**Supporting Information for**

**Green synthesis of chiral aromatic alcohols through *Lactobacillus kefiri* P2 as a novel biocatalyst**

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***Spectral data for the compounds***

**(*R*)-1-phenylethanol (1a)1:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ =* 7.38-7.33 (m, 4H), 7.31-7.26 (m, 1H), 4.84 (q, *J* = 6.45 Hz, 1H), 2.62 (bs, OH), 1.48 (d, *J* = 6.5 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 146.0, 128.4, 127.3, 125.5, 70.2, 25.2 (Figure S1); [α]D25 = 43.7 (c 1.1, CHCl3), 99% ee; Lit. [α]D25 = 40.6 (c 1.1, CHCl3, 92% ee for *R* enantiomer)1; HPLC condition of product, Chiralcel OD-H column, 210 nm, flow rate: 1.0 mL/min, *i*‐PrOH/*n*-hexane 5:95, t*R* (*R*) 9.2, (*S*) 10.9 min (Figure S19). HPLC analysis condition of ketone **1** is the same as alcohol **(*R*)-1a** and retention time of substrate was determined as 6.2 min (Figure S17).

**(*R*)-1-(2-chlorophenyl)ethanol** **(2a)2,3:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* = 7.58-7.56 (m, 1H), 7.32-7.17 (m, 3H), 5.27 (q, *J* = 6.4 Hz, 1H), 2.25 (bs, OH), 1.47 (d, *J* = 6.4 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 143.0, 131.6, 129.4, 128.4, 127.2, 126.4, 66.9, 23.5; [α]D25 = 31.3 (c 1.0, CHCl3), 46% ee; Lit. [α]D25 = 66.8 (c 1.1, CHCl3, 98% ee for *R* enantiomer)2; HPLC condition of product, Chiralcel OD-H column, 220 nm, flow rate: 0.8 mL/min, *i*‐PrOH/*n*-hexane 2:98, t*R* (*R*) 16.4, (*S*) 17.5 min (Figure S22). HPLC analysis condition of ketone **2** is the same as alcohol **(*R*)-2a** and retention time of substrate was determined as 8.2 min (Figure S20).

**(*S*)- 1-(2 -bromophenyl)ethanol** **(3a)1,4:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* = 7.56-7.54 (m, 1H), 7.50-7.48 (m, 1H), 7.33-7.29 (m, 1H), 7.12-7.08 (m, 1H), 5.39 (q, *J* = 6.4 Hz, 1H), 2.79 (bs, OH), 1.44 (d, *J* = 6.4 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 144.7, 132.6, 128.7, 127.8, 126.7, 121.6, 69.1, 23.6; [α]D25 = 22.8 (c 1.0, CHCl3), 40% ee; Lit. [α]D25 = 45.7 (c 1.0, CHCl3, 80% ee for *R* enantiomer)1; HPLC condition of product, Chiralcel OD-H column, 210 nm, flow rate: 1.0 mL/min, *i*‐PrOH/*n*-hexane 1:99, t*R* (*R*) 22.2, (*S*) 19.6 min (Figure S25). HPLC analysis condition of ketone **3** is the same as alcohol **(*S*)-3a** and retention time of substrate was determined as 9.2 min (Figure S23).

**(*R*)-1-(2-methoxyphenyl)ethanol** **(4a)5:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* =7.36-7.43 (m, 1H), 7.28-7.23 (m, 1H), 6.97 (t, *J* = 7.5 Hz, 1H), 6.88 (d, J = 8.20 Hz, 1H), 5.13-5.07 (m, 1H), 3.86 (s, 1H), 2.78 (bs, OH), 1.50 (d, *J* = 7.1 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 156.5, 133.4, 128.3, 126.3, 120.8, 110.4, 66.4, 55.2, 22.9; [α]D25 = 23.9 (c 1.1, CHCl3), 97% ee; Lit. [α]D25 = 23.3 (c 1.1, CHCl3, 94% ee for *S* enantiomer)5; HPLC condition of product, Chiralcel OD-H column, 220 nm, flow rate: 1.0 mL/min, *i*‐PrOH/*n*-hexane 2:98, t*R* (*R*) 20.8, (*S*) 19.2 min (Figure S28). HPLC analysis condition of ketone **4** is the same as alcohol **(*R*)-4a** and retention time of substrate was determined as 9.3 min (Figure S26).

**(*R*)-1-(2-nitrophenyl)ethanol (5a)1:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* =7.84 (dd, *J* = 8.2, 1.1 Hz, 1H), 7.79 (dd, *J* = 7.9, 1.1 Hz, 1H), 7.63-7.59 (m, 1H), 7.40-7.36 (m, 1H), 5.35 (q, *J* = 6.4 Hz, 1H), 2.85 (bs, 1H), 1.51 (d, *J* = 6.4 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 147.7, 141.0, 133.6, 128.0, 127.5, 124.2, 65.4, 24.2 [α]D25 = 15 (c 0.4, CHCI3), 50% ee; Lit. [α]D25 = 29.7 (c 0.4, CHCl3, % >99 ee for *S* enantiomer)1; HPLC condition of product, Chiralcel AS-H column, 220 nm, flow rate: 0.8 mL/min, *i*‐PrOH/*n*-hexane 5:95, t*R* (*R*) 20.4, (*S*) 21.7 min (Figure S31). HPLC analysis condition of ketone **5** is the same as alcohol **(*R*)-5a** and retention time of substrate was determined as 6.0 min (Figure S29).

**(*S*)-1-(3 -chlorophenyl)ethanol (6a)5,6:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* =7.34-7.19 (m, 4H), 4.82 (q, *J* = 6.4 Hz, 1H), 2.43 (bs, OH), 1.45 (d, *J* = 6.5 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 147.8, 134.3, 129.8, 127.5, 125.6, 123.5, 69.7, 25.2 [α]D25 = 38.7 (c 0.6, CHCl3), 100% ee; Lit. [α]D25 = 38.3 (c 0.6, CHCl3, %99 ee for *S* enantiomer)5; HPLC condition of product, Chiralcel AS-H column, 220 nm, flow rate: 1.0 mL/min, *i*‐PrOH/*n*-hexane 0.5:99.5, t*R* (*R*) 54.2, (*S*) 49.5 min (Figure S34). HPLC analysis condition of ketone **6** is the same as alcohol **(*S*)-6a** and retention time of substrate was determined as 16.6 min (Figure S32).

**(*R*)-1-(3-bromophenyl)ethanol (7a)4:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* =7.49 (s, 1H), 7.36-7.38 (m, 1H), 7.25-7.16 (m, 2H), 4.79 (m, 1H), 2.67 (bs, 1H), 1.44 (d, *J* = 6.4 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 148.1, 130.4, 130.1, 128.5, 124.0, 122.5, 69.6, 25.2 [α]D25 = 33.3 (c 1.0, CHCI3), 94% ee; Lit. [α]D25 = 33.3 (c 1.0, CHCl3, %93 ee for *R* enantiomer)4; HPLC condition of product, Chiralcel OD-H column, 210 nm, flow rate: 1.0 mL/min, *i*‐PrOH/*n*-hexane 2:98, t*R* (*R*) 18.4, (*S*) 16.3 min (Figure S37). HPLC analysis condition of ketone **7** is the same as alcohol **(*R*)-7a** and retention time of substrate was determined as 6.4 min (Figure S35).

**(*S*)-1-(3-methoxyphenyl)ethanol (8a)7:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* = 7.27-7.23 (m, 1H), 6.93-6.91 (m, 2H), 6.81-6.78 (m, 1H), 4.83 (q, J = 6.4 Hz, 1H), 3.79 (s, 3H), 2.41 (bs, OH), 1.46 (d, *J* = 6.5 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 159.7, 147.6, 129.5, 117.7, 112.8, 110.9, 70.2, 55.2, 25.1 [α]D25 = 53.4 (c 0.9, CHCl3), 90% ee; Lit. [α]D25 = 58.8 (c 0.9, CHCl3, %99 ee for *S* enantiomer)7; HPLC condition of product, Chiralcel OD-H column, 210 nm, flow rate: 0.8 mL/min, *i*‐PrOH/*n*-hexane 5:95, t*R* (*R*) 21.0, (*S*) 18.1 min (Figure S40). HPLC analysis condition of ketone **8** is the same as alcohol **(*S*)-8a** and retention time of substrate was determined as 8.8 min (Figure S38).

**(*S*)-1-(3-nitrophenyl)ethanol (9a)8,9:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* = 8.21 (m, 1H), 8.09 (m, 1H), 7.68 (m, 1H), 7.49(m, 1H), 4.99 (q, *J* = 6.5 Hz, 1H), 2.84 (bs, OH), 1.51 (d, *J* = 6.5 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 148.3, 147.9, 131.6, 129.4, 122.3, 120.4, 69.3, 29.4; [α]D25 = 28.6 (c 0.86, CHCI3), 94% ee; Lit. [α]D25 = 30.2 (c 0.86, CHCl3, %99 ee for *S* enantiomer)9; HPLC condition of product, Chiralcel AS-H column, 220 nm, flow rate: 0.8 mL/min, *i*‐PrOH/*n*-hexane 5:95, t*R* (*R*) 23.4, (*S*) 25.4 min (Figure S43). HPLC analysis condition of ketone **9** is the same as alcohol **(*S*)-9a** and retention time of substrate was determined as 23.1 min (Figure S41).

**(*R*)-1-(3-methylphenyl)ethanol (10a)5:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* = 7.25-7.09 (m, 4H), 4.84 (q, *J* = 6.4 Hz, 1H), 3.38 (s, 3H), 2.20 (bs, OH), 1.46 (d, *J* = 6.5 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* = 145.8, 138.1, 128.4, 128.2, 126.1, 122.4, 70.4, 25.1, 21.5; [α]D25 = 13.5 (c 0.6, CHCI3), 98% ee; Lit. [α]D25 = 9.38 (c 0.6, CHCl3, %68 ee for *S* enantiomer)5; HPLC condition of product, Chiralcel OD-H column, 210 nm, flow rate: 1.0 mL/min, *i*‐PrOH/*n*-hexane 3:97, t*R* (*R*) 11.9, (*S*) 15.1 min (Figure S46). HPLC analysis condition of ketone **10** is the same as alcohol **(*R*)-10a** and retention time of substrate was determined as 6.0 min (Figure S44).

**(*R*)-1-(4-chlorophenyl)ethanol (11a)5:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* = 7.29-7.22 (m, 4H), 4.79 (q, *J* = 6.5 Hz, 1H), 2.77 (bs, 1H), 1.41 (d, *J* = 6.5 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 144.2, 132.9, 128.5, 126.8, 69.6, 25.2; [α]D25= 45.7 (c 1.0, CHCI3), 98% ee; Lit. [α]D25 = 39.7 (c 1.0, CHCl3, %85 ee for *S* enantiomer)5; HPLC condition of product, Chiralcel OD-H column, 220 nm, flow rate: 1.0 mL/min, *i*‐PrOH/*n*-hexane 2:98, t*R* (*R*) 15.7, (*S*) 14.1 min (Figure S49). HPLC analysis condition of ketone **11** is the same as alcohol **(*R*)-11a** and retention time of substrate was determined as 6.4 min (Figure S47).

