

Mechanochemical activation of metallic lithium for the generation and application of organolithium compounds in air

In the format provided by the
authors and unedited

Table of contents

- 1. Chemicals and instrumentation**
- 2. General procedure of mechanochemical generation and use of organolithium compound**
- 3. General procedures of protonation experiments under ball-milling conditions**
- 4. Deuterium experiments**
- 5. Mechanochemical preparation of LDA**
- 6. Gram-scale reaction**
- 7. Experimental procedures with test tube**
- 8. Application to stepwise functionalization including late-stage C–F lithiation**
- 9. Investigation of the generation of heteroaromatic lithium species and their silylation**
- 10. Investigation of the generation of benzylic lithium compounds**
- 11. Mechanochemical direct lithiation and subsequent nucleophilic addition of a ketone under inert-gas conditions**
- 12. Characterization of products**
- 13. References**
- 14. NMR Spectra**

1. Chemicals and instrumentation

Materials were obtained from commercial suppliers and used as received. Solvents for the synthesis of starting materials and liquid additives for mechanochemical reactions were also purchased from commercial suppliers and dried over molecular sieves (MS 4A) prior to use. 2-Bromo-9-methyl-9H-carbazole was prepared from 2-bromocarbazole by reaction with methyl iodide. Lithium wire (diam. 3.2 mm, in mineral oil, 99.9% trace metals basis) was purchased from Aldrich (220914-100G). All mechanochemical reactions were carried out using grinding vessels in a Retsch MM400 mill (Figure S1). Both jars (10 and 5 mL) and balls (10 mm) are made of stainless (SUS400B and SUS420J2, respectively) (Figure S2). NMR spectra were recorded on JEOL JNM-EC X400P and JNM-ECS400 spectrometers (^1H : 392 or 396 or 399 or 401 MHz, ^{13}C : 99 or 100 or 101 MHz). Tetramethylsilane (^1H), CDCl_3 (^{13}C) were employed as external standards, respectively. Multiplicity was recorded as follows: s = singlet, brs = broad singlet, d = doublet, t = triplet, q = quartet, quint = quintet, sept = septet, o = octet, m = multiplet. 1,1,2,2-Tetrachloroethane was used as an internal standard to determine NMR yields. Recycle preparative gel permeation chromatography (GPC) was conducted with a JAI LaboACE LC-5060 using CHCl_3 as eluent with JAIGEL-1HR and JAIGEL-2HR. High-resolution mass spectra were recorded at the Global Facility Center, Hokkaido University.

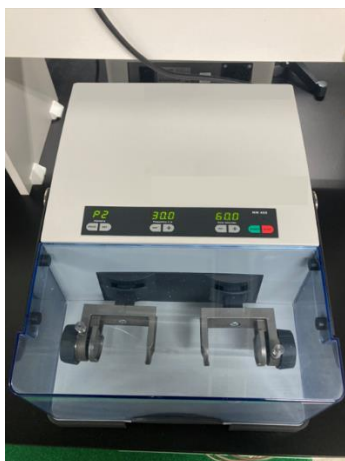


Figure S1. Retsch MM400 used in this study.

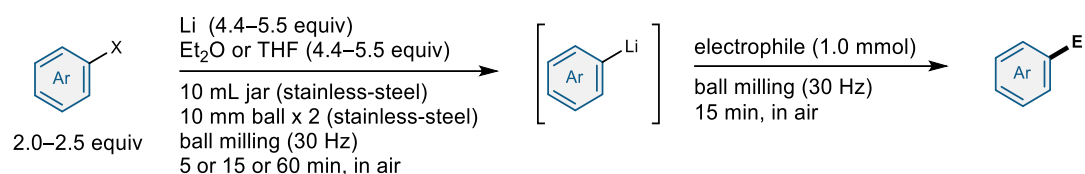


Figure S2. Stainless jar (10 mL and 5 mL) and balls (10 mm) used in this study.

Caution: Although we did not encounter any hazards in the mechanochemical generation and use of organolithium compounds in air, a thorough risk assessment must be carried out to avoid ignition and explosion hazards given that organolithium compounds and lithium metal are generally considered to be pyrophoric.

2. General procedure of mechanochemical generation and use of organolithium compound

Procedure A: Generation of aryl lithium compounds and reactions with electrophiles (nucleophilic substitution of hydrosilane, nucleophilic addition to ketone and aldehyde and Weinreb ketone synthesis) in air.



