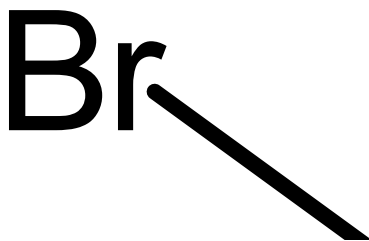


James Deiningner  
Dr. Walba  
2009 Summer REU

| Experimental Section |

To a 250 mL round bottom flask fitted with magnetic stir bar was added 50mL of anhydrous THF, 50mL of deionized water, 3mL of HCL, and 2-bromo-5-(dimethoxymethyl)thiophene (25g, 105.95 mmol). The reaction mixture was heated under reflux for approximately 2 hours while monitored by TLC. After reflux the reaction mixture was left to stir for 5 min at room temperature. The reaction mixture was separated with an equal volume of ethyl acetate and water (2X). The separated organic solution was then dried over  $MgSO_4$ , and evaporated under pressure to give the final product 5-bromothiophene-2-carbaldehyde, which was a light brown oil. An overall yield of 87.5% (17.61 g) was obtained.  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$ : 9.77 (s, 1H), 7.53 (d, 1H,  $J=3.2$  Hz), 7.19 (d, 1H,  $J= 3.2$  Hz).



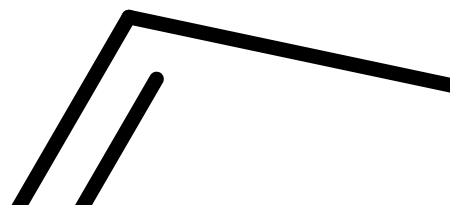
To a 250mL round bottom flask fitted with a magnetic stir bar was added  $NaBH_4$  in 15mL of dry THF followed by the dropwise addition of 5-bromothiophene-2-carbaldehyde (4.00, 10.531mmol) in 15mL of dry THF. The reaction mixture was cooled in an ice-bath and iodine (1.27g, 5mmol) in 15mL of dry THF was added over a 30min period. The reaction mixture was left to stir over the weekend. The

reaction mixture was quenched with 20mL of 2N HCL (2X), and separated with diethyl ether. Additionally, the reaction mixture was washed with 20mL of 3N NaOH (2X) and brine. The reaction mixture was dried over MgSO<sub>4</sub>, and evaporated under pressure (600mmHg) to remove excess solvent. Column chromatography was conducted (10% Etoac : 90% hexane), approximately 2.80 g was obtained a 70% yield. H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$ : 6.93 (d, 1H, J= 4 Hz), 6.77 (d, 1H, J=4 Hz), 4.76 (s, 2H), 1.90 (s, 1H).

To a 250mL round bottom flask fitted with magnetic stir bar THF was added and cooled to 5<sup>o</sup>C by aid of an ice-bath. Sodium Hydride 60% dispersion in mineral oil (0.081g, 3.386mmol) was added to the reaction flask followed by dropwise addition of (5-bromothiophen-2-yl)methanol (0.5g, 2.605mmol). The reaction mixture was allowed to stir for approximately 15min. During stirring the reaction mixture went from a grey to dark yellow color. After stirring 1-bromodecane (0.749g, 3.386mmol) was added dropwise to the reaction flask. The flask was stirred under reflux overnight for a total of 24 hours. During this time the reaction mixture was occasionally monitored by TLC (Refer to notebook). After the reaction went to completion, according to TLC, the reaction mixture was allowed to cool to room temperature and an equal volume of water (50mL) was added. The THF was then removed by rotary evaporation. Next the reaction mixture was washed (2X) with dichloromethane. The combined organic layers were dried over MgSO<sub>4</sub>, and the dichloromethane was evaporated under pressure to give the final product - a light yellow oil. Column chromatography was performed (2:8 ethyl acetate: hexane). The eluded final product was placed under vacuum to remove any excess ethyl acetate. A total of 0.445 g of product was obtained, a 61% yield. H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$ : 6.91 (d, 1H, J= 4 Hz), 6.77 (d, 1H, J=4 Hz), 3.48 (t, 2H, J=16 Hz), 1.88 (m, 21H).

To a 250mL round bottom flask fitted with a magnetic stir bar was added 50mL of dry DMF. The solvent was cooled to 5°C by aid of an ice-bath, and Sodium Hydride (60% dispersion in mineral oil) (0.2g, 6.75 mmol) was added to the reaction flask followed by dropwise addition of a solution of (5-bromothiophen-2-yl)methanol (1.0 g, 5.21mmol) in 6mL of DMF. The reaction mixture was allowed to stir for approximately 15min. During stirring the reaction mixture went from a light red to light brown color. A solution of 1-bromodecane (1.47g, 6.66 mmol) in 5mL of DMF was then added dropwise to the reaction mixture. The mixture was then allowed to stir under reflux for a total of 24 hours. During this time the reaction mixture was occasionally monitored by removal of a small aliquot of the mixture, and analysis by TLC. After the reaction, was judged complete by TLC, the reaction mixture was allowed to cool to room temperature and an equal volume of water (50mL) was added. The reaction mixture was separated with ethyl acetate. The organic layer was rotovaped down and column chromatography was performed with ethyl acetate and hexane (1:9). A total of 0.5g was obtained a 50% yield. H NMR (400 MHz, CDCl<sub>3</sub>) δ: 6.91 (d, 1H, J=5 Hz), 6.75 (m, 1H), 4.57 (s, 2H), 3.46 (t, 2H, J= 8 Hz), 1.58 (m, 6H), 1.27 (s, 9H), 0.89 (t, 3H, J = 9Hz).

