Supplementary Material (ESI) for Chemical Communications
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Supporting information

Dynamic kinetic resolution of *β*-keto sulfones via asymmetric transfer hydrogenation

Zhenhua Ding, Jin Yang, Ting Wang, Zongxuan Shen and Yawen Zhang*

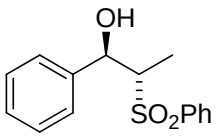
General

^{1}H and ^{13}C NMR spectra were recorded on a Inova Unity 400 spectrometer in $CDCl_3$, tetramethylsilane (TMS) served as an internal standard (δ=0) for ^{1}H NMR and $CDCl_3$ as an internal standard (δ=77.5) for ^{13}C NMR. Optical rotations were measured at 589 nm with an Analytical Automatic Polarimeter made in Rudolph company. The enatiomeric excess was determined by HPLC analysis using a Chiralpak AD-H or Chiralcel OD-H column. HPLC analysis was performed on following apparatuses: Waters 1525 (pump), and waters 1996 detector.

General procedure of the asymmetric hydrogen transfer reduction [1,2]

A suspension of $[RuCl_2(p\text{-cymene})]_2$ (3.75 mg, 0.00625 mmol) and (*S*,*S*)-TsDPEN (4.58 mg, 0.0125 mmol) in DMF (0.5 mL) was degassed three times, and then stirred at 80 °C for 1 h. After cooling to room temperature, 5:2 HCOOH/Et_3N (0.2 mL) was added, and then β-keto sulfone (0.5 mmol) was added. The reaction was stirred at 50 °C until completion according to TLC detection. 5.0 mL water was added to the reaction, the mixture was then extracted with EtOAc (10 mL) three times, dried over Na_2SO_4 and concentrated. The desired product was purified by silica gel chromatography (EtOAc : petroleum = 1 : 2). The enantioselectivity of the asymmetric hydrogen transfer products were determined by HPLC analysis.

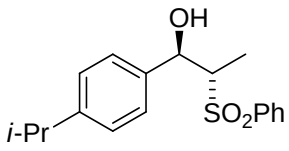
The racemic samples of diastereomeric mixtures of **2a**-**2p** for HPLC analysis were prepared following literature procedures.[3]



(1*R*,2*S*)-1-phenyl-2-(phenylsulfonyl)propan-1-ol, **2a**

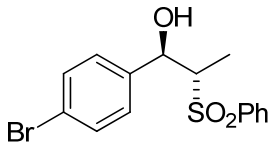
White solid; yield 95%; mp: 108–110 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 1.22 (d, J = 7.1 Hz, 3H, CHCH_3), 3.24 (q, J = 7.1 Hz, 1H, CHCHCH$_3$), 3.29 (s, 1H, OH), 5.54 (s, 1H, CHOH), 7.27–7.37

(m, 5H, Ar-*H*), 7.65 (t, *J* = 7.3 Hz, 2H, Ar-*H*), 7.74 (t, *J* = 7.5 Hz, 1H, Ar-*H*), 7.99 (d, *J* = 8.3 Hz, 2H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) *δ*: 6.21, 66.08, 69.68, 125.98, 128.20, 128.90, 129.17, 129.85, 134.57, 137.75, 140.23; HRMS (EI): *m/z* = 276.0820 (calcd for $C_{15}H_{16}O_3S$ = 276.0820); HPLC: Chiralpak AD-H (*i*-PrOH-hexane, 10 : 90, flow rate 1 mL min^{-1}, λ = 210.5 nm): t_1 = 13.814 min, t_2 = 18.318 min, t_3 = 22.008 min, t_4 = 23.733 min; $[\alpha]_D^{24}$ = –12.86 (*c* = 1.0, acetone), *dr* = 97 : 3, *ee* = 98%.



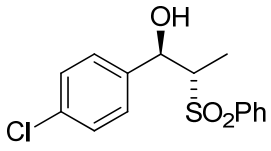
(1*R*,2*S*)-1-(4-isopropylphenyl)-2-(phenylsulfonyl)propan-1-ol, **2b**

Colorless oil; yield 85%; ^{1}H NMR (400 MHz, $CDCl_3$) *δ*: 1.21–1.23 (m, 9H, CH_3 and $CH(CH_3)_2$), 2.88 (heptet, *J* = 6.9 Hz, 1H, C*H*$(CH_3)_2$), 3.20–3.25 (m, 2H, O*H*, C*H*CH_3), 5.51 (s, 1H, C*H*OH), 7.18–7.21 (m, 4H, Ar-*H*), 7.62 (t, *J* = 7.7 Hz, 2H, Ar-*H*), 7.71 (t, *J* = 7.4 Hz, 1H, Ar-*H*), 7.97 (d, *J* = 7.4 Hz, 2H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) *δ*: 6.34, 24.37, 24.39, 34.20, 66.14, 69.62, 125.97, 126.93, 129.16, 129.80, 134.49, 137.62, 137.84, 148.94; HRMS (EI): *m/z* = 318.1294 (calcd for $C_{18}H_{22}O_3S$ = 318.1290); HPLC: Chiralpak AD-H (*i*-PrOH-hexane, 10 : 90, flow rate 1 mL min^{-1}, λ = 220.0 nm): t_1 = 13.688 min, t_2 = 21.074 min, t_3 = 22.611 min, t_4 = 26.930 min; $[\alpha]_D^{24}$ = –10.85 (*c* = 1.0, acetone), *dr* = 86 : 14, *ee* = 99%.



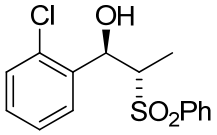
(1*R*,2*S*)-1-(4-bromophenyl)-2-(phenylsulfonyl)propan-1-ol, **2d**

White solid; yield 96%; mp: 99–100 °C; ^{1}H NMR (400 MHz, $CDCl_3$) *δ*: 1.16 (d, *J* = 7.1 Hz, 3H, CHC*H*$_3$), 3.16 (q, *J* = 7.1 Hz, 1H, C*H*CH_3), 3.36 (d, *J* = 1.7 Hz, 1H, O*H*), 5.48 (s, 1H, C*H*OH), 7.14 (d, *J* = 8.4 Hz, 2H, Ar-*H*), 7.45 (d, *J* = 8.4 Hz, 2H, Ar-*H*), 7.62 (t, *J* = 7.7 Hz, 2H, Ar-*H*), 7.72 (t, *J* = 7.4 Hz, 1H, Ar-*H*), 7.95 (d, *J* = 7.4 Hz, 2H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) *δ*: 6.34, 65.79, 69.17, 122.02, 127.77, 129.13, 129.87, 131.95, 134.66, 137.44, 139.37; HRMS (EI): *m/z* = 353.9921 (calcd for $C_{15}H_{15}B_rO_3S$ = 353.9925); HPLC: Chiralpak AD-H (*i*-PrOH-hexane, 10 : 90, flow rate 1 mL min^{-1}, λ = 220.2 nm): t_1 = 21.759 min, t_2 = 25.532 min, t_3 = 42.858 min, t_4 = 45.486 min; $[\alpha]_D^{24}$ = –14.23 (*c* = 1.0, acetone), *dr* = 90 : 10, *ee* = 97%.



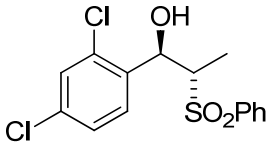
(1*R*,2*S*)-1-(4-chlorophenyl)-2-(phenylsulfonyl)propan-1-ol, **2e**

White solid; yield 95%; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 1.17 (d, J = 7.1 Hz, 3H, CHC*H*$_3$), 3.14–3.19 (m, 1H, CHC*H*CH$_3$), 3.37 (d, J = 1.6 Hz, 1H, O*H*), 5.51 (s, 1H, C*H*OH), 7.30 (d, J = 8.4 Hz, 2H, Ar-*H*), 7.21 (d, J = 8.3 Hz, 2H, Ar-*H*), 7.63 (t, J = 7.6 Hz, 2H, Ar-*H*), 7.73 (t, J = 7.4 Hz, 1H, Ar-*H*), 7.96 (d, J = 7.3 Hz, 2H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 6.31, 65.84, 69.13, 127.41, 129.01, 129.13, 129.87, 133.88, 134.66, 137.46, 138.81; HRMS (EI): *m/z* = 310.0424 (calcd for $C_{15}H_{15}ClO_3S$ = 310.0430); HPLC: Chiralcel OD-H (*i*-PrOH-hexane, 10 : 90, flow rate 1 mL min^{-1}, λ = 220.0 nm): t_1 = 11.839 min, t_2 = 13.646 min, t_3 = 15.144 min, t_4 = 22.406 min; $[\alpha]_D^{24}$ = –14.59 (*c* = 1.0, acetone), *dr* = 98 : 2, *ee* = 90%.



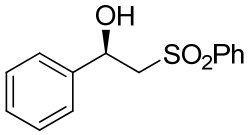
(1R,2S)-1-(2-chlorophenyl)-2-(phenylsulfonyl)propan-1-ol, **2f**

Colorless oil; yield 88%; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 0.95–1.30 (m, 3H, CHC*H*$_3$), 3.42–3.54 (m, 1H, C*H*CH$_3$), 3.60, 4.50 (s, 1H, O*H*), 5.53–5.58 (m, 1H, C*H*OH), 7.21–8.03 (m, 9H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 5.04, 12.22, 61.73, 66.53, 67.03, 69.76, 127.23, 127.79, 128.44, 128.74, 129.14, 129.29, 129.34, 129.54, 129.61, 129.75, 129.83, 130.56, 130.96, 133.04, 134.45, 134.48, 136.79, 136.98, 137.44, 137.51; HRMS (EI): *m/z* = 310.0428 (calcd for $C_{15}H_{15}ClO_3S$ = 310.0430); HPLC: Chiralpak AD-H (*i*-PrOH-hexane, 10 : 90, flow rate 1 mL min^{-1}, λ = 210.5 nm): t_1 = 12.695 min, t_2 = 18.255 min, t_3 = 20.684 min, t_4 = 25.249 min, *dr* = 51 : 49, *ee* = 57% and 45%, respectively.



1-(2,4-dichlorophenyl)-2-(phenylsulfonyl)propan-1-ol, **2g**

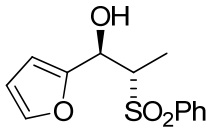
White solid; yield 89%; mp: 94–95 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 0.97–1.28 (m, 3H, CHC*H*$_3$), 3.37–3.48 (m, 1H, C*H*CH$_3$), 3.62, 4.53 (s, 1H, O*H*), 5.31–5.50 (m, 1H, C*H*OH), 7.27–8.02 (m, 8H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 5.15, 12.17, 61.63, 66.23, 66.75, 69.38, 127.59, 128.16, 129.12, 129.26, 129.44, 129.58, 129.66, 129.74, 131.55, 133.60, 134.54, 134.87, 135.77, 136.30, 136.74, 137.31; HRMS (EI): *m/z* = 344.0040 (calcd for $C_{15}H_{14}Cl_2O_3S$ = 344.0041); HPLC: Chiralpak AD-H (*i*-PrOH-hexane, 10 : 90, flow rate 1 mL min^{-1}, λ = 210.5 nm): t_1 = 15.696 min, t_2 = 18.857 min, t_3 = 22.865 min, t_4 = 39.215 min, *dr* = 67 : 33, *ee* = 83%, 30%.



(*R*)-1-phenyl-2-(phenylsulfonyl)ethanol, **2i**

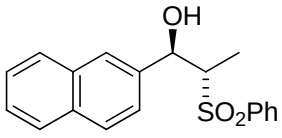
White solid; yield 96%; mp: 93–94^{o}C; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 3.36 (dd, J = 1.7 Hz, J =

14.4 Hz, 1H, C*H*H), 3.52 (dd, *J* = 10.1 Hz, *J* = 14.3 Hz, 1H, CH*H*), 3.67 (d, *J* = 2.1 Hz, 1H, O*H*), 5.30 (d, *J* = 10.1 Hz, 1H, C*H*), 7.28–7.36 (m, 5H, Ar-*H*), 7.61 (t, *J* = 7.7 Hz, 2H, Ar-*H*), 7.71 (t, *J* = 7.4 Hz, 1H, Ar-*H*), 7.98 (d, *J* = 7.4 Hz, 2H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 64.30, 68.82, 126.03, 128.35, 128.71, 129.13, 129.83, 134.48, 139.56, 141.05; HRMS (EI): *m/z* = 262.0669 (calcd for $C_{14}H_{14}O_3S$ = 262.0664); HPLC: Chiralpak AD-H (*i*-PrOH-hexane, 10 : 90, flow rate 1 mL min^{-1}, λ = 210.5 nm): t_1 = 26.681 min, t_2 = 29.874 min; $[\alpha]_D^{24}$ = –35.85 (*c* = 1.0, acetone), *ee* = 99%.



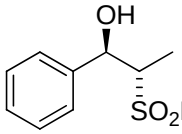
(1*R*,2*S*)-1-(furan-2-yl)-2-(phenylsulfonyl)propan-1-ol, **2j**

Brown oil; yield 89%; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 1.33 (d, *J* = 7.1 Hz, 3H, CHC*H*$_3$), 3.22 (brs, 1H, O*H*), 3.48 (q, *J* = 7.0 Hz, 1H, C*H*CH$_3$), 5.49 (s, 1H, C*H*OH), 6.34 (s, 2H, furan-*H*), 7.31 (s, 1H, furan-*H*), 7.61 (t, *J* = 7.5 Hz, 2H, Ar-*H*), 7.71 (t, *J* = 7.3 Hz, 1H, Ar-*H*), 7.95 (d, *J* = 7.8 Hz, 2H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 7.54, 63.35, 65.89, 107.81, 110.90, 129.19, 129.78, 134.54, 137.66, 142.50, 152.70; HRMS (EI): *m/z* = 266.0620 (calcd for $C_{13}H_{14}O_4S$ = 266.0613); HPLC: Chiralpak AD-H (*i*-PrOH-hexane, 10 : 90, flow rate 1 mL min^{-1}, λ = 220.0 nm): t_1 = 18.244 min, t_2 = 26.884 min, t_3 = 31.300 min, t_4 = 35.917 min, *dr* = 95 : 5, *ee* > 99%.



(1*R*,2*S*)-1-(naphthalen-2-yl)-2-(phenylsulfonyl)propan-1-ol, **2k**

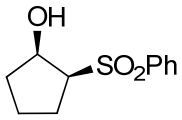
Brown oil; yield 95%; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 1.22 (d, *J* = 7.1 Hz, 3H, CHC*H*$_3$); 3.34 (q, *J* = 7.0 Hz, 1H, C*H*CH$_3$); 3.42 (s, 1H, O*H*); 5.71 (s, 1H, C*H*OH); 7.48–8.03 (m, 12H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 6.41, 65.97, 69.84, 123.74, 125.14, 126.58, 126.83, 128.11, 128.46, 128.71, 129.22, 129.88, 133.30, 133.59, 134.61, 137.63, 137.74; HRMS (EI): *m/z* = 326.0981 (calcd for $C_{19}H_{18}O_3S$ = 326.0977); HPLC: Chiralpak AD-H (*i*-PrOH-hexane, 10 : 90, flow rate 1 mL min^{-1}, λ = 220.0 nm): t_1 = 25.887 min, t_2 = 30.241 min, t_3 = 36.355 min, t_4 = 44.550 min; $[\alpha]_D^{24}$ = –15.81 (*c* = 1.0, acetone), *dr* = 87 : 13, *ee* = 98%.



(1*R*,2*S*)-2-(ethylsulfonyl)-1-phenylpropan-1-ol, **2l**

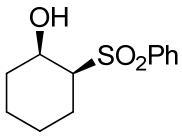
Colorless oil; yield 94%; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 1.32 (d, *J* = 7.2 Hz, 3H, CHC*H*$_3$), 1.45 (t,

J = 7.5 Hz, 3H, CH_2CH_3), 3.03 (brs, 1H, O*H*), 3.11–3.20 (m, 3H, CH_2CH_3,$CHCH_3$), 5.63 (s, 1H, C*H*OH), 7.30~7.42 (m, 5H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 6.03, 6.58, 45.53, 64.10, 70.13, 125.99, 128.27, 128.93, 140.69; HRMS (EI): *m/z* = 228.0830 (calcd for $C_{11}H_{16}O_3S$ = 228.0820); HPLC: Chiralpak AD-H (*i*-PrOH-hexane, 5 : 95, flow rate 1 mL min^{-1}, λ = 210.5 nm): t_1 = 16.222 min, t_2 = 18.783 min, t_3 = 24.743 min; $[\alpha]_D^{24}$ = –24.40 (*c* = 1.0, acetone), *dr* = 90 : 10, *ee* > 99%.



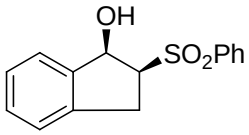
(1*R*,2*S*)-2-(phenylsulfonyl)cyclopentanol, **2m**

Brown oil; yield 90%; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 1.64–3.31 (m, 7H, alicyclic), ,3.46 (s, 1H, O*H*), 4.43 (s, 1H, C*H*OH), 7.59 (t, *J* = 7.6 Hz, 2H, Ar-*H*), 7.68 (t, *J* = 7.4 Hz, 1H, Ar-*H*), 7.95 (d, *J* = 7.3 Hz, 2H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 21.41, 23.64, 34.43, 68.11, 72.63, 128.24, 129.54, 134.10, 139.74; HRMS (EI): *m/z* = 226.0661 (calcd for $C_{11}H_{14}O_3S$ = 226.0664); HPLC: Chiralpak AD-H (*i*-PrOH-hexane, 10 : 90, flow rate 1 mL min^{-1}, λ = 220.0 nm): t_1 = 16.803 min, t_2 = 26.374 min, t_3 = 32.728 min; $[\alpha]_D^{24}$ = –14.19 (*c* = 1.2, acetone), dr = *99* : 1, *ee* = 84%.



(1*R*,2*S*)-2-(phenylsulfonyl)cyclohexanol, **2n**

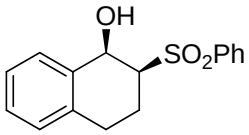
White solid; yield 87%; mp: 70–72 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 1.17-2.11 (m, 2H, CH_2), 1.31–1.47 (m, 1H, C*H*H), 1.71–1.79 (m, 1H, CH*H*), 1.88–2.11 (m, 8H, alicyclic $CH_2CH_2CH_2CH_2$),), 2.90–2.94 (m, 1H, C*H*CHOH), 3.34 (s, 1H,O*H*), 4.32 (s, 1H,C*H*OH), 7.60 (t, *J* = 7.7 Hz, 2H, Ar-*H*), 7.70 (t, *J* = 7.4 Hz, 1H, Ar-*H*), 7.91 (d, *J* = 7.8 Hz, 2H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 18.91, 19.55, 25.30, 32.67, 63.86, 66.58, 128.96, 129.65, 134.34, 137.84; HRMS (EI): *m/z* = 240.0827 (calcd for $C_{12}H_{16}O_3S$ = 240.0820); HPLC: Chiralpak AD-H (*i*-PrOH-hexane, 10 : 90, flow rate 1 mL min^{-1}, λ = 220.0 nm): t_1 = 23.891 min, t_2 = 31.039 min, t_3 = 42.995 min; $[\alpha]_D^{24}$ = –16.80 (*c* = 1.0, acetone), *dr* = 98 : 2, *ee* = 65%.



(1*R*,2*S*)-2-(phenylsulfonyl)-2,3-dihydro-1H-inden-1-ol, **2o**

White solid; yield 90%; mp: 112–114 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 3.19(dd, *J* = 8.1 Hz, *J* = 16.1 Hz, 2H, CH_2), 3.70 (dd, *J* = 8.9 Hz, *J* = 16.1 Hz, 1H, C*H*OH), 3.97 (dt, *J* = 5.8 Hz, *J* = 8.5 Hz, 1H, CHC*H*CH_2), 5.31 (d, *J* = 5.7 Hz, 1H, O*H*), 7.25–7.40 (m, 4H, Ar-*H*), 7.59 (t, *J* = 7.6 Hz, 2H, Ar-*H*), 7.68 (t, *J* = 7.4 Hz, 1H, Ar-*H*), 8.02–8.05 (m, 2H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 31.81, 67.33, 75.06, 125.33, 125.46, 128.27, 128.98, 129.68, 129.97, 134.37, 139.67, 140.12,

142.19; HRMS (EI): *m/z* = 274.0662 (calcd for $C_{15}H_{14}O_3S$ = 274.0664); HPLC: Chiralpak AD-H (*i*-PrOH-hexane, 10 : 90, flow rate 1 mL min^{-1}, λ = 220.0 nm): t_1 = 27.837 min, t_2 = 35.290 min; $[\alpha]_D^{24}$ = –8.46 (*c* = 0.65, acetone), *dr* > 99 : 1, *ee* = 99%.



(1*R*,2*S*)-2-(phenylsulfonyl)-1,2,3,4-tetrahydronaphthalen-1-ol, **2p**

Brown oil; yield 92%; ^{1}H NMR (400 MHz, $CDCl_3$) *δ*: 2.22-3.31 (m, 6H, alicyclic), 5.07 (s, 1H, O*H*), 7.12–7.27 (m, 4H, Ar-*H*), 7.62 (t, *J* = 7.6 Hz, 2H, Ar-*H*), 7.72 (t, *J* = 7.4 Hz, 1H, Ar-*H*), 8.00 (d, *J* = 7.6 Hz, 2H, Ar-*H*); ^{13}C NMR (100 MHz, $CDCl_3$) *δ*: 16.82, 28.58, 65.42, 66.18, 127.00, 129.22, 129.35, 129.45, 129.75, 130.39, 134.52, 135.47, 135.94, 138.25; HRMS (EI): *m/z* = 270.0709 (calcd for $C_{16}H_{16}O_3S - H_2O$ = 270.0715); HPLC: Chiralpak AD-H (*i*-PrOH-hexane, 20 : 80, flow rate 1 mL min^{-1}, λ = 210.5 nm): t_1 = 18.741 min, t_2 = 26.386 min; $[\alpha]_D^{24}$ = –67.33 (*c* = 0.30, acetone), *dr* > 99 : 1, *ee* > 99%.

References

1. F. Eustache, P. Dalko and J. Cossy, *Org. Lett.*, 2002, **4**, 1263.
2. A. Ros, A. Magriz, H. Dietrich, J. M. Lassaletta and R. Fernάndez, *Tetrahedron*, 2007, **63**, 7532.
3. W. E. Truce and T. C. Klingler, *J. Org. Chem*., 1970, **35**, 1834.

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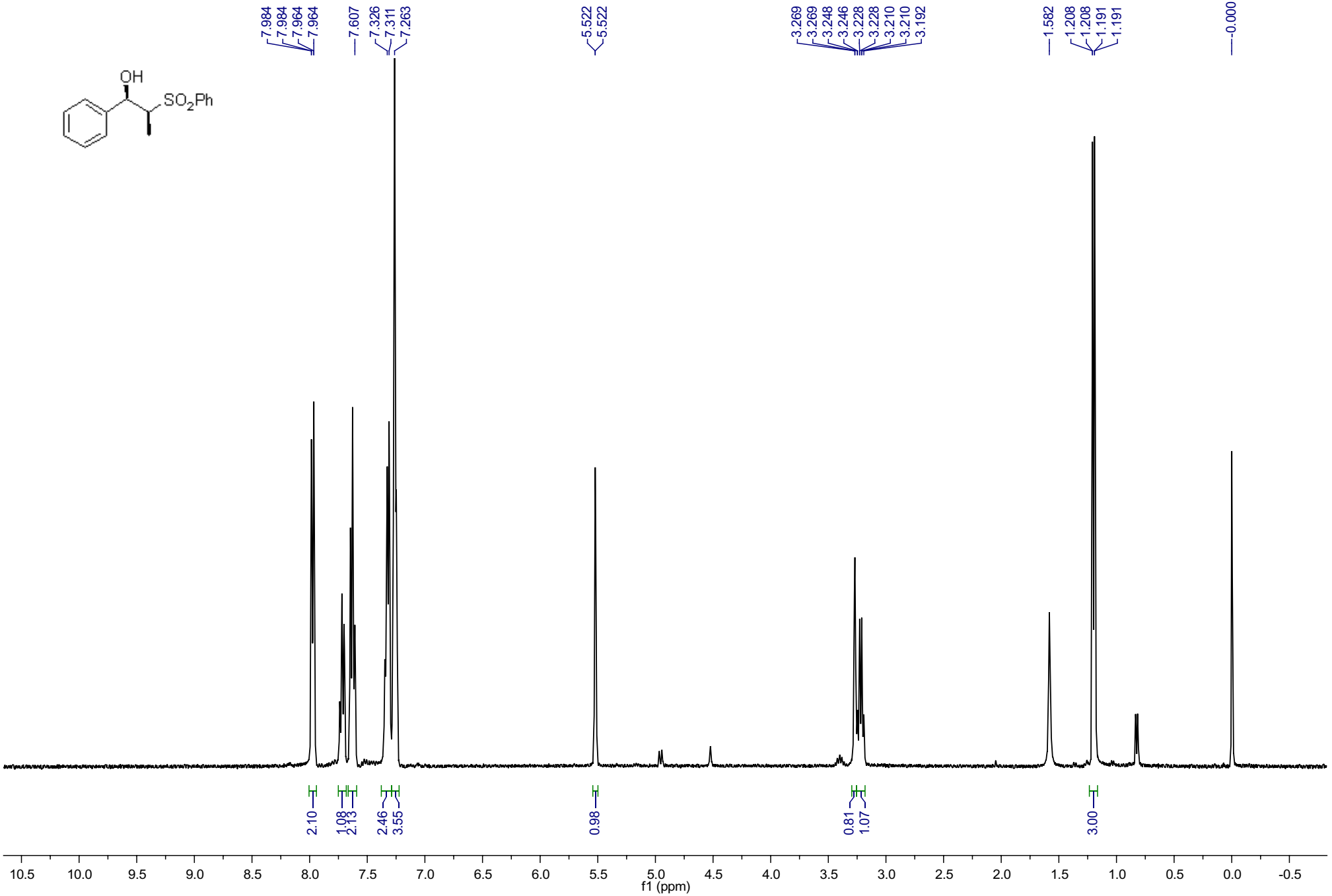

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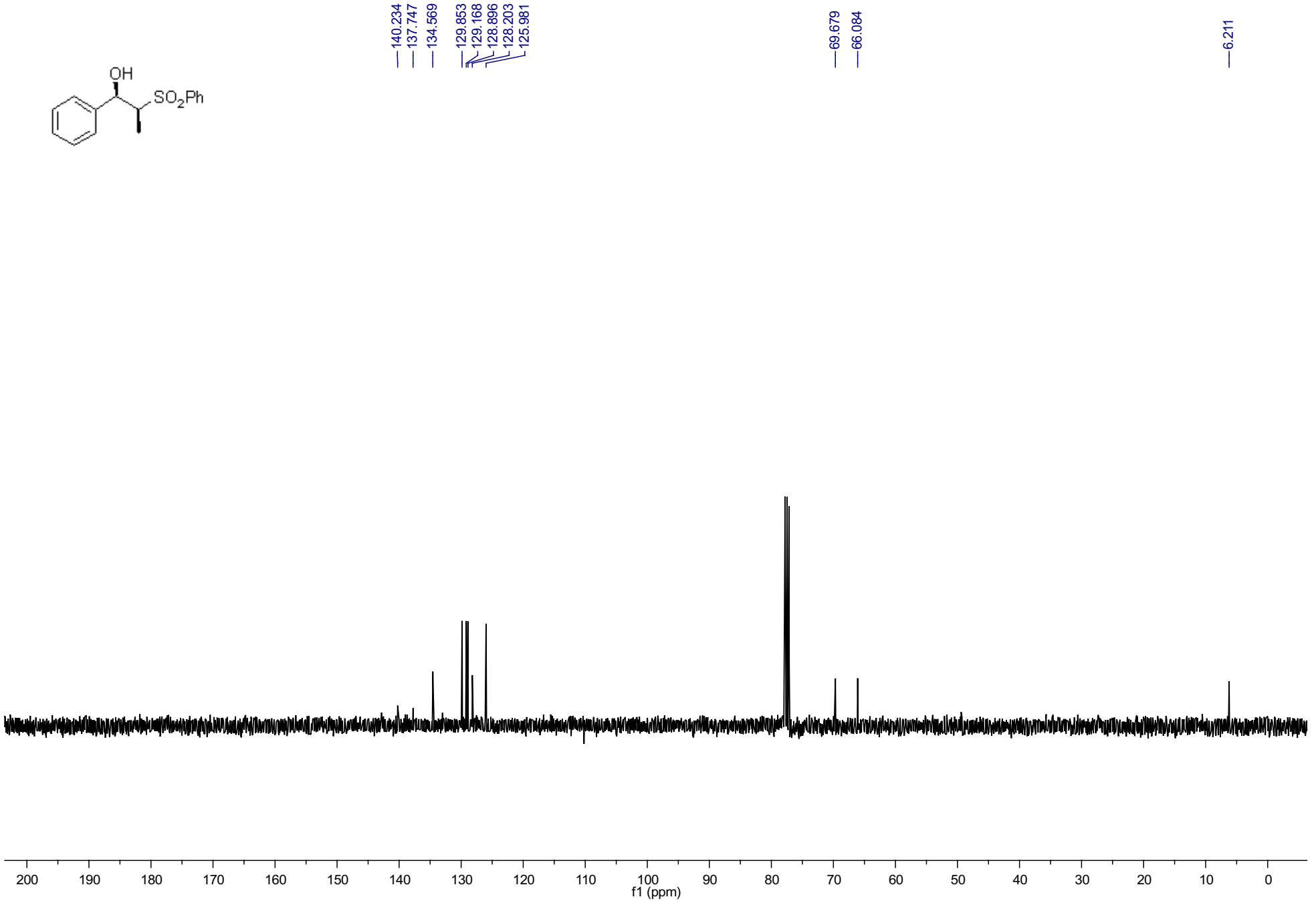

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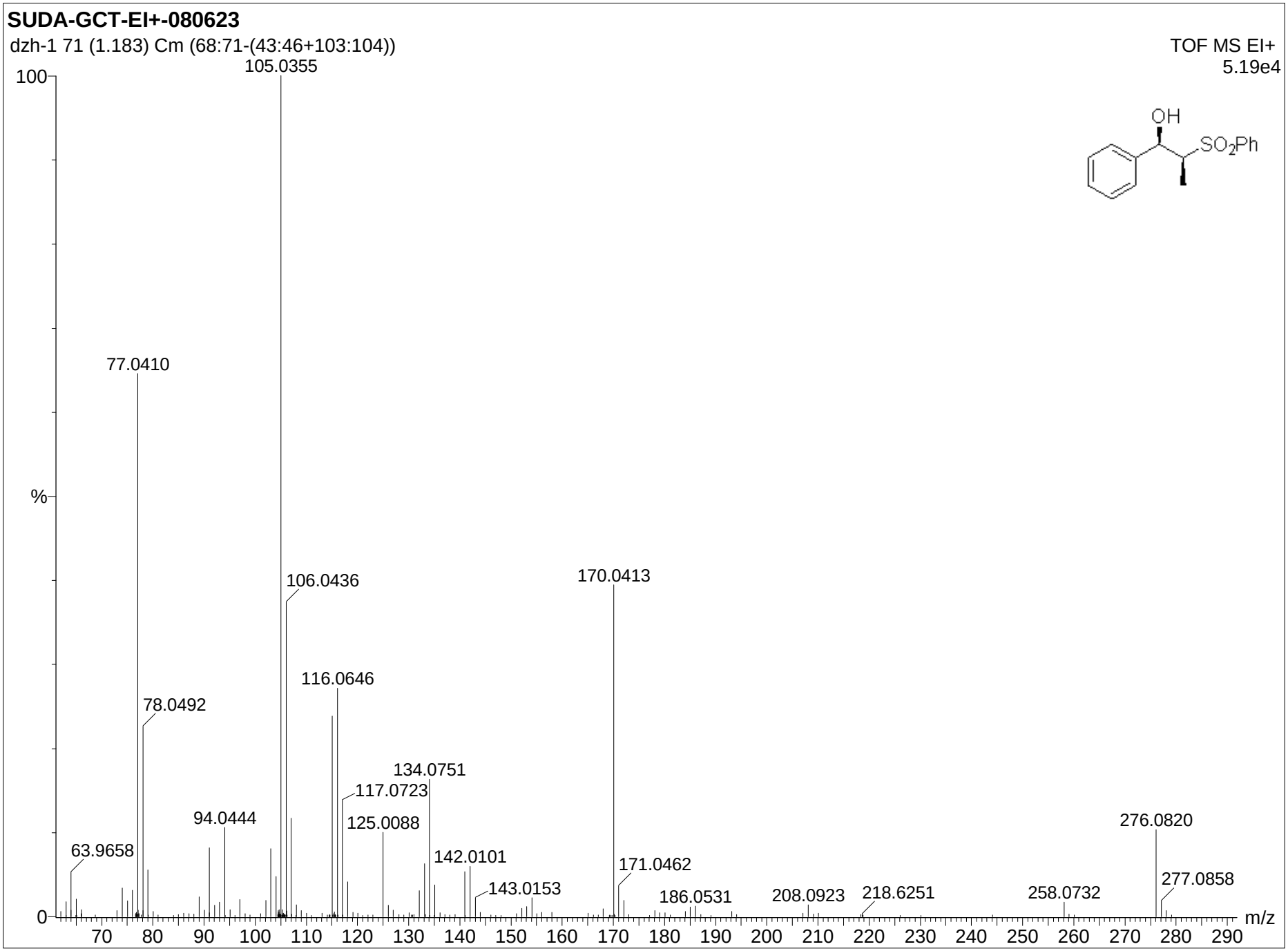

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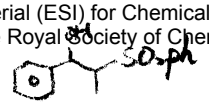
Empower 2



(DMF. 30°C S/C =40)