Lithium wire (4.4–5.5 equiv) was cut into small pieces (diameter: ca. 4–5 mm) and weighed in the air after wiping off the mineral oil on it with paper, which was then added into a milling jar (10 mL) with two balls (10 mm, diameter). An organic halide (2.0–2.5 equiv) and Et₂O or THF (4.4–5.5 equiv) were added to the jar. After the jar was closed without purging with inert gas, the jar was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 5, 15, or 60 min, the jar was opened in air and charged with an electrophile (1.0 mmol, 1.0 equiv) as quickly as possible. The jar was then closed without purging with inert gas and was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 15 min, the reaction mixture was quenched with a saturated aqueous solution of NH₄Cl and extracted with EtOAc (30 mL×3). The solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding product was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. The crude material was purified by flash chromatography (SiO₂, typically EtOAc/hexane, typically 0–10:90) to give the corresponding product.

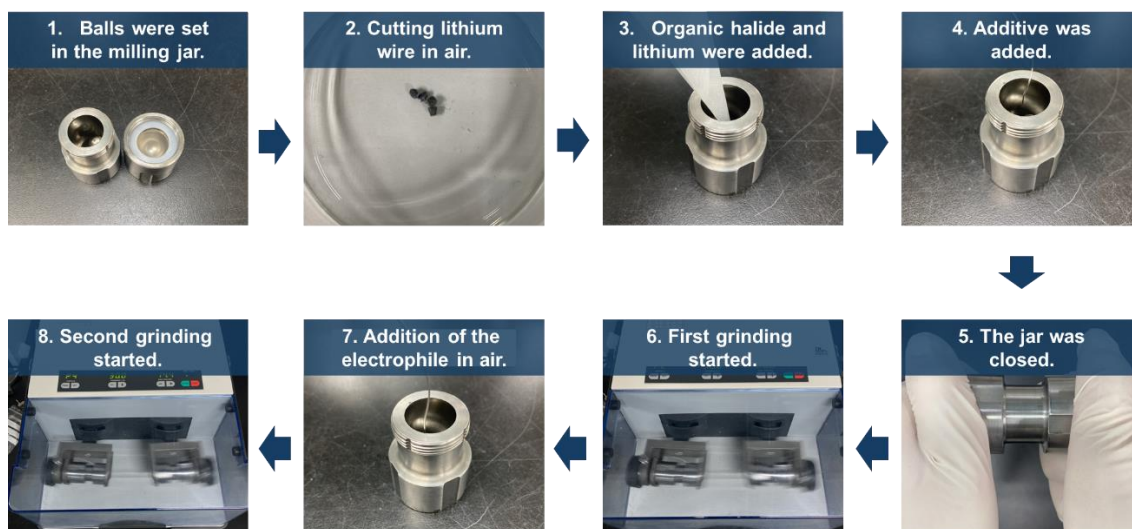
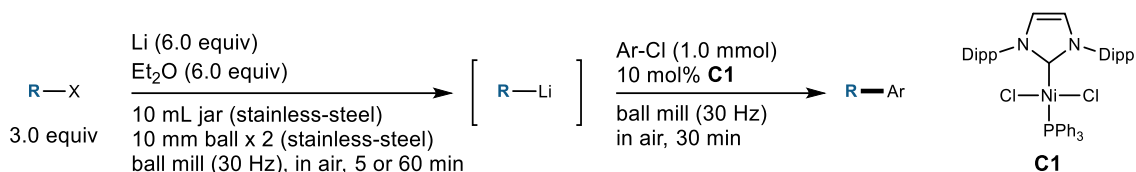


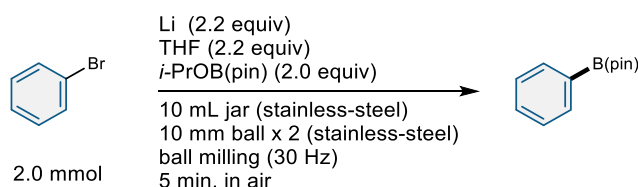
Figure S3. Set-up procedure for mechanochemical generation and use of organolithium compound.

Procedure B: Nickel-catalyzed cross-coupling reaction in air.