**The reaction below needs additional workup**



To a 250mL round bottom flask fitted with a magnetic stir bar was added 40mL of dry DMF. The solvent was cooled to 5°C by aid of an ice-bath, and Sodium Hydride (60% dispersion in mineral oil) (0.081g, 3.386mmol) was added to the reaction flask followed by dropwise addition of a solution of (5-bromothiophen-2-yl)methanol (1.0 g, 5.21mmol) in 3mL of DMF. The reaction mixture was allowed to stir for approximately 15min. During stirring the reaction mixture went from a grey to a light yellow color. A solution of 1-bromododecane (0.6 g, 6.75 mmol) in 5mL of DMF was then added dropwise to the reaction mixture. The mixture was then allowed to stir under reflux for a total of 24 hours – in which the oil bath caught on fire. The reaction mixture was saved, however workup needs to be conducted. **(An**

equal volume of water (50mL) should be added. The reaction mixture should then be separated with ethyl acetate. The organic layer should be rotovaped down and column chromatography can be performed with ethyl acetate and hexane (1:9).

In a 250mL round bottom flask fitted with magnetic stir bar THF was added and cooled to 5°C by aid of an ice-bath. Sodium Hydride 60% dispersion in mineral oil (0.081g, 3.386mmol) was added to the reaction flask followed by dropwise addition of (5-bromothiophen-2-yl)methanol (0.5g, 2.605mmol). The reaction mixture was allowed to stir for approximately 15min. During stirring the reaction mixture went from a grey to dark yellow color. After stirring 1-bromotetradecane (0.939 g, 3.386mmol) was added dropwise to the reaction flask. The flask was stirred under reflux for a total of 48 hours. During this time the reaction mixture was occasionally monitored by TLC (Refer to notebook). After the reaction went to completion, according to TLC, the reaction mixture was allowed to cool to room temperature and an equal volume of water (50mL) was added. The reaction mixture was left to sit over the weekend. Most of the THF was then removed by rotary evaporation in vac (dry pump at 600mmHg pressure). Next the reaction mixture was washed 2X with 20mL of dichloromethane. The combined organic layers were dried over MgSO<sub>4</sub>, and the dichloromethane was evaporated under pressure to give crude product as a light yellow oil. Purification by flash column chromatography was conducted with hexanes and ethyl acetate (9:1). **H NMR (400 MHz, CDCl<sub>3</sub>) δ: Located on "Jimmy" folder and below (I do not have the chemical shifts to report, sorry!).**