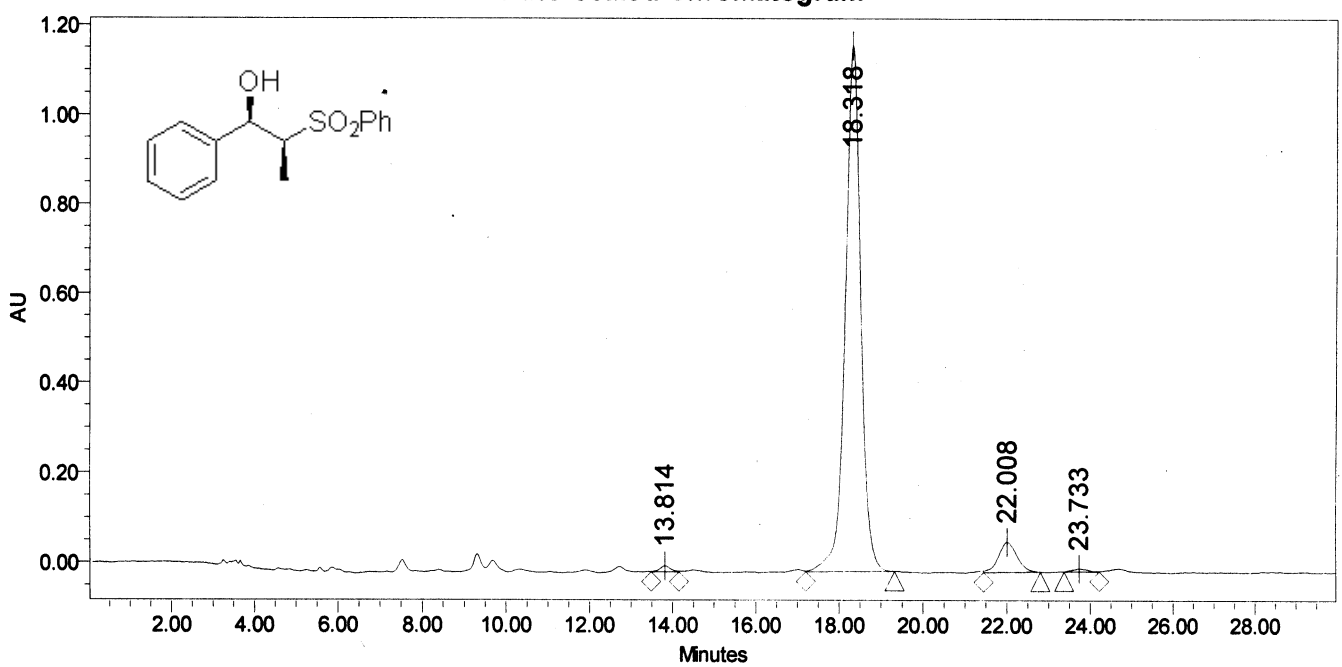
SZX

AD-H (90/10) 1ML/min

SAMPLE INFORMATION

Sample Name:	dzh-DMF	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	605	Acq. Method Set:	Untitled
Injection #:	7	Processing Method:	szx
Injection Volume:	20.00 ul	Channel Name:	210.5nm
Run Time:	30.0 Minutes	Proc. Chnl. Descr.:	PDA 210.5 nm
Date Acquired:	2007-11-30 14:58:28 CST		
Date Processed:	2007-11-30 15:38:55 CST		

Auto-Scaled Chromatogram



Peak Results

	RT	Area	% Area	Height	Amount
1	13.814	243999	0.75	13464	
2	18.318	30144254	92.33	1175704	
3	22.008	2090872	6.40	67766	
4	23.733	168472	0.52	6449	

Reported by User: System
Report Method: szx
Report Method ID 5989
Page: 1 of 2

Project Name: szx
Date Printed:
2007-11-30
15:39:58 PRC

dr 93:7

ee 98%, 85%

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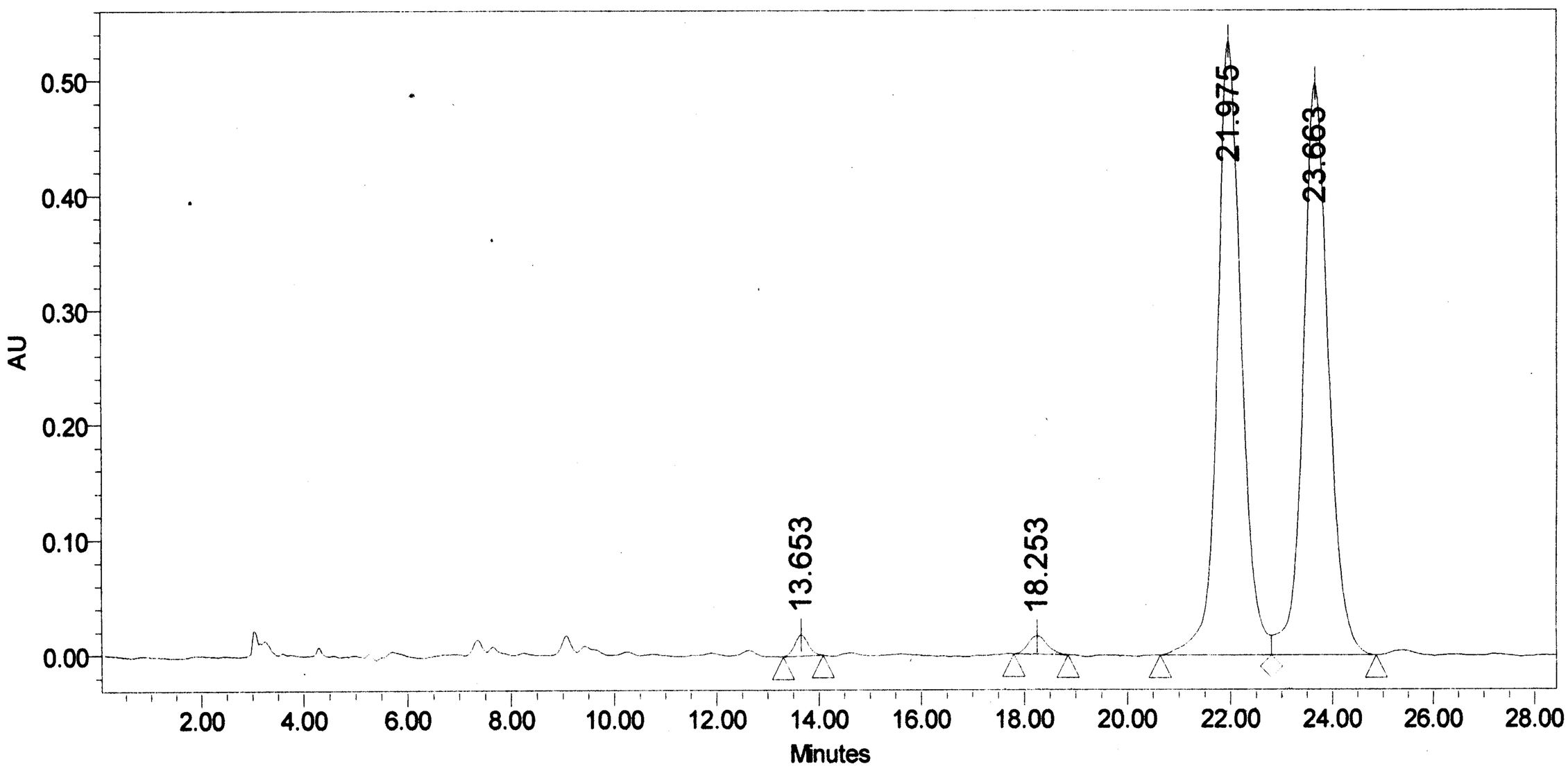
Empower 2

SZX

SAMPLE INFORMATION

Sample Name:	dzh-r	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	605	Acq. Method Set:	Untitled
Injection #:	3	Processing Method:	LC PQ ApexTrack
Injection Volume:	20.00 ul	Channel Name:	210.5nm
Run Time:	30.0 Minutes	Proc. Chnl. Descr.:	PDA 210.5 nm
Date Acquired:	2007-11-30 13:13:40 CST		
Date Processed:	2007-11-30 13:43:49 CST		

Auto-Scaled Chromatogram



Peak Results

	RT	Area	% Area	Height	Amount
1	13.653	342341	0.97	18459	
2	18.253	411988	1.17	16112	
3	21.975	17349892	49.10	535172	
4	23.663	17228112	48.76	498599	

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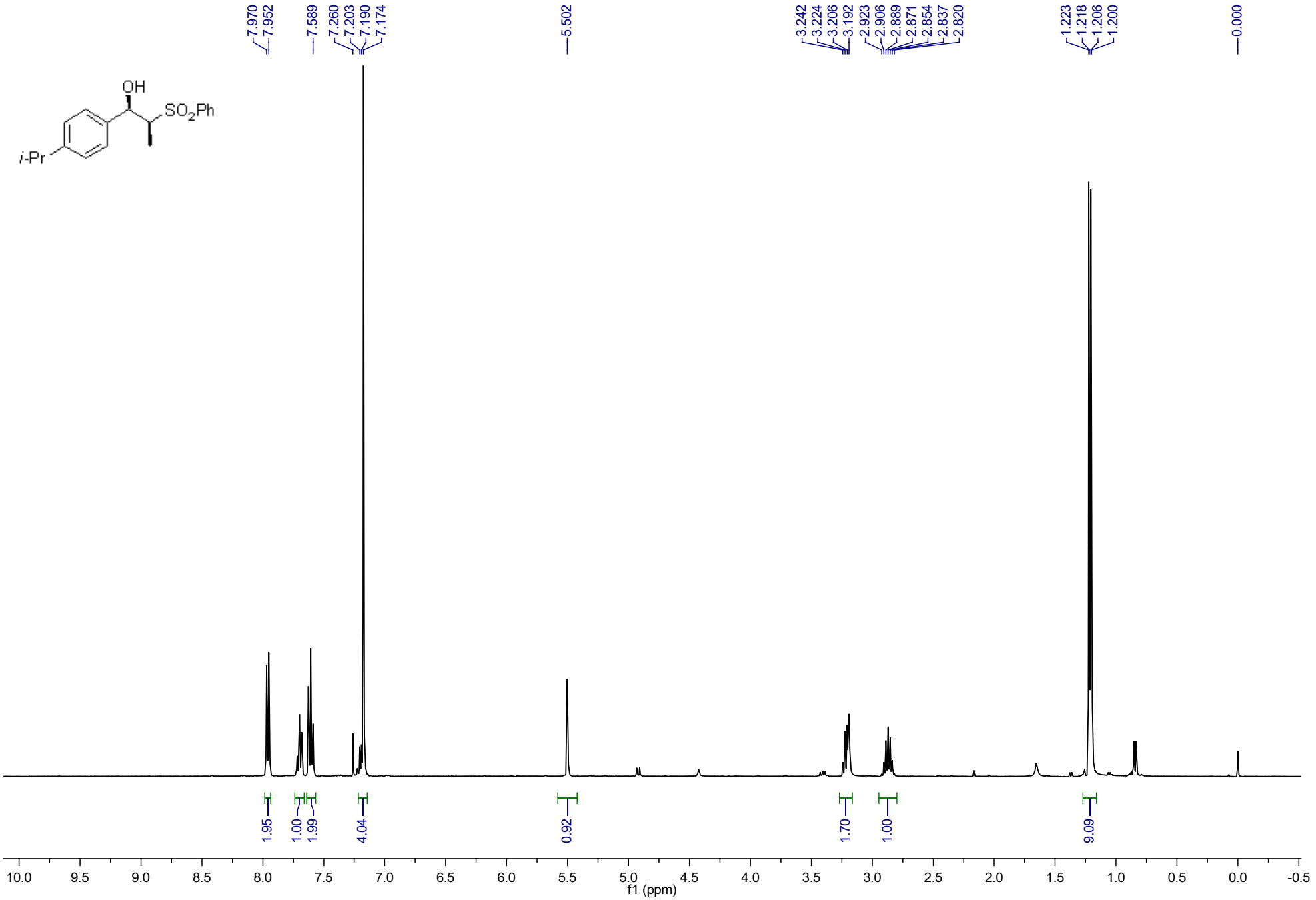

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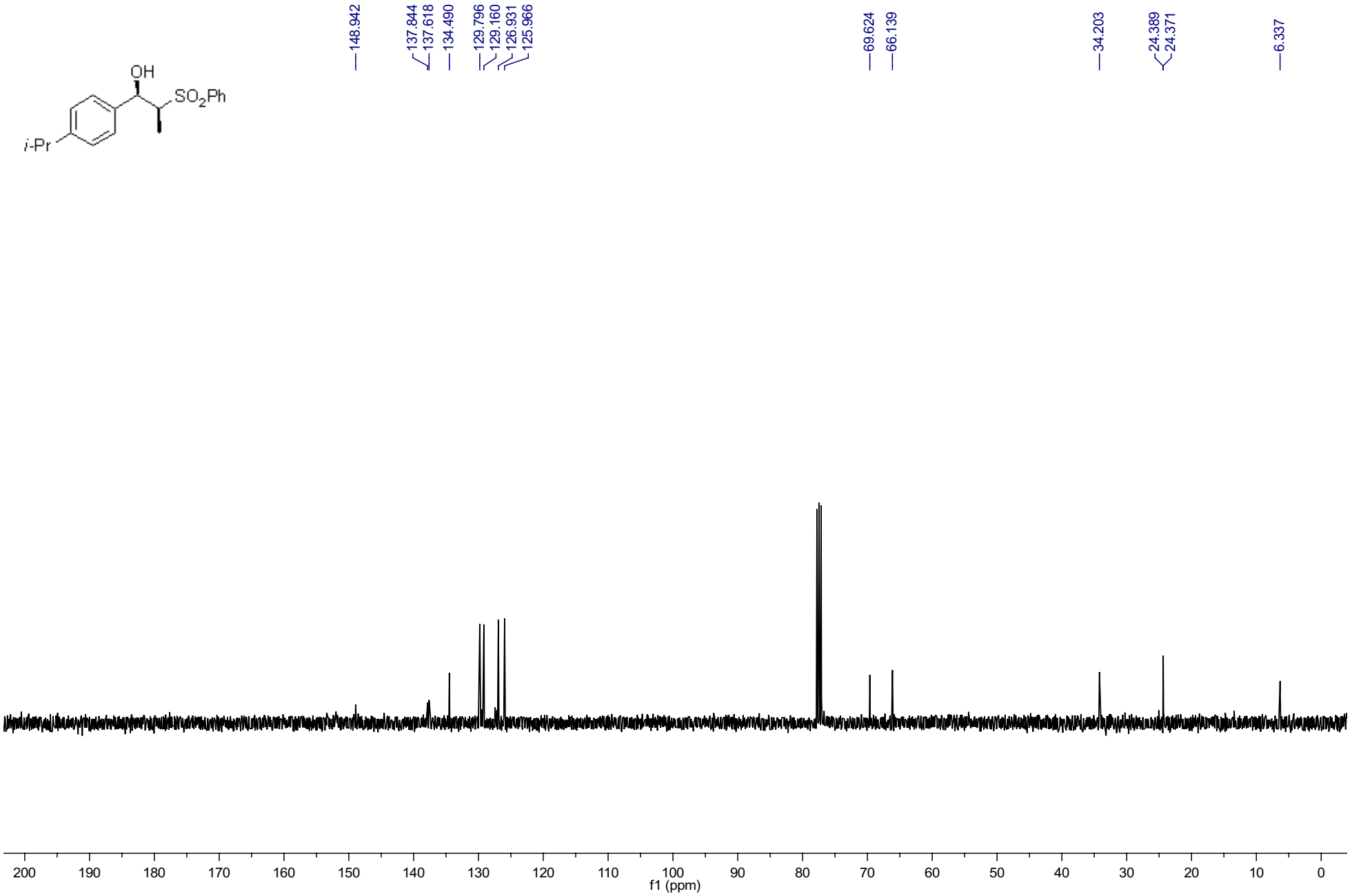

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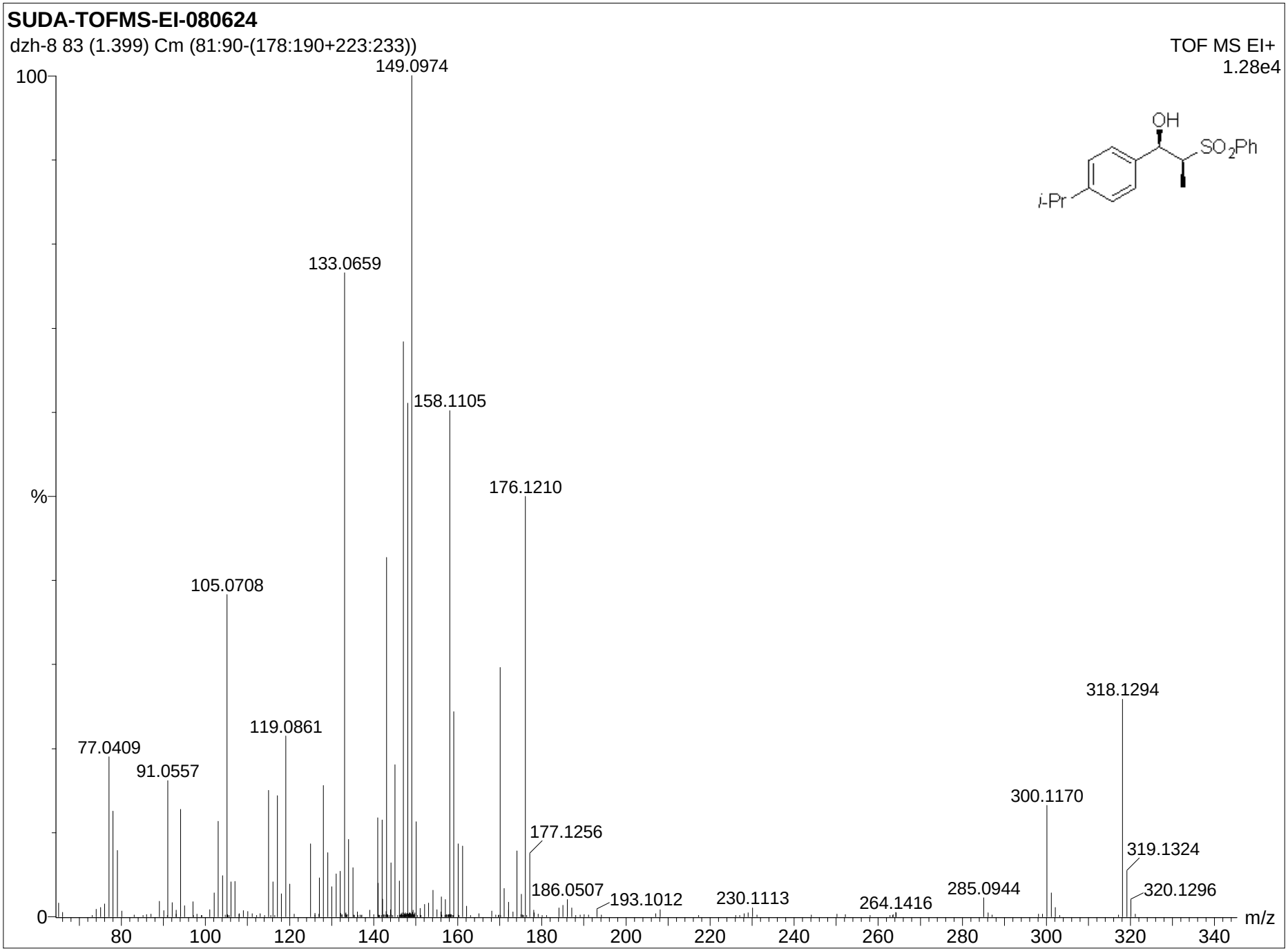

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Empower 2

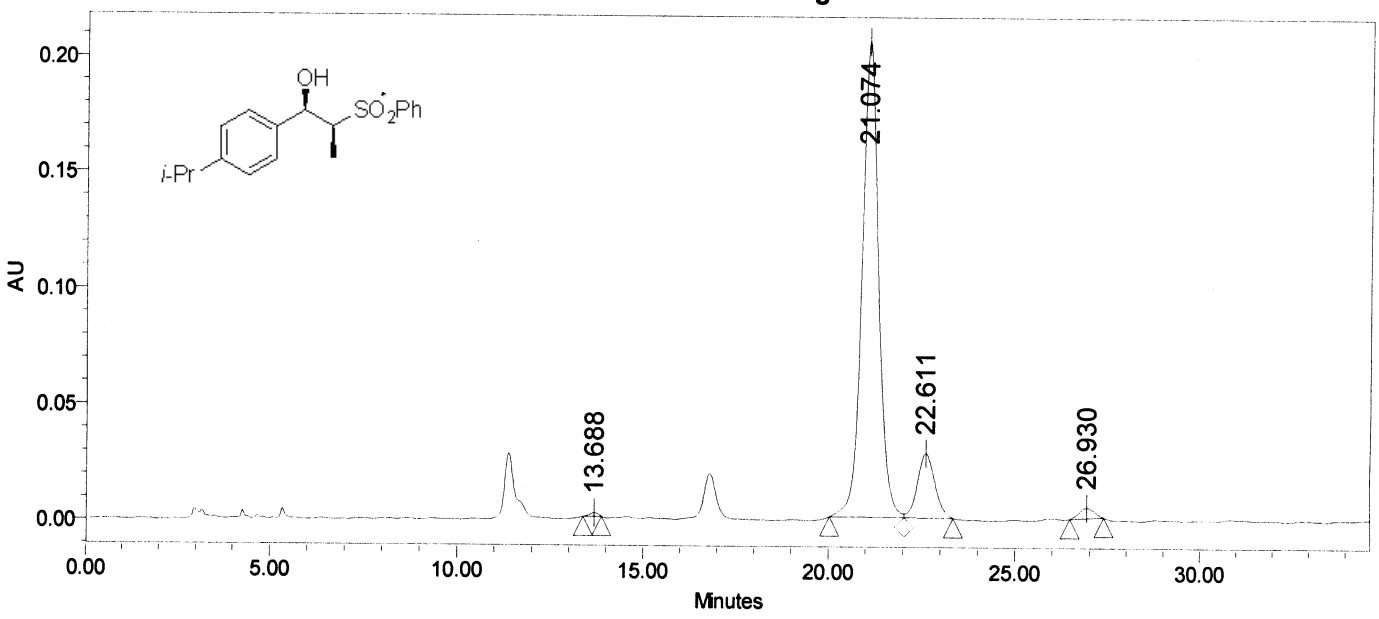
szx1

4天

SAMPLE INFORMATION

Sample Name:	dzh-2	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	22	Processing Method:	szx1
Injection Volume:	10.00 ul	Channel Name:	220.0nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-4-30 20:14:00 CST		
Date Processed:	2008-4-30 21:16:22 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		13.688	24798	1624			0.34
2		21.074	6332321	205389			85.67
3		22.611	904239	27977			12.23
4		26.930	130382	4529			1.76

d: 86.1%
ee: 99%

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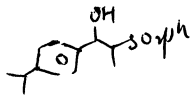
Empower 2 SOFTWARE

szx1

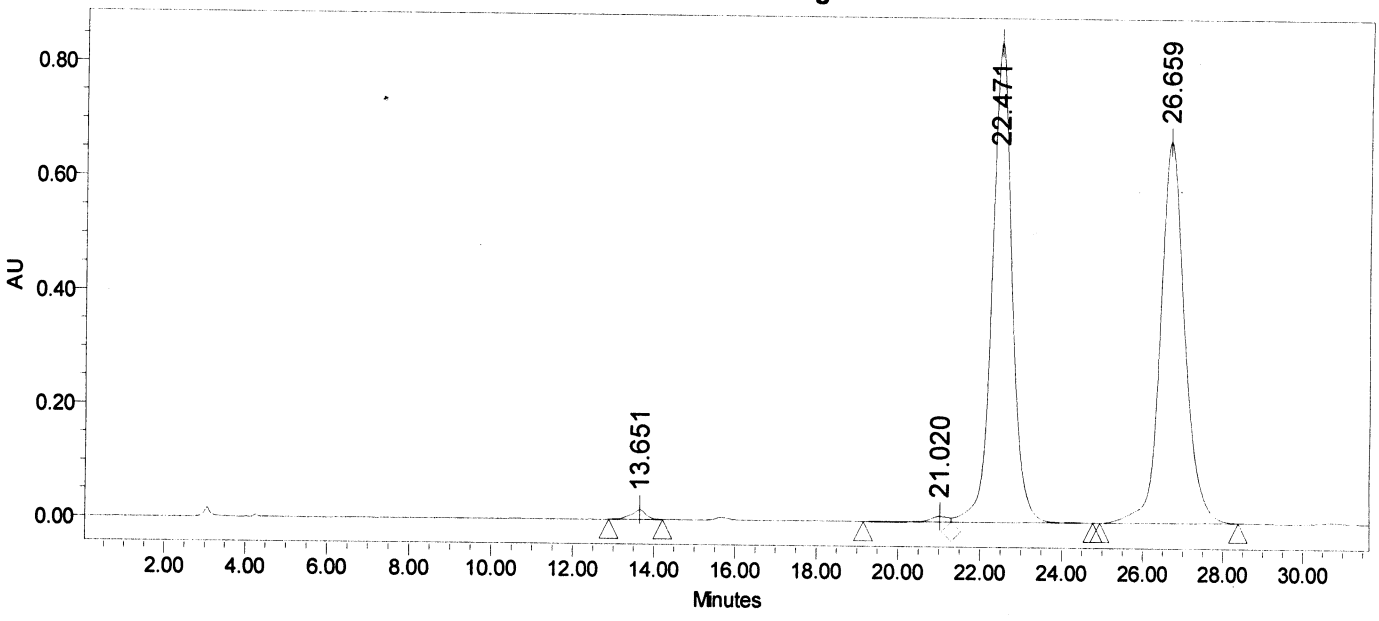


AD-H(90/10)

SAMPLE INFORMATION

Sample Name:	dzh-2-rac	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	21	Processing Method:	szx1
Injection Volume:	10.00 ul	Channel Name:	220.0nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-4-30 19:41:29 CST		
Date Processed:	2008-4-30 20:41:20 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		13.651	428252	17234			0.74
2		21.020	328001	10130			0.57
3		22.471	28664750	844724			49.48
4		26.659	28512039	671822			49.22

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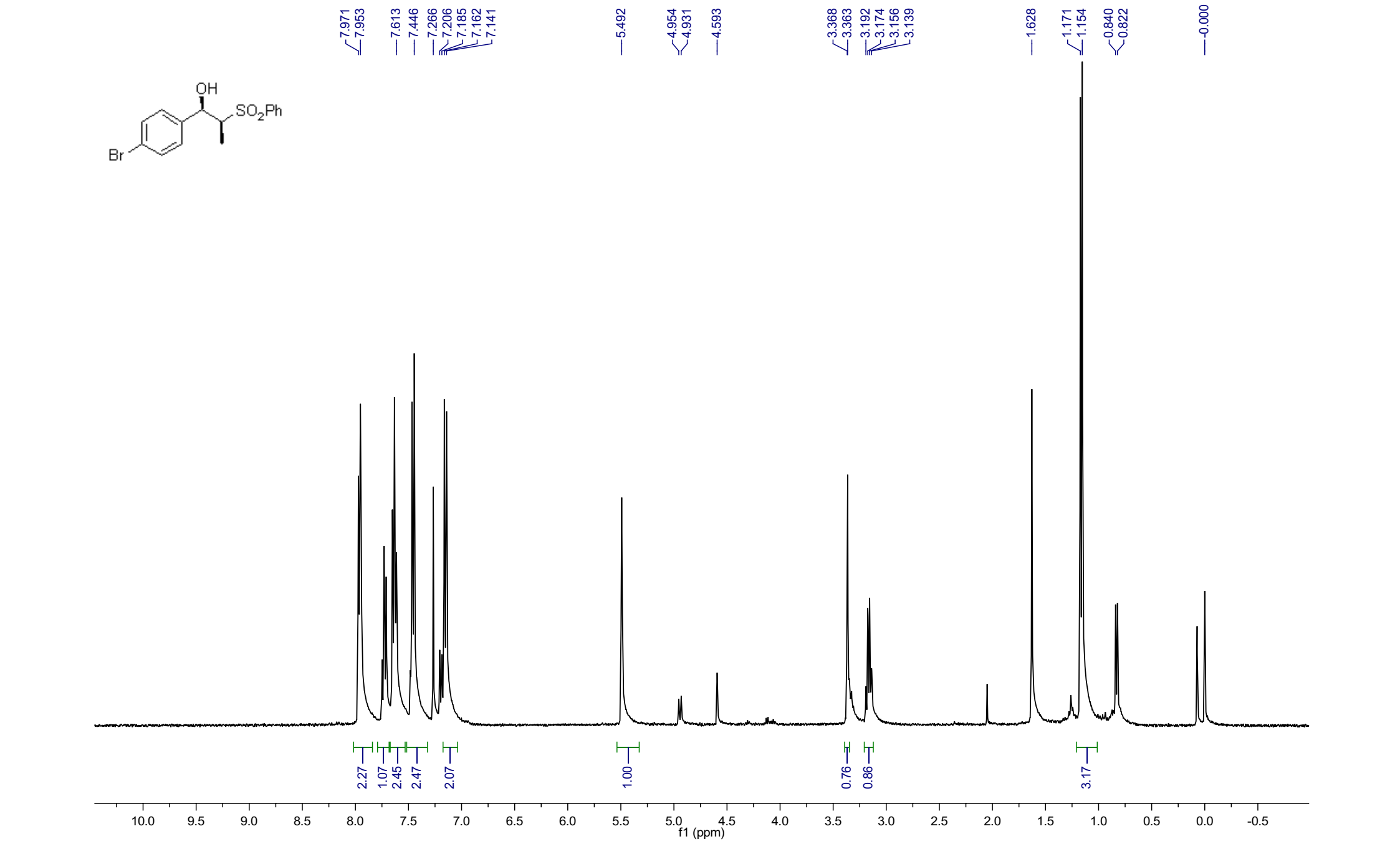

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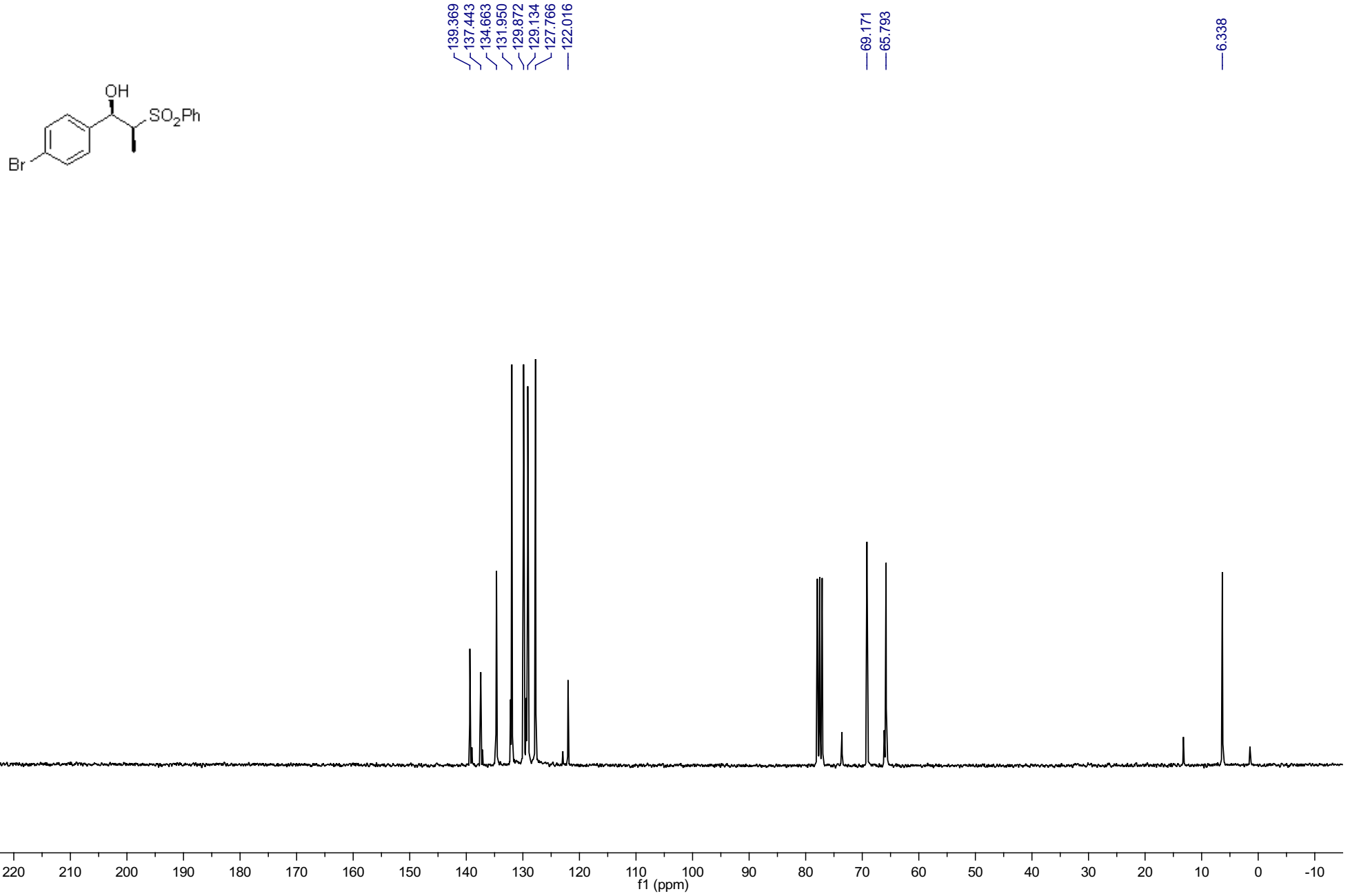