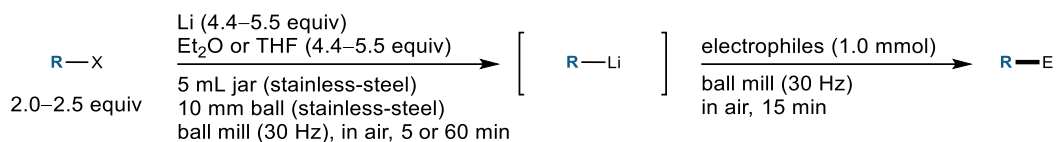
Lithium wire (6.0 equiv) was cut into small pieces (diameter: ca. 4–5 mm) and weighed in air after wiping off the mineral oil on it with paper, which was then added into a milling jar (10 mL) with two balls (10 mm, diameter). An organic halide (3.0 equiv) and Et₂O (6.0 equiv) were added to the jar using a syringe. After the jar was closed without purging with inert gas, the jar was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 5 min for an aryl halide or 60 min for an alkyl halide, the jar was opened in air and charged with an aryl chloride (1.0 mmol, 1.0 equiv) and the nickel catalyst **C1** (0.1 equiv). The jar was then closed without purging with inert gas and was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 30 min, the reaction mixture was quenched with H₂O and extracted with EtOAc (30 mL×3). The solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding product was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. The crude material was purified by flash chromatography (SiO₂, typically EtOAc/hexane, typically 0–10:90) to give the corresponding product.

Procedure C: *in situ* borylation.



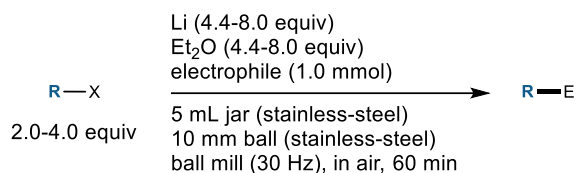
Lithium wire (2.2 equiv) was cut into small pieces (diameter: ca. 4–5 mm) and weighed in air after wiping off the mineral oil on it with paper, which was then added into a milling jar (10 mL) with two balls (10 mm, diameter). Phenyl bromide (2.0 mmol, 1.0 equiv), THF (2.2 equiv) and *i*-PrOB(pin) (2.0 equiv) were added to the jar. After the jar was closed without purging with inert gas, the jar was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 5 min, the reaction mixture was quenched with H₂O and extracted with EtOAc (30 mL×3). The solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude material was purified by flash chromatography (SiO₂, EtOAc/hexane, 0–7:93) to give the corresponding product.

Procedure D: Step-wise generation of primary alkyl lithium compounds and reaction with electrophiles (nucleophilic substitution of hydrosilane, nucleophilic addition to ketone and Weinreb ketone synthesis).



Lithium wire (4.4–5.5 equiv) was cut into small pieces (diameter: ca. 4–5 mm) and weighed in the air after wiping off the mineral oil on it with paper, which was then added into a milling jar (10 mL) with a ball (10 mm, diameter). An organic halide (2.0–2.5 equiv) and additive (Et₂O or THF) (4.4–5.5 equiv) were added to the jar. After the jar was closed without purging with inert gas, the jar was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 5 min for an aryl halide or 60 min for an alkyl halide, the jar was opened in air and charged with an electrophile (1.0 mmol, 1.0 equiv). The jar was then closed without purging with inert gas and was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 15 min, the reaction mixture was quenched with a saturated aqueous solution of NH₄Cl and extracted with EtOAc (30 mL×3). The solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding product was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. The crude material was purified by flash chromatography (SiO₂, typically EtOAc/hexane, typically 0–10:90) to give the corresponding product.

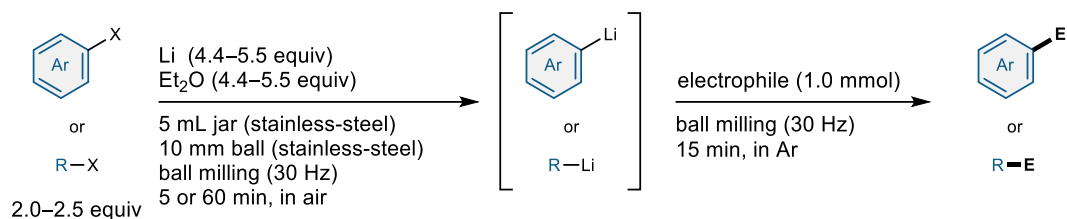
Procedure E: Barbier conditions for generating and using aryl-, primary-, secondary-, tertiary- and vinyl lithium compounds.



Lithium wire (4.4–8.0 equiv) was cut into small pieces (diameter: ca. 4–5 mm) and weighed in air after wiping off the mineral oil on it with paper, which was then added into a milling jar (10 mL) with a ball (10 mm, diameter). An organic halide (2.0–4.0 equiv), Et₂O (4.4–8.0 equiv), and electrophile (1.0 mmol, 1.0 equiv) were added to the jar. After the jar was closed without purging with inert gas, the jar was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 60 min, the reaction mixture was quenched with a saturated aqueous solution of NH₄Cl and extracted with EtOAc (30 mL×3). The solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding product was determined by ¹H NMR analysis with 1,1,2,2-

tetrachloroethane as the internal standard. The crude material was purified by flash chromatography (SiO₂, typically EtOAc/hexane, typically 0–10:90) to give the corresponding product.