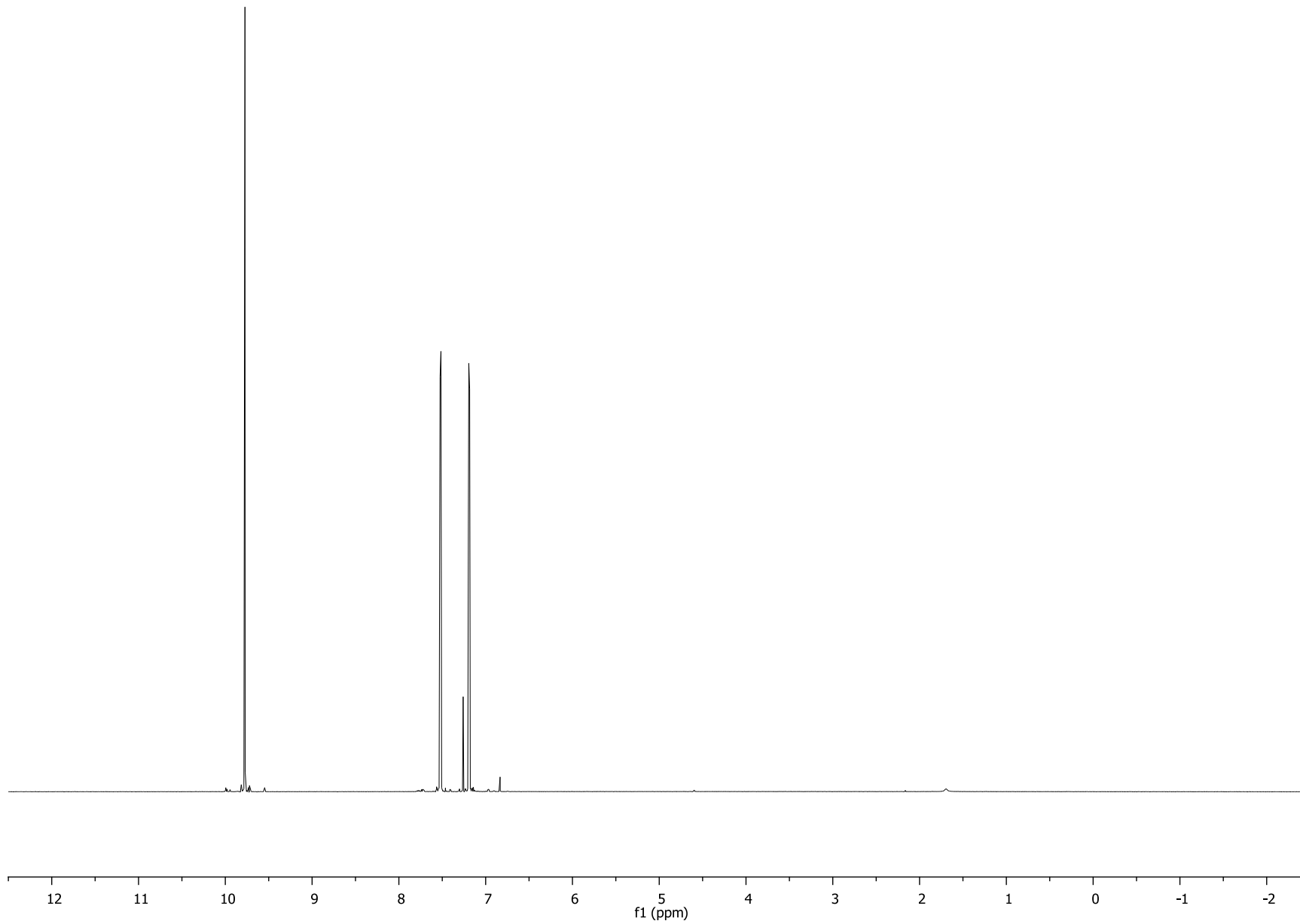
To a 250mL round bottom flask fitted with a magnetic stir bar was added 40mL of dry THF. The solvent was cooled to 5°C by aid of an ice-bath, and Sodium Hydride (60% dispersion in mineral oil) (0.50 g, 20.83 mmol) was added to the reaction flask followed by dropwise addition of a solution of (5-bromothiophen-2-yl)methanol (0.5g, 2.605mmol) in 3mL of THF. The reaction mixture was allowed to stir for approximately 15min. During stirring the reaction mixture went from a grey to a light yellow color. A solution of 422 (3.04 g, 5.21 6mmol) in 5mL of THF was then added dropwise to the reaction mixture. The mixture was then allowed to stir under reflux for a total of 24 hours. During this time the reaction mixture was occasionally monitored by removal of a small aliquot of the mixture, and analysis by TLC. After the reaction, was judged complete by TLC, the reaction mixture was allowed to cool to room temperature and an quenched with aqueous mixed solvent (Me<sub>2</sub>CO/H<sub>2</sub>O = 9:1). Acetone was added to the solution and dried over MgSO<sub>4</sub>. The mixture was filtered and the solvent was removed under pressure (600 mmHg). The residue was dissolved in dichloromethane (50mL), and washed with aqueous NaHCO<sub>3</sub>, and dried with MgSO<sub>4</sub>. Column Chromatography was conducted with (10% ethyl acetate : 90% hexane). A total of 1.9g of pure product was obtained. NMR can be seen in "NMR Data" section. CNMR is currently being analyzed. **H NMR (400 MHz, CDCl<sub>3</sub>) δ: Located on "Jimmy" folder and below (I do not have the chemical shifts to report, sorry!).**

To a 250mL round bottom flask fitted with a magnetic stir bar was added 40mL of dry DMF. The solvent was cooled to 5°C by aid of an ice-bath, and Sodium Hydride (60% dispersion in mineral oil) (0.20 g, 8.3 mmol) was added to the reaction flask followed by dropwise addition of a solution of (5-bromothiophen-2-yl)methanol (0.4g, 2.11 mmol) in 3mL of DMF. The reaction mixture was allowed to stir for approximately 15min. During stirring the reaction mixture went from a light pink to a light brown color. A solution of 4222 (1.9 g, 2.705 mmol) in 5mL of DMF was then added dropwise to the reaction mixture. The mixture was then allowed to stir under reflux for a total of 24 hours. During this time the reaction mixture was occasionally monitored by removal of a small aliquot of the mixture, and analysis by TLC. After the reaction, was judged complete by TLC, the reaction mixture was allowed to cool to room temperature and an equal volume of water (50mL) was added. The reaction mixture was separated with ethyl acetate. The organic layer was dried over MgSO<sub>4</sub> and was rotovaped down. Column chromatography was performed with ethyl acetate and hexane (1:9). Column Chromatography was conducted with (10% petroleum ethers: 90% hexane). **H NMR (400 MHz, CDCl<sub>3</sub>) δ: on "Jimmy" folder and below.**