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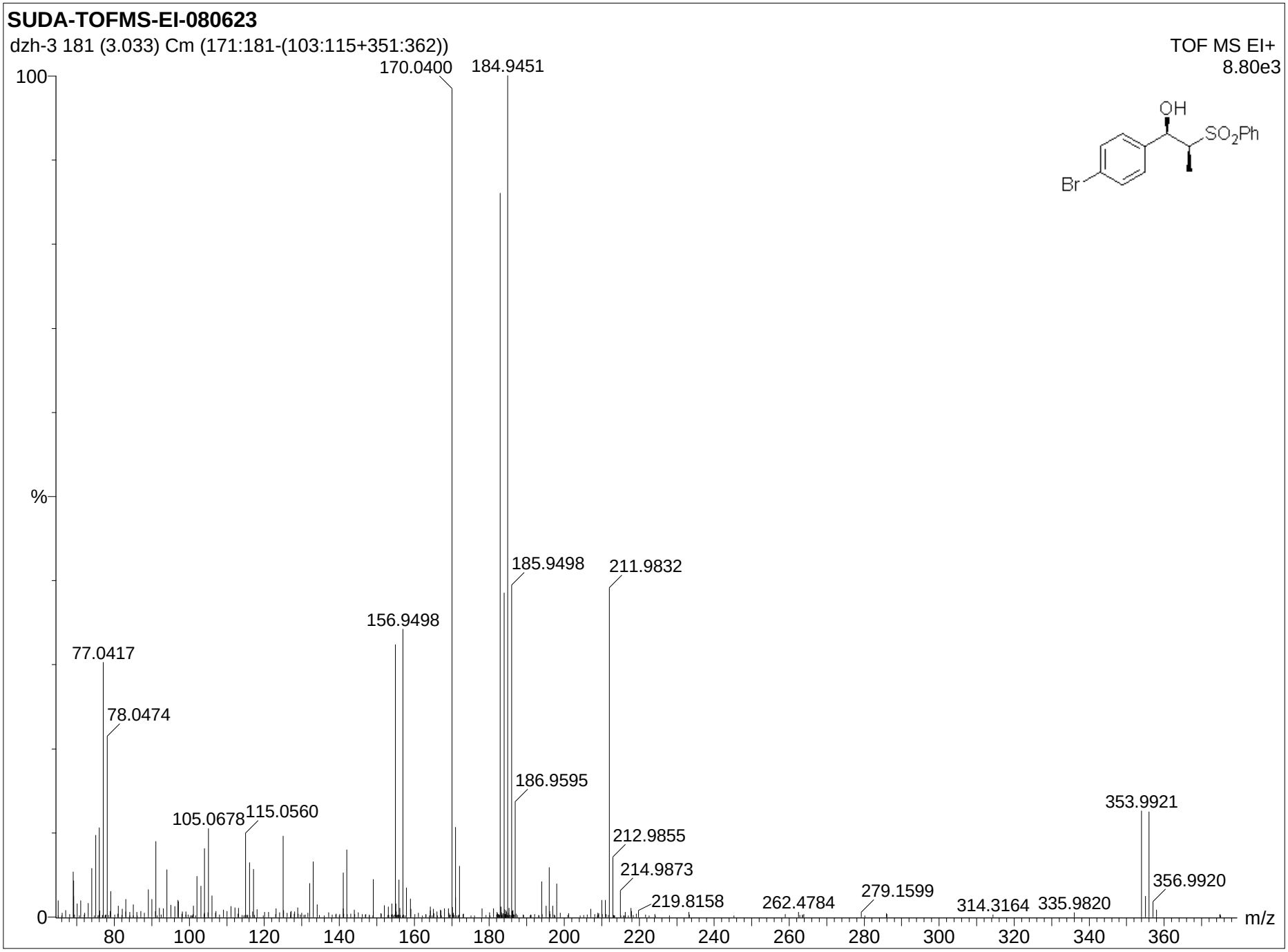


Empower 2

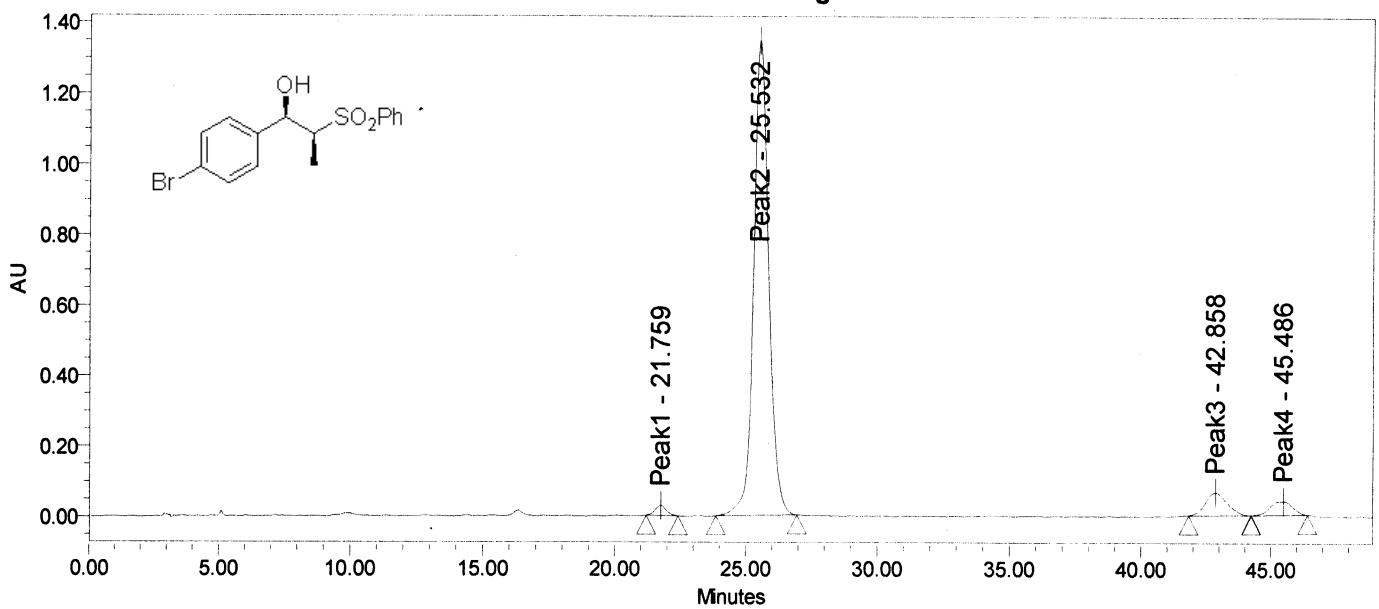
szx2

AD-H柱 (90/10) 1mL/min

SAMPLE INFORMATION

Sample Name:	dzh-对溴	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Test
Injection #:	4	Processing Method:	szx2
Injection Volume:	10.00 ul	Channel Name:	220.0nm
Run Time:	55.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-3-17 10:43:38 CST		
Date Processed:	2008-3-17 11:34:27 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Height	Area	% Area
1	Peak1	21.759	28037	828519	1.37
2	Peak2	25.532	1346010	53658357	88.49
3	Peak3	42.858	64001	3757275	6.20
4	Peak4	45.486	39369	2390960	3.94

dr: 90:10

ee: 97% 22%

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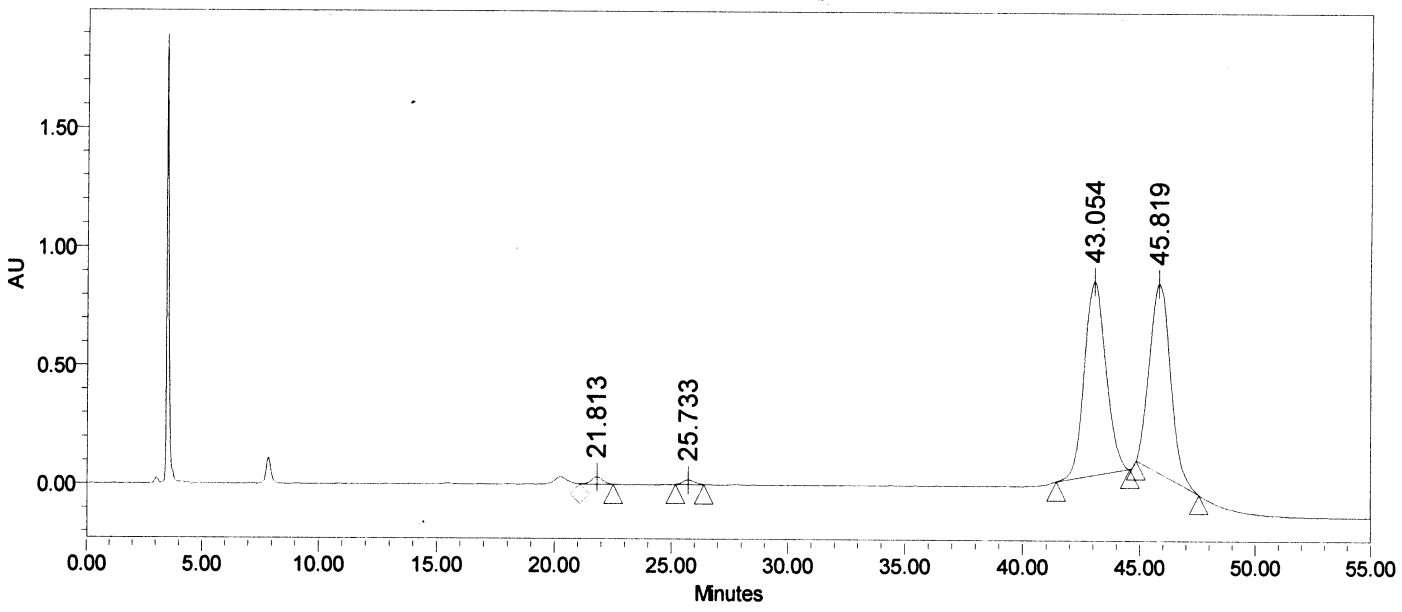
SAMPLE INFORMATION

Sample Name:	dzh-对溴(rac)	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Test
Injection #:	10	Processing Method:	szx2
Injection Volume:	10.00 ul	Channel Name:	220.0nm
Run Time:	55.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-3-17 14:14:56 CST		
Date Processed:	2008-3-17 15:12:57 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Height	Area	% Area
1		21.813	30618	1081986	1.03
2		25.733	19494	675788	0.64
3		43.054	819262	52659995	50.03
4		45.819	800691	50834789	48.30

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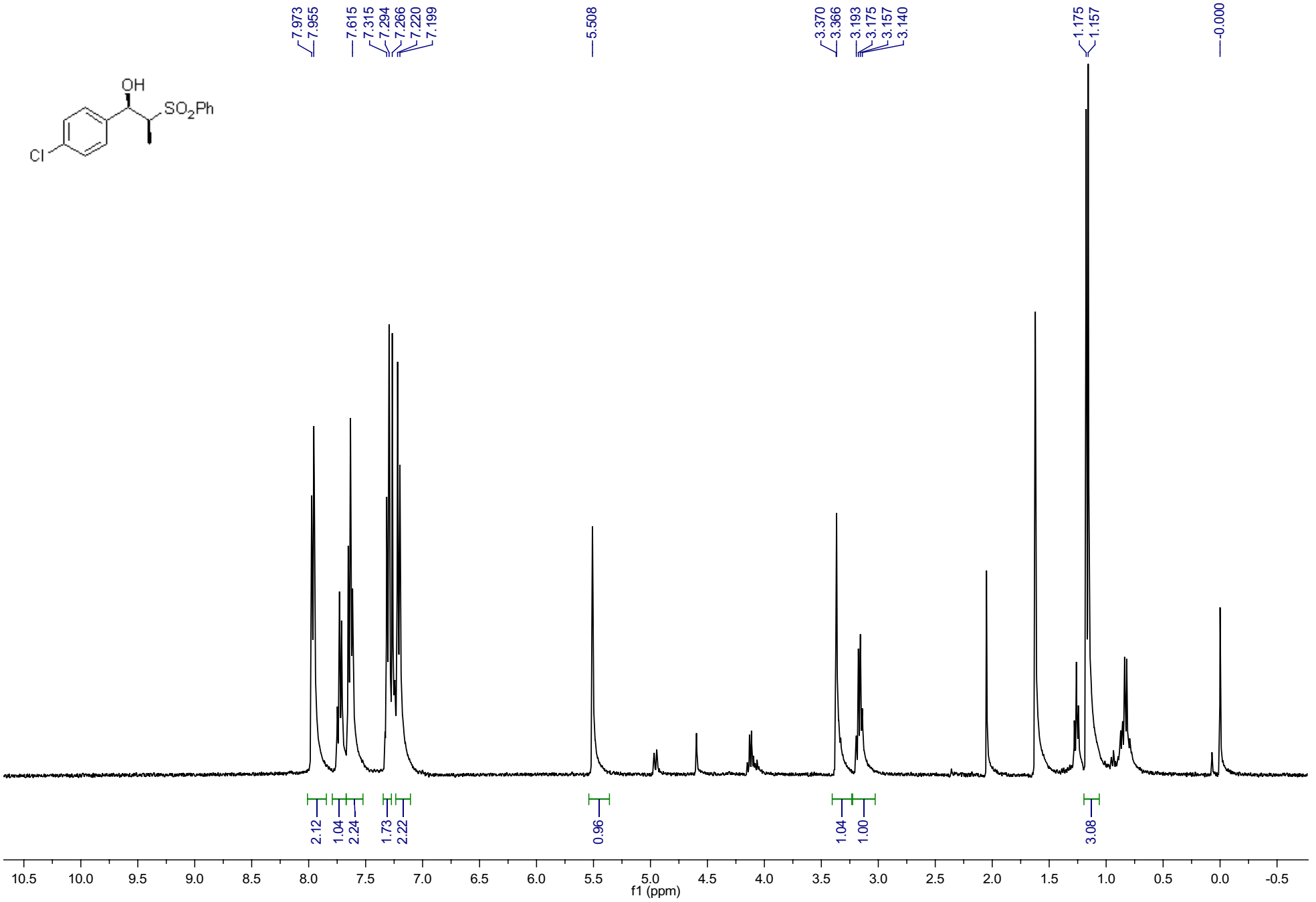

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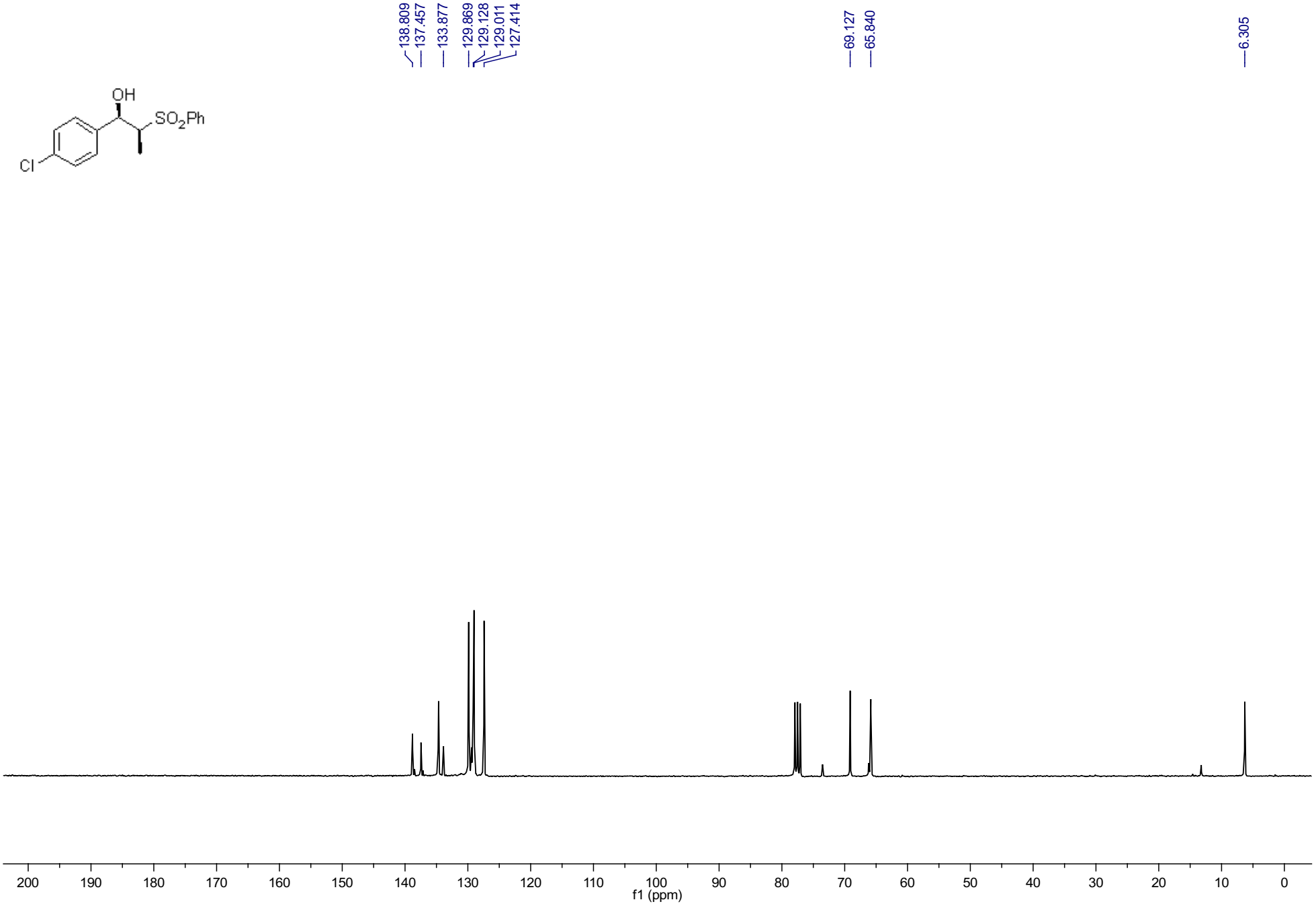

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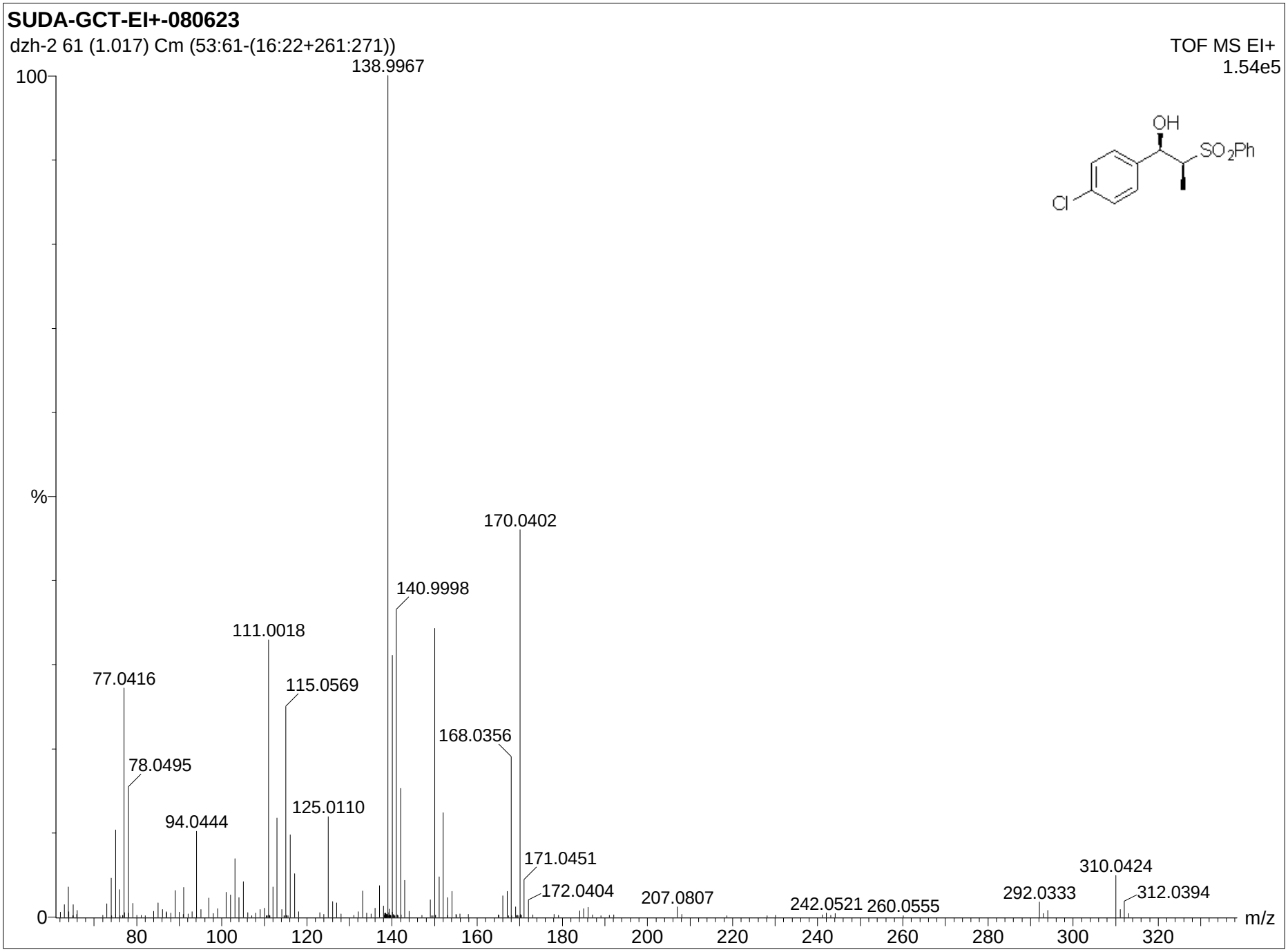

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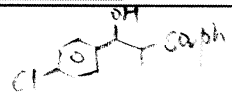
Empower 2

szx2

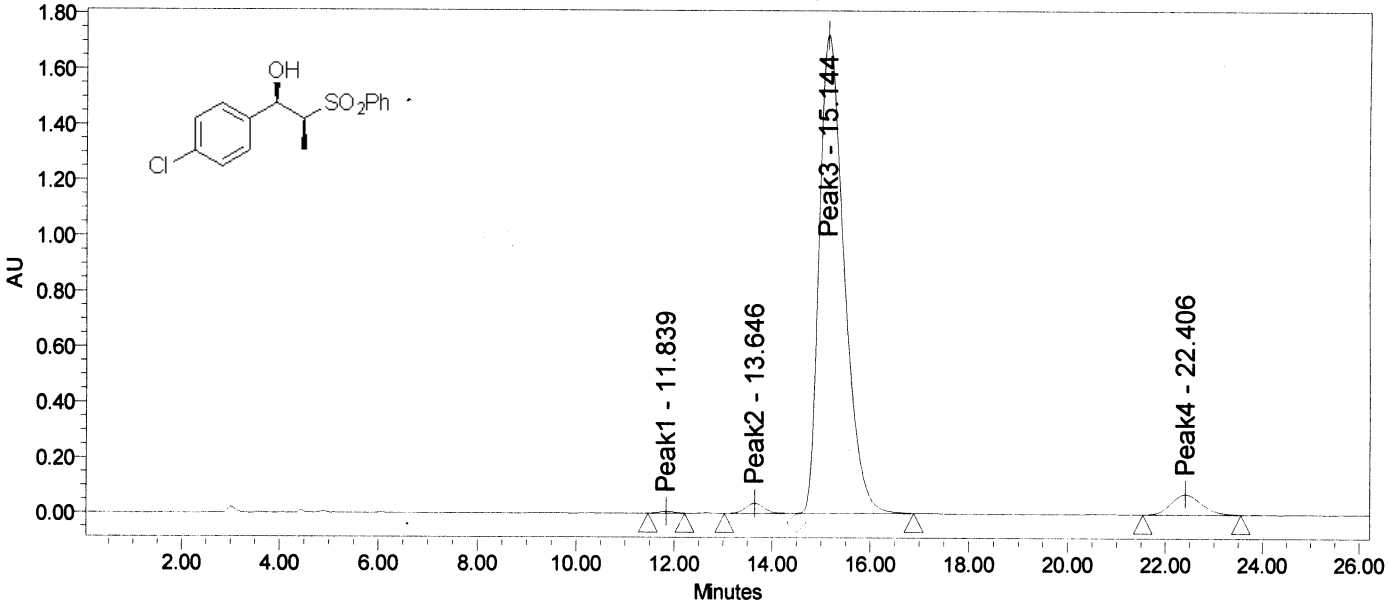


CD-H柱 (90/10)

SAMPLE INFORMATION

Sample Name:	dzh-对氯	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Test
Injection #:	2	Processing Method:	szx2
Injection Volume:	10.00 ul	Channel Name:	220.0nm
Run Time:	55.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-3-17 19:43:05 CST		
Date Processed:	2008-3-17 20:20:47 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Height	Area	% Area
1	Peak1	11.839	6742	135183	0.21
2	Peak2	13.646	37670	1007378	1.55
3	Peak3	15.144	1725593	60626404	93.23
4	Peak4	22.406	73966	3259492	5.01

dr 98:2

er. 9% 76%

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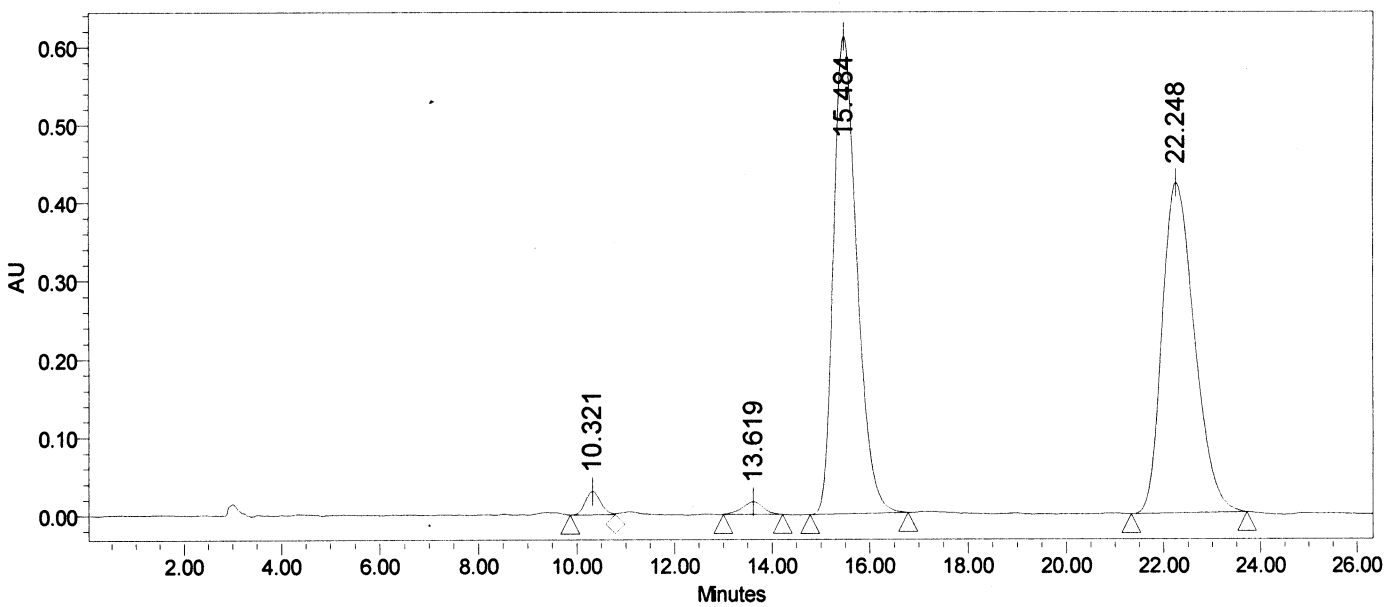
Empower 2 software

szx2

SAMPLE INFORMATION

Sample Name:	dzh-对氯(rac)`	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Test
Injection #:	1	Processing Method:	szx2
Injection Volume:	10.00 ul	Channel Name:	220.0nm
Run Time:	55.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-3-17 19:15:54 CST		
Date Processed:	2008-3-17 19:46:07 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Height	Area	% Area
1		10.321	30038	656115	1.60
2		13.619	16293	480865	1.17
3		15.484	611988	20242027	49.38
4		22.248	422976	19616852	47.85

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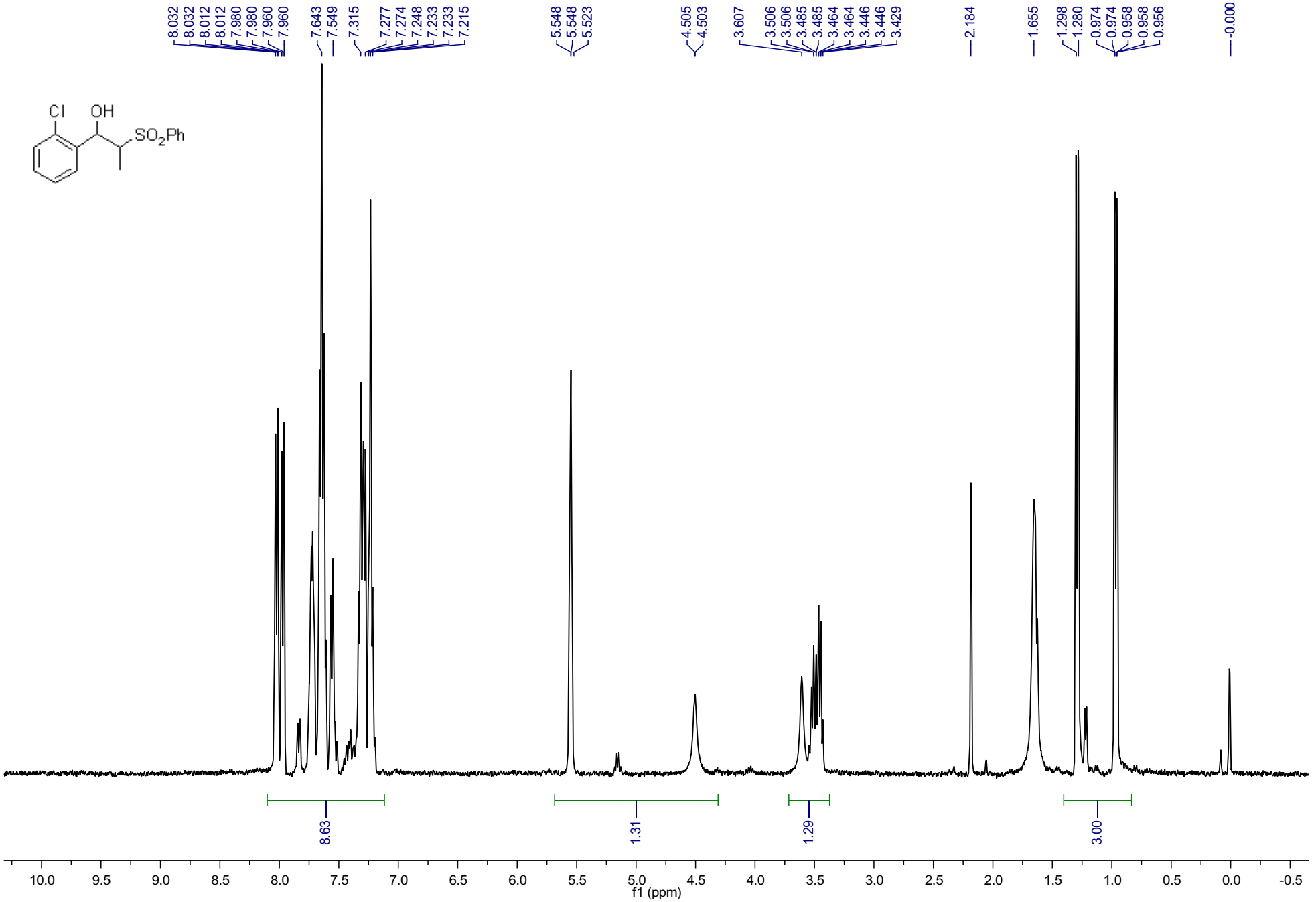

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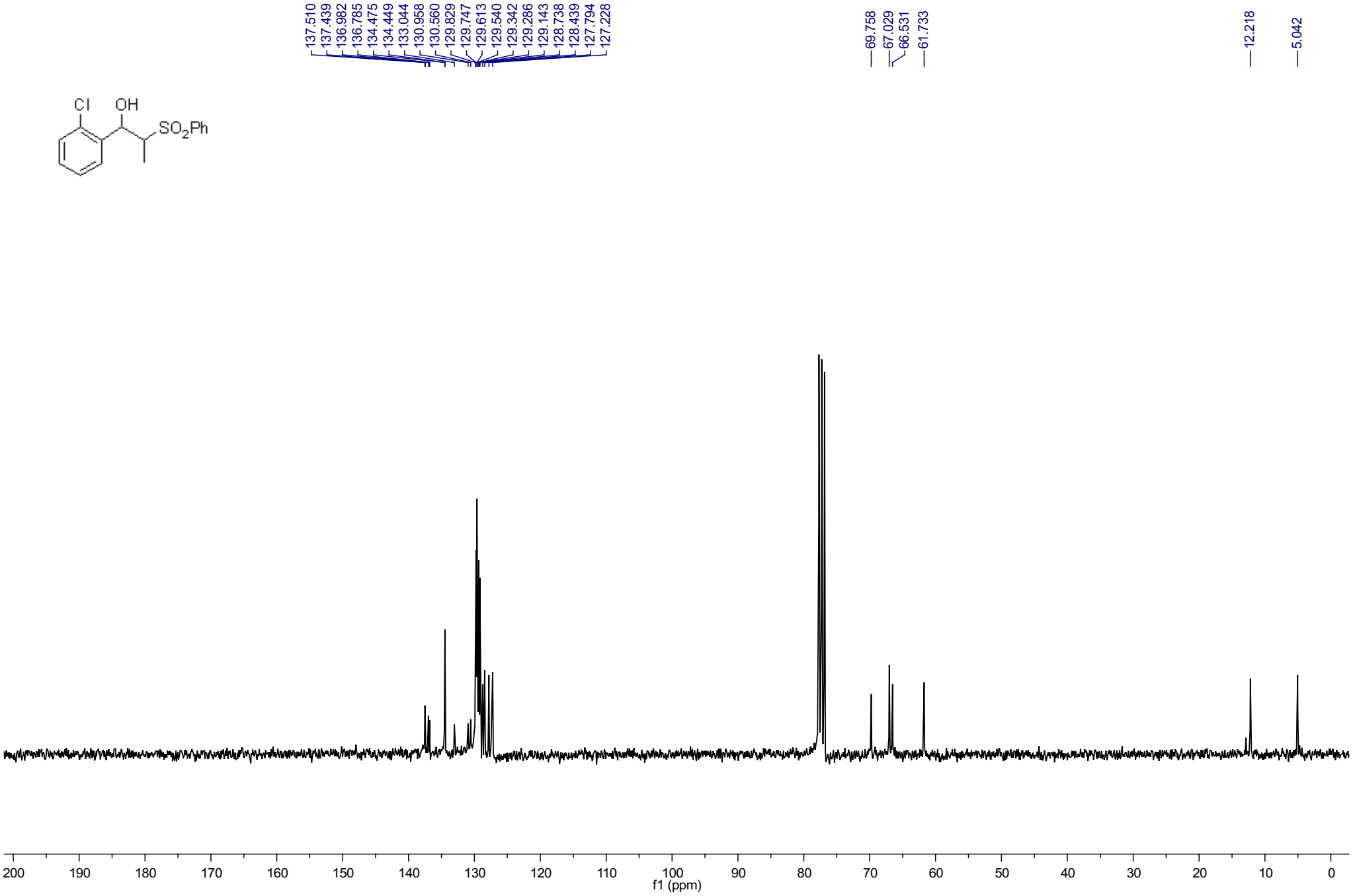