**(*S*)-1-(4-bromophenyl)ethanol** **(12a)1:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* = 7.43-7.40 (m, 2H), 7.18-7.15 (m, 2H), 4.75 (q, *J* = 6.5 Hz, 1H), 2.93 (bs, OH), 1.39; 13C-NMR (100 MHz, CDCl3) δ 144.7, 131.5, 127.2, 121.0, 69.6, 25.2; [α]D25 = 44.5 (c 1.0, CHCl3), 94% ee; Lit. [α]D25 = 25.1 (c 1.0, CHCl3, %54 ee for *S* enantiomer)1; HPLC condition of product, Chiralcel OD-H column, 220 nm, flow rate: 1.0 mL/min, *i*‐PrOH/*n*-hexane 5:95, t*R* (*R*) 9.9, (*S*) 10.8 min (Figure S52). HPLC analysis condition of ketone **12** is the same as alcohol **(*S*)-12a** and retention time of substrate was determined as 6.3 min (Figure S50).

**(*R*)-1-(4-methoxyphenyl)ethanol (13a)10:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* =7.30-7.27 (m, 2H), 6.89-6.85 (m, 2H), 4.83 (q, *J* = 6.4 Hz, 1H), 3.79 (s, 3H), 2.11 (bs, OH), 1.46 (d, *J* = 6.5 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 158.9, 138.0, 126.7, 113.8, 69.9, 55.3, 25.0; [α]D25 = +44.2 (c 1.1, CHCl3), 74% ee; Lit. [α]D25 = 20.5 (c 1. 1, CHCl3) for 83% ee for *S* enantiomer)10; HPLC condition of product, Chiralcel OD-H column, 220 nm, flow rate: 0.8 mL/min, *i*‐PrOH/*n*-hexane 5:95, t*R* (*R*) 17.2, (*S*) 19.2 min (Figure S55). HPLC analysis condition of ketone **13** is the same as alcohol **(*R*)-13a** and retention time of substrate was determined as 11.2 min (Figure S53).

**(*R*)-1-(4-nitrophenyl)ethanol (14a)1:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* = 8.10-8.14 (m, 2H), 7.51-7.48 (m, 2H), 5.00-4.94 (m, 1H), 2.75 (bs, OH), 1.47 (d, *J* = 6.5 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 153.3, 147.0, 126.1, 123.7, 69.4, 25.4; [α]D25 = 22.5 (c 0.5, CHCl3), 88% ee; Lit. [α]D25 = 25.4 (c 0.5, CHCl3) for 99% ee for *S* enantiomer)1; HPLC condition of product, Chiralcel AS-H column, 220 nm, flow rate: 1.0 mL/min, *i*‐PrOH/*n*-hexane 20:80, t*R* (*R*) 12.0, (*S*) 15.7 min (Figure S58). HPLC analysis condition of ketone **14** is the same as alcohol **(*R*)-14a** and retention time of substrate was determined as 5.1 min (Figure S56).

**(*S*)-1-(4-methylphenyl)ethanol** **(15a)1:** Colorless oil, 1H-NMR (400 MHz, CDCl3) *δ* = 7.27 (d, *J* = 8.0 Hz, 1H), 7.17 (d, *J* = 7.9 Hz, 1H), 4.84 (q, *J* = 6.5 Hz, 1H), 2.42 (bs, OH), 2.37 (s, 3H), 1.48 (d, *J* = 6.5 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 142.9, 137.0, 129.1, 125.4, 70.1, 25.1, 21.1; [α]D25 = +63.4 (c 1.0, CHCl3); 100% ee; Lit. [α]D25 = 56.9 (c 1.0, CHCl3) for 94% ee for *S* enantiomer)1; HPLC condition of product, Chiralcel AS-H column, 220 nm, flow rate: 1.0 mL/min, *i*‐PrOH/*n*-hexane 5:95, t*R* (*R*) 9.1, (*S*) 8.2 min (Figure S61). HPLC analysis condition of ketone **15** is the same as alcohol **(*S*)-15a** and retention time of substrate was determined as 9.3 min (Figure S59).

**(*R*)-1-(*p*-biphenyl)ethanol (16a)1:** White solid, 1H-NMR (400 MHz, CDCl3) *δ* = 7.63-7.60 (m, 4H), 7.49-7.45 (m, 4H), 7.40-7.36 (m, 1H), 4.95 (qd, *J* = 6.4, 2.9 Hz, 1H), 2.24 (bs, OH), 1.56 (d, *J* = 6.5 Hz, 3H); 13C-NMR (100 MHz, CDCl3) *δ* 144.9, 140.9, 140.4, 128.8, 127.3, 127.3, 127.1, 125.9, 70.1, 25.2; [α]D25 = 46.2 (c 0.55, CH2Cl2), 94% ee; Lit. [α]D25 = 45.3 (c 0.55, CH2Cl2) for 92% ee for *R* enantiomer)1; HPLC condition of product, Chiralcel OD column, 220 nm, flow rate: 0.6 mL/min, *i*‐PrOH/*n*-hexane 10:90, t*R* (*R*) 18.5, (*S*) 17.3 min (Figure S64). HPLC analysis condition of ketone **16** is the same as alcohol **(*R*)-16a** and retention time of substrate was determined as 14.1 min (Figure S62).

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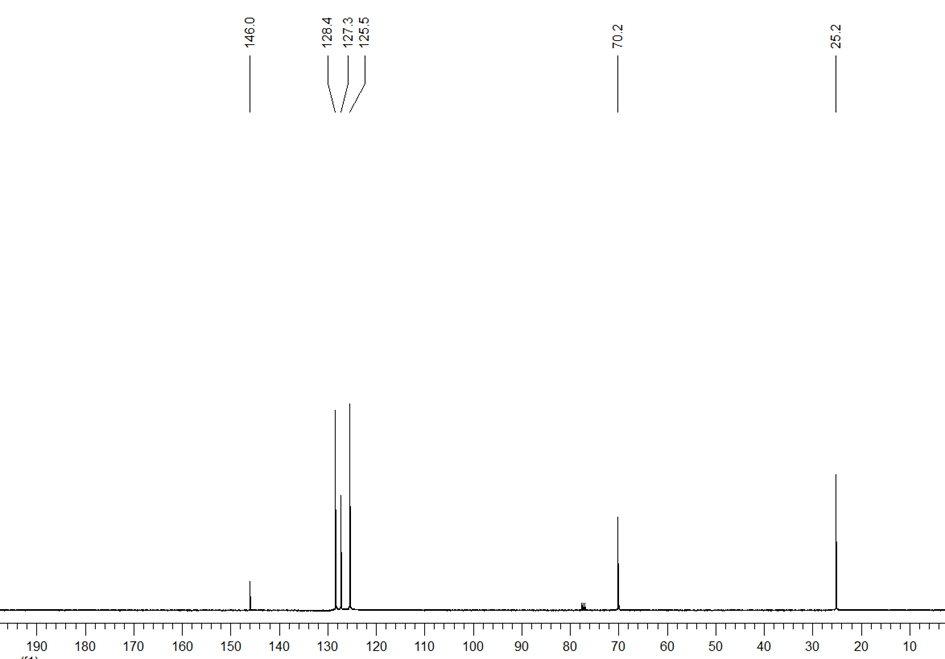
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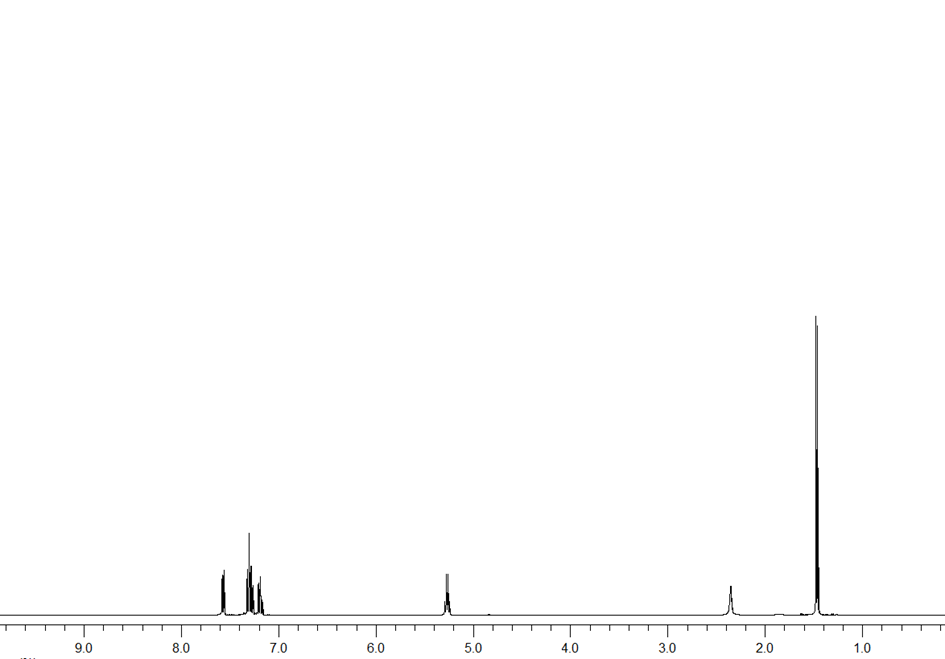
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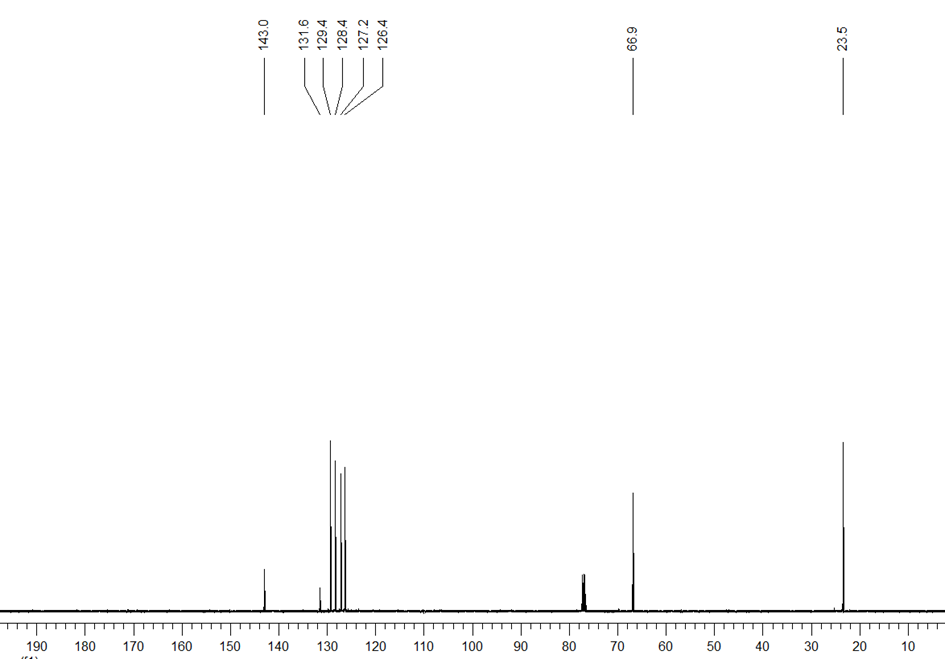
**1H and 13C-NMR spectrums of compound 1a-16a**