Procedure F: Generation and use of organolithium compounds using the new safety-oriented jar.



Lithium wire (4.4–5.5 equiv) was cut into small pieces (diameter: ca. 4–5 mm) and weighed in the air after wiping off the mineral oil on it with paper, which was then added into a milling jar (10 mL) with a ball (10 mm, diameter). An organic halide (2.0–2.5 equiv) and Et₂O (4.4–5.5 equiv) were added to the jar. After the jar was closed without purging with inert gas, the jar was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 5 min for aryl halide or 60 min for alkyl halide, the screw on the side face of the jar was opened with flushing argon gas and charged with an electrophile (1.0 mmol, 1.0 equiv) via a hole. The screw was then closed while purging with argon and the jar was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 15 min, the reaction mixture was quenched with a saturated aqueous solution of NH₄Cl and extracted with EtOAc (30 mL×3). The solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding product was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. The crude material was purified by flash chromatography (SiO₂, typically EtOAc/hexane, typically 0–10:90) to give the corresponding product.

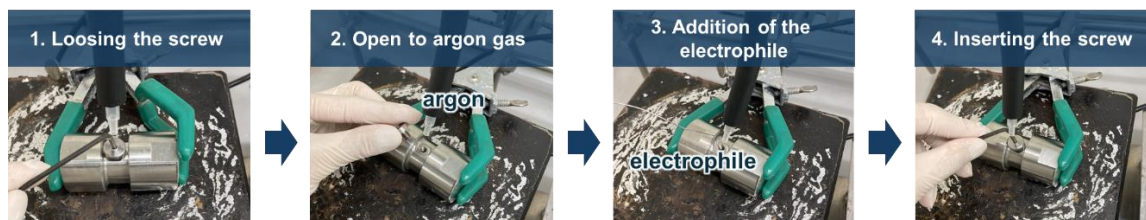
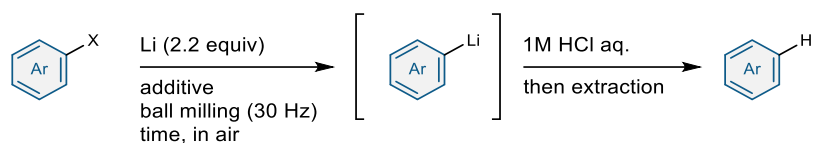


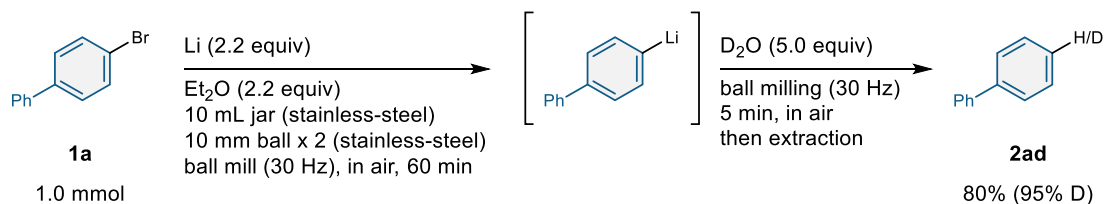
Figure S4. Safety procedure for addition of the electrophile to the generated organolithium compound.

3. General procedures of protonation experiments under ball-milling conditions



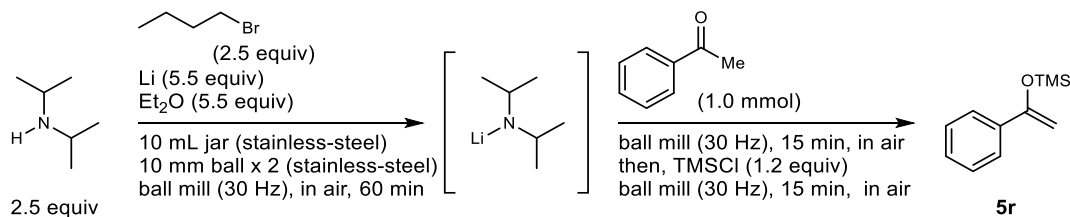
Lithium wire (2.2 equiv) was cut into small pieces (diameter: ca. 4–5 mm) and weighed in air after wiping off the mineral oil on it with paper, which was then added into a milling jar (10 mL) with a ball (10 mm, diameter). An organic halide (1.0 mmol) and an additive (2.2 equiv) were added to the jar. After the jar was closed without purging with inert gas, the jar was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 5–60 minutes, the mixture was quenched with 1 M HCl and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding product was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard or by GC analysis with tetradecane as the internal standard.