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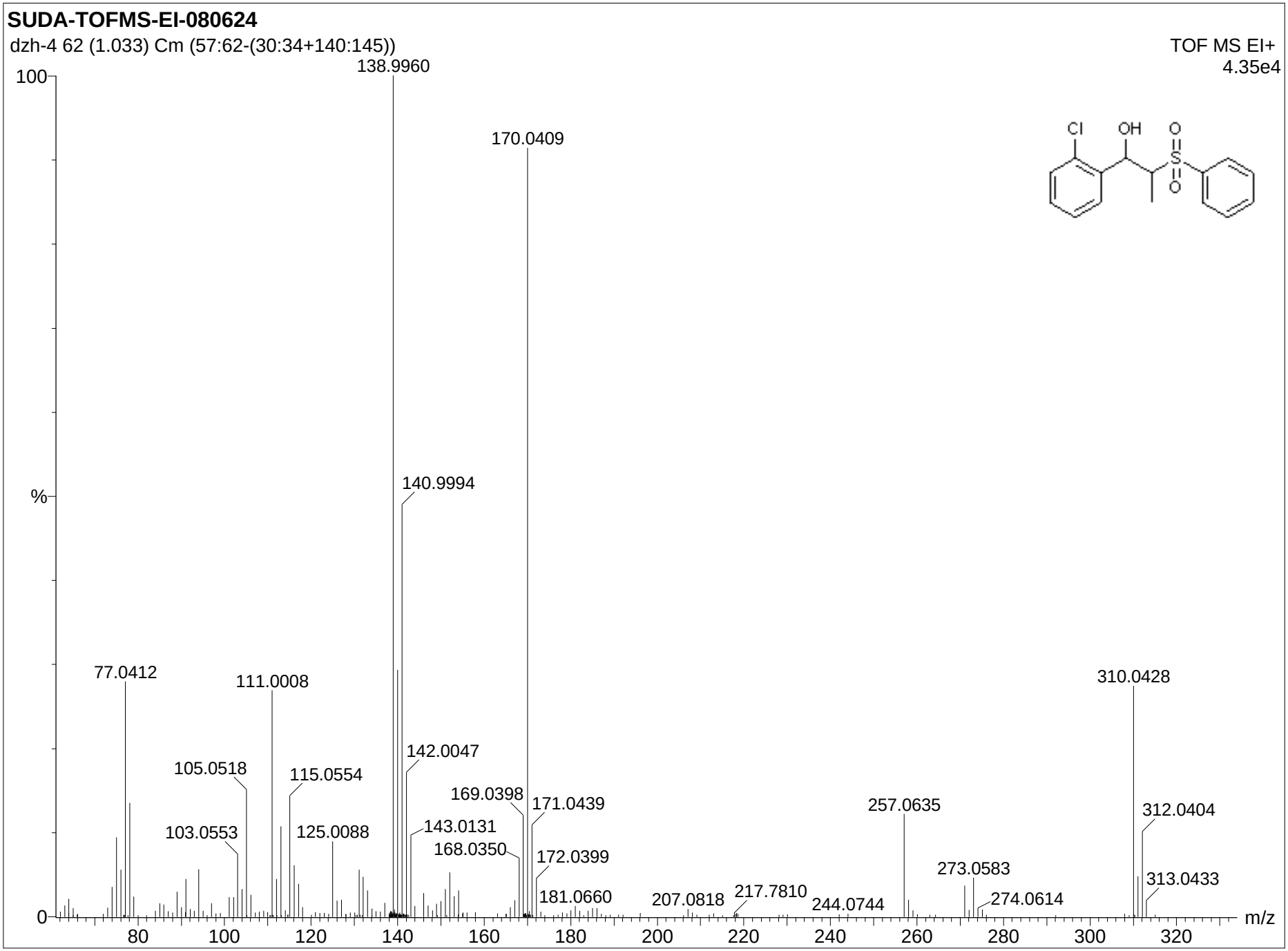

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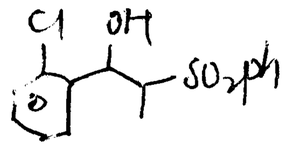
Empower 2 SOFTWARE



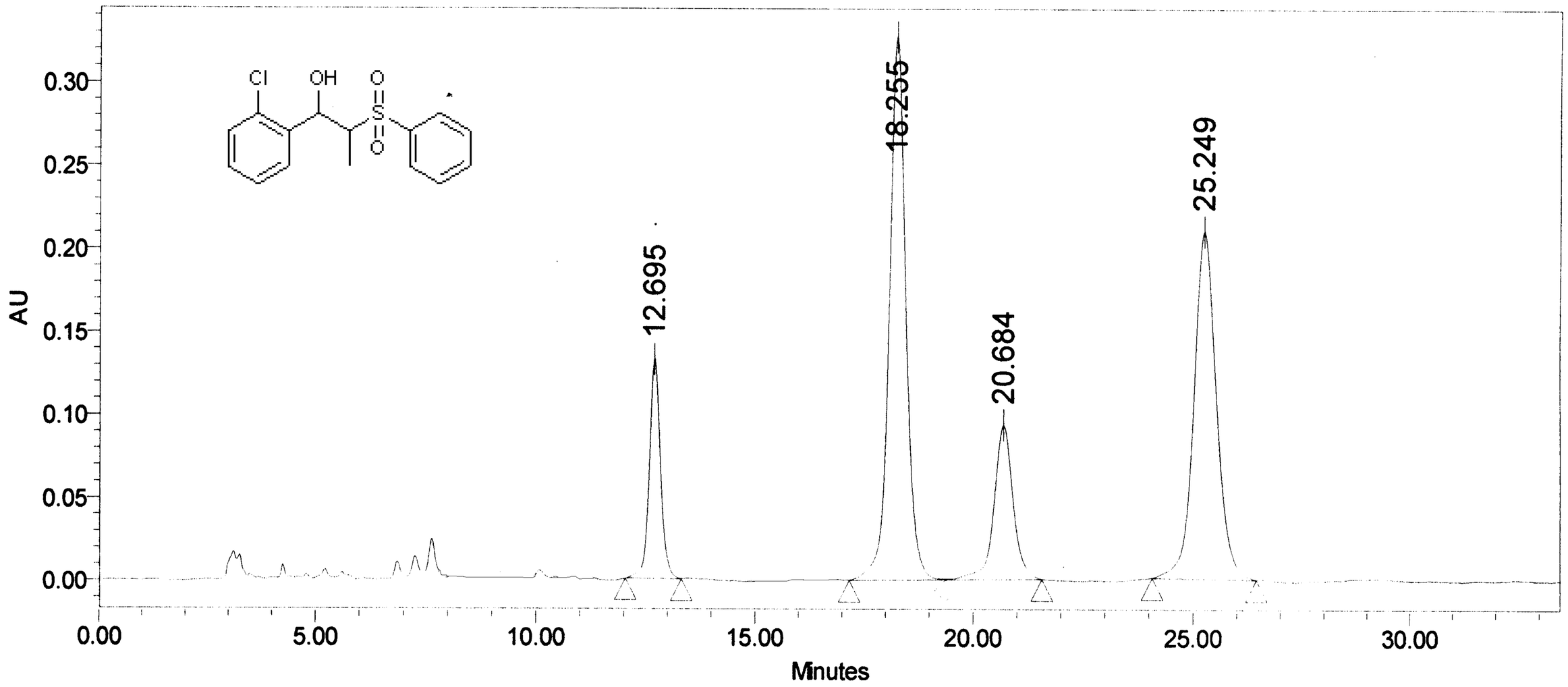
AD-H (90/10)

szx1

SAMPLE INFORMATION

Sample Name:	dzh	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	7	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	210.5nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 210.5 nm
Date Acquired:	2008-5-22 18:43:43 CST		
Date Processed:	2008-5-22 19:18:56 CST		

Auto-Scaled Chromatogram

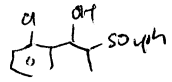


Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		12.695	2366950	132597			11.05
2		18.255	8651050	327013			40.40
3		20.684	2851769	93164			13.32
4		25.249	7541100	209802			35.22

dr: 51:49
ee 57.2 4%

Empower 2 software



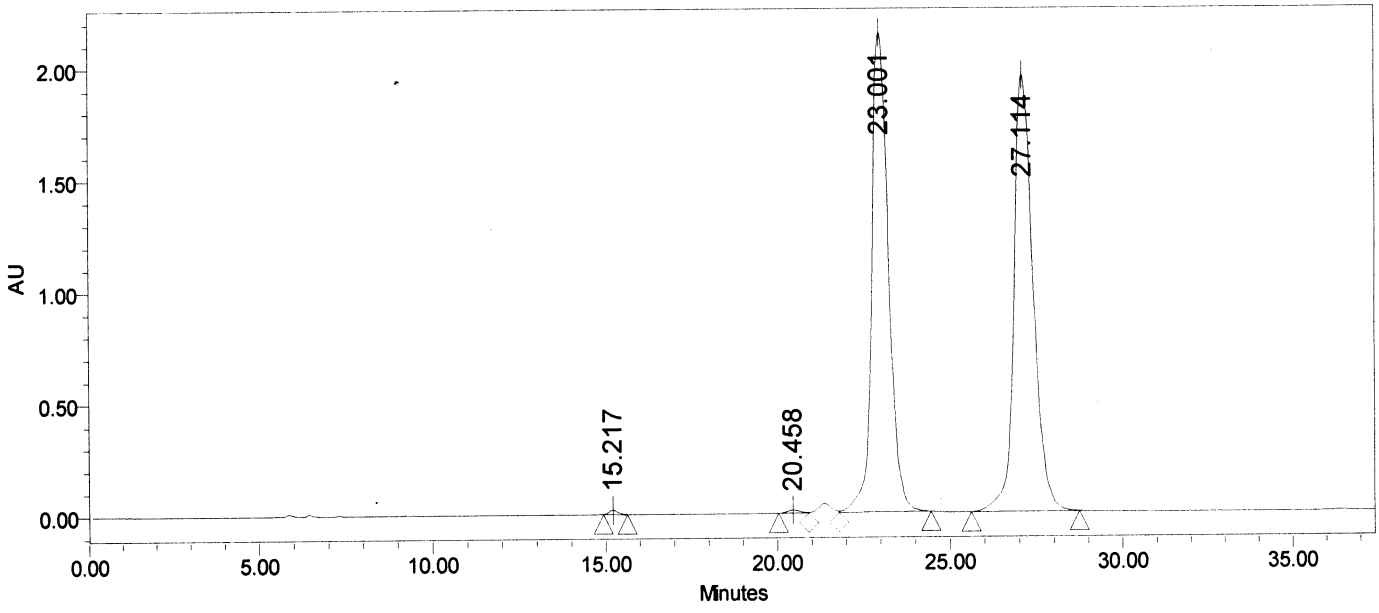
AD-H (9%/10)

szx1

SAMPLE INFORMATION

Sample Name:	dzh-邻氯-rac	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	1	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	220.0nm
Run Time:	100.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-5-13 8:25:15 CST		
Date Processed:	2008-5-13 9:46:22 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		15.217	327012	19211			0.22
2		20.458	326286	13654			0.22
3		23.001	72915190	2148854			48.81
4		27.114	75824721	1958849			50.76

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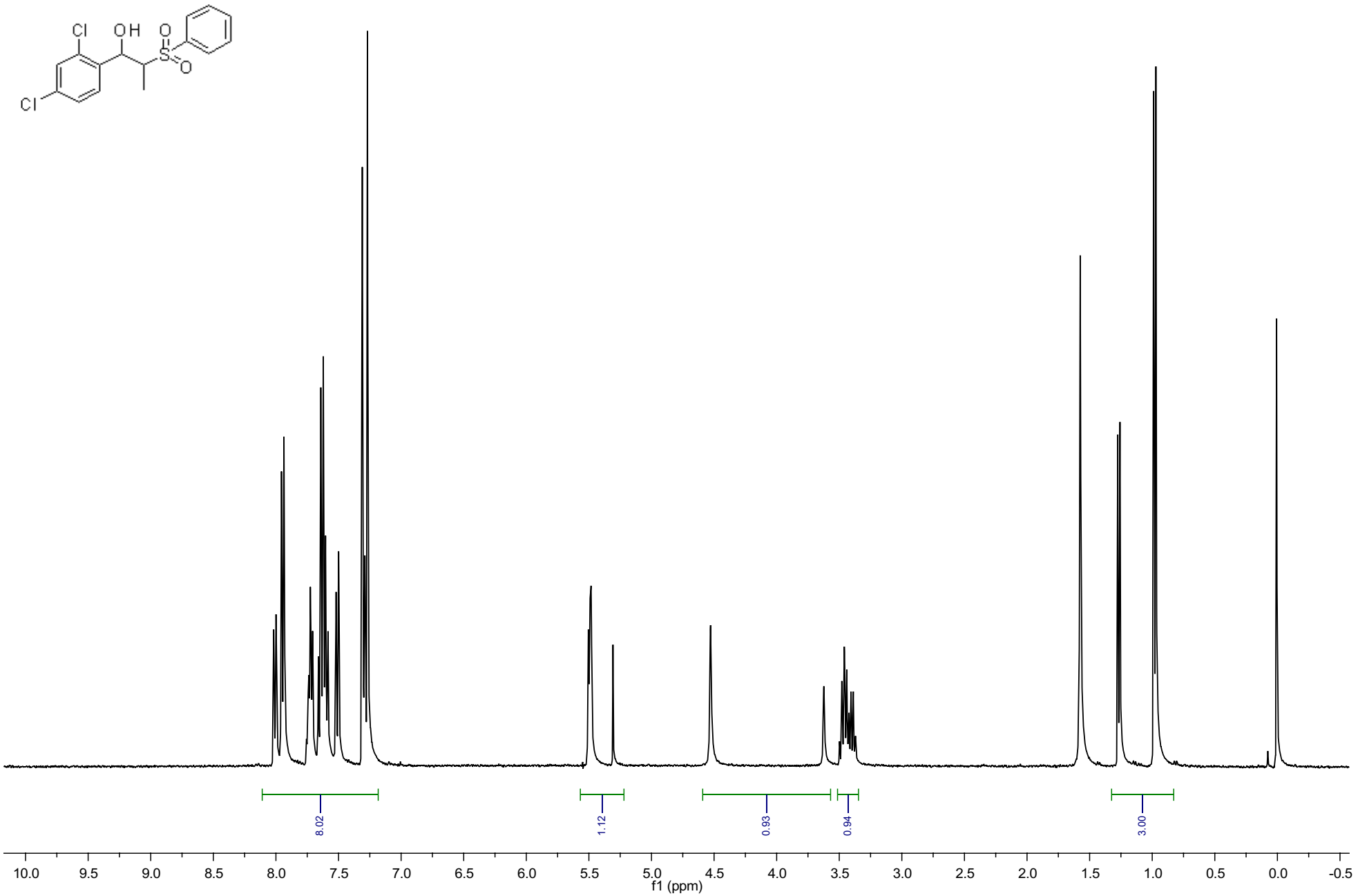

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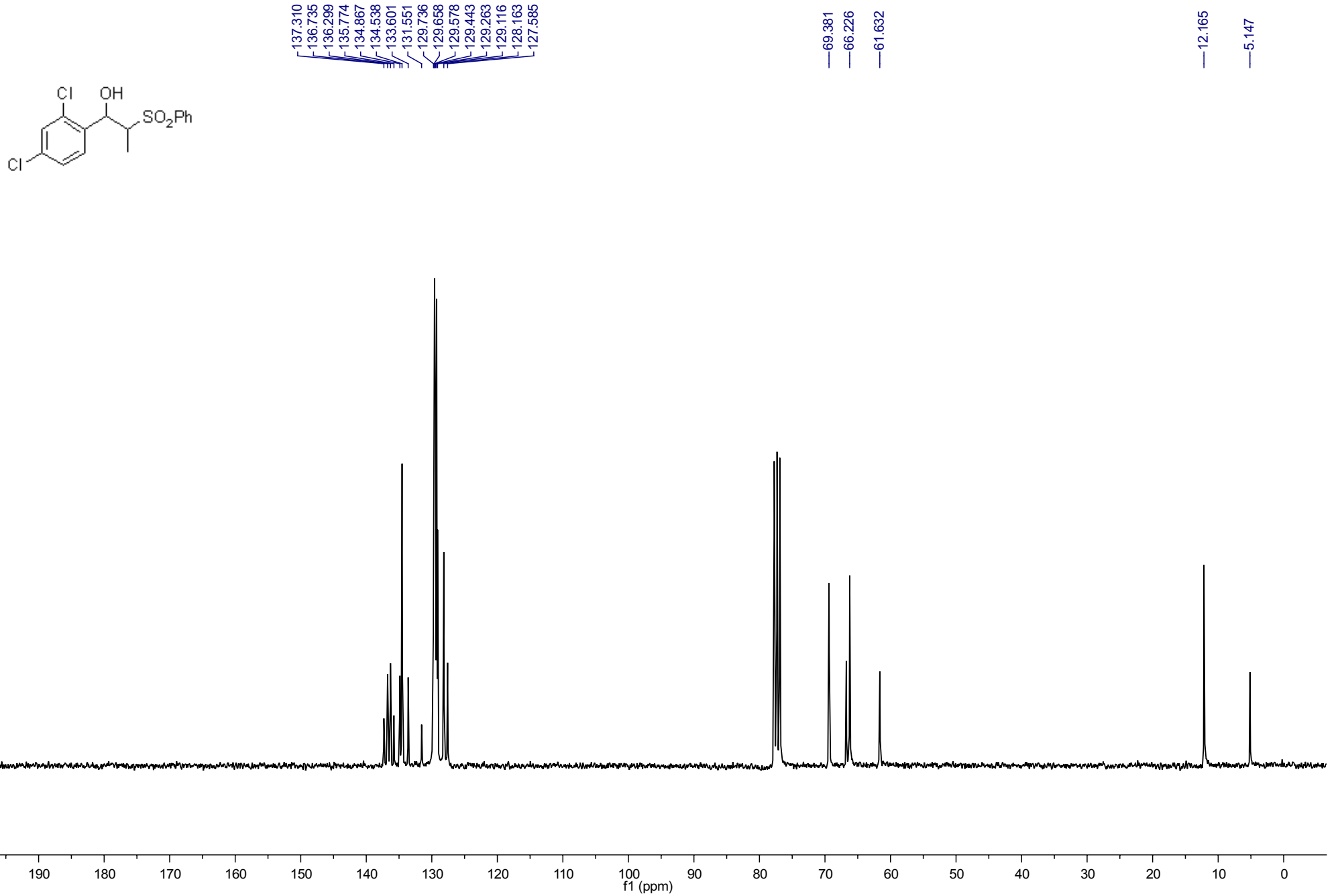

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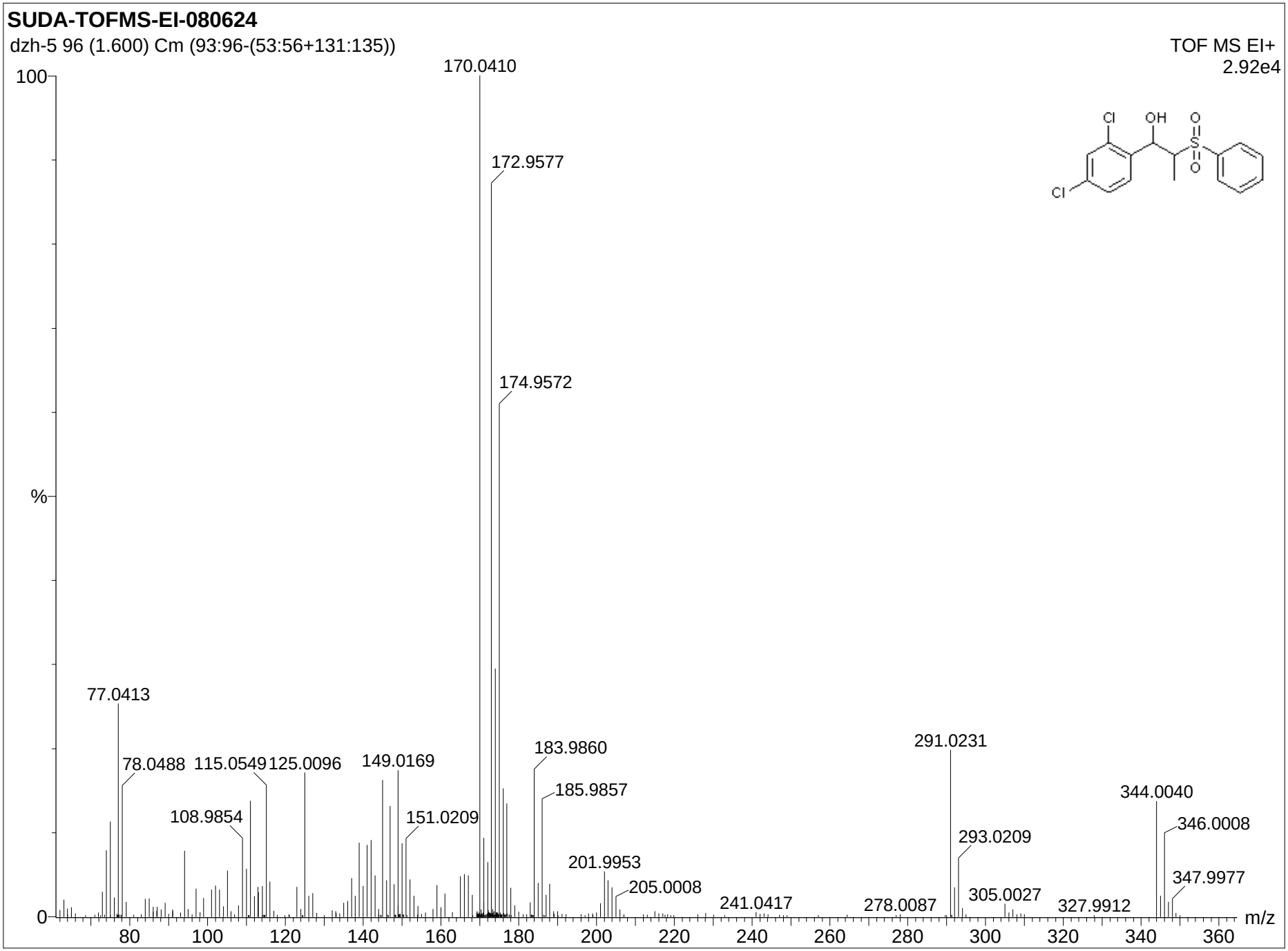


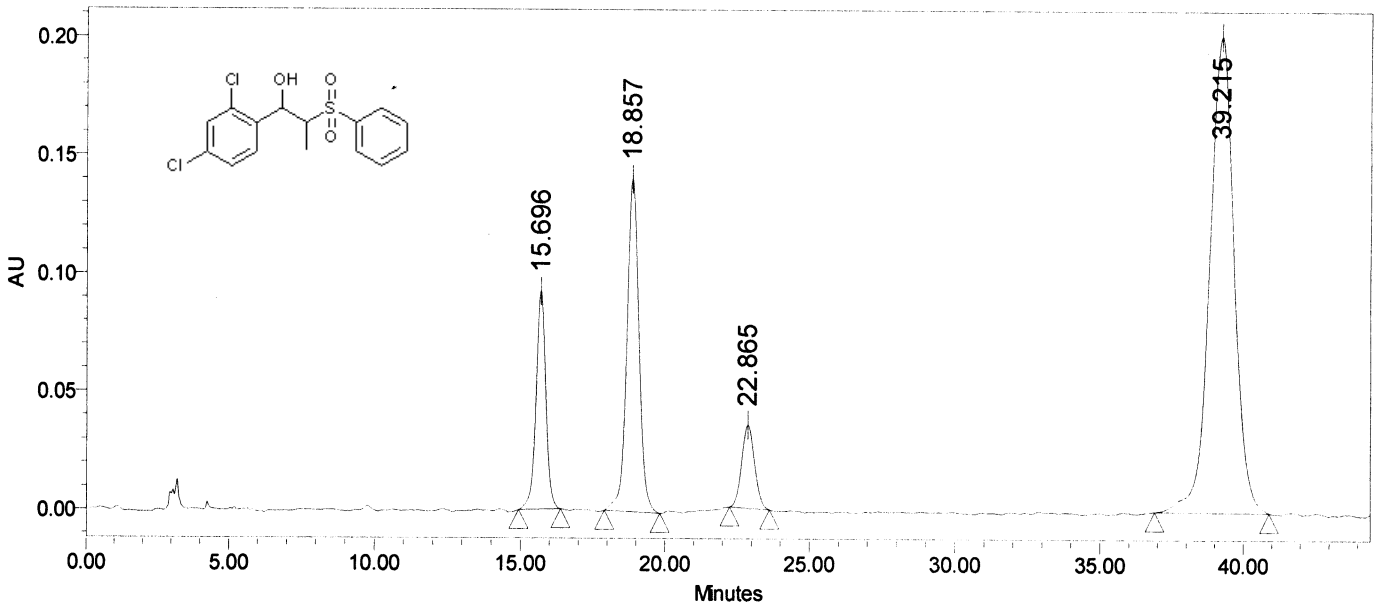
Empower 2 software

szx1

SAMPLE INFORMATION

Sample Name:	dzh-5	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	2	Processing Method:	szx1
Injection Volume:	10.00 ul	Channel Name:	210.5nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 210.5 nm
Date Acquired:	2008-5-3 11:37:19 CST		
Date Processed:	2008-5-3 12:24:48 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		15.696	2189579	92475			11.24
2		18.857	4115275	140875			21.13
3		22.865	1107610	35338			5.69
4		39.215	12064887	201697			61.94

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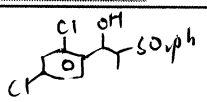
Empower 2

szx1

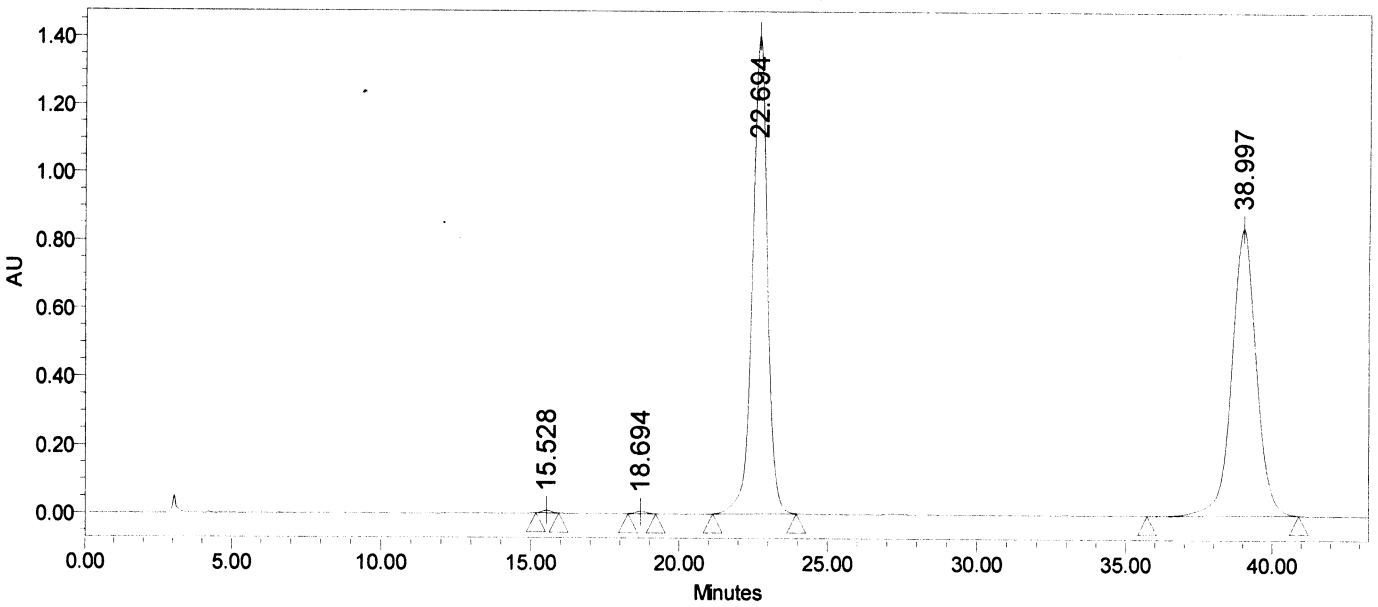


AD-H(90/10)

SAMPLE INFORMATION

Sample Name:	dzh-5-rac	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	1	Processing Method:	szx1
Injection Volume:	10.00 ul	Channel Name:	210.5nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 210.5 nm
Date Acquired:	2008-5-3 10:53:10 CST		
Date Processed:	2008-5-3 11:38:14 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		15.528	157550	7990			0.16
2		18.694	173759	6662			0.18
3		22.694	48899745	1404103			49.57
4		38.997	49419682	841541			50.10

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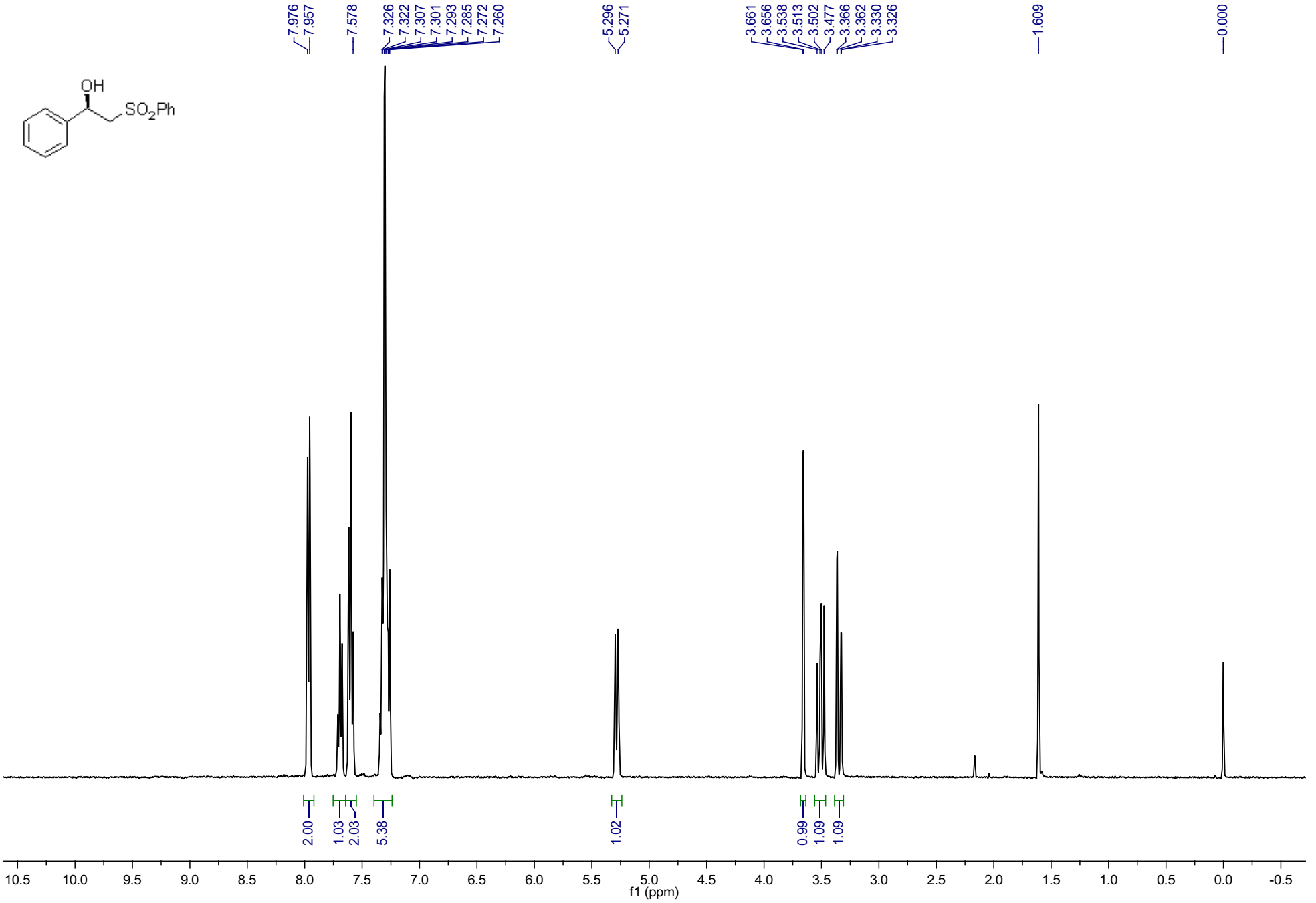
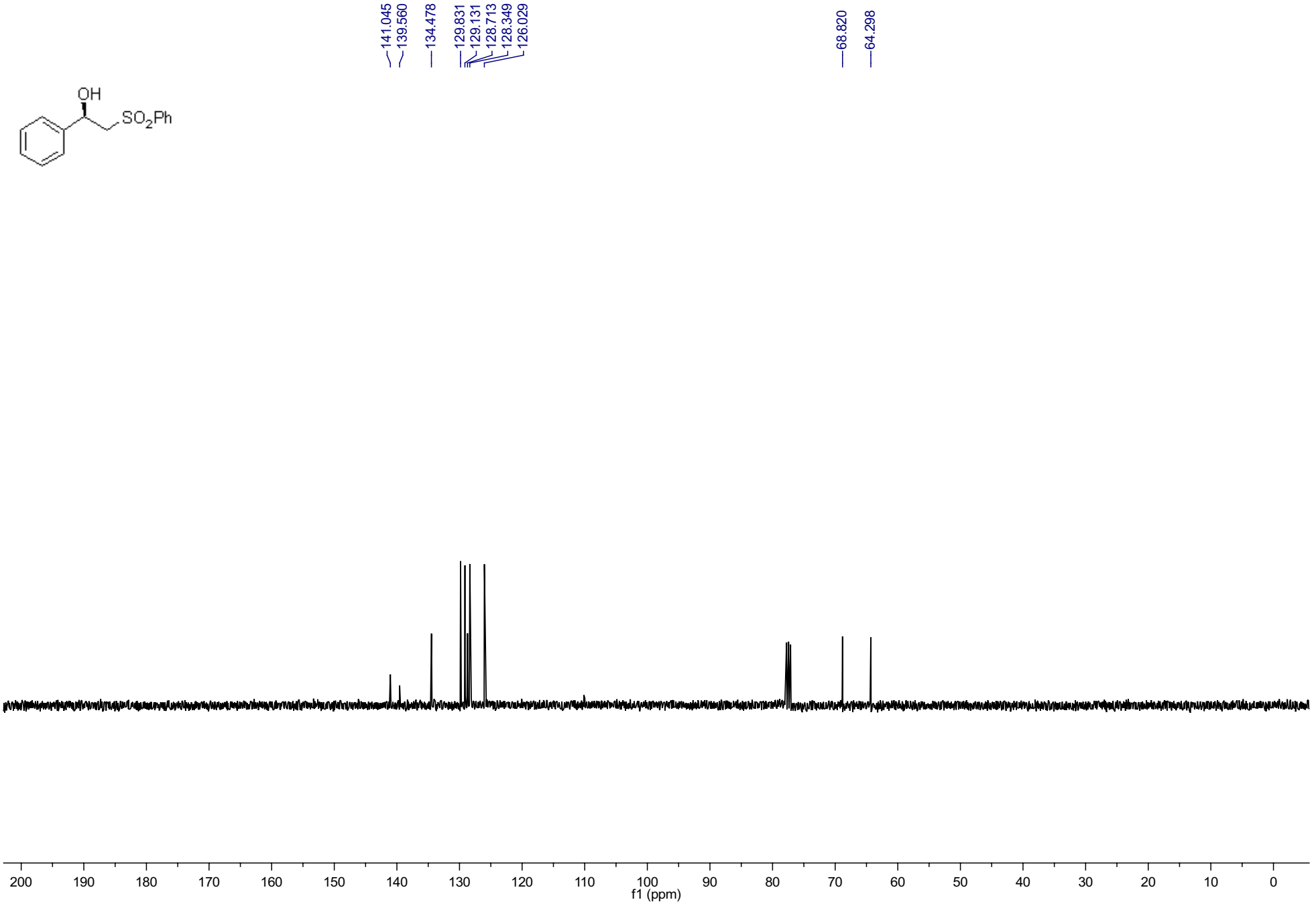