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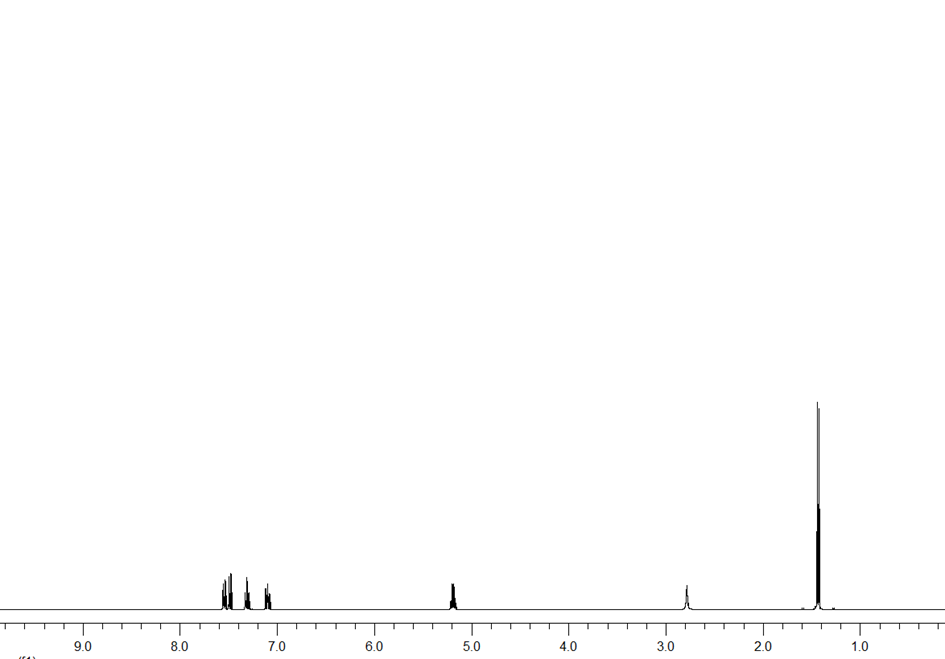
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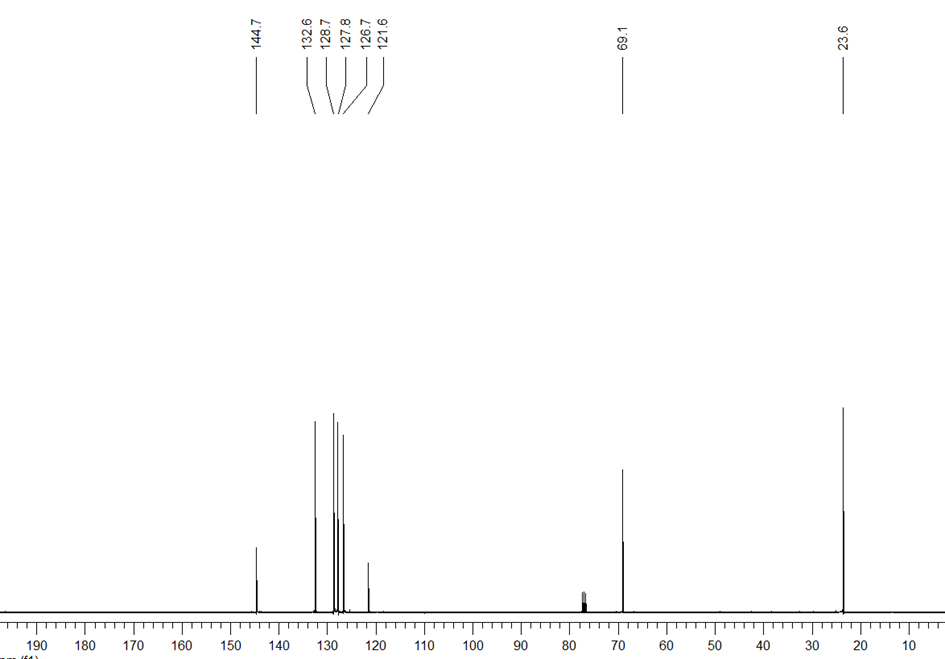
**Figure S1:** 1H and 13C-NMR spectrum of (***R*)-1a**



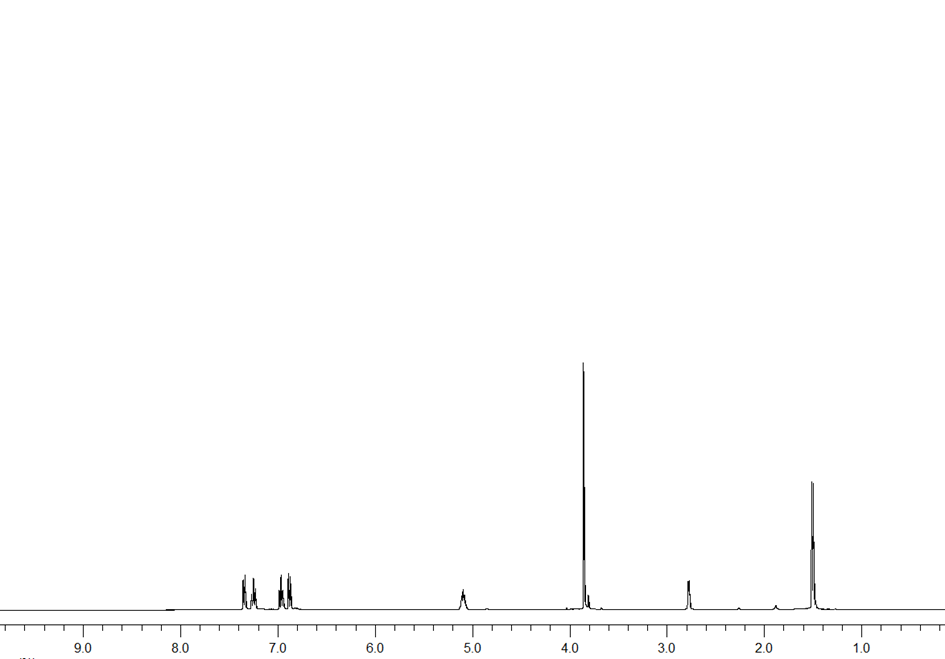


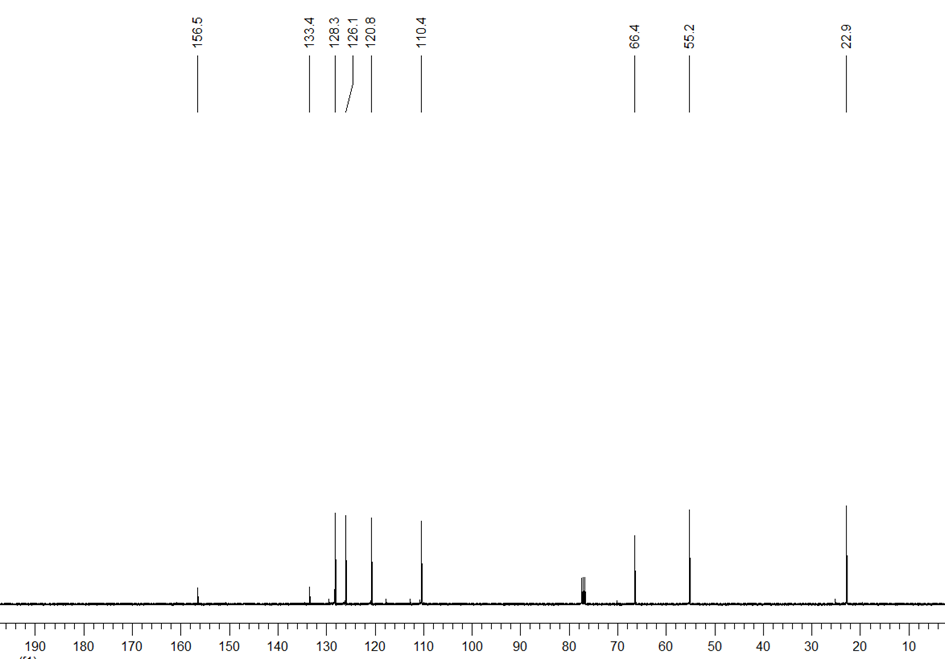
**Figure S2:** 1H and 13C-NMR spectrum of (***R*)-2a**