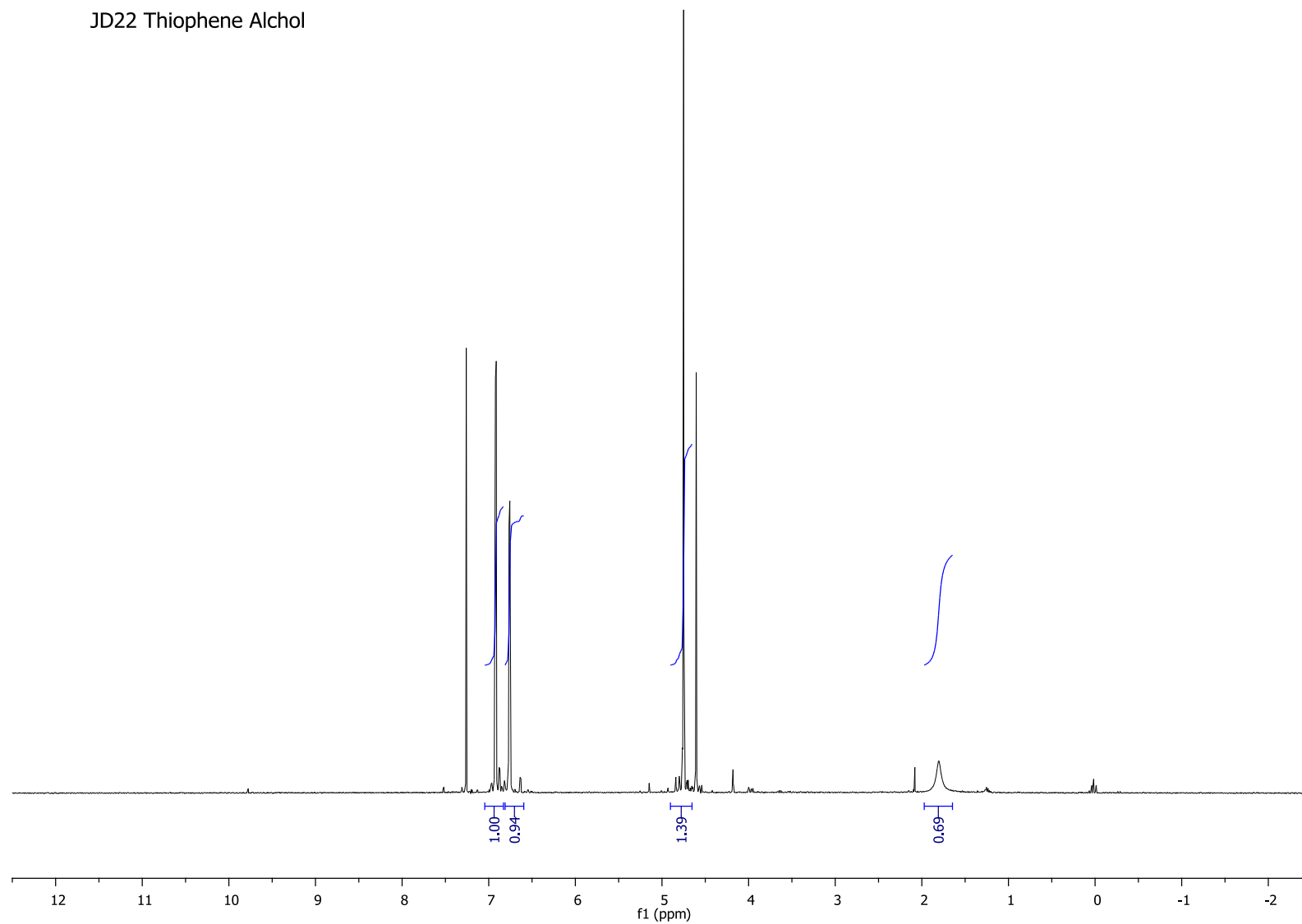
| NMR Data |

(These files are “.emf” and can be expanded or contracted)