This journal is © The Royal Society of Chemistry 2009



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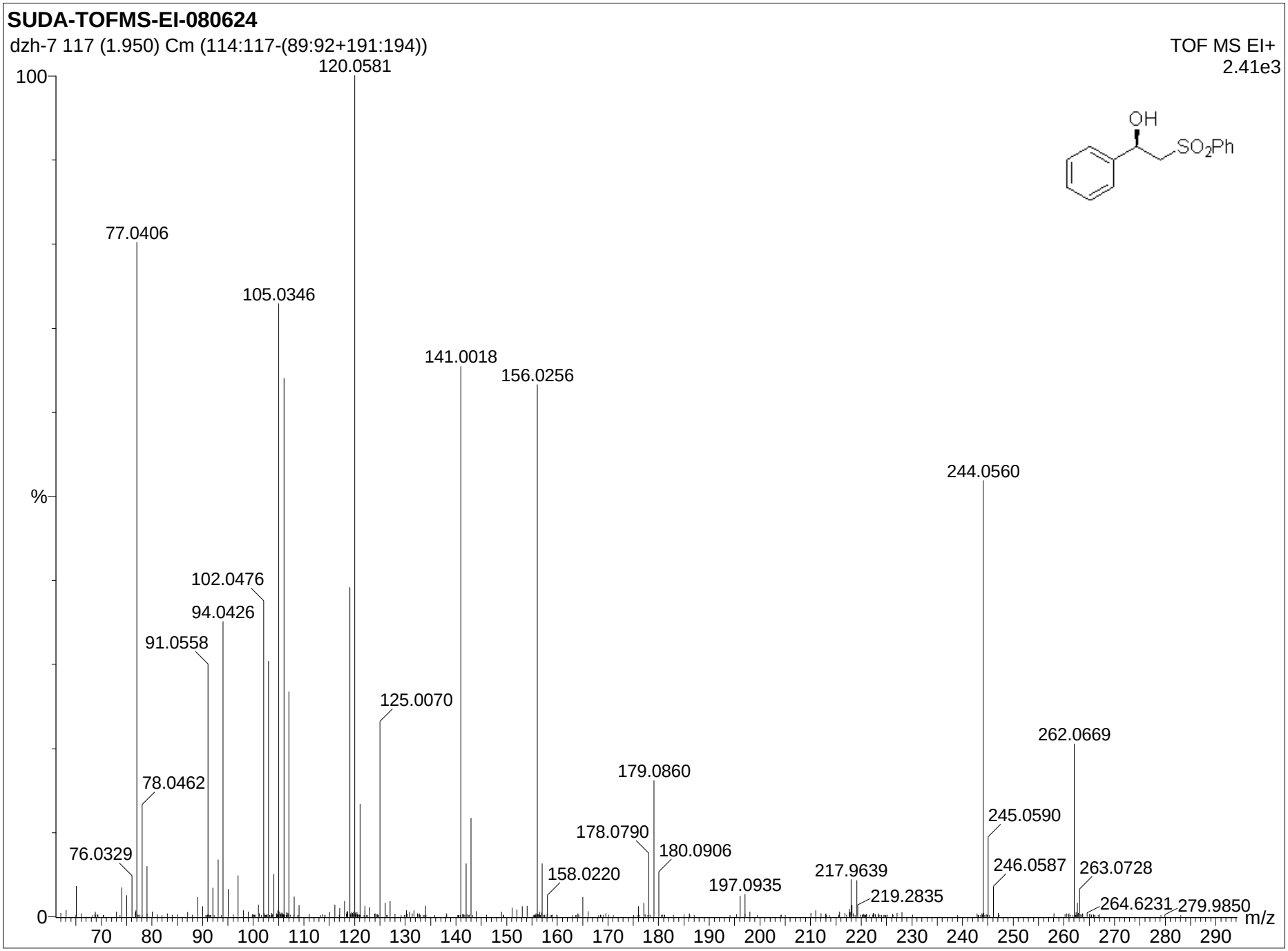

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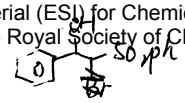
Empower 2 software



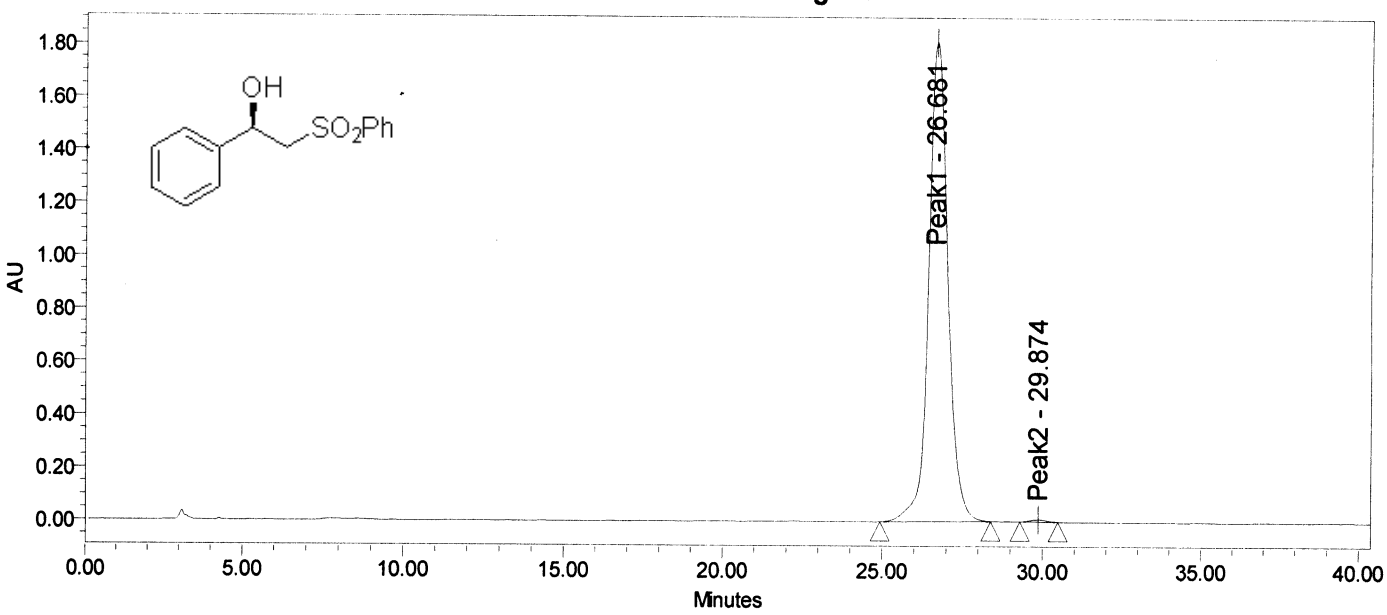
AD-H (90/10)

szx1

SAMPLE INFORMATION

Sample Name:	dzh-2	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	5	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	210.5nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 210.5 nm
Date Acquired:	2008-5-22 17:24:17 CST		
Date Processed:	2008-5-22 18:06:23 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1	Peak1	26.681	75358403	1813729			99.59
2	Peak2	29.874	308242	8883			0.41

dr >99:1
ee 99%

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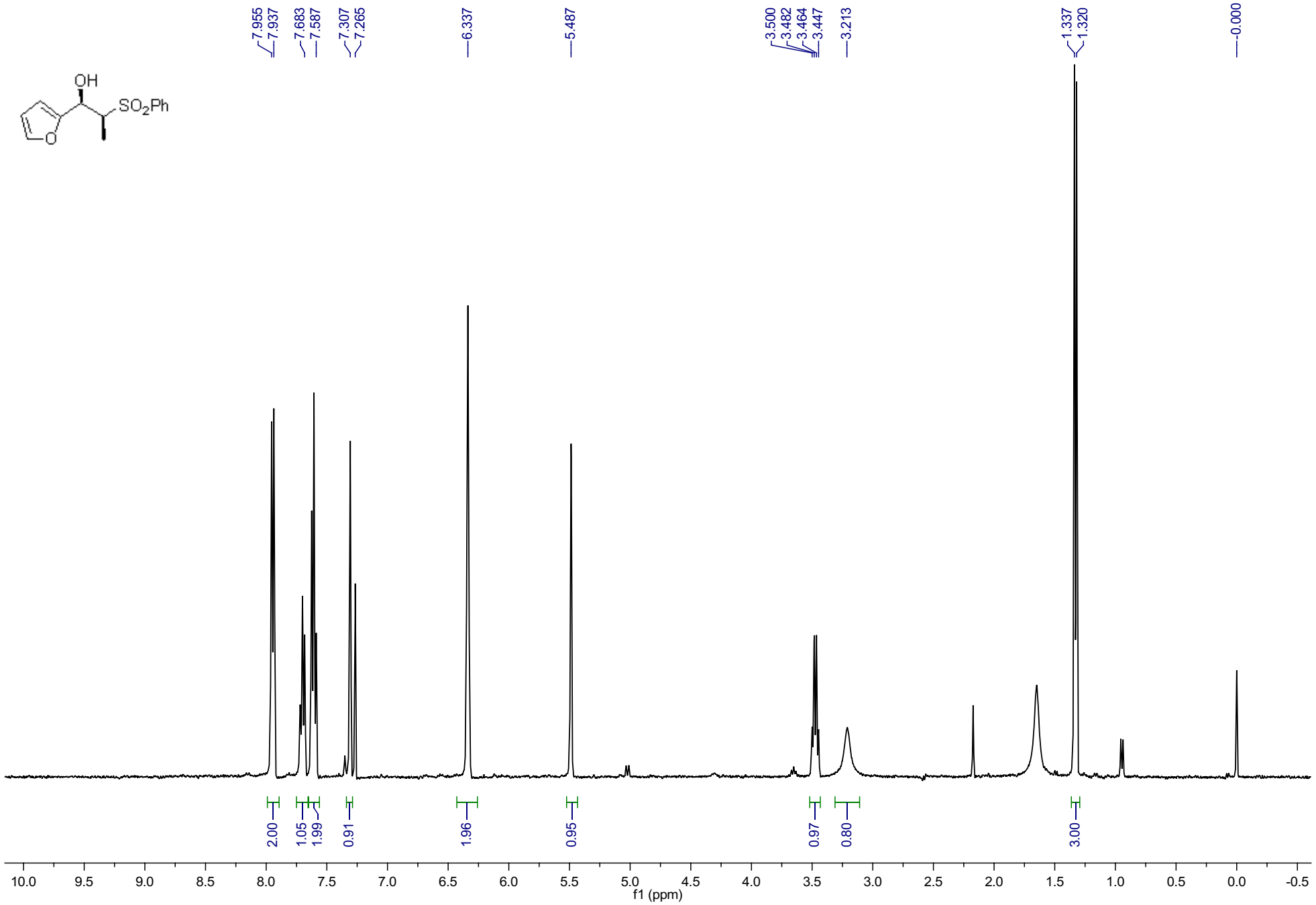

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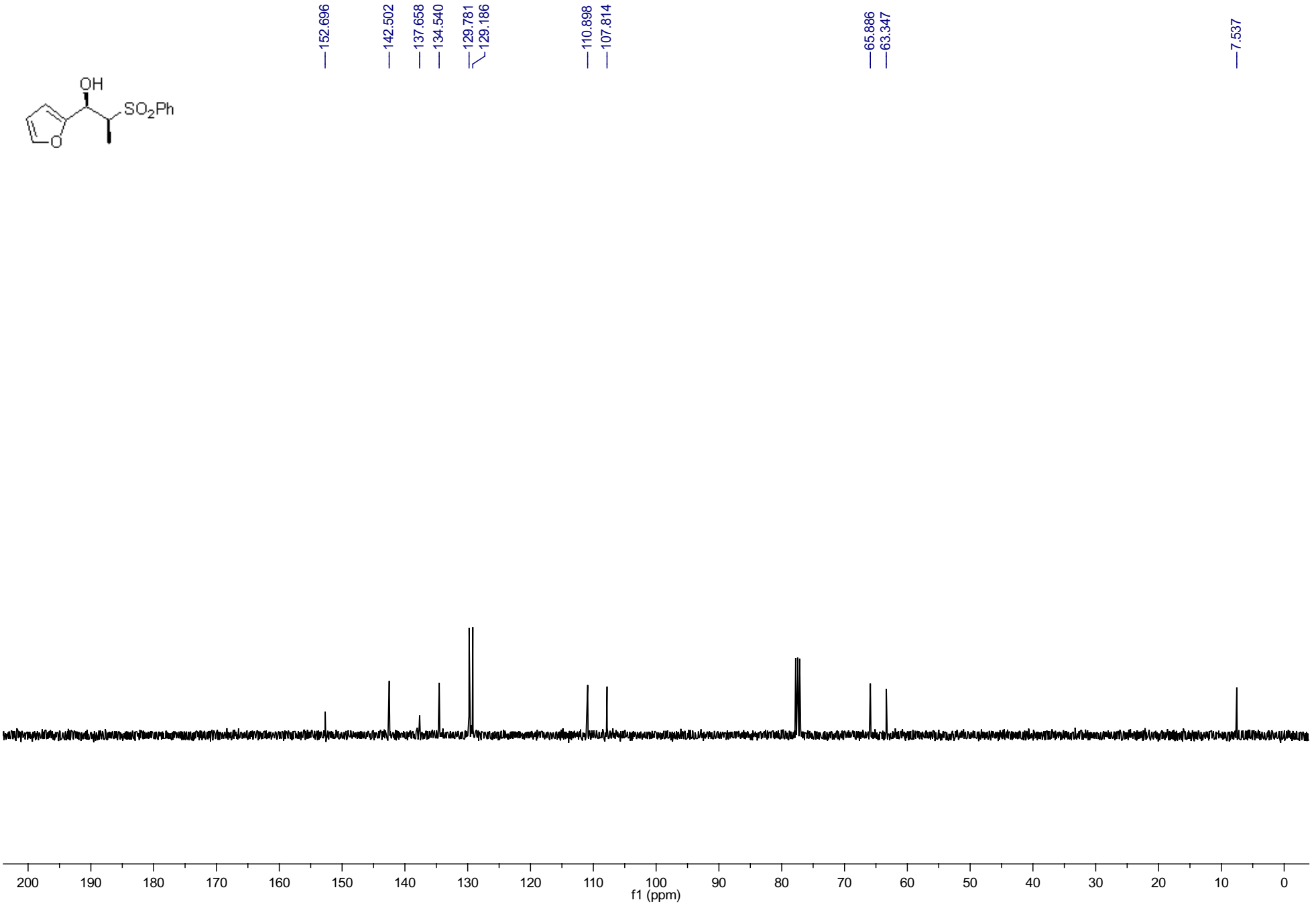

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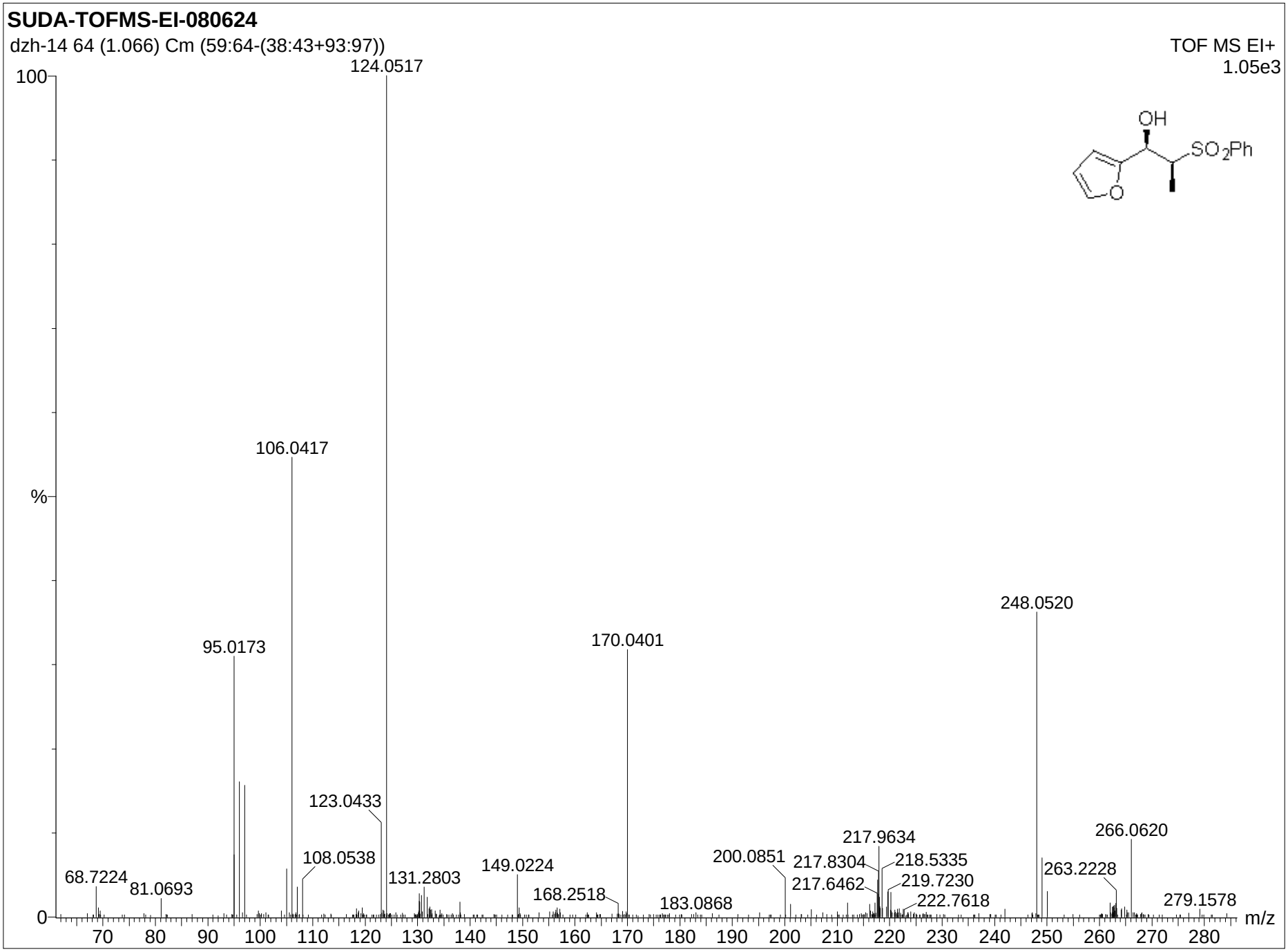

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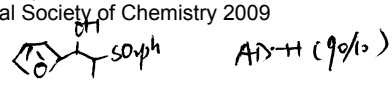
Empower 2 software



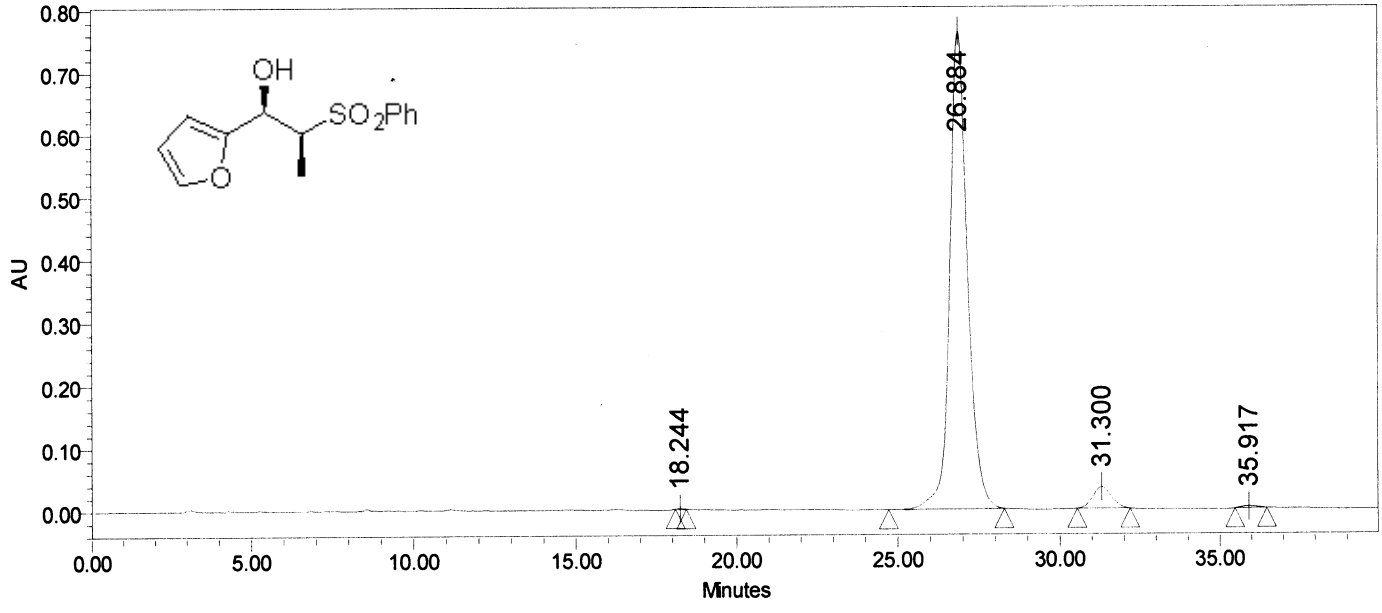
AD-H (9%)

szx1

SAMPLE INFORMATION

Sample Name:	dzh-1	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	2	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	220.0nm
Run Time:	40.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-5-22 15:41:55 CST		
Date Processed:	2008-5-22 16:24:36 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		18.244	9150	784			0.03
2		26.884	28921311	765289			95.05
3		31.300	1388171	34572			4.56
4		35.917	107481	3113			0.35

dr 95:5

ee >99%

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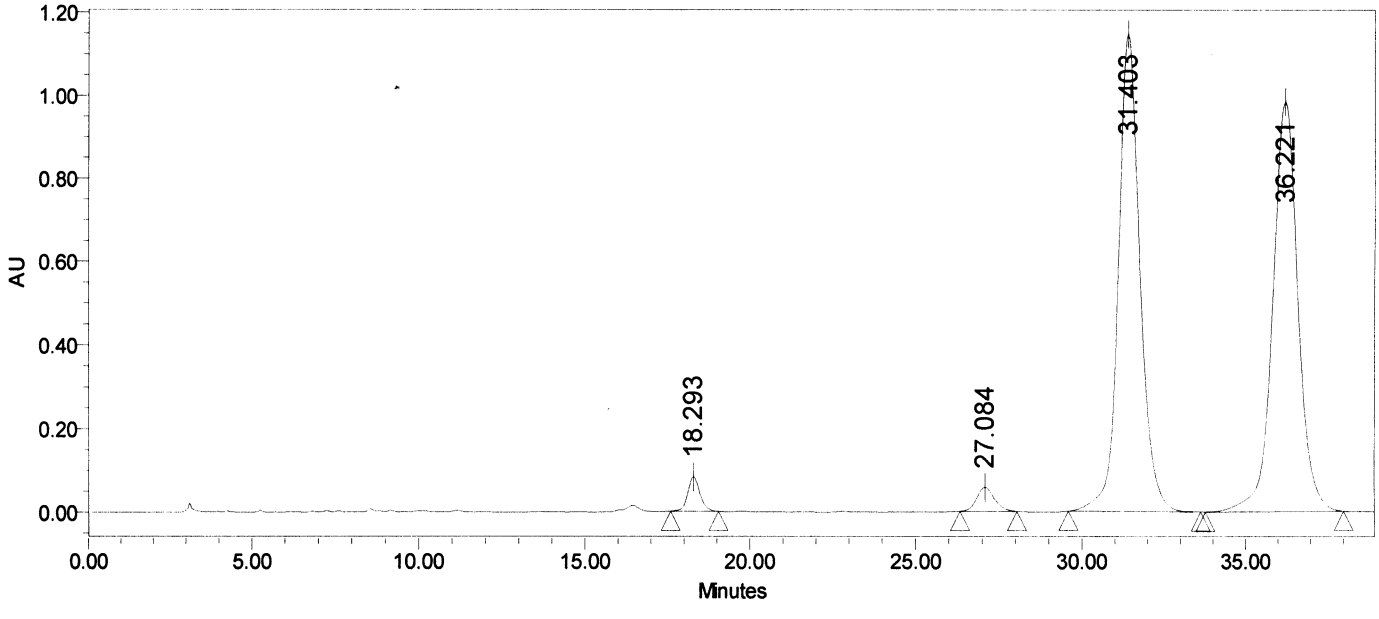
50/1 AD-H (9/10)

szx1

SAMPLE INFORMATION

Sample Name:	dzh-1-rac	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	1	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	220.0nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-5-22 15:02:08 CST		
Date Processed:	2008-5-22 15:42:48 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		18.293	2124049	82524			1.94
2		27.084	2140785	57367			1.96
3		31.403	52235948	1146076			47.83
4		36.221	52719646	982400			48.27

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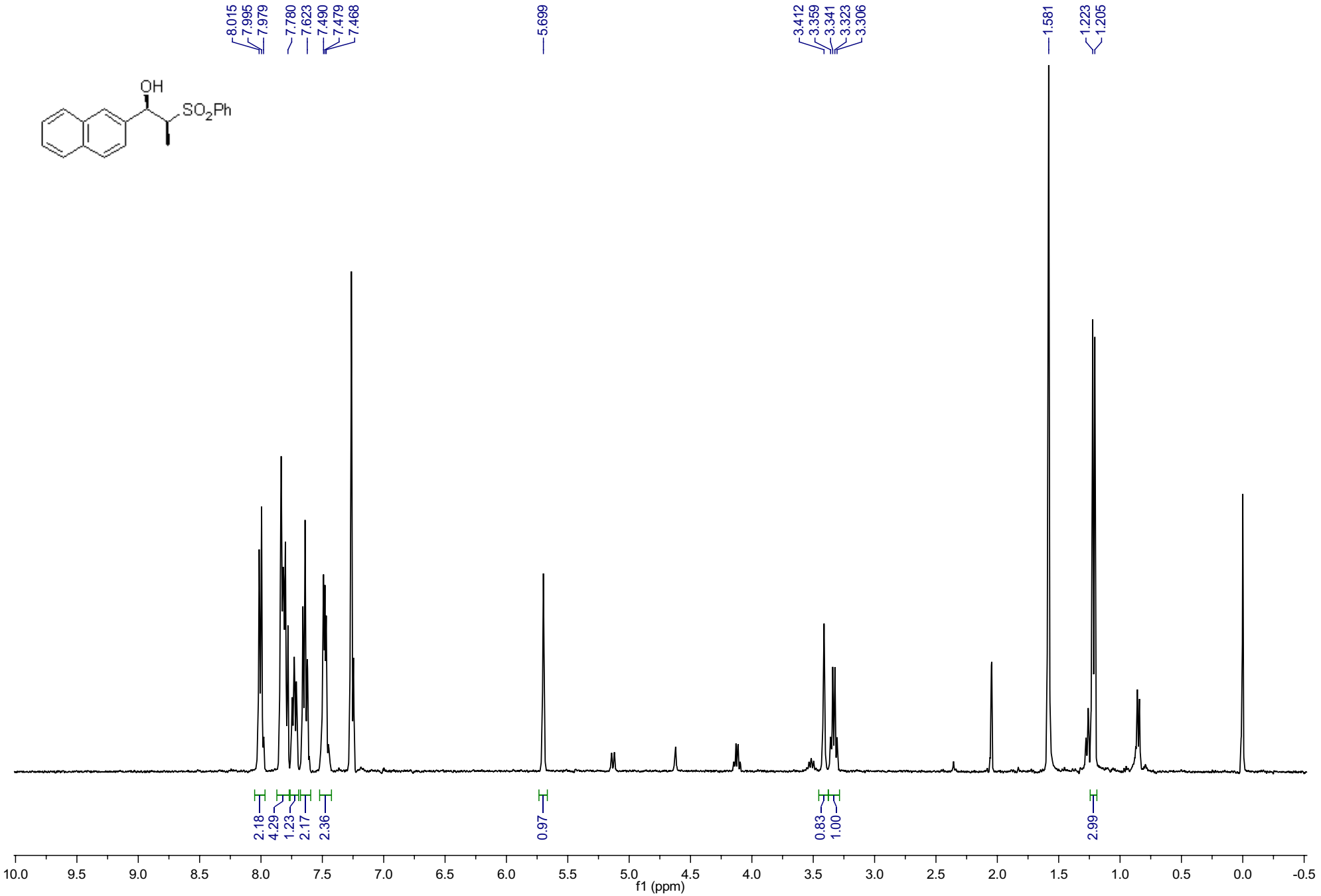

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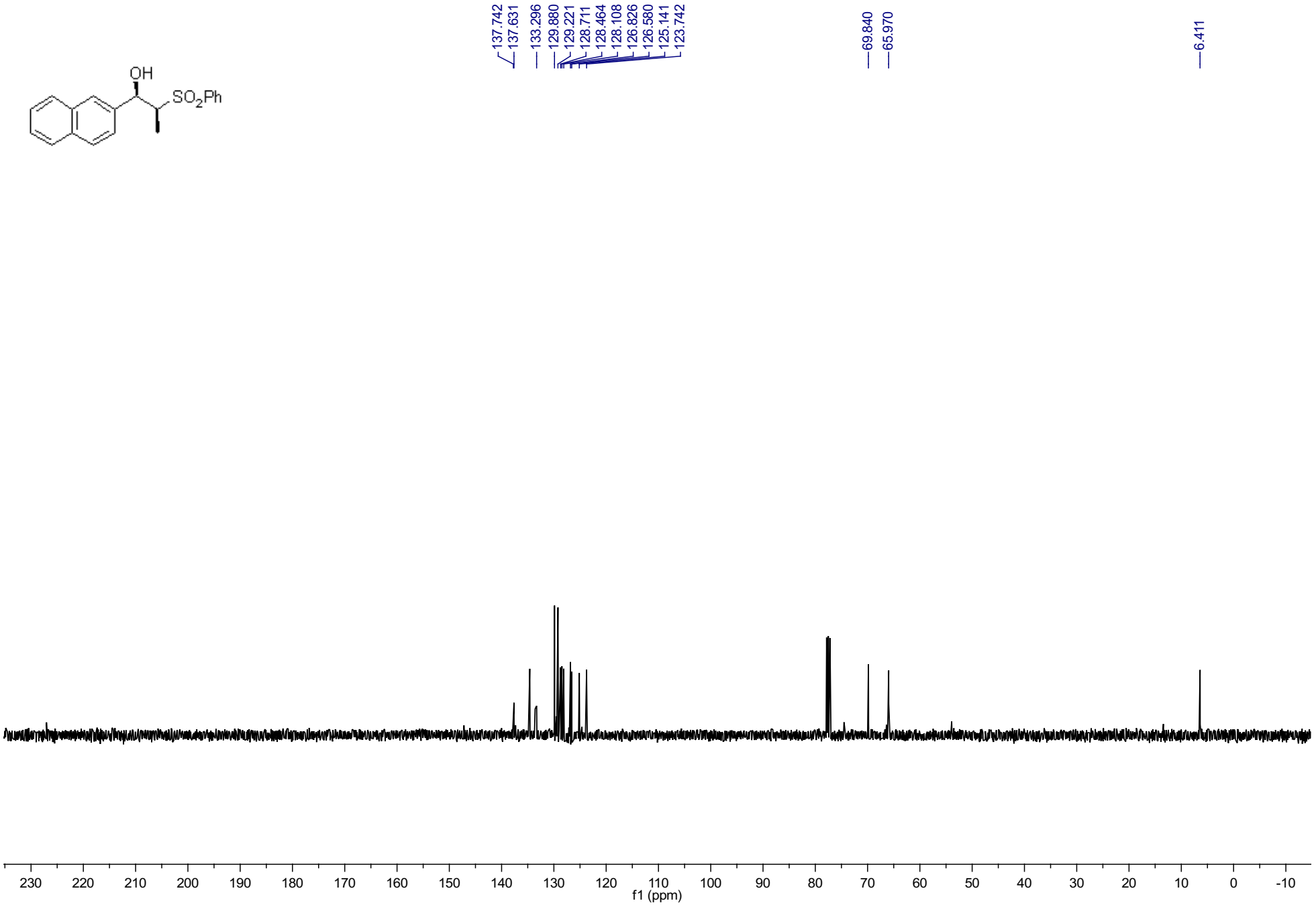