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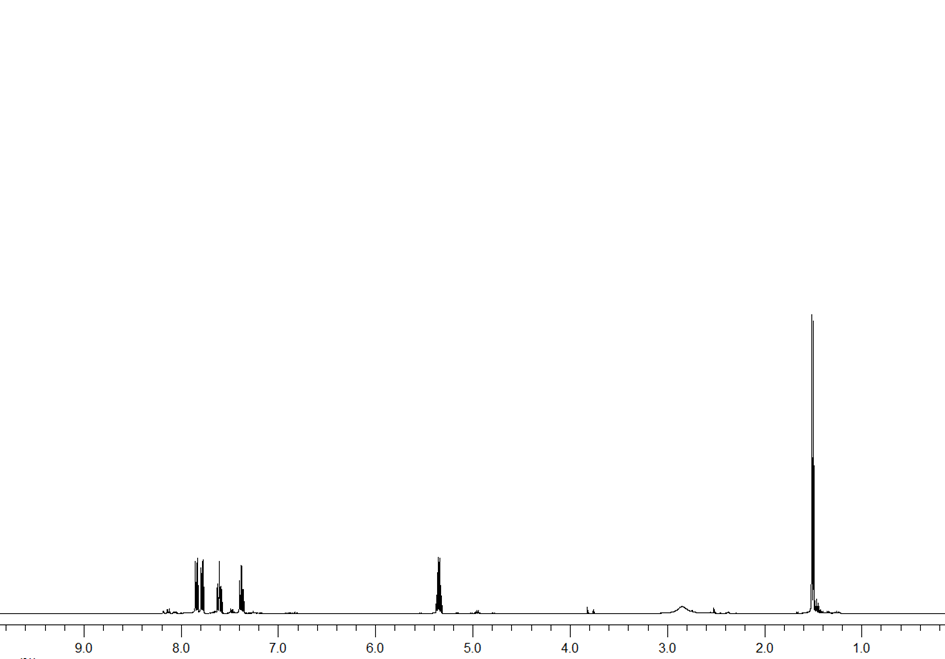
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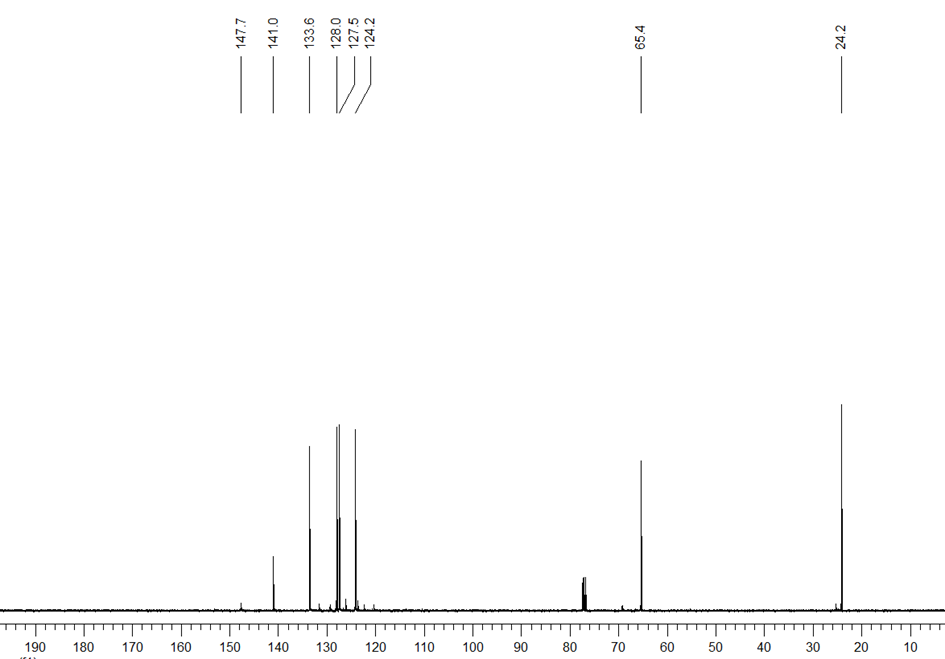
**Figure S3:** 1H and 13C-NMR spectrum of (***S*)-3a**



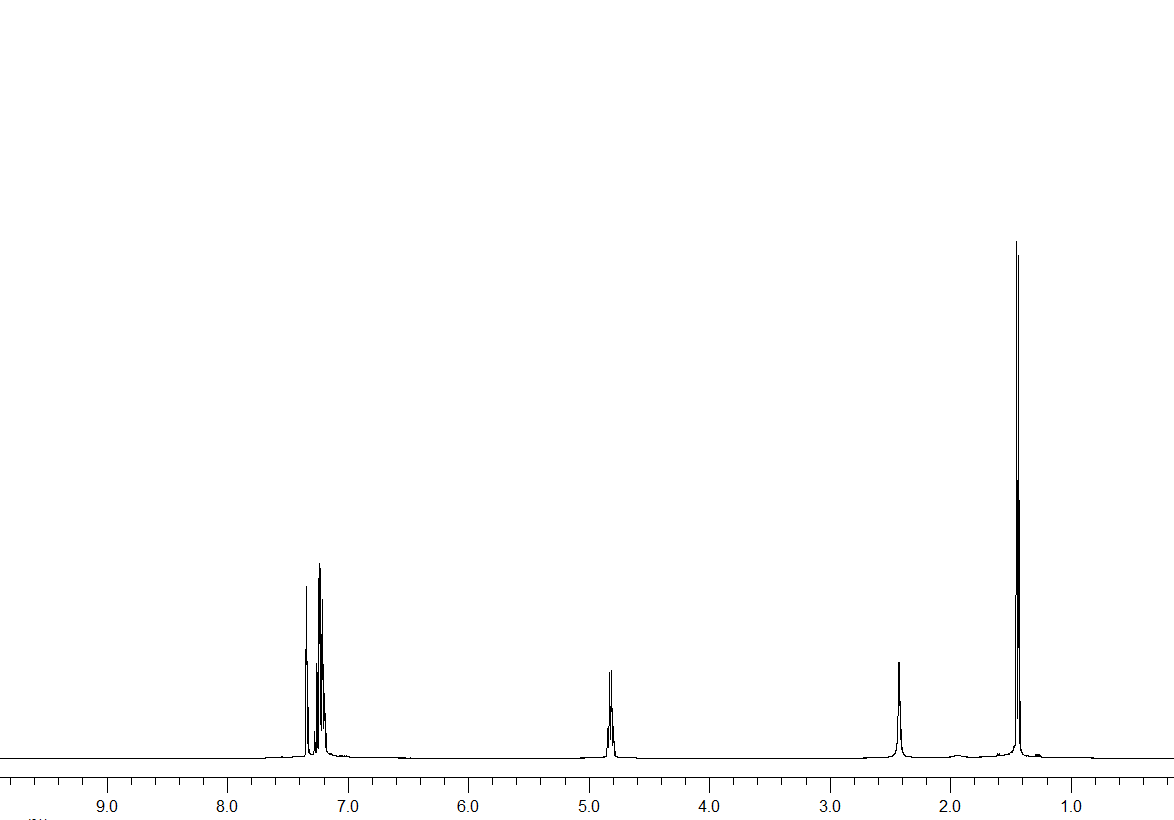


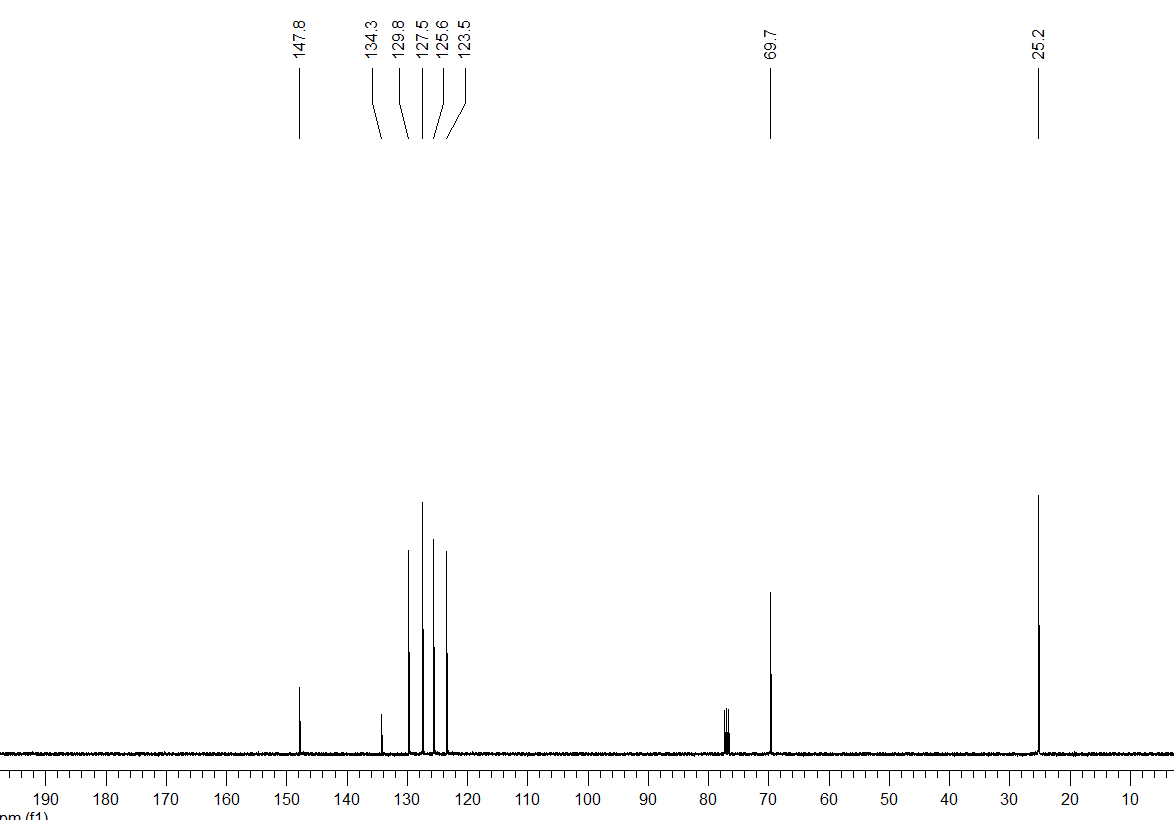
**Figure S4:** 1H and 13C-NMR spectrum of (***R*)-4a**