JD Aldehyde Starting Material Purity Test

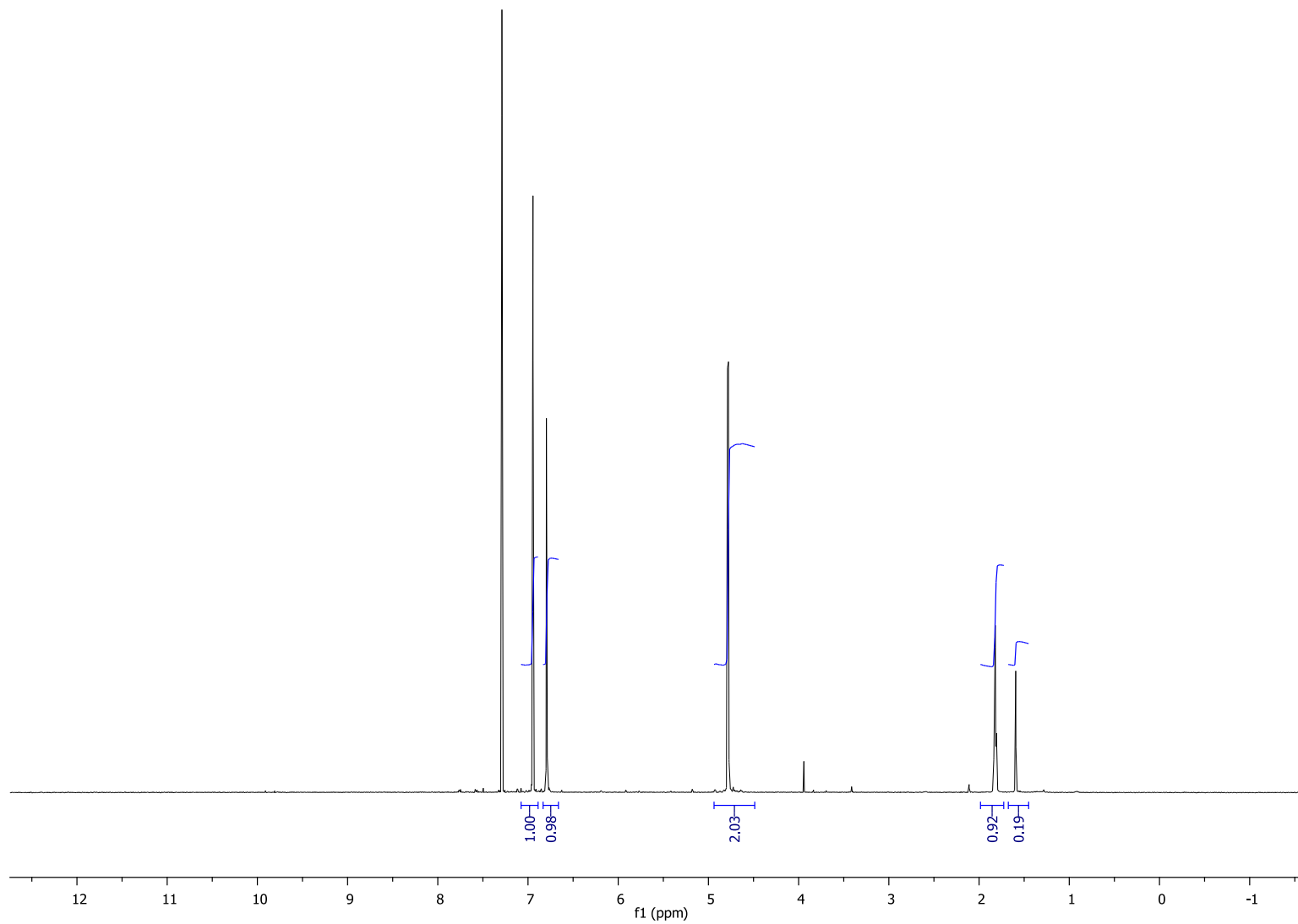


JD22 Thiophene Alcohol