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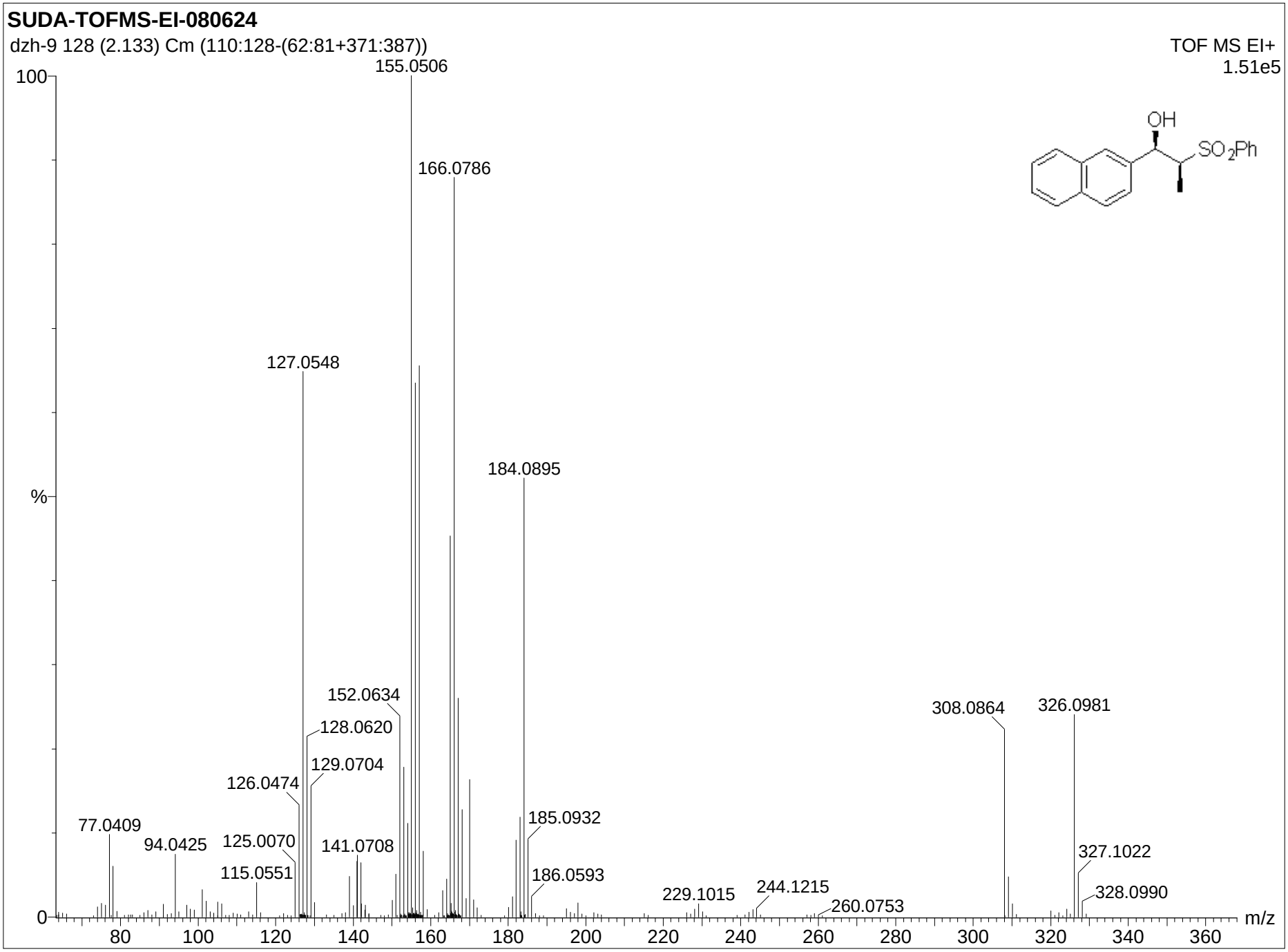

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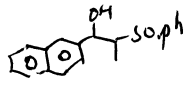
Empower 2

szx1

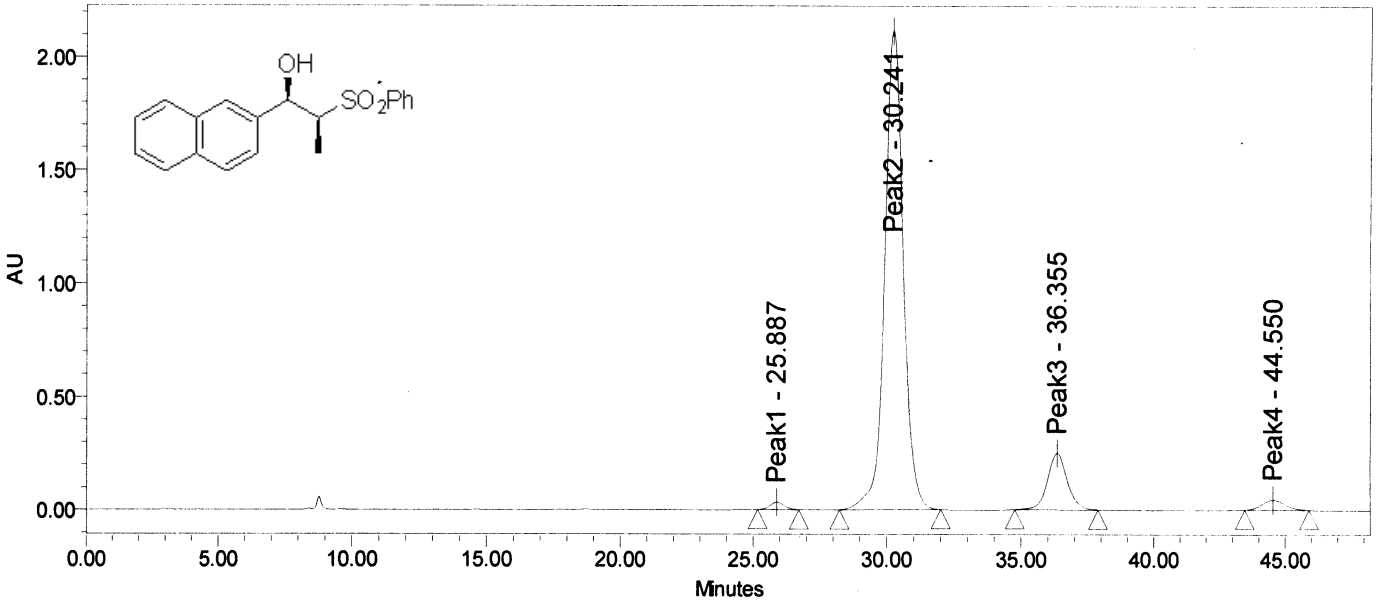


AD-H(90/10)

SAMPLE INFORMATION

Sample Name:	dzh-3	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	16	Processing Method:	szx1
Injection Volume:	10.00 ul	Channel Name:	220.0nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-4-30 15:45:11 CST		
Date Processed:	2008-5-3 11:53:54 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1	Peak1	25.887	1191558	33143			1.00
2	Peak2	30.241	101854488	2116886			85.75
3	Peak3	36.355	12994144	251203			10.94
4	Peak4	44.550	2741720	45200			2.31

dr 87:13

ee: 98%

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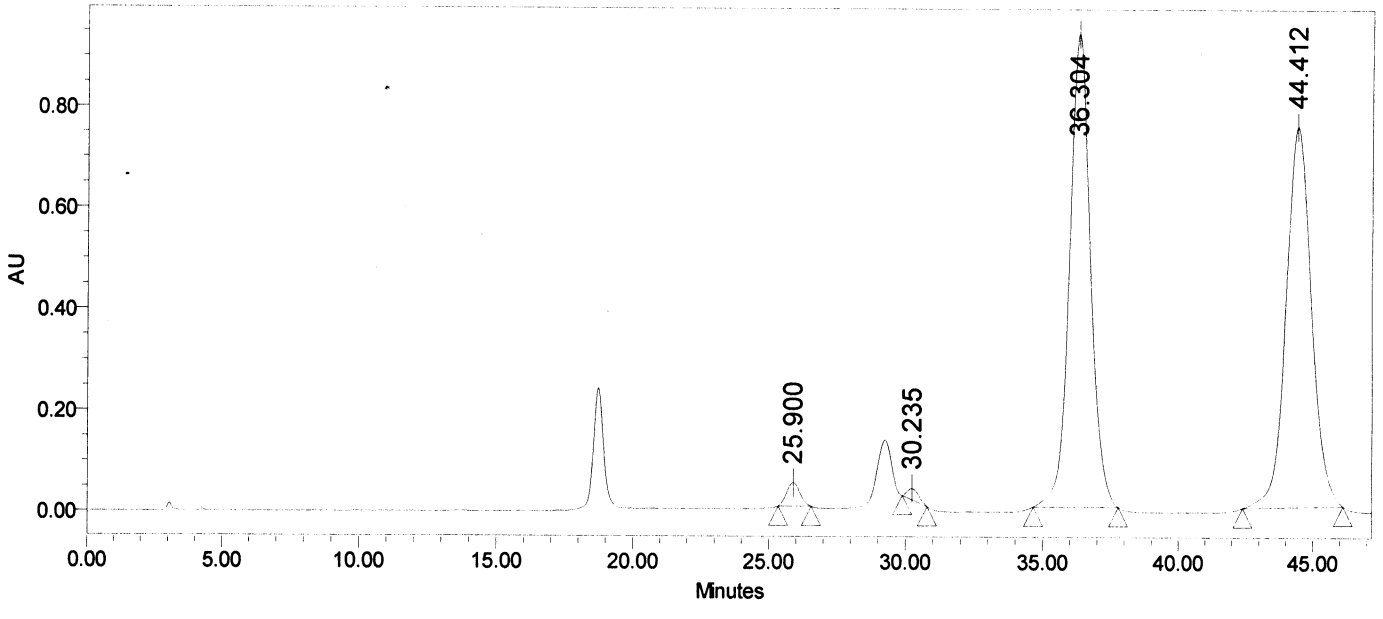
Empower 2 SOFTWARE

szx1

SAMPLE INFORMATION

Sample Name:	dzh-3-rac	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	15	Processing Method:	szx1
Injection Volume:	10.00 ul	Channel Name:	220.0nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-4-30 14:57:11 CST		
Date Processed:	2008-4-30 16:07:38 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		25.900	1574923	46446			1.55
2		30.235	650584	22047			0.64
3		36.304	50055563	936417			49.12
4		44.412	49627677	753517			48.70

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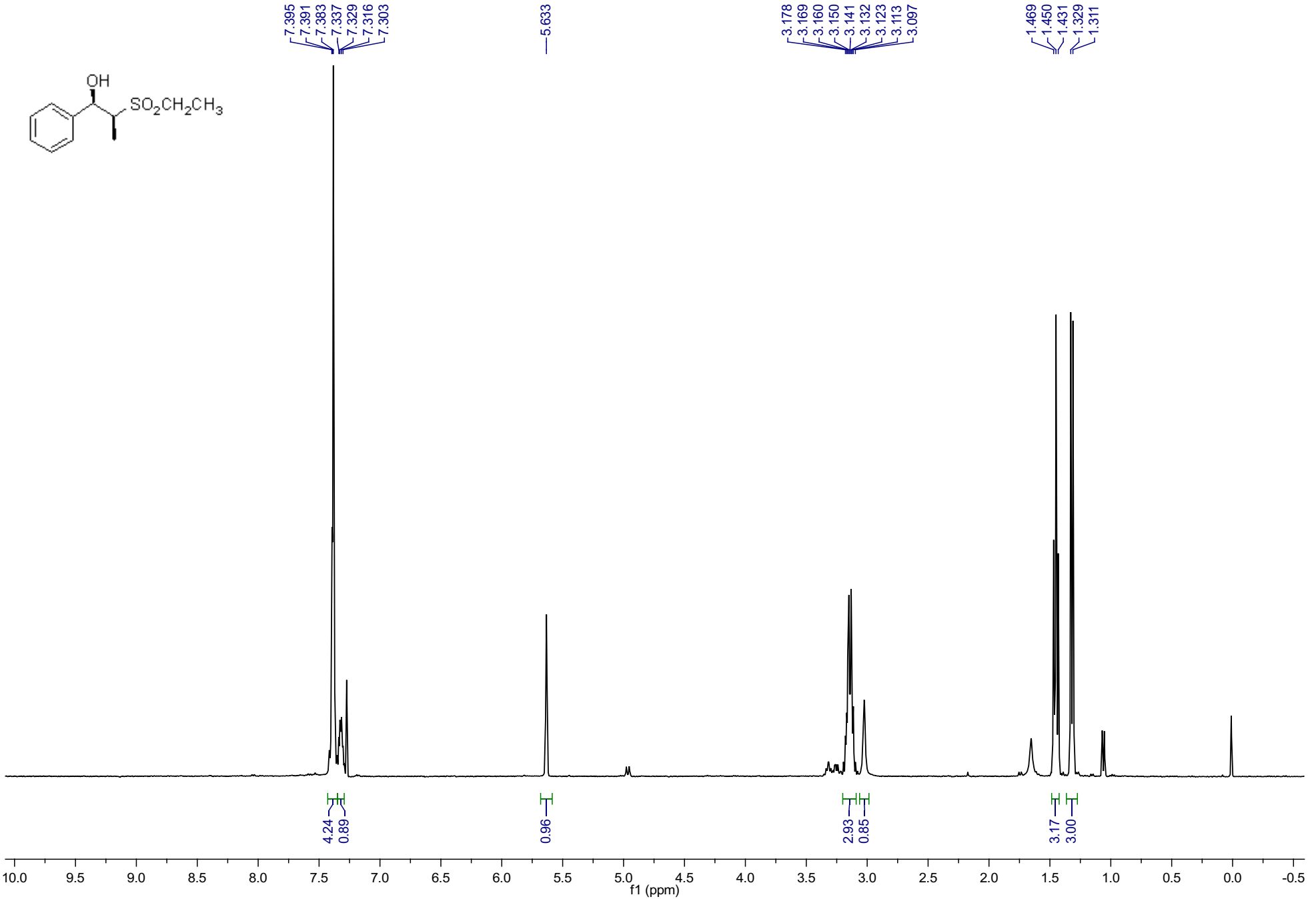

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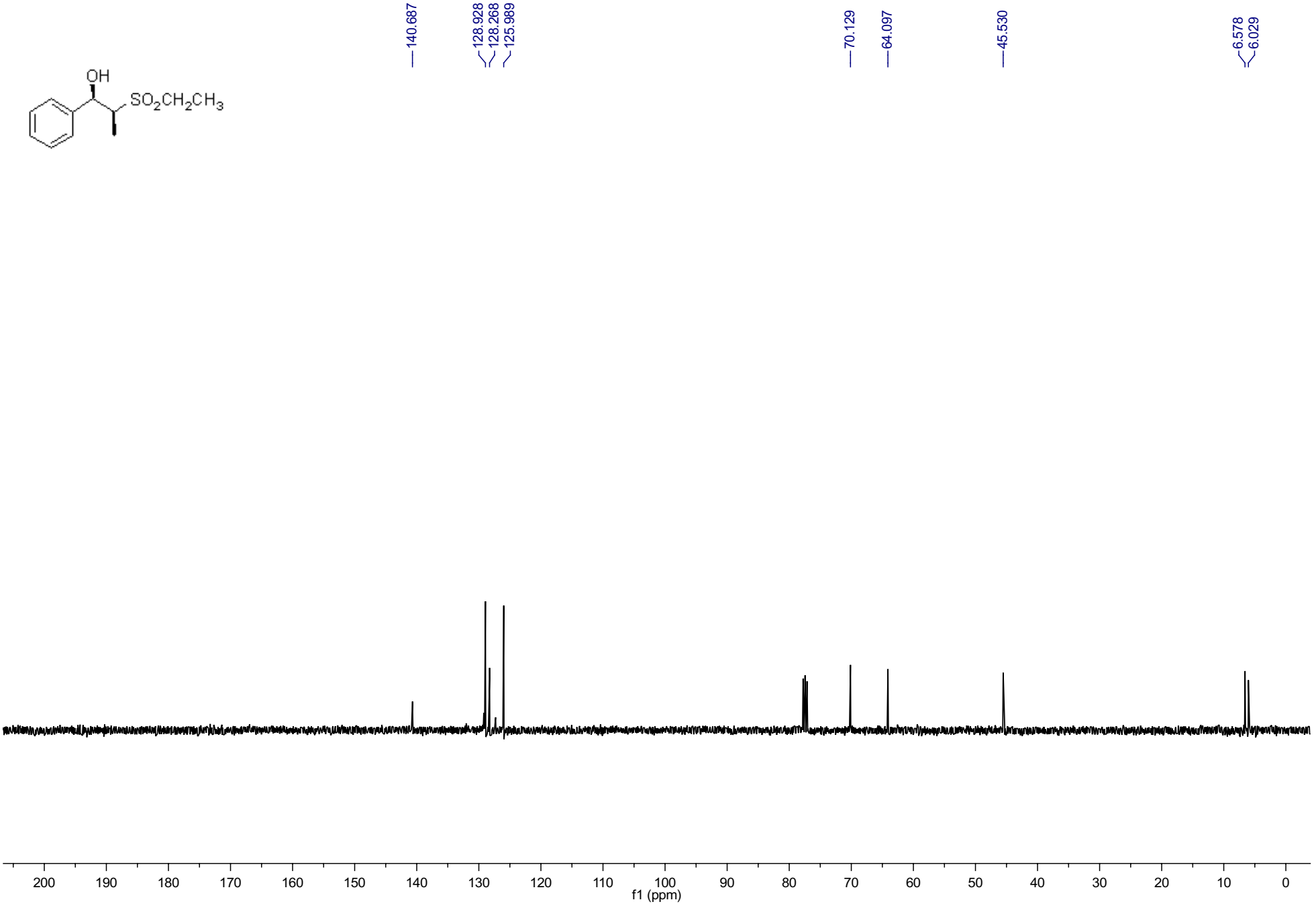

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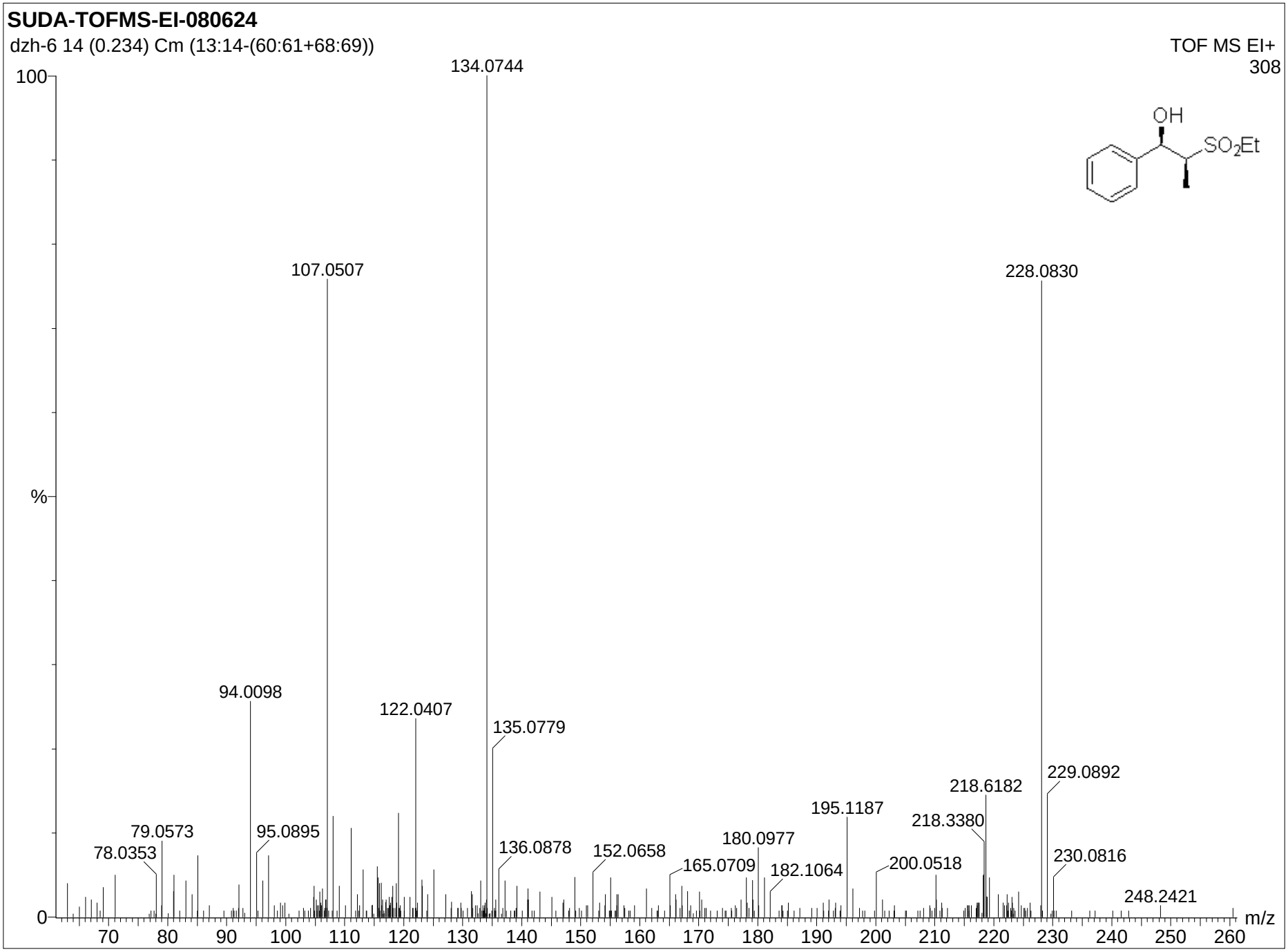

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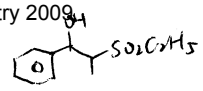
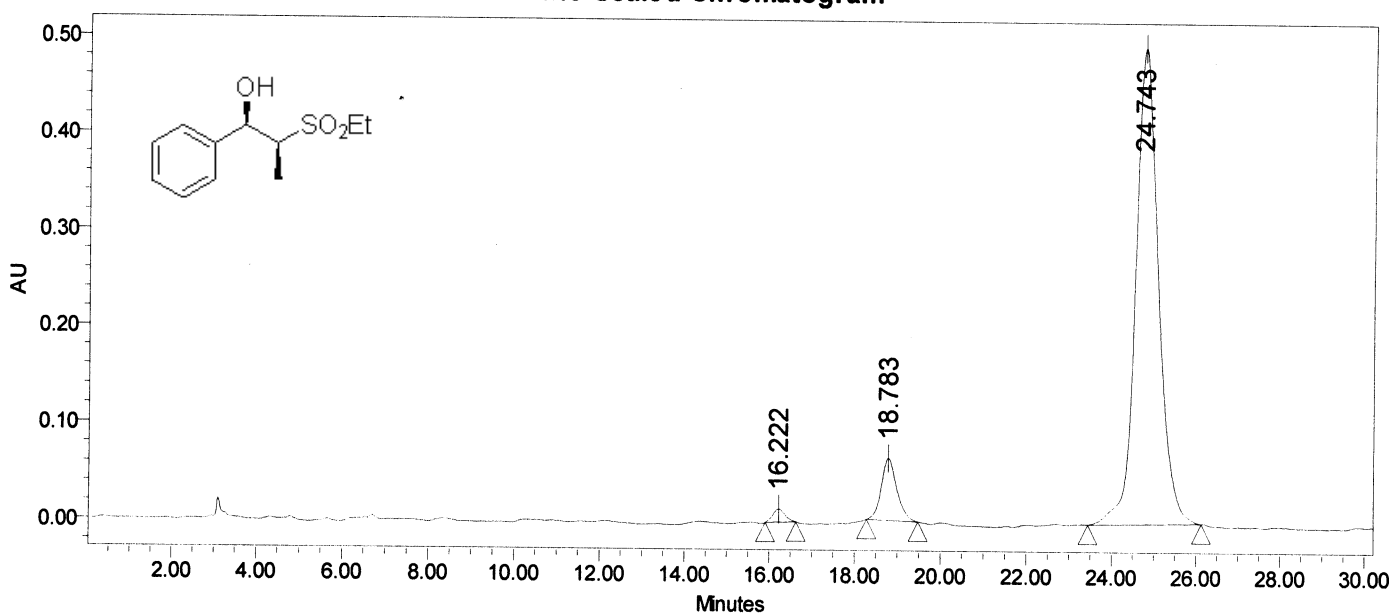
AD-H(95/5) 

szx1

SAMPLE INFORMATION

Sample Name:	dzh	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	4	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	210.5nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 210.5 nm
Date Acquired:	2008-5-16 17:24:22 CST		
Date Processed:	2008-5-16 17:57:21 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		16.222	271565	13712			1.33
2		18.783	1636262	64622			8.00
3		24.743	18537620	493452			90.67

dr 9:1
ee: >99%

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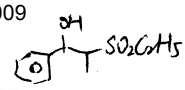
AD-H (95/5)

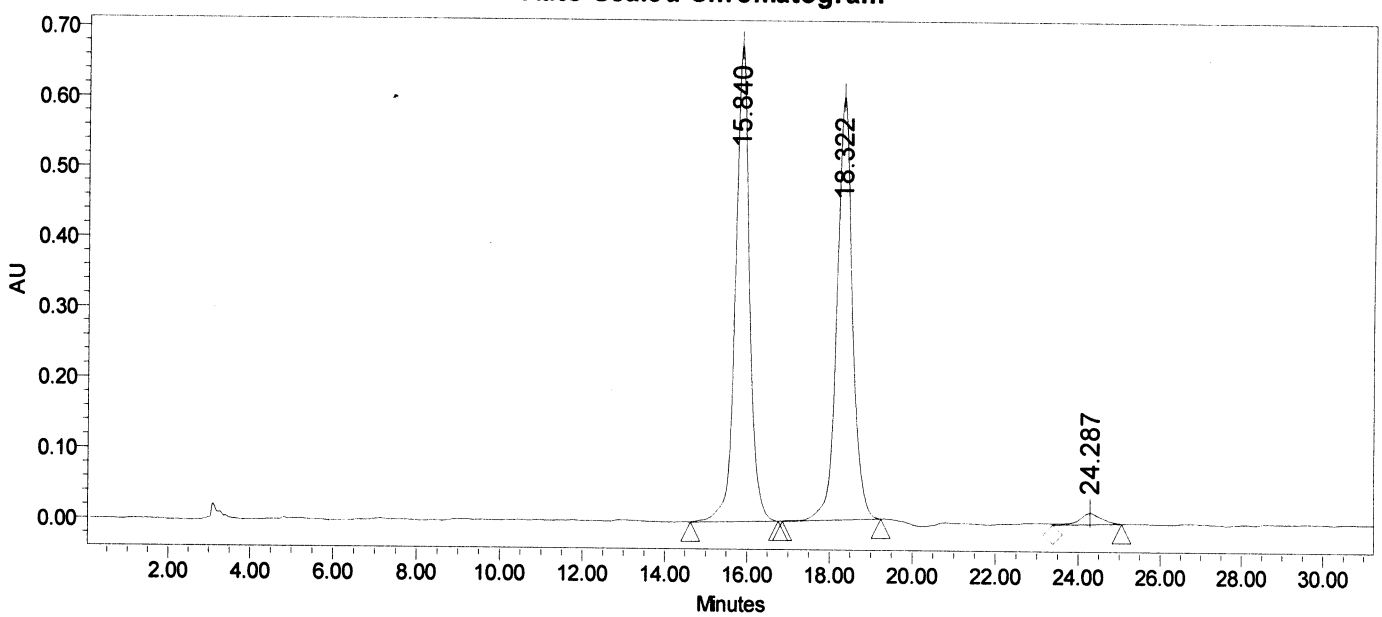


szx1

SAMPLE INFORMATION

Sample Name:	dzh-rac	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	3	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	210.5nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 210.5 nm
Date Acquired:	2008-5-16 16:52:16 CST		
Date Processed:	2008-5-16 17:53:24 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		15.840	16030669	677596			49.75
2		18.322	15587727	601162			48.37
3		24.287	604515	16165			1.88

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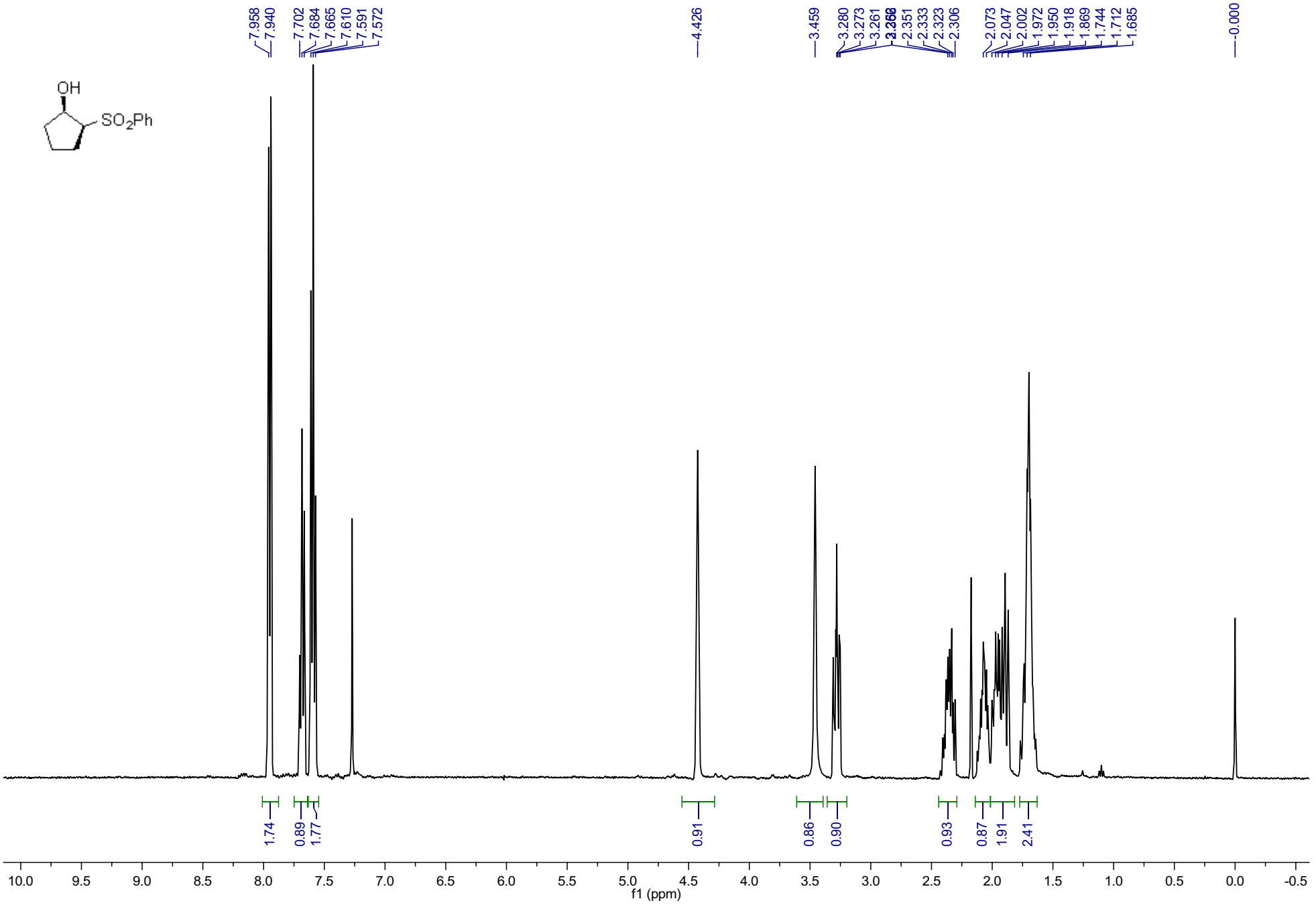