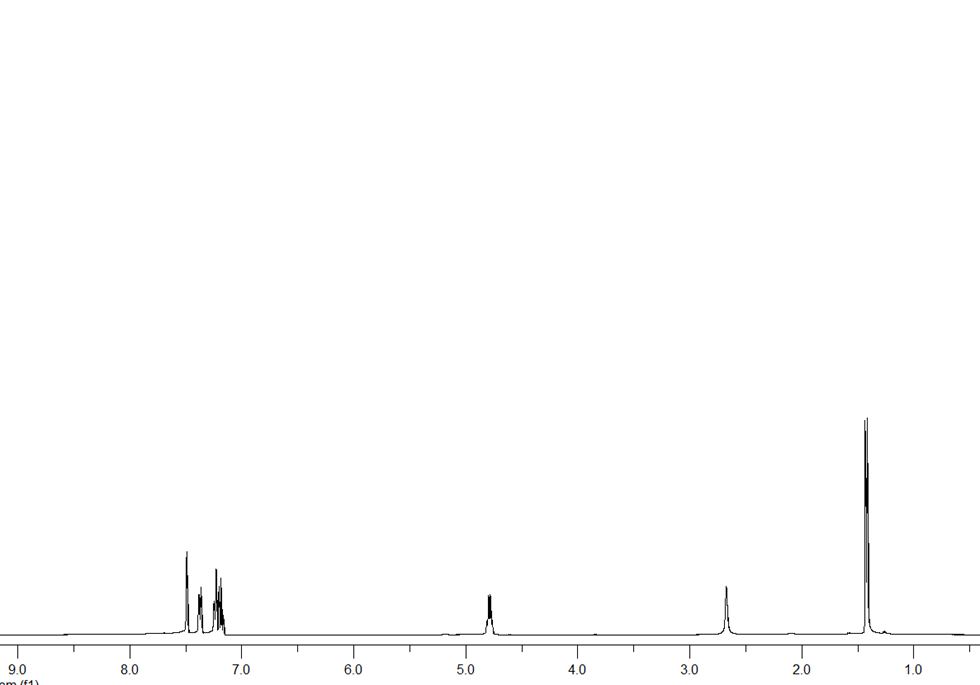


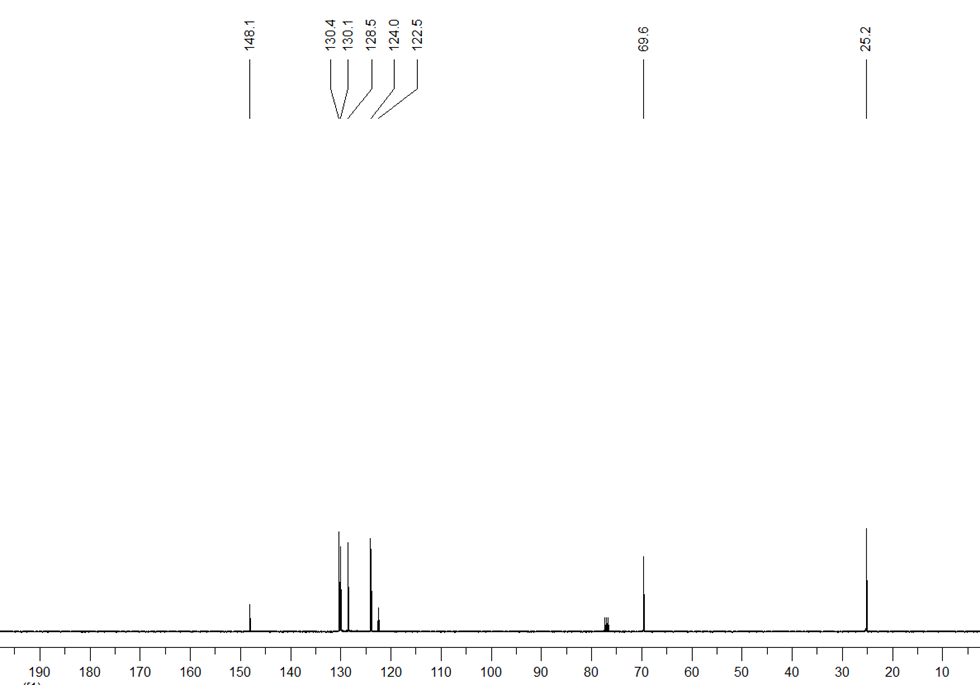
**Figure S5:** 1H and 13C-NMR spectrum of (***R*)-5a**



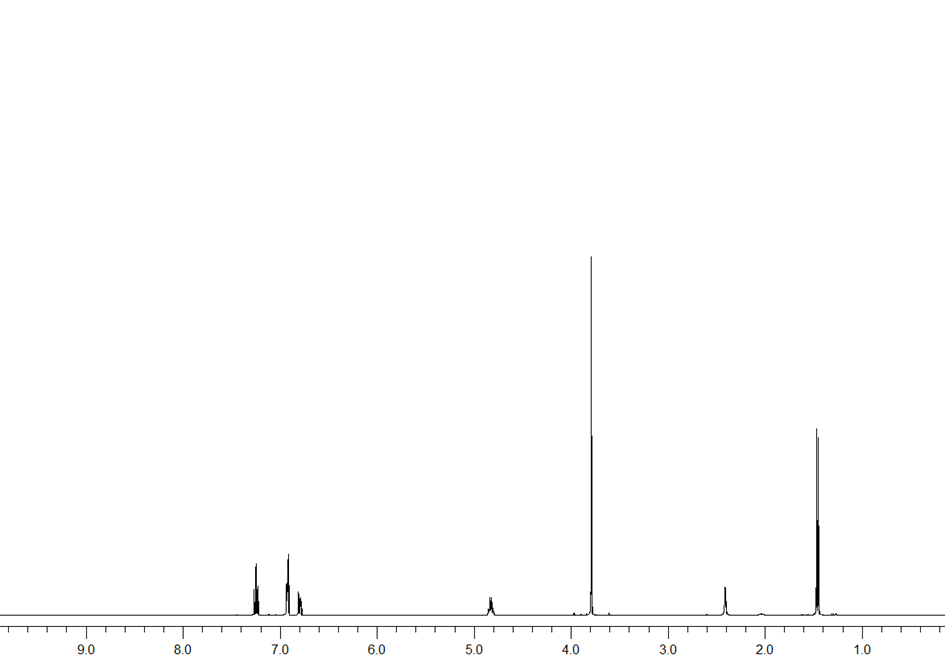


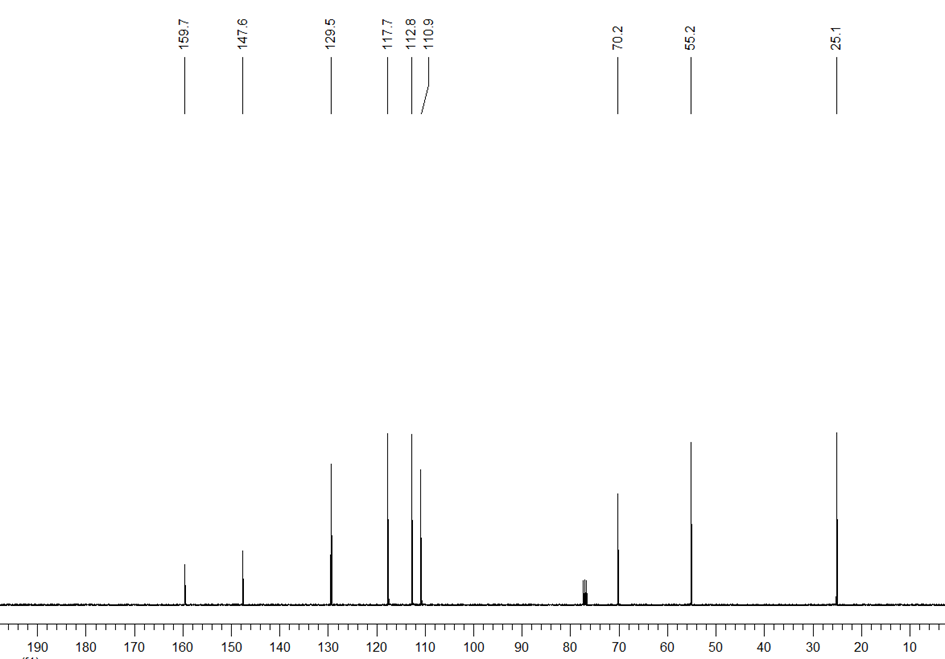
**Figure S6:** 1H and 13C-NMR spectrum of (***S*)-6a**

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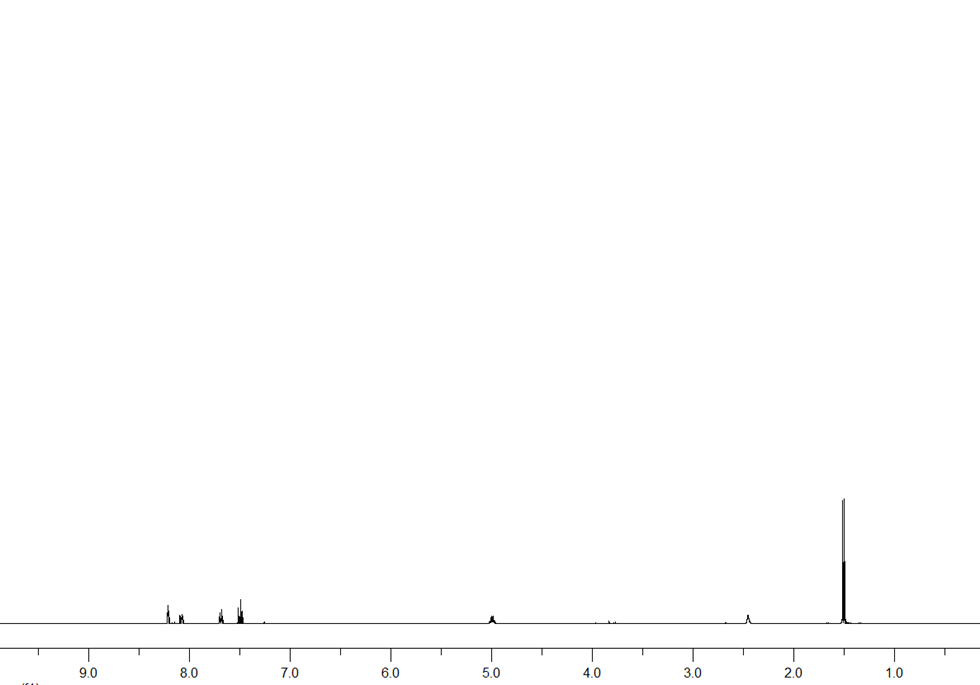
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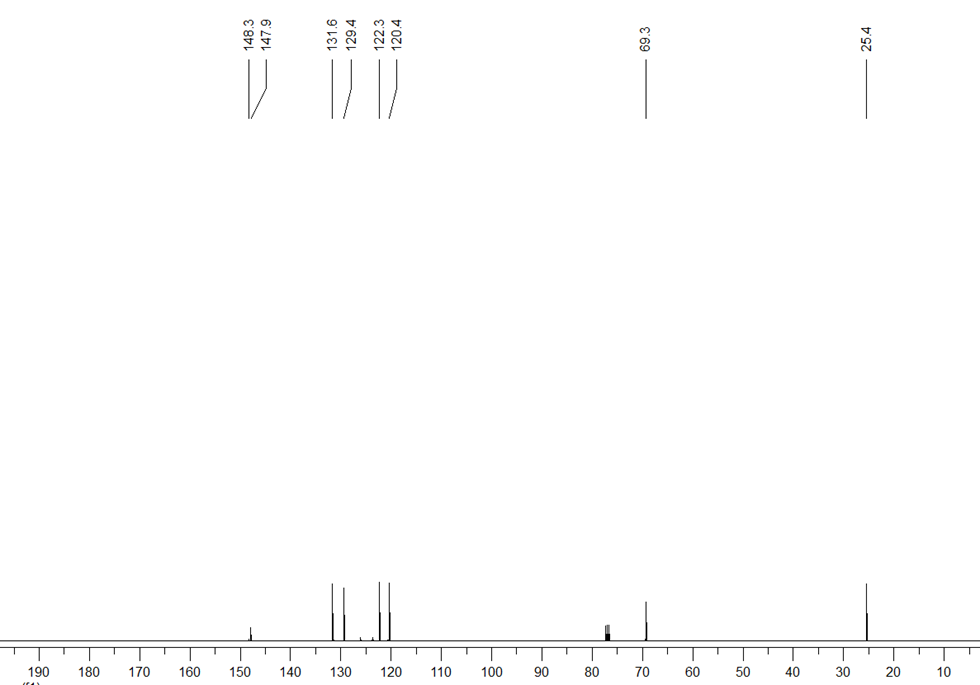
**Figure S7:** 1H and 13C-NMR spectrum of (***R*)-7a**