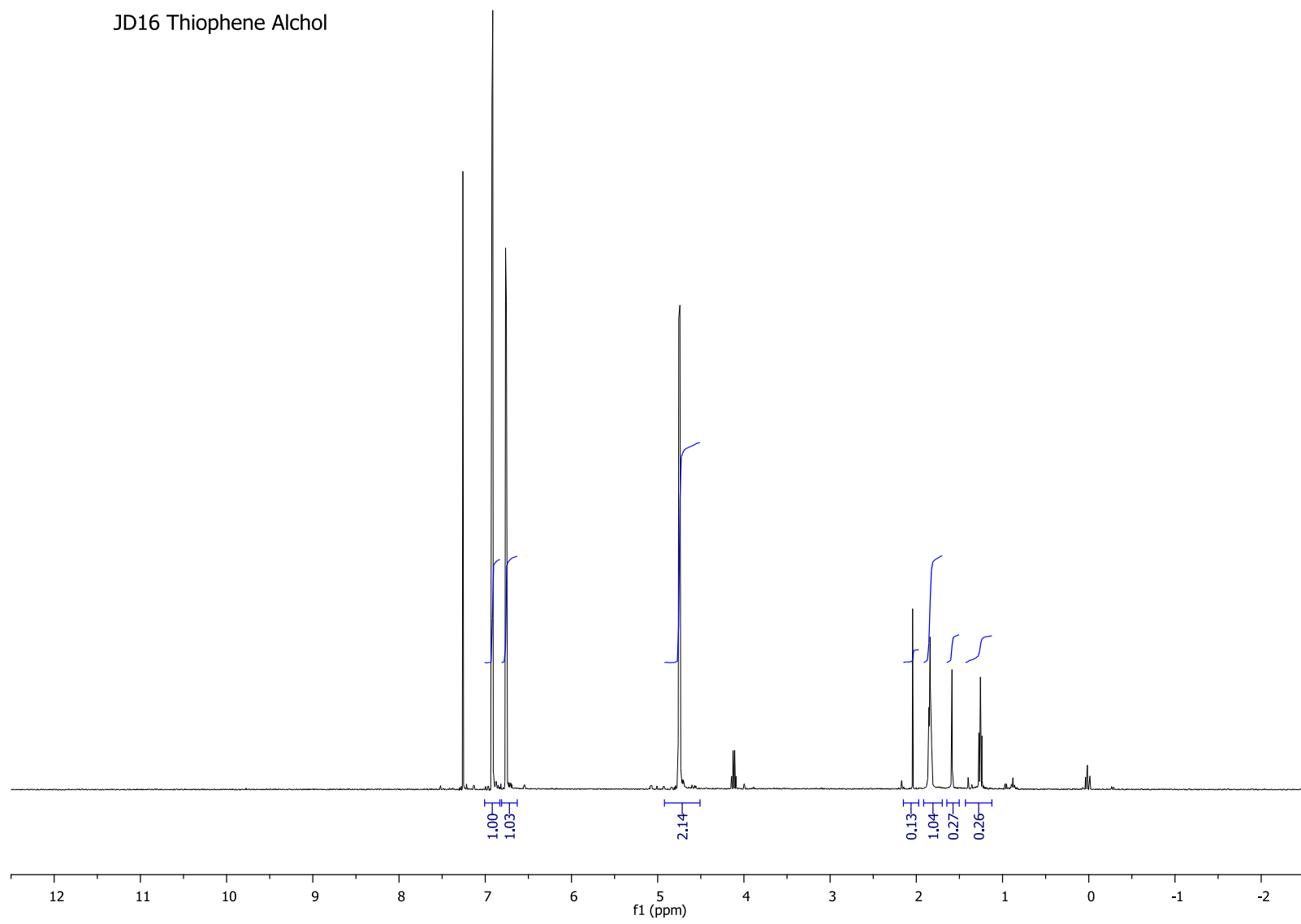




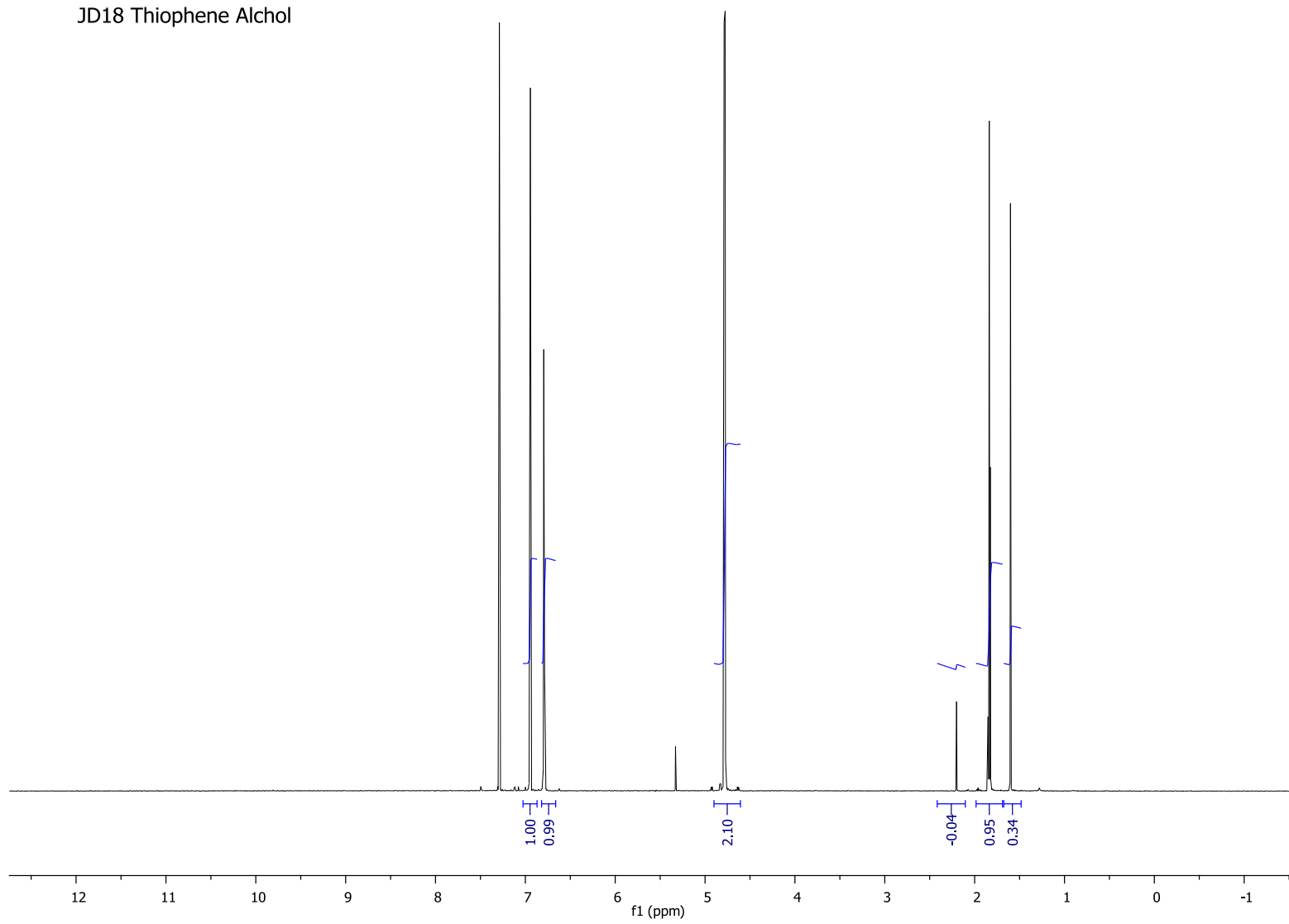
## JD5 Thiophene Alcohol



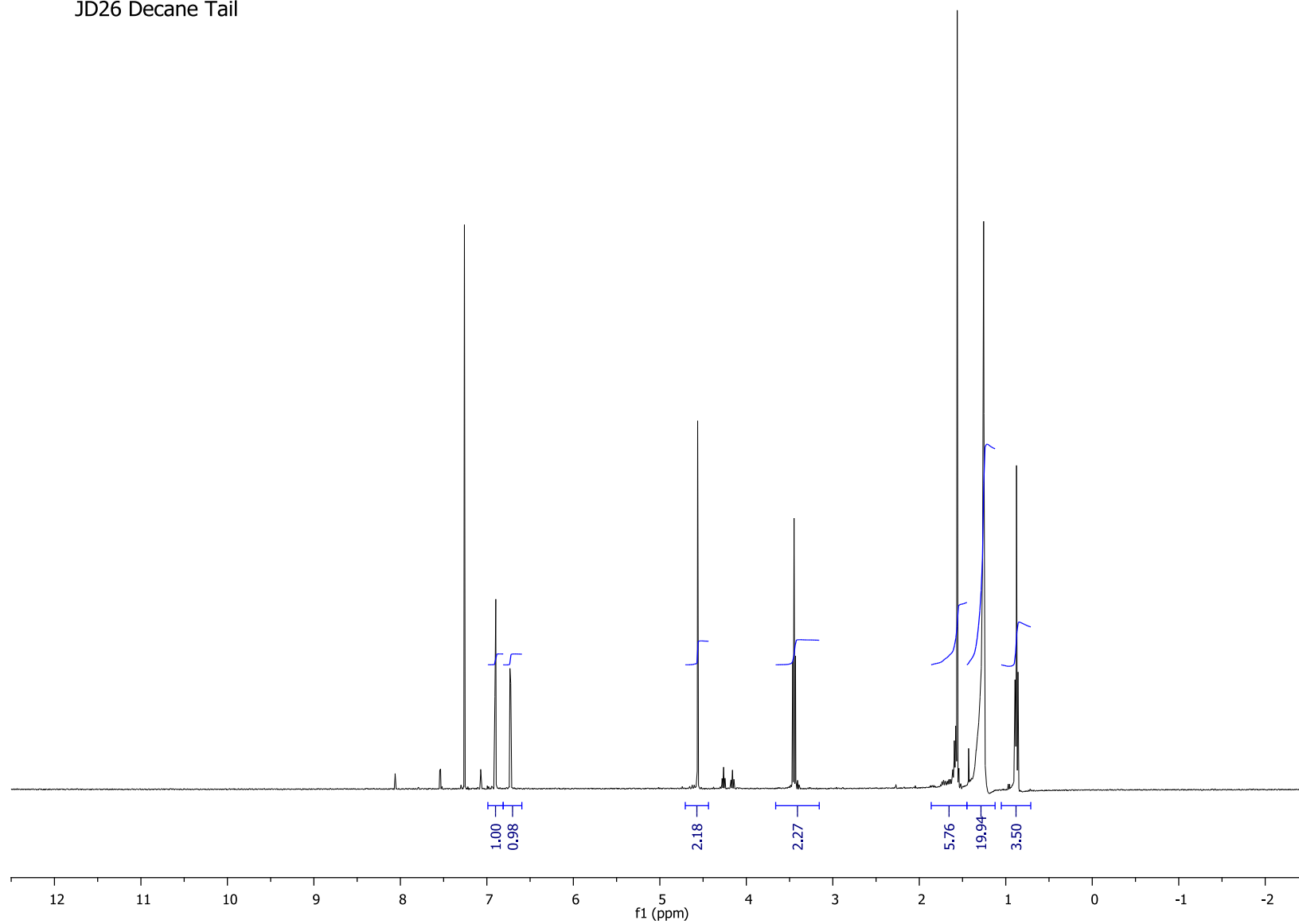