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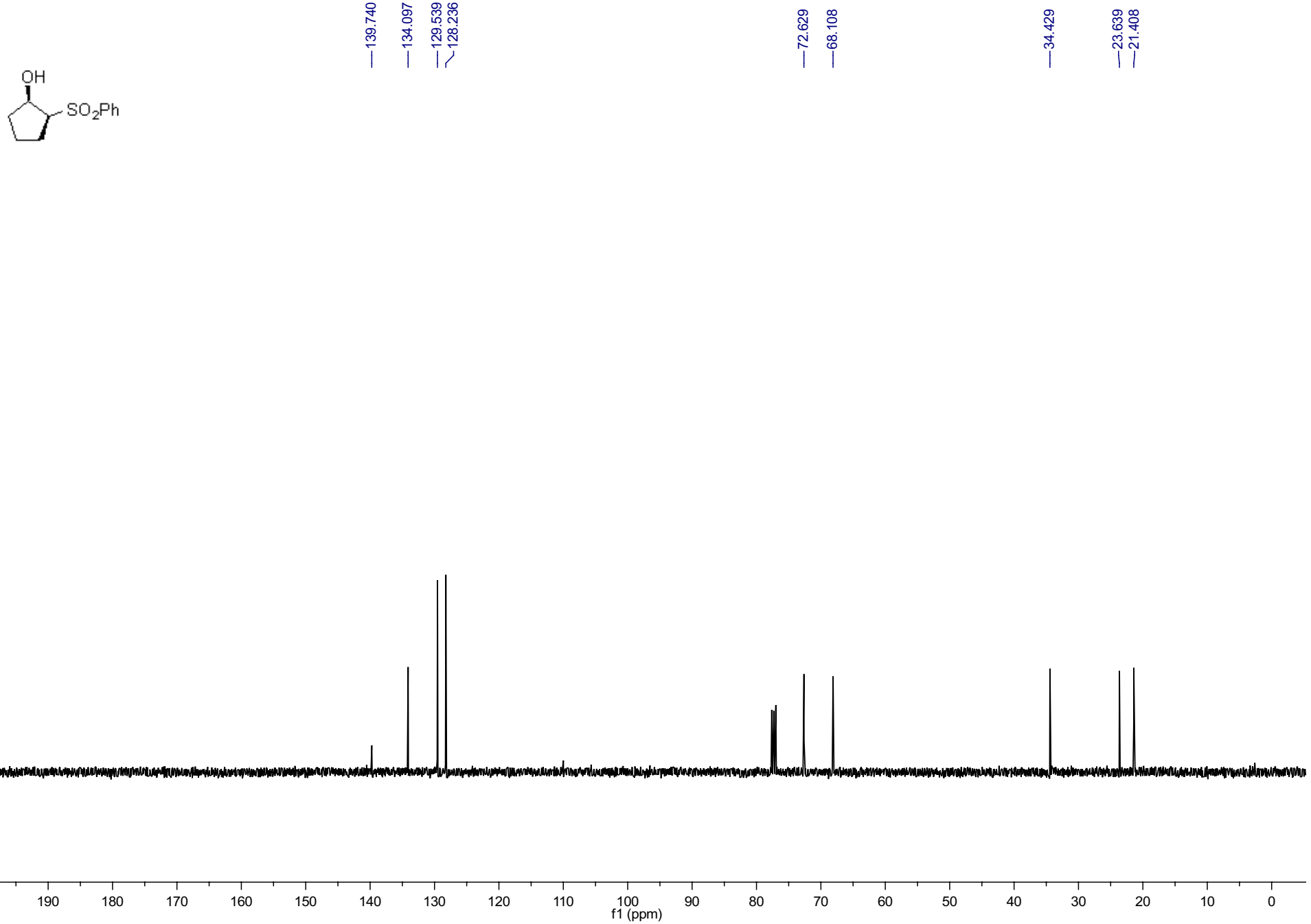

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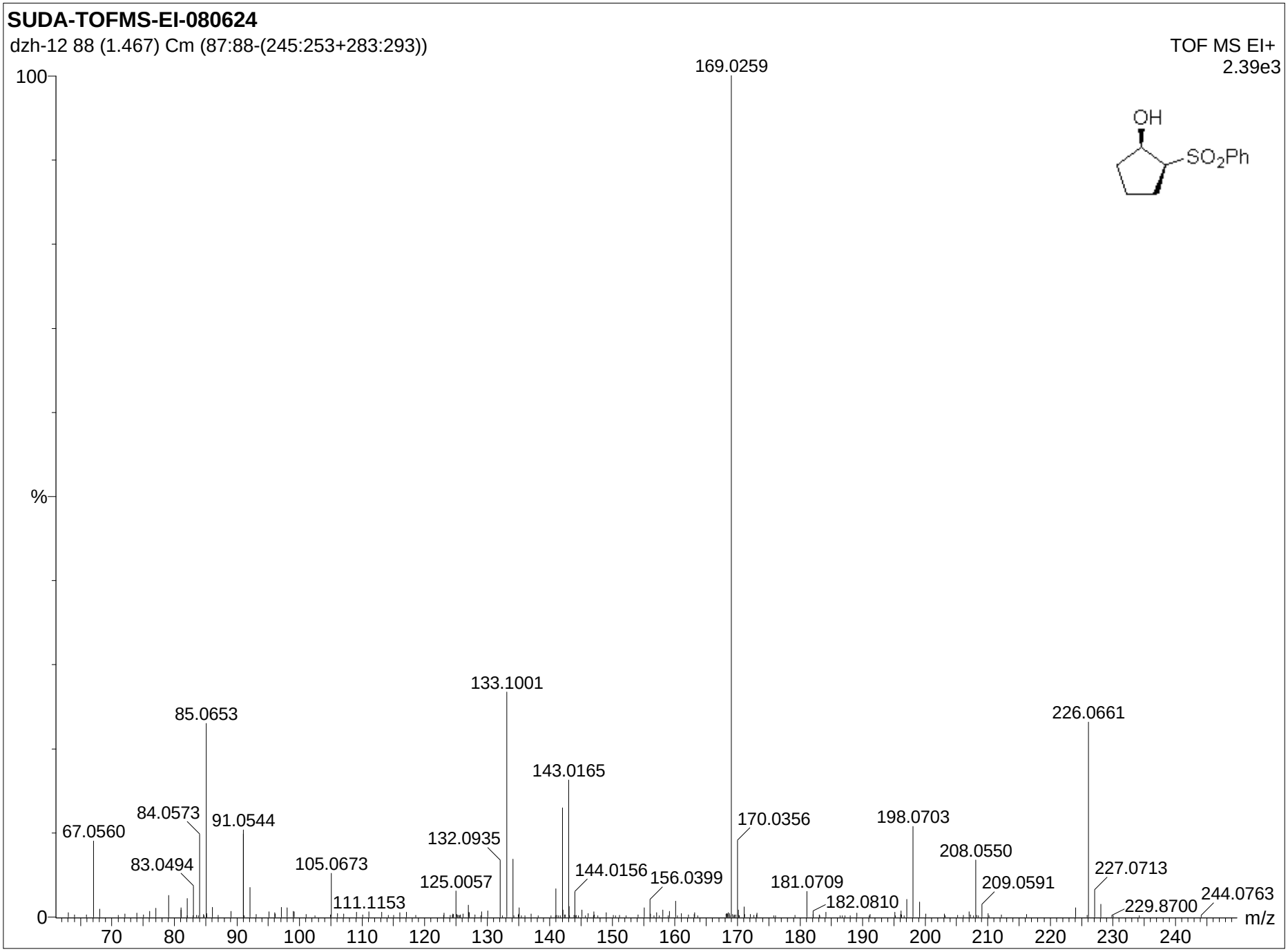

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Empower 2 software

OH
SO2ph

AD-H (9/10)

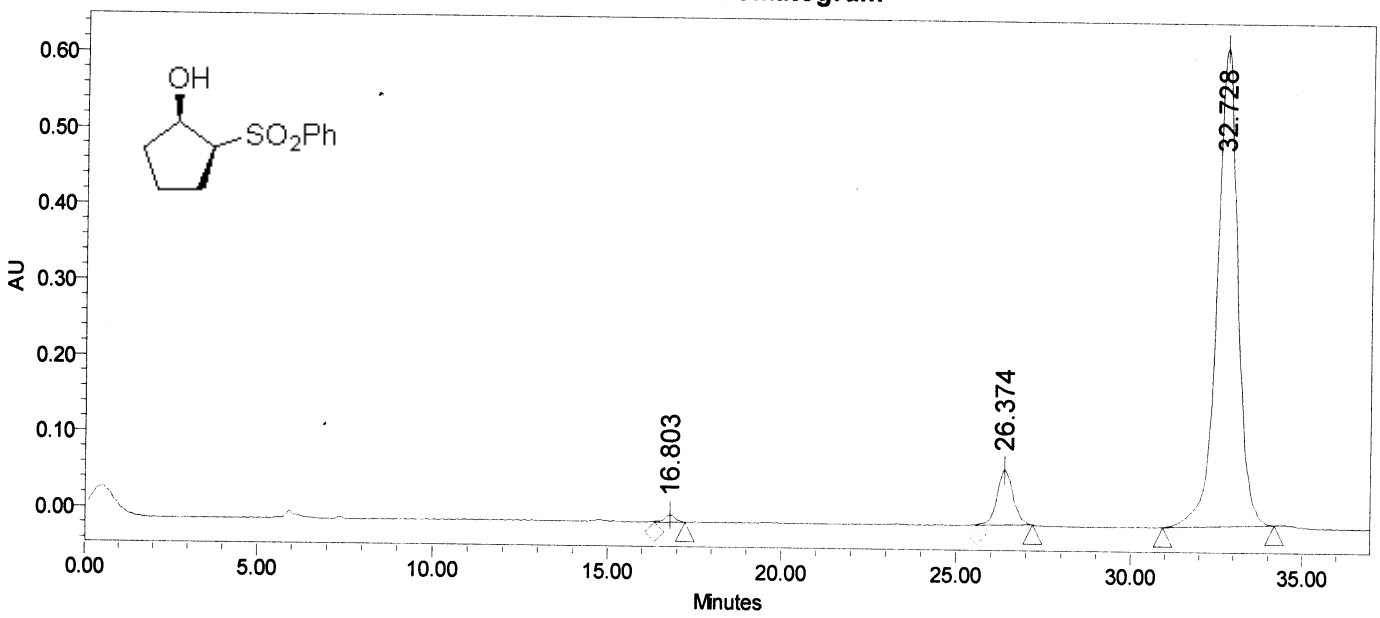
~~ZVA~~ 水

szx1

SAMPLE INFORMATION

Sample Name:	dzh-环戊	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	7	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	220.0nm
Run Time:	100.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-5-13 12:05:49 CST		
Date Processed:	2008-5-13 12:44:53 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		16.803	211247	9462			0.72
2		26.374	2308717	72644			7.88
3		32.728	26787857	629619			91.40

dr 99:1

ee: 84%

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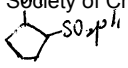
Empower 2 software



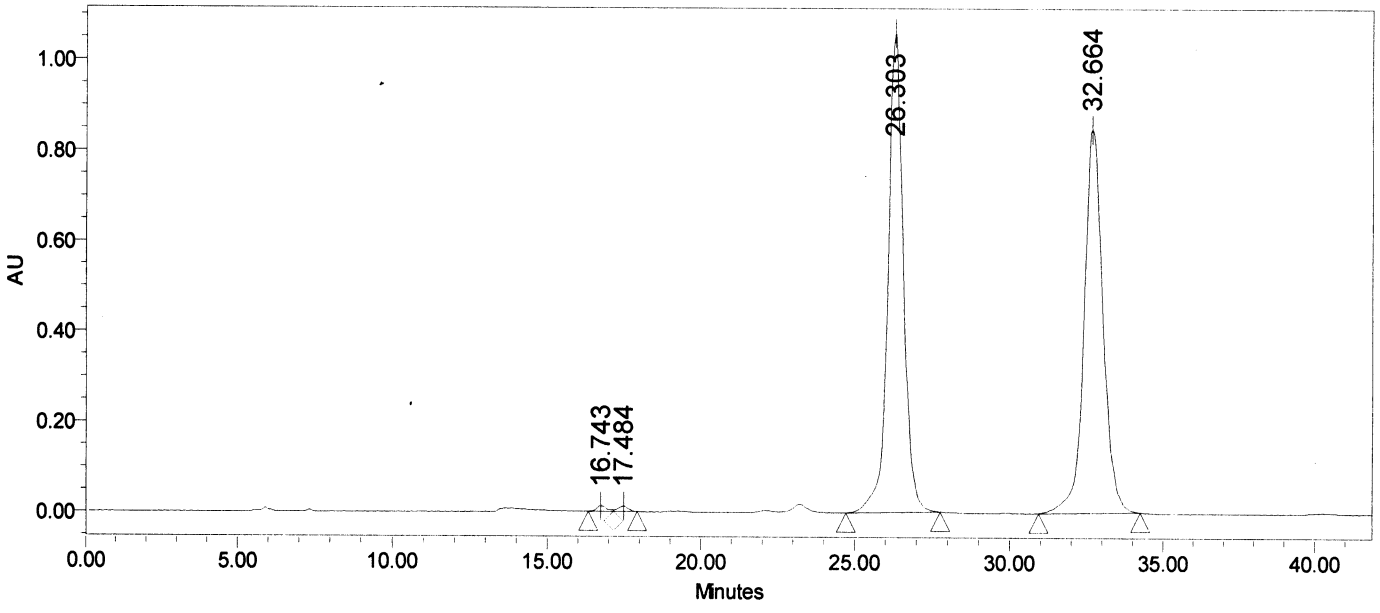
AD-H(90/10)

szx1

SAMPLE INFORMATION

Sample Name:	dzh-环戊-rac	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	6	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	220.0nm
Run Time:	100.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-5-13 11:23:04 CST		
Date Processed:	2008-5-13 12:36:16 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		16.743	272977	12091			0.37
2		17.484	259516	12060			0.35
3		26.303	36846339	1059013			49.82
4		32.664	36576413	847940			49.46

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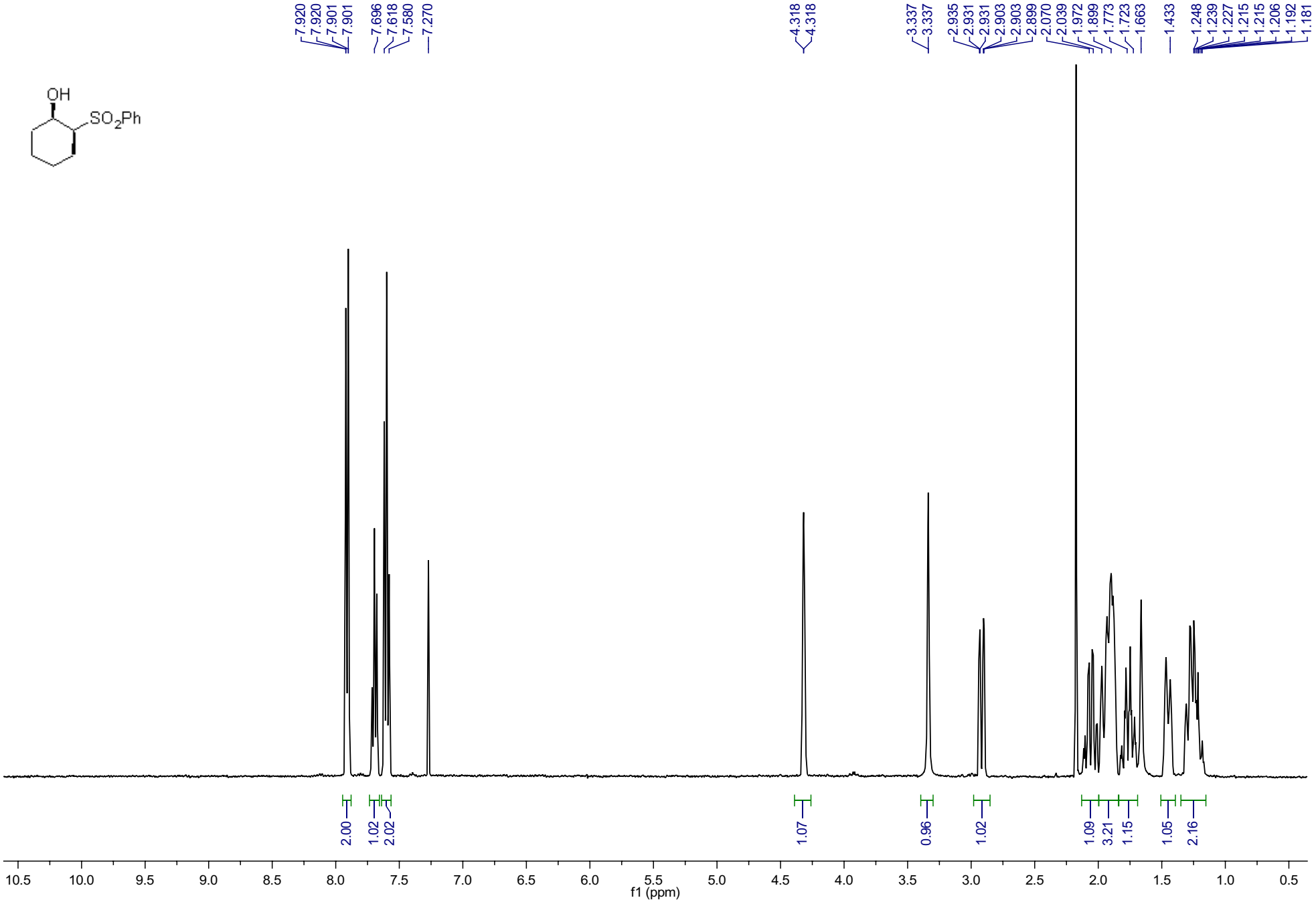

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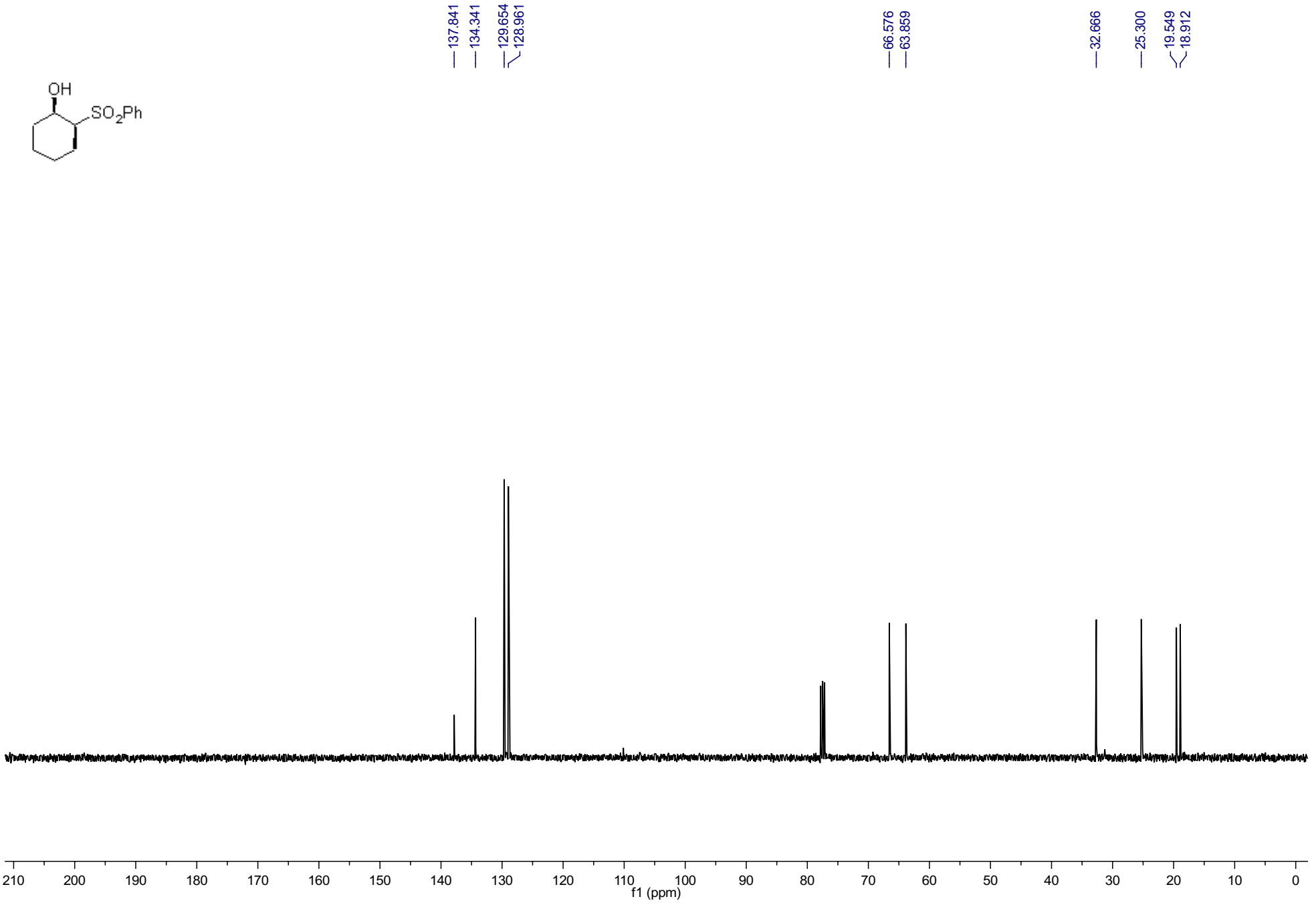

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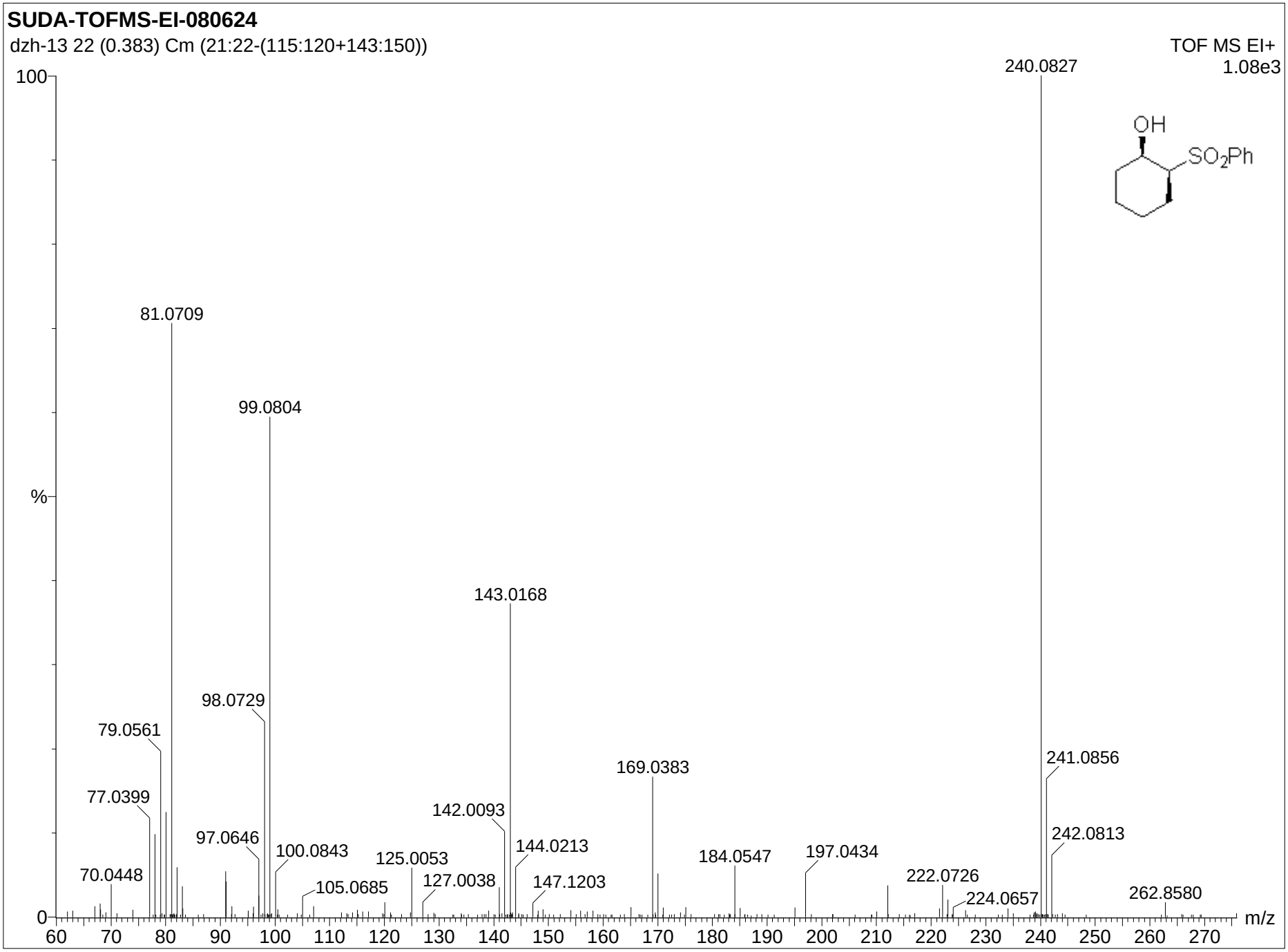

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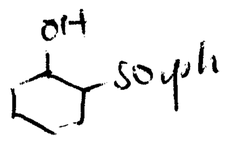


AD-H(90/10) 2天

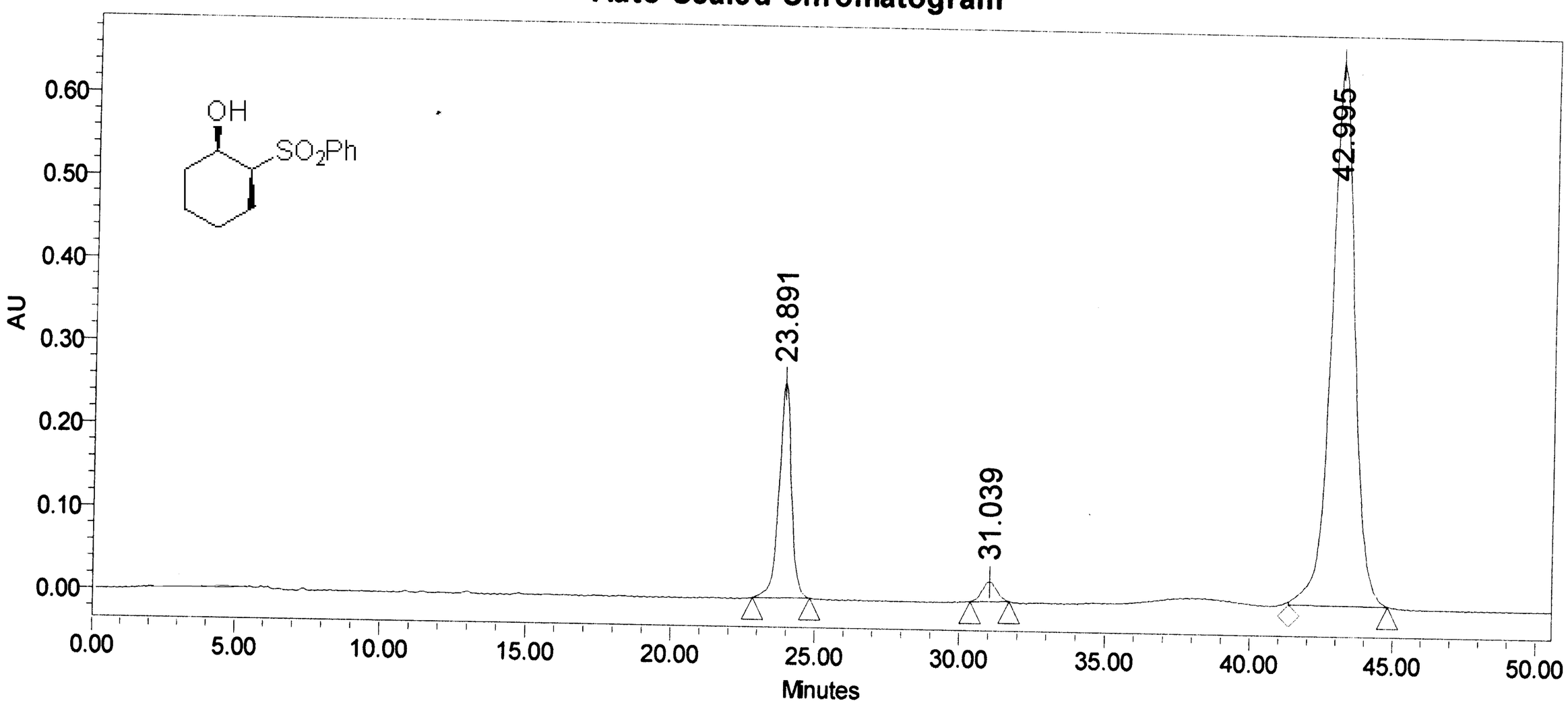
Empower 2 software

szx1

SAMPLE INFORMATION

Sample Name:	dzh-环己	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	9	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	220.0nm
Run Time:	100.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-5-13 13:32:43 CST		
Date Processed:	2008-5-13 14:25:51 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		23.891	7817628	259032			17.06
2		31.039	848461	23762			1.85
3		42.995	37154481	655644			81.09

dr 98:2
ee. 64.5%

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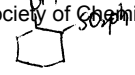


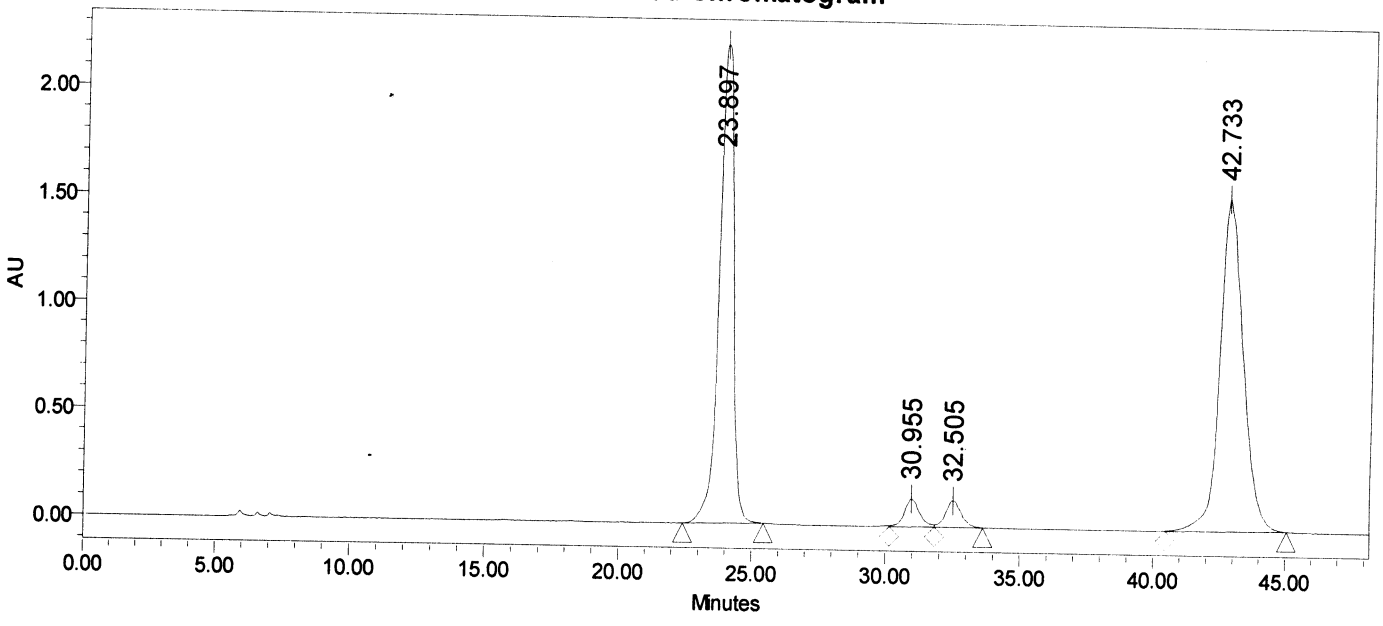
AD-H (9%/10) 2天

szx1

SAMPLE INFORMATION

Sample Name:	dzh-环己-rac	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	8	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	220.0nm
Run Time:	100.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-5-13 12:43:39 CST		
Date Processed:	2008-5-13 14:19:57 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		23.897	83292508	2228636			44.04
2		30.955	5124258	130046			2.71
3		32.505	5051009	122967			2.67
4		42.733	95679518	1550900			50.58

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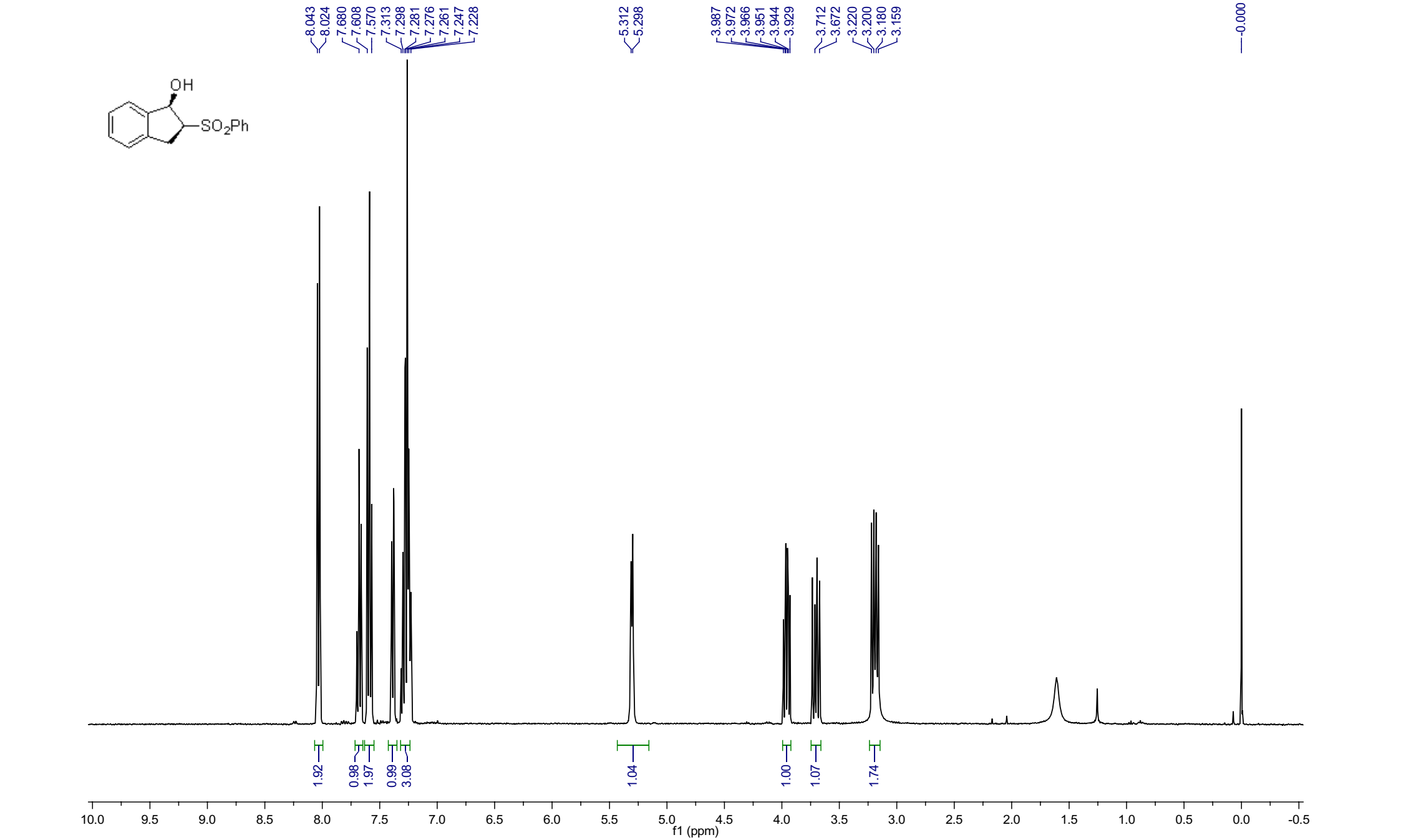