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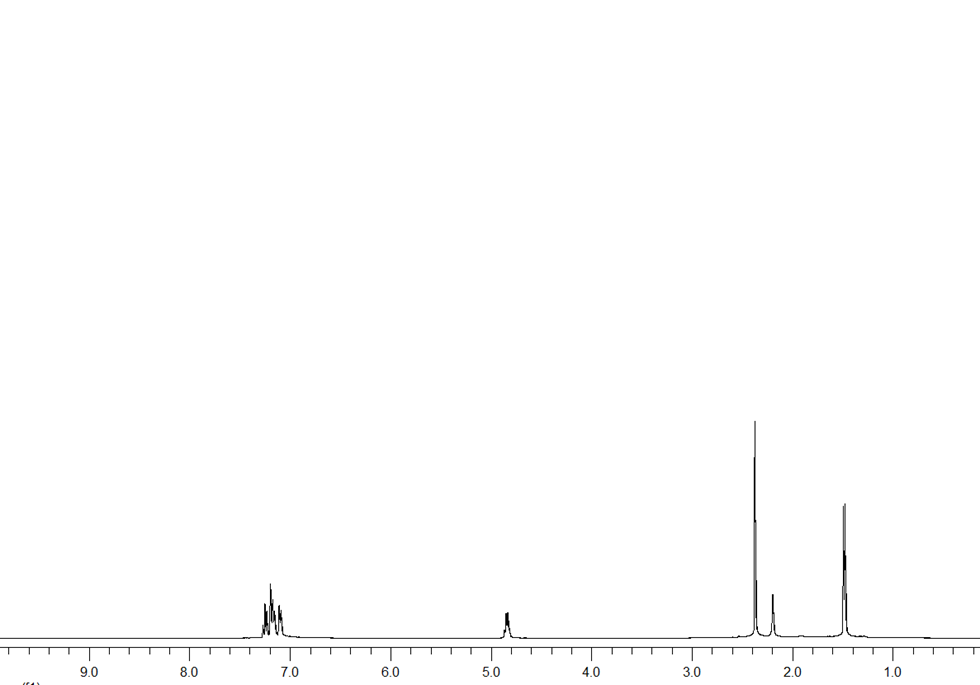
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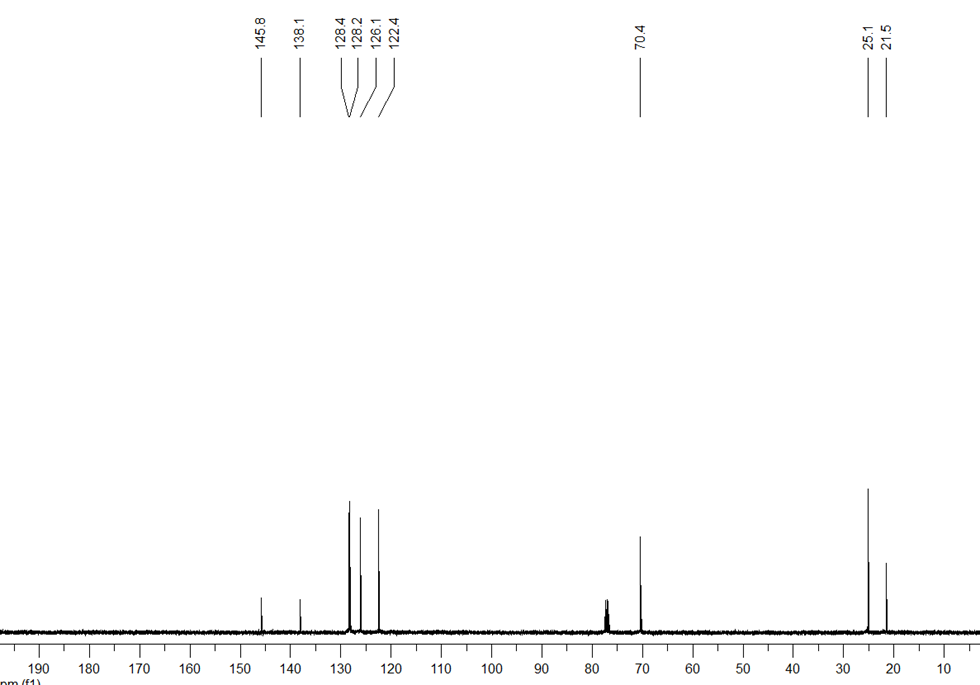
**Figure S8:** 1H and 13C-NMR spectrum of (***S*)-8a**

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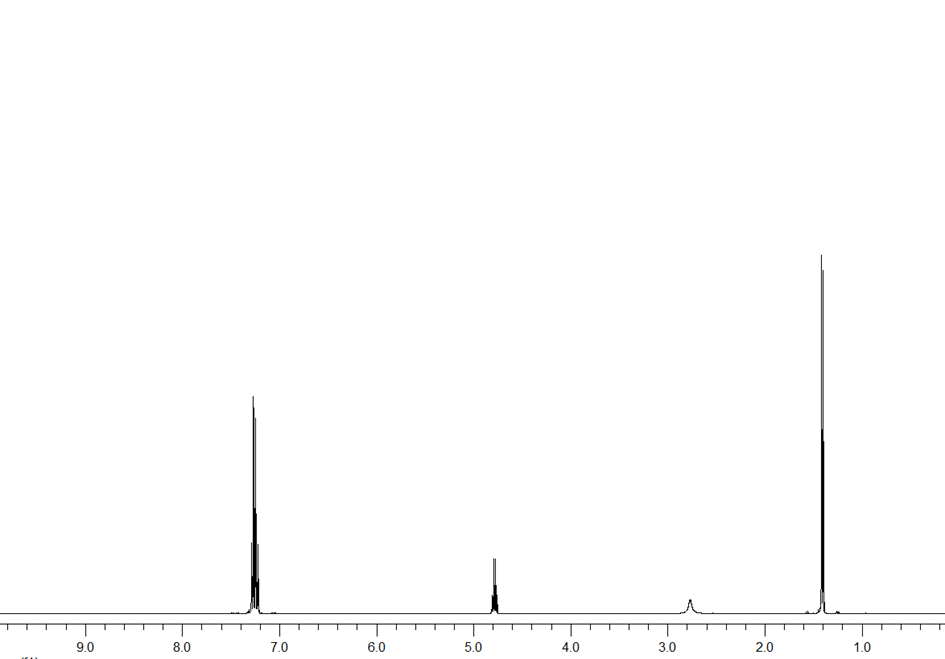
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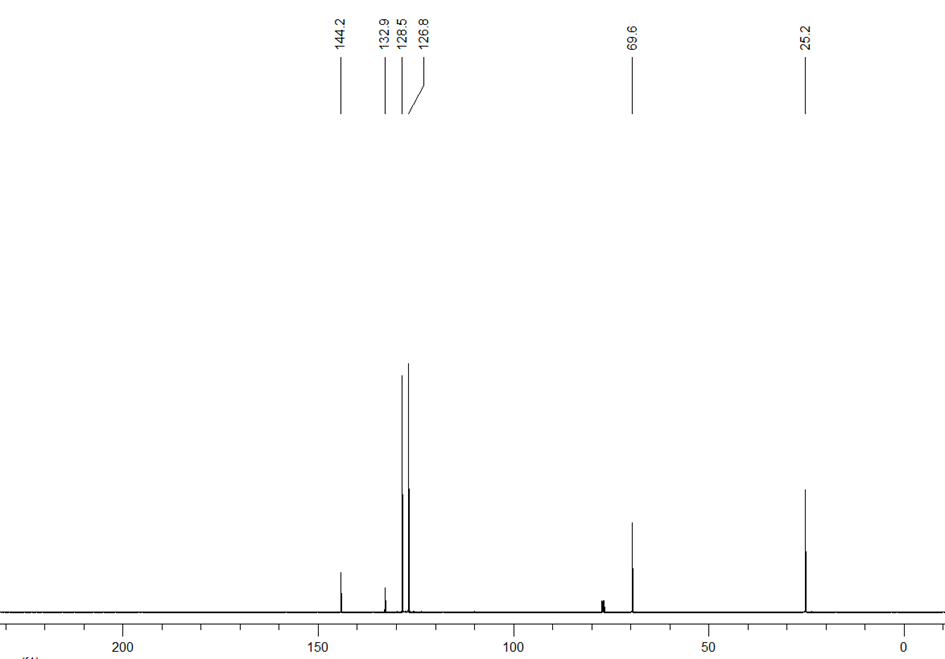
**Figure S9:** 1H and 13C-NMR spectrum of (***S*)-9a**

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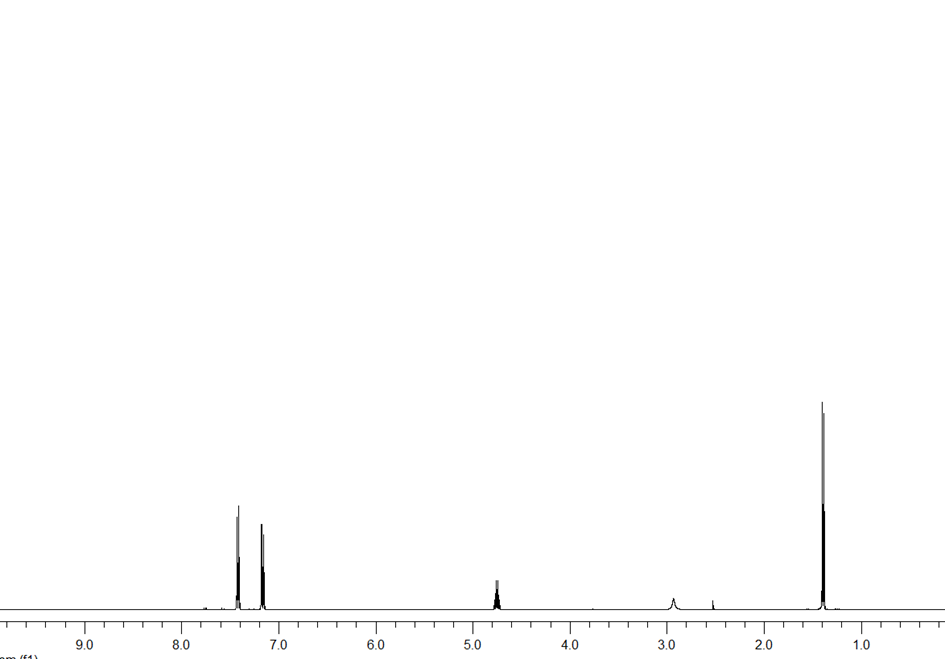
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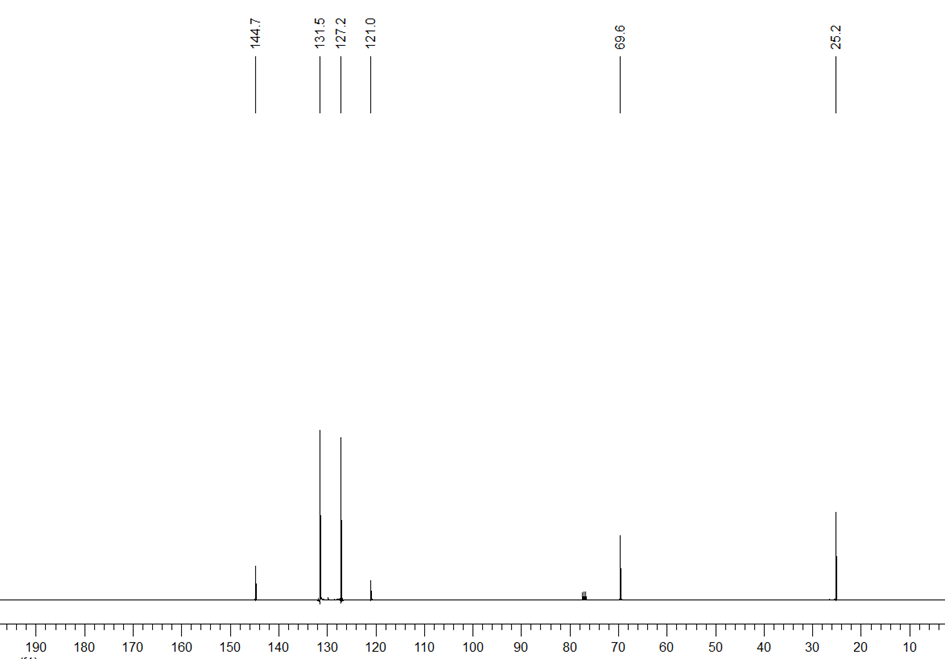
**Figure S10:** 1H and 13C-NMR spectrum of (***R*)-10a**

