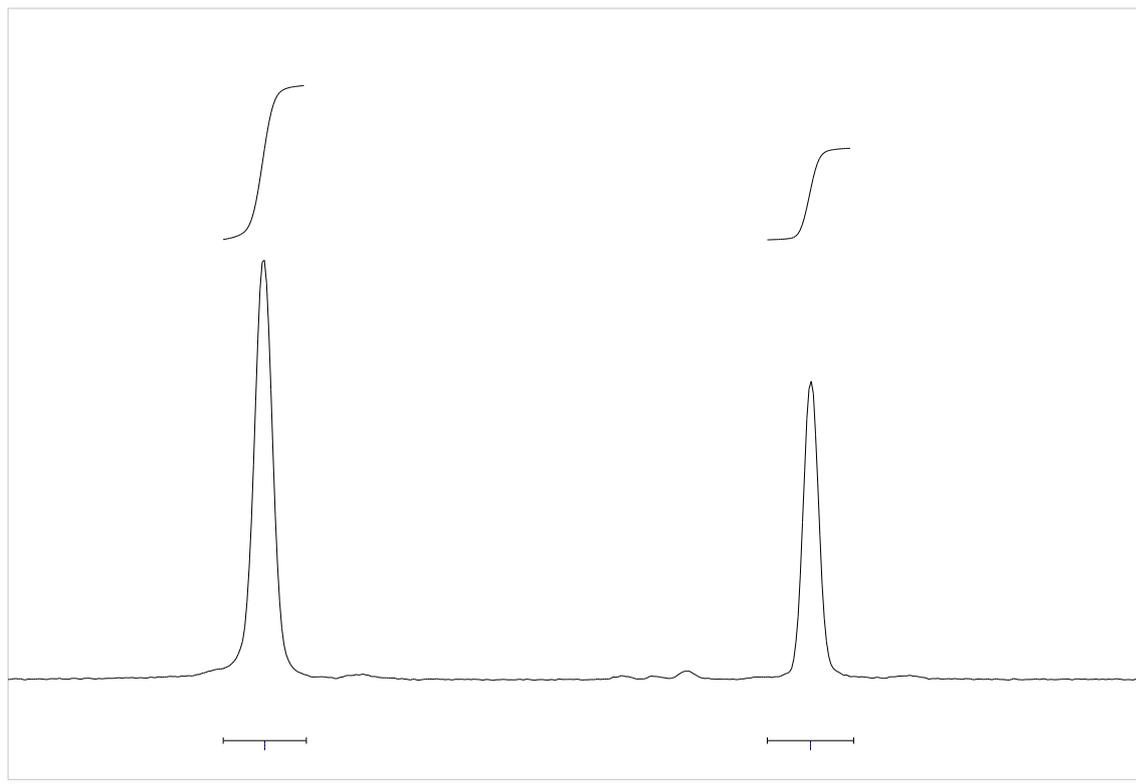
Opening of **3b** to **4b** catalyzed by (*R,S_{ax}*)-**2b** in THF (¹⁹F NMR)



Opening of **3c** to **4c** catalyzed by (*R,S_{ax}*)-**2b** in THF (¹⁹F NMR)



Opening of **3d** to **4d** catalyzed by (*R,S_{ax}*,*R*)-**2b** in THF (¹⁹F NMR)



Opening of **3e** to **4e** catalyzed by (*R,S_{ax}*,*R*)-**2b** in THF (¹⁹F NMR)