JD16 Thiophene Alcohol



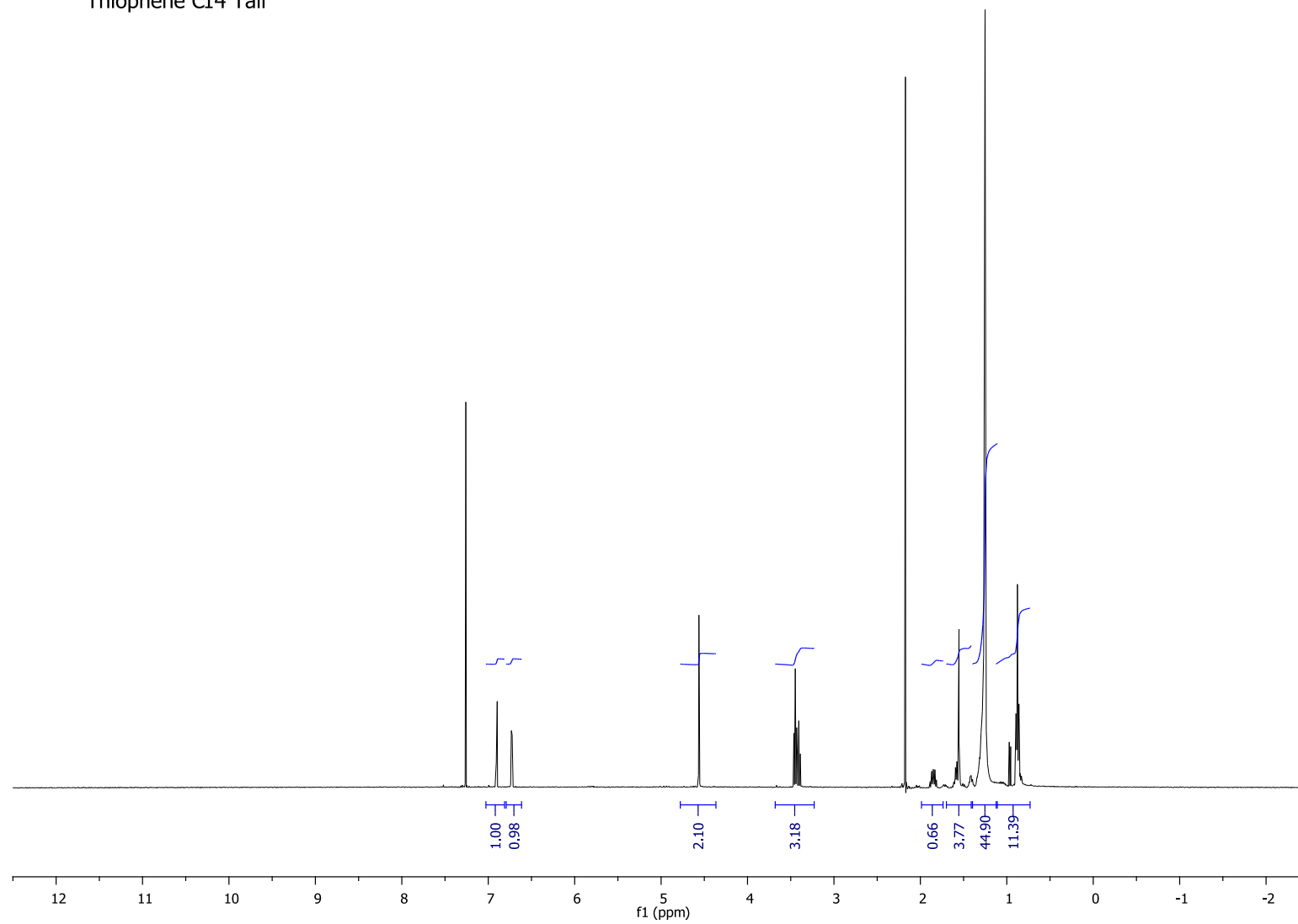
## JD18 Thiophene Alcohol