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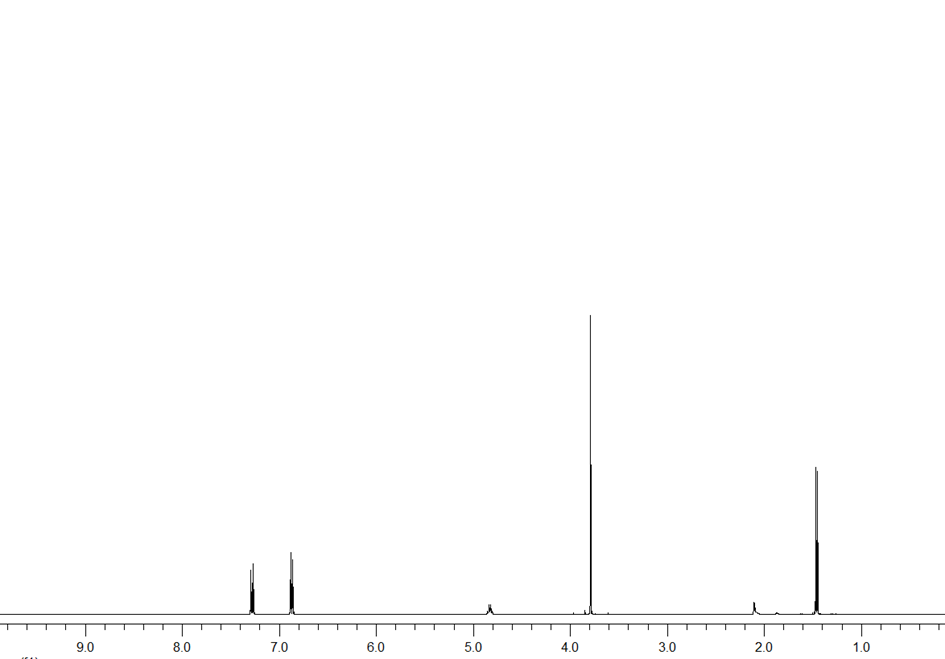
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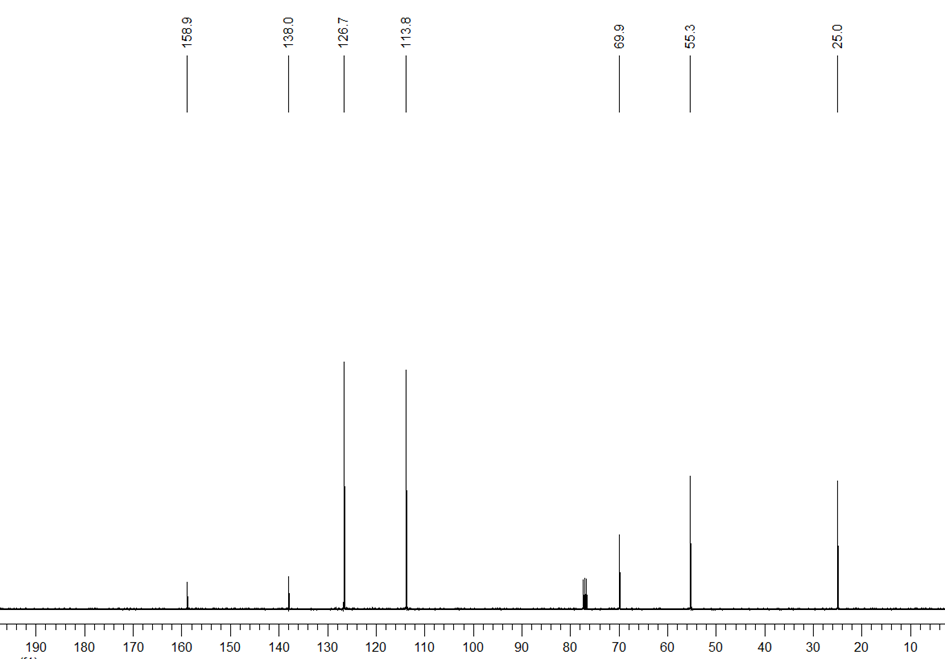
**Figure S11:** 1H and 13C-NMR spectrum of (***R*)-11a**

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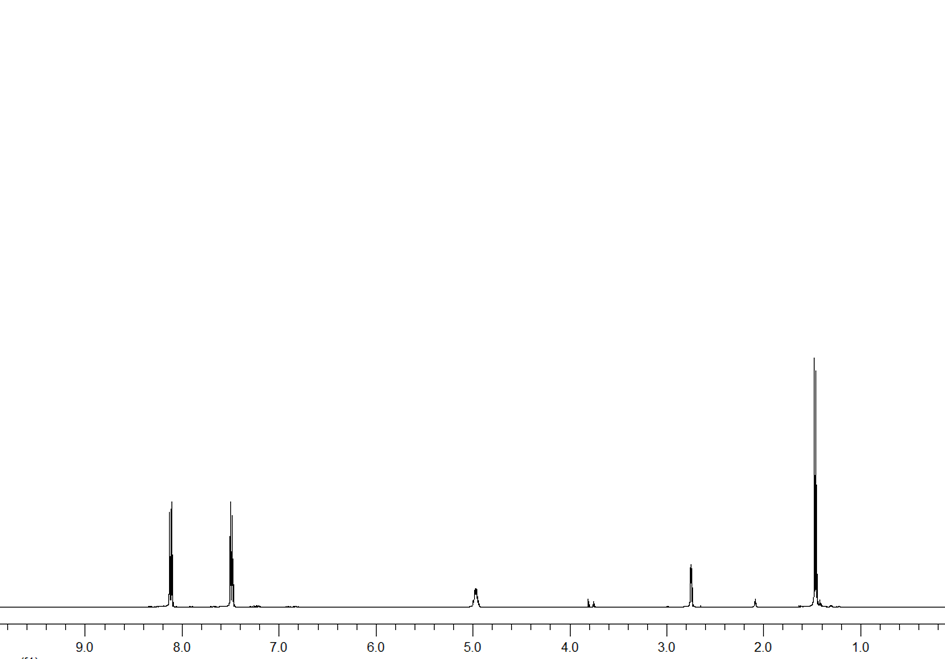
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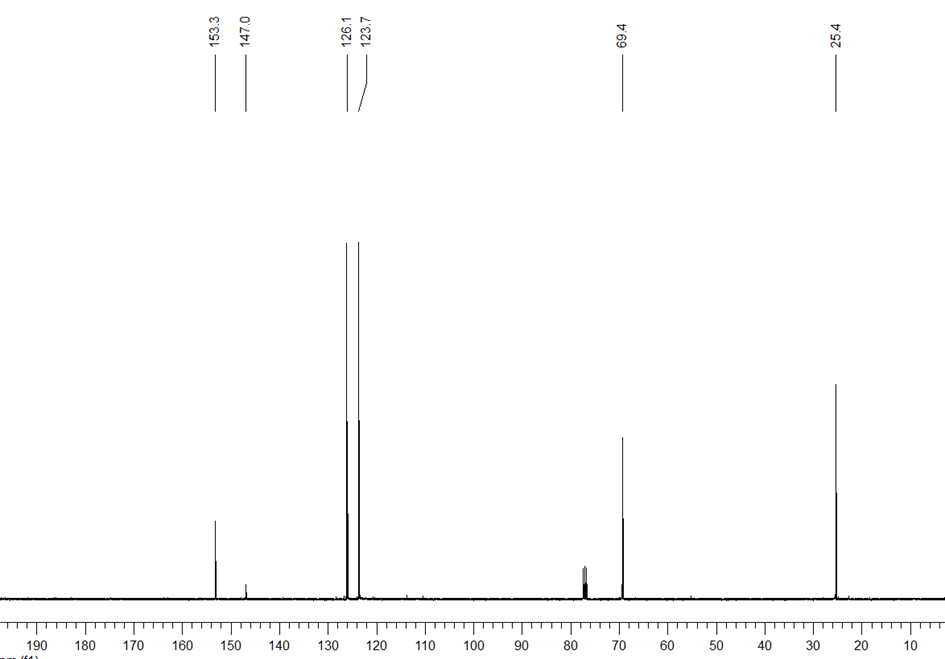
**Figure S12:** 1H and 13C-NMR spectrum of (***S*)-12a**