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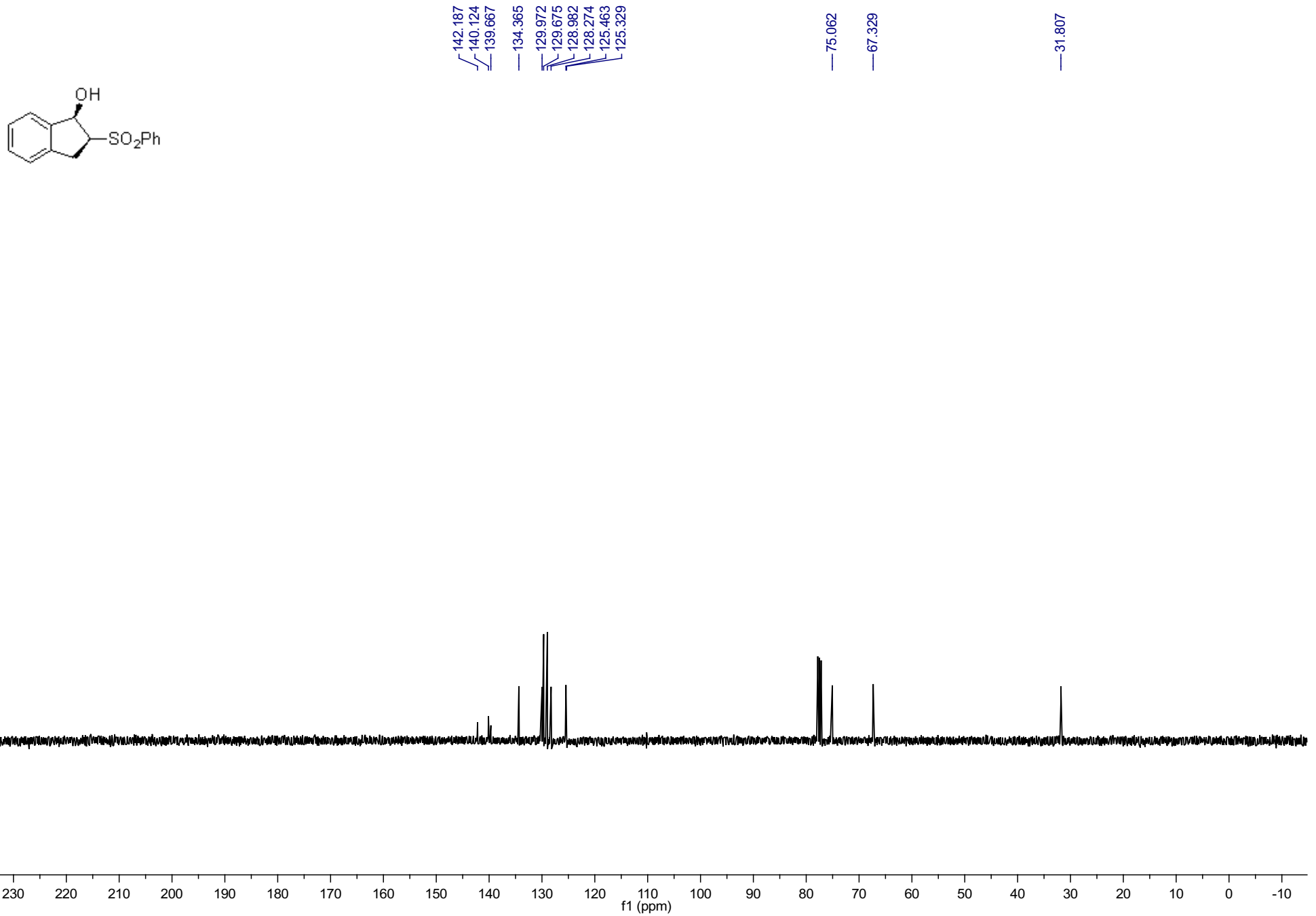

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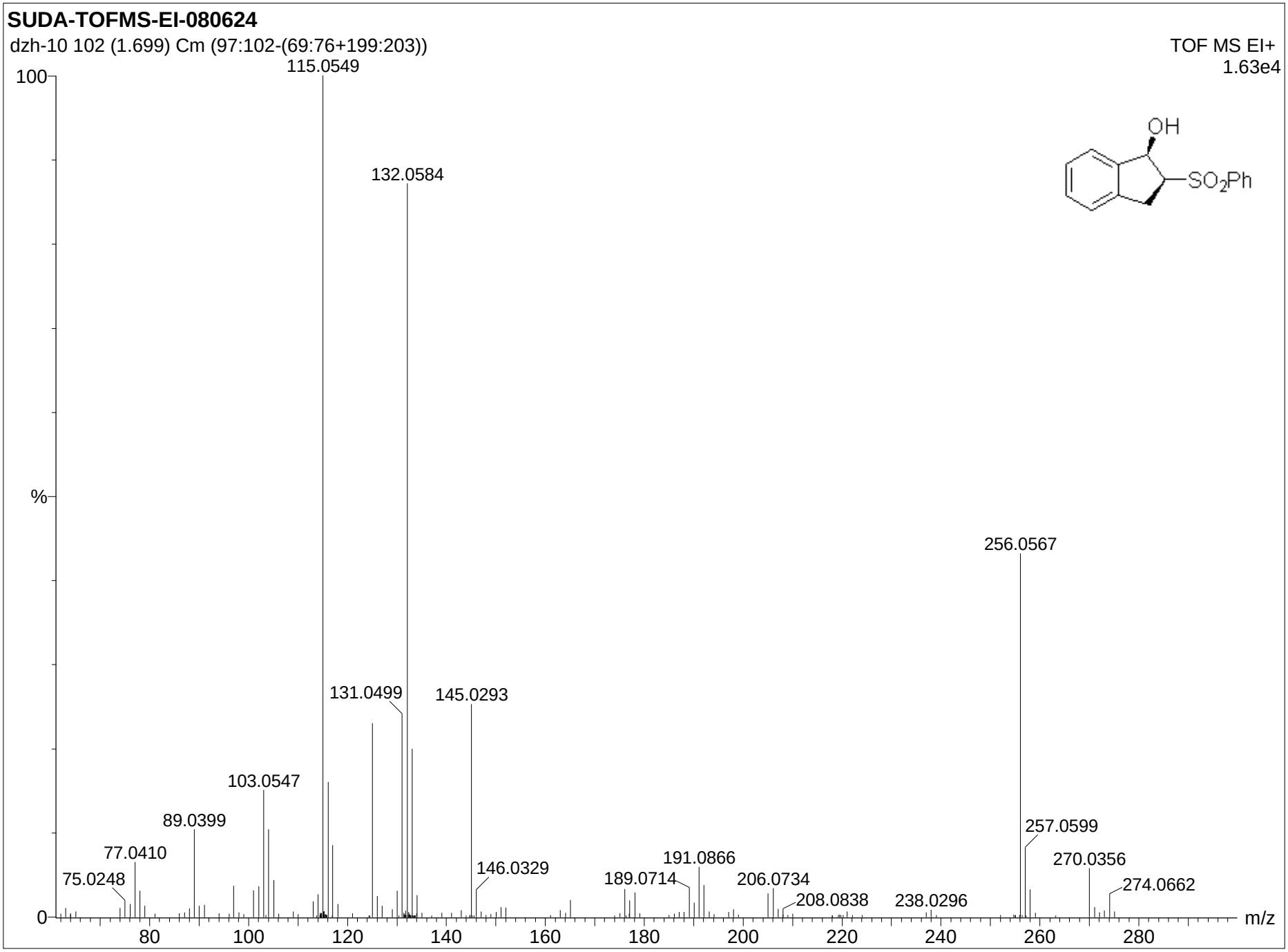

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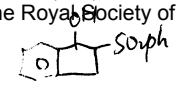


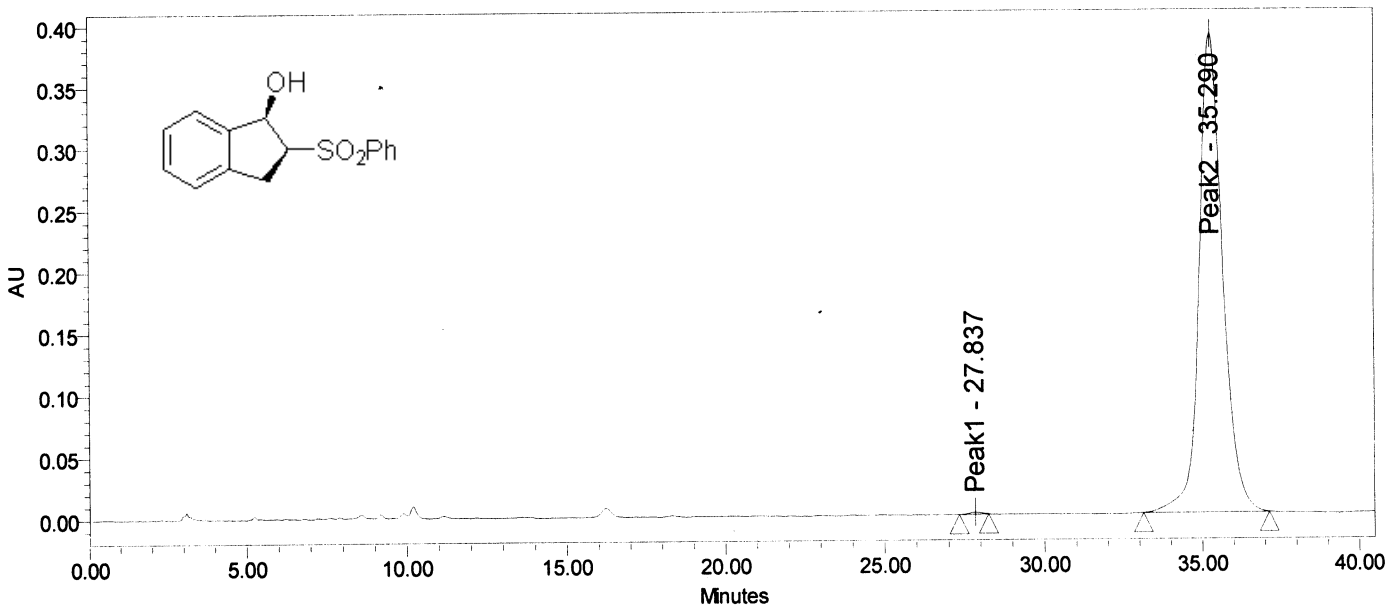
AD-H (9%)

szx1

SAMPLE INFORMATION

Sample Name:	dzh-2	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	3	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	220.0nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 220.0 nm
Date Acquired:	2008-5-29 13:04:01 CST		
Date Processed:	2008-5-29 13:46:09 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1	Peak1	27.837	46202	1740			0.23
2	Peak2	35.290	20168874	387986			99.77

dr >99:1

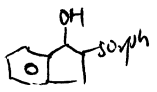
ee >99%

Reported by User: System
Report Method: szx1
Report Method ID 1275

Project Name: szx1
Date Printed:
2008-5-29
13:47:32 PRC

Empower 2 software

szx1

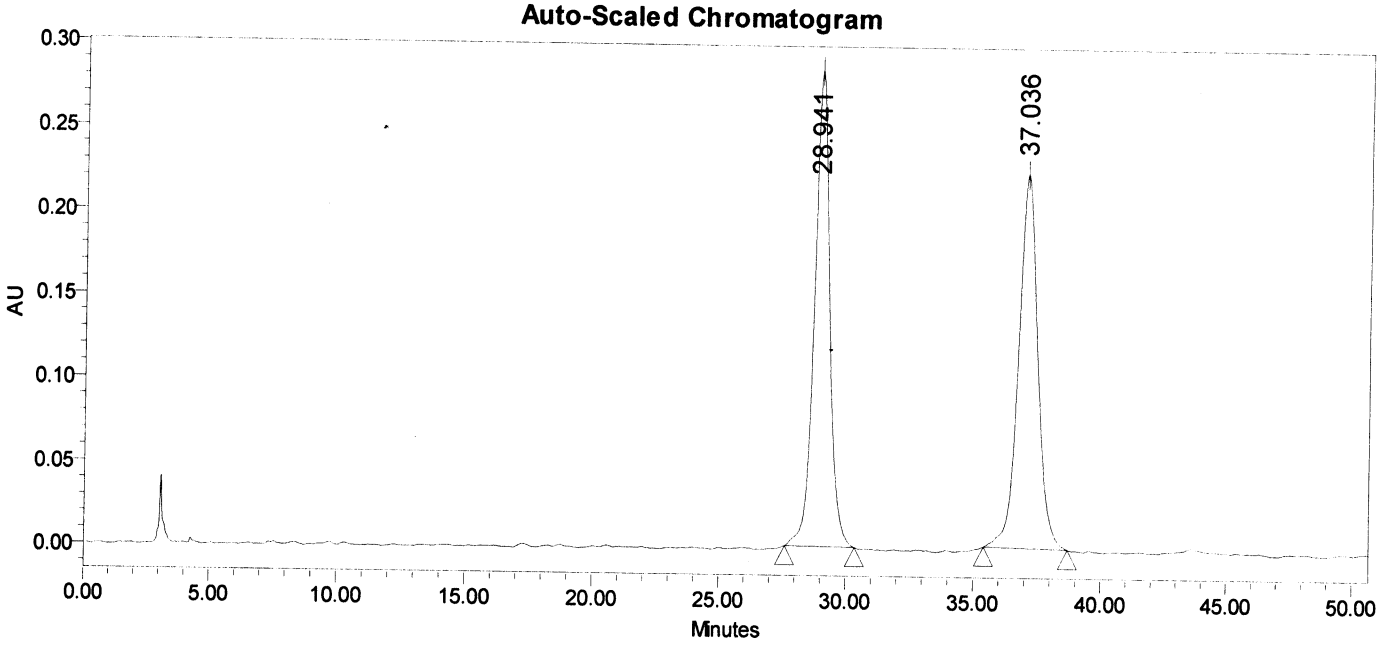


AD-H (90/10)

SAMPLE INFORMATION

Sample Name:	dzh-1-rac	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	19	Processing Method:	LC PQ
Injection Volume:	10.00 ul	Channel Name:	210.5nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 210.5 nm
Date Acquired:	2008-4-30 18:08:02 CST		
Date Processed:	2008-4-30 19:19:05 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		28.941	11876023	283811			50.23
2		37.036	11766176	223295			49.77

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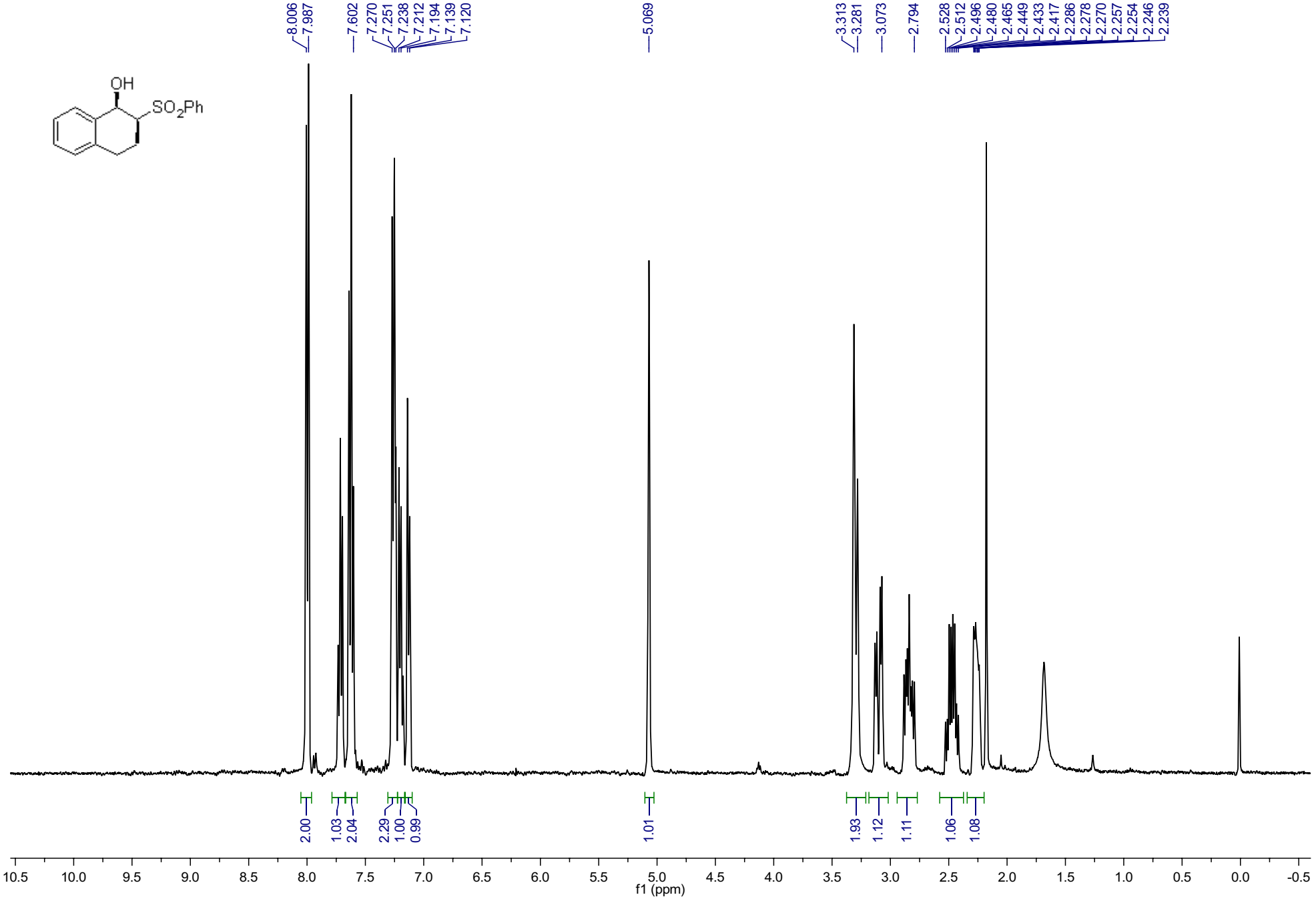

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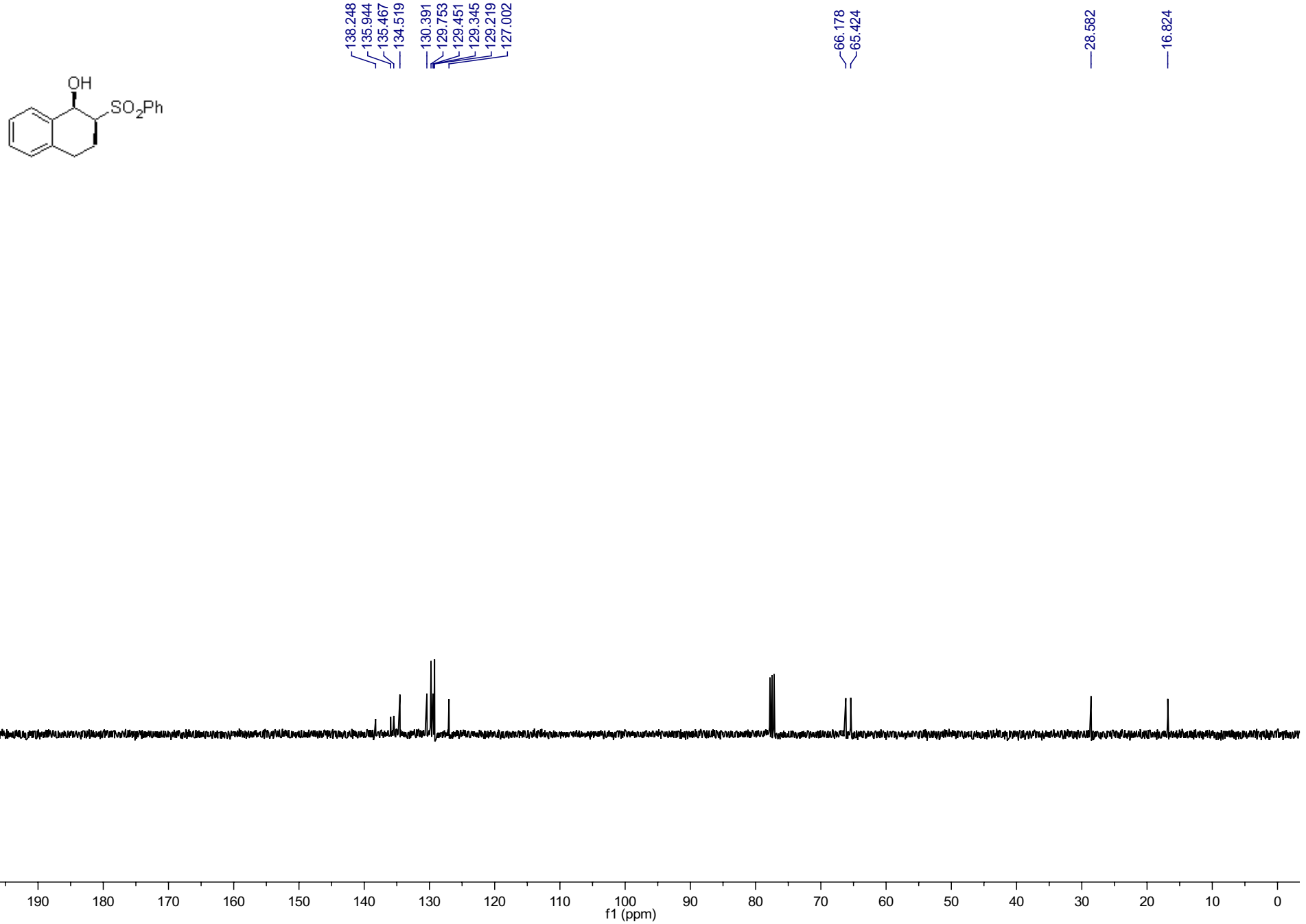

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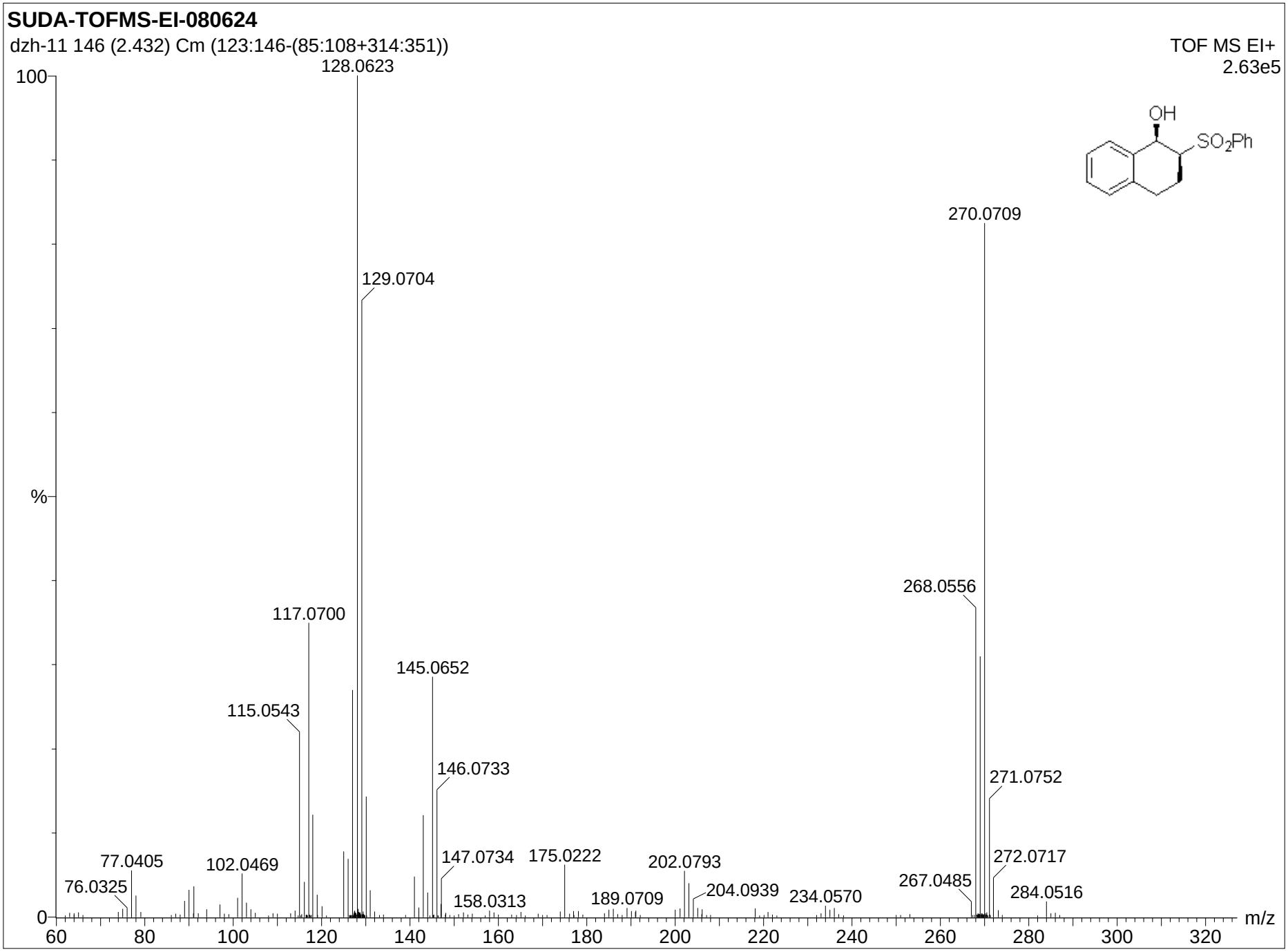

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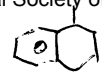
Empower 2



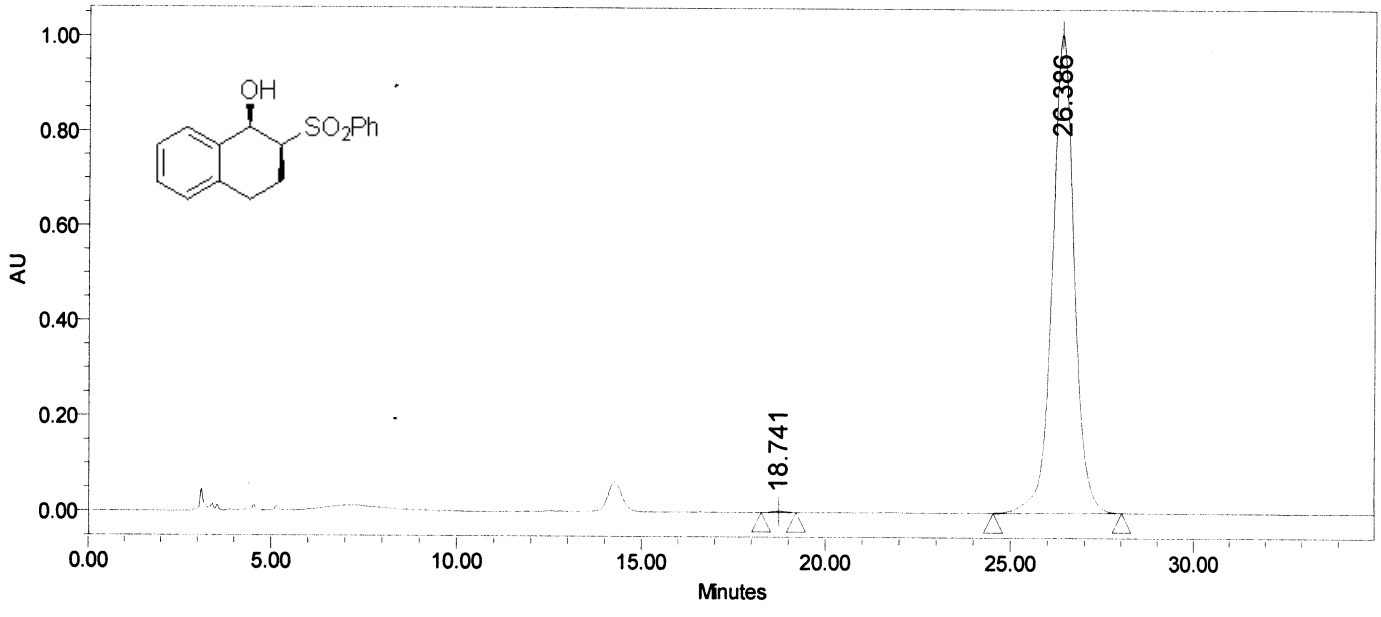
AD-H(80/20)

szx1

SAMPLE INFORMATION

Sample Name:	dzh	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	2	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	210.5nm
Run Time:	35.0 Minutes	Proc. Chnl. Descr.:	PDA 210.5 nm
Date Acquired:	2008-5-29 15:37:51 CST		
Date Processed:	2008-5-29 16:15:19 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		18.741	74804	2984			0.18
2		26.386	41554022	1009204			99.82

dr > 99:1

ee >99%

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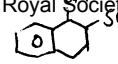


50μl AD-H (80/20)

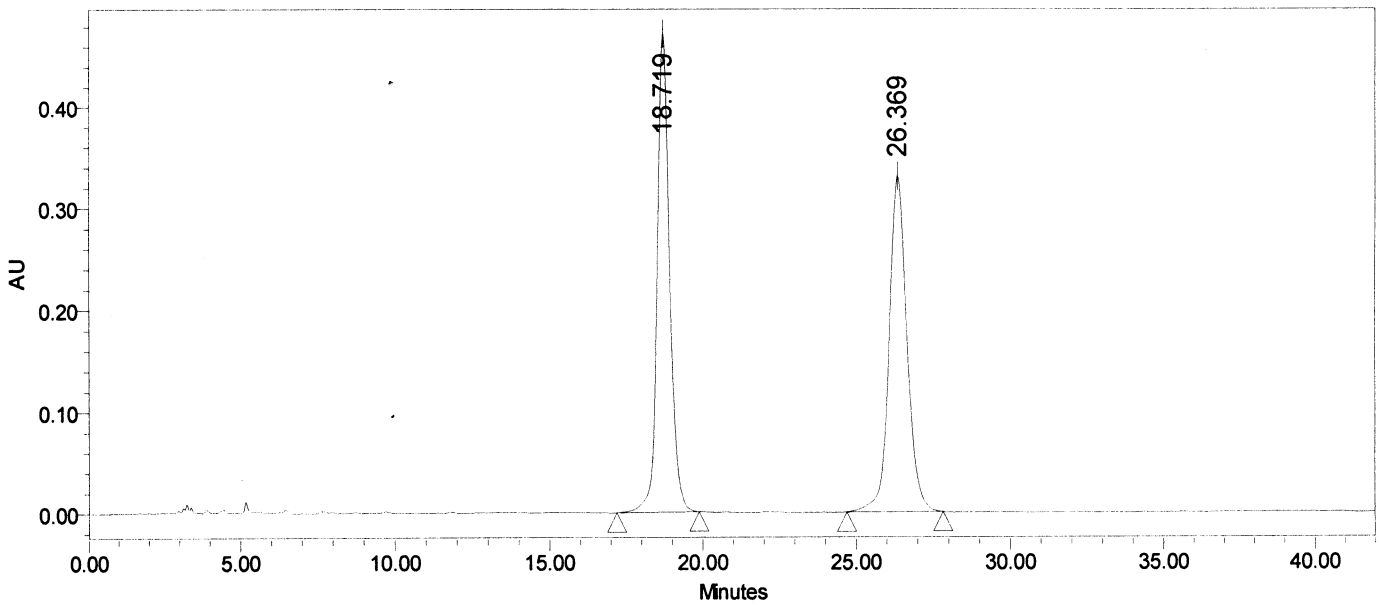
(rac)

szx1

SAMPLE INFORMATION

Sample Name:	dzh-rac	Acquired By:	System
Sample Type:	Unknown	Sample Set Name:	
Vial:	1	Acq. Method Set:	Untitled
Injection #:	1	Processing Method:	szx1
Injection Volume:	20.00 ul	Channel Name:	210.5nm
Run Time:	60.0 Minutes	Proc. Chnl. Descr.:	PDA 210.5 nm
Date Acquired:	2008-5-29 14:55:01 CST		
Date Processed:	2008-5-29 15:40:05 CST		

Auto-Scaled Chromatogram



Peak Results

	Name	RT	Area	Height	Amount	Units	% Area
1		18.719	13357035	472575			50.02
2		26.369	13344298	330452			49.98