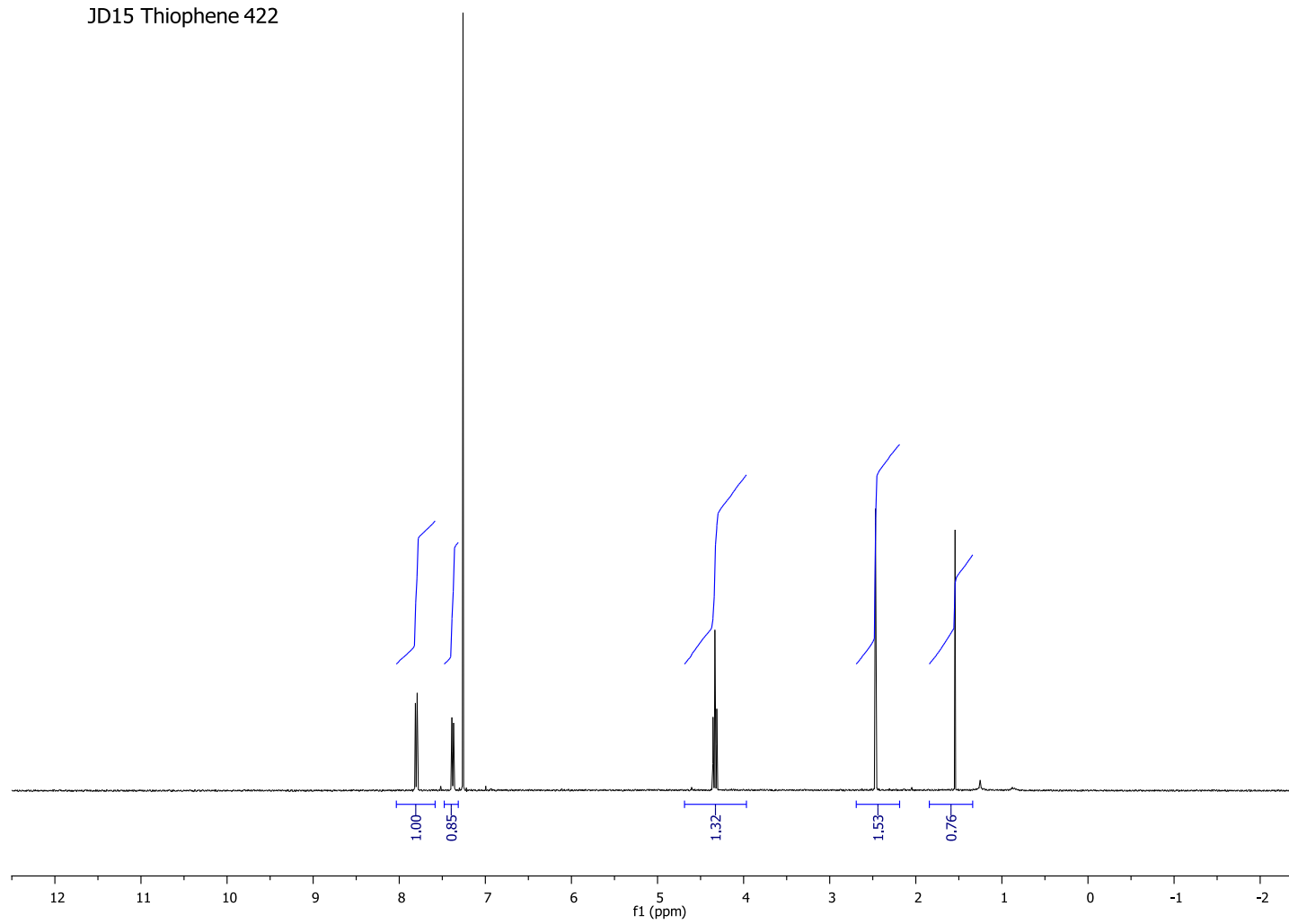
JD26 Decane Tail



## Thiophene C14 Tail



JD15 Thiophene 422



JD28 Thiophene 4222