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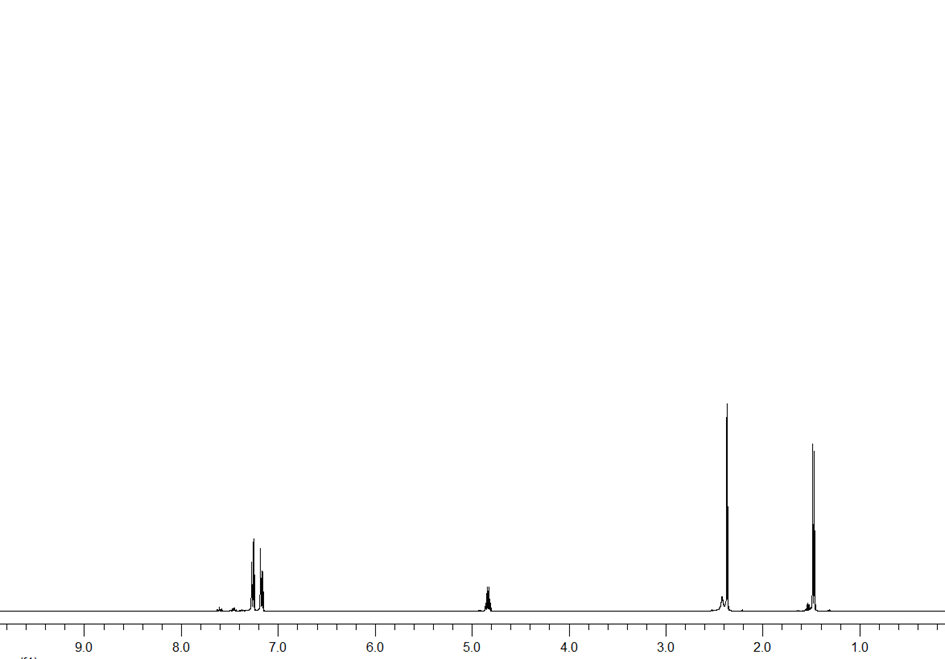
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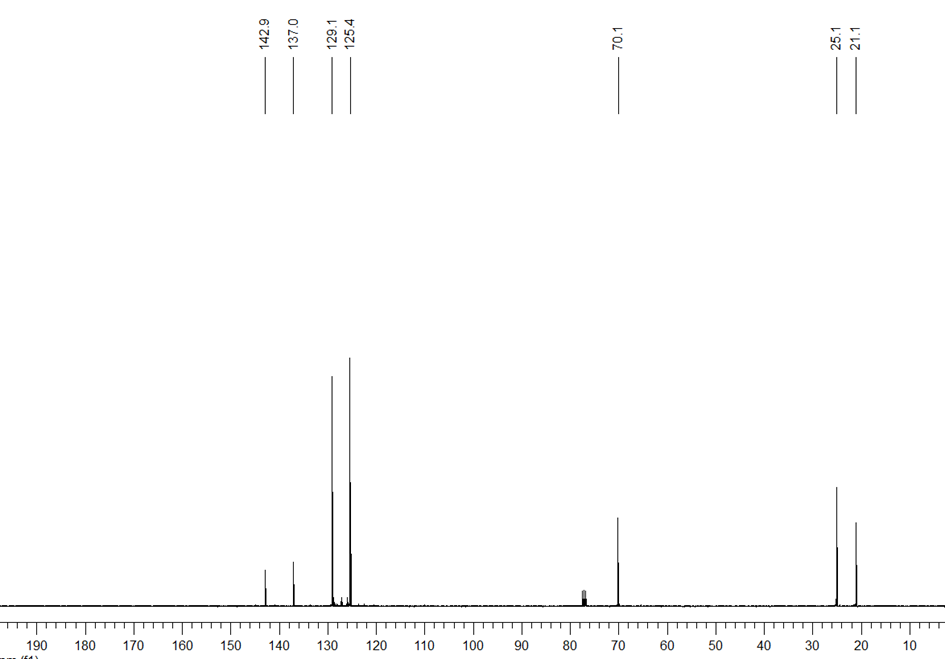
**Figure S13:** 1H and 13C-NMR spectrum of (***R*)-13a**

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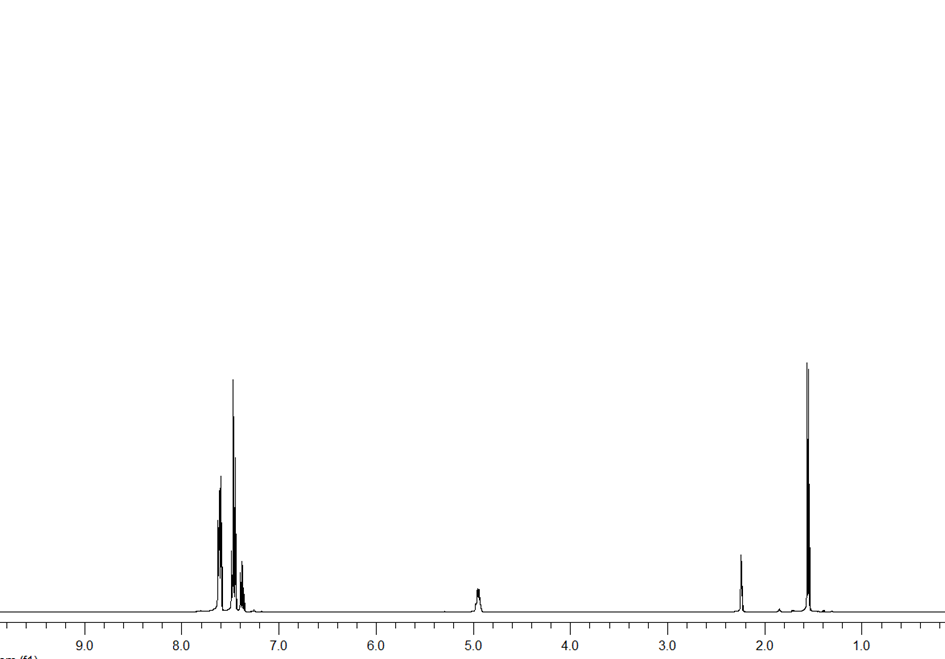
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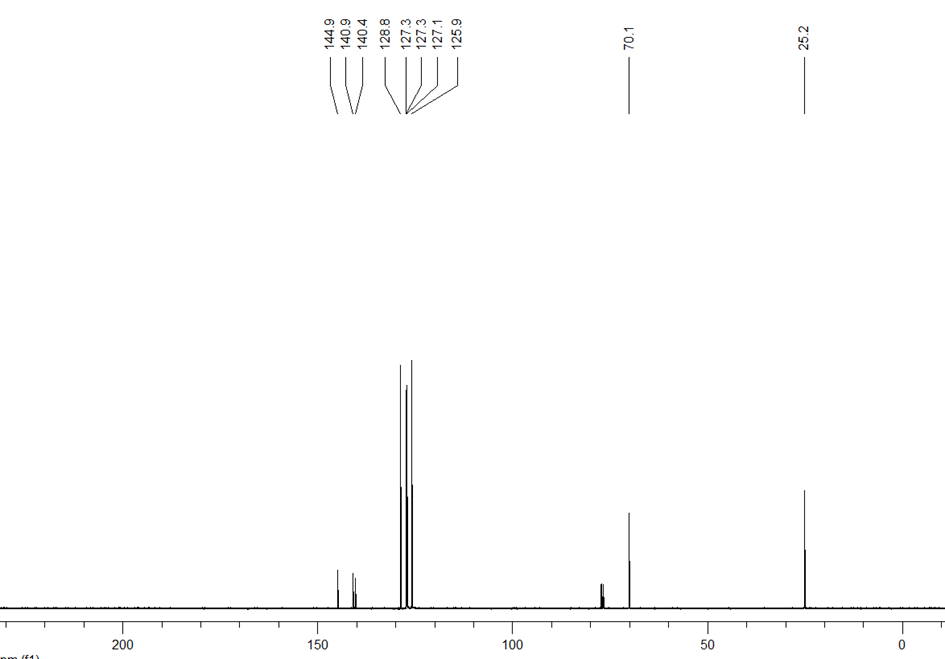
**Figure S14:** 1H and 13C-NMR spectrum of (***R*)-14a**

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**Figure S15:** 1H and 13C-NMR spectrum of (***S*)-15a**

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**Figure S16:** 1H and 13C-NMR spectrum of (***R*)-16a**

**HPLC chromatograms of compounds**

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|  |
| Figure S17: HPLC chromatogram of Substrate **1** |
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| Figure S18: HPLC chromatogram of Racemic **1a** |

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| Figure S19: HPLC chromatogram of **(*R*)-1a** |

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| Figure S20: HPLC chromatogram of Substrate **2** |
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| Figure S21: HPLC chromatogram of Racemic 2**a** |

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| Figure S22: HPLC chromatogram of **(*R*)-2a** |

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| Figure S23: HPLC chromatogram of Substrate **3** |
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| Figure S24: HPLC chromatogram of Racemic **3a** |

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| Figure S25: HPLC chromatogram of **(*S*)-3a** |

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| Figure S26: HPLC chromatogram of Substrate **4** |
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| Figure S27: HPLC chromatogram of Racemic **4a** |

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| Figure S28: HPLC chromatogram of **(*R*)-4a** |

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| Figure S29: HPLC chromatogram of Substrate **5** |
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| Figure S30: HPLC chromatogram of Racemic **5a** |

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| Figure S31: HPLC chromatogram of **(*R*)-5a** |

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| Figure S32: HPLC chromatogram of Substrate **6** |
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| Figure S33: HPLC chromatogram of Racemic **6a** |

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| Figure S34: HPLC chromatogram of **(*S*)-6a** |

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| Figure S35: HPLC chromatogram of Substrate **7** |
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| Figure S36: HPLC chromatogram of Racemic **7a** |

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| Figure S37: HPLC chromatogram of **(*R*)-7a** |

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| Figure S38: HPLC chromatogram of Substrate **8** |
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| Figure S39: HPLC chromatogram of Racemic **8a** |

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| Figure S40: HPLC chromatogram of **(*S*)-8a** |

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| Figure S41: HPLC chromatogram of Substrate **9** |
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| Figure S42: HPLC chromatogram of Racemic **9a** |

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| Figure S43: HPLC chromatogram of **(*S*)-9a** |

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| Figure S44: HPLC chromatogram of Substrate **10** |
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| Figure S45: HPLC chromatogram of Racemic **10a** |

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| Figure S46: HPLC chromatogram of **(*R*)-10a** |

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| Figure S47: HPLC chromatogram of Substrate **11** |
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| Figure S48: HPLC chromatogram of Racemic **11a** |

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| Figure S49: HPLC chromatogram of **(*R*)-11a** |

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| Figure S50: HPLC chromatogram of Substrate **12** |
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| Figure S51: HPLC chromatogram of Racemic **12a** |

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| Figure S52: HPLC chromatogram of **(*S*)-12a** |

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| Figure S53: HPLC chromatogram of Substrate **13** |
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| Figure S54: HPLC chromatogram of Racemic **13a** |

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| Figure S55: HPLC chromatogram of **(*R*)-13a** |

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| Figure S56: HPLC chromatogram of Substrate **14** |
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| Figure S57: HPLC chromatogram of Racemic **14a** |

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| Figure S58: HPLC chromatogram of **(*R*)-14a** |

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| Figure S59: HPLC chromatogram of Substrate **15** |
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| Figure S60: HPLC chromatogram of Racemic **15a** |

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| Figure S61: HPLC chromatogram of **(*S*)-15a** |

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| Figure S62: HPLC chromatogram of Substrate **16** |
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| Figure S63: HPLC chromatogram of Racemic **16a** |

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| Figure S64: HPLC chromatogram of **(*R*)-16a** |