4. Deuterium experiments



Lithium wire (2.2 mmol, 15.3 mg) was cut off into small pieces (diameter: ca. 4–5 mm) and weighed in air after wiping off the mineral oil on it with paper, which was then added into a milling jar (10 mL) with two balls (10 mm, diameter) in air. **1a** (1.0 mmol, 233.2 mg) and Et₂O (2.2 mmol, 230 μ L) were added to the jar. After the jar was closed without purging with inert gas, the jar was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 60 min, the jar was opened in air, and charged with D₂O (5.0 mmol, 90 μ L). The jar was then closed without purging with inert gas and was placed in the ball mill (Retsch MM 400, 5 min, 30 Hz). After grinding for 5 min, the reaction mixture was quenched with 1 M HCl and extracted with Et₂O (30 mL $\times$ 3). The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard.

5. Mechanochemical preparation of LDA

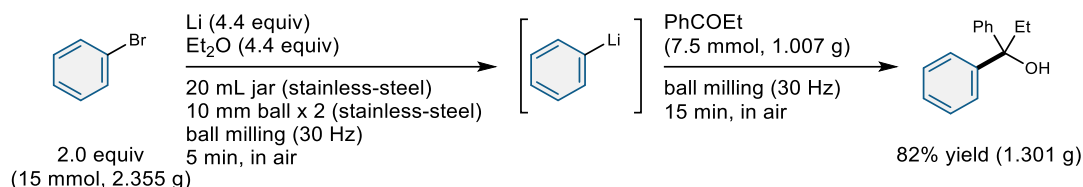


Lithium wire (5.5 mmol, 38.1 mg) was cut off into small pieces (diameter: ca. 4–5 mm) and weighed in air after wiping off the mineral oil on it with paper, which was then added into a milling jar (10 mL) with two balls (10 mm, diameter) in air. Diisopropylamine (2.5 mmol, 350 μ l), 1-bromobutane (2.5 mmol, 270 μ l), and Et₂O (5.5 mmol, 570 μ l) were added to the jar. After the jar was closed without purging with inert gas, the jar was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 60 min, the jar was opened in air and charged with acetophenone (1.0 mmol, 120.7 mg). The jar was then closed without purging with inert gas and was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 15 min, the jar was opened in air and charged with trimethylsilyl chloride (1.2 mmol, 150 μ l). The jar was then closed without purging with inert gas and was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 15 min, the reaction mixture was quenched with H₂O and extracted with Et₂O (30 mL $\times$ 3). The solution was dried over MgSO₄, filtrated, and evaporated in vacuo. Crude yields of the corresponding products were determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 64% of **5r** was obtained. Due to the poor stability of **5r** on silica gel, the isolation of **5r** was unsuccessful. **5r** was characterized by crude ¹NMR analysis. ¹H NMR agreed with the literature.¹

¹H NMR (396 MHz, CDCl₃, δ): 0.27 (s, 9H), 4.43 (d, J = 1.2 Hz, 1H), 4.92 (d, J = 2.0 Hz, 1H), 7.27–7.36 (m, 3H), 7.56–7.62 (m, 2H).

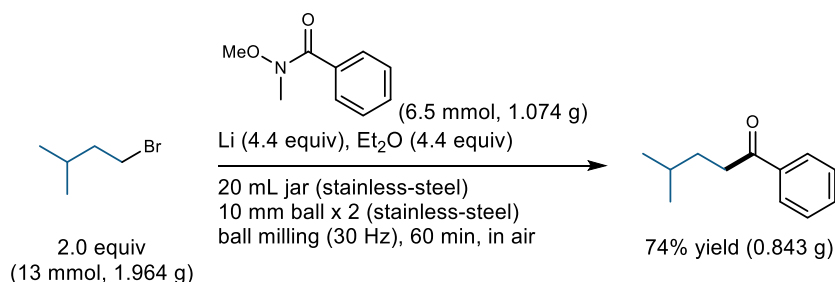
6. Gram-scale reaction

Generation of phenyl lithium and nucleophilic addition to propiophenone



Lithium wire (33.1 mmol, 228.3 mg) was cut off into small pieces (diameter: ca. 4–5 mm) and weighed in air after wiping off the mineral oil on it with paper, which was then added into a milling jar (20 mL) with two balls (10 mm, diameter) in air. Bromobenzene (15.0 mmol, 2.355 g) and Et₂O (33.0 mmol, 3.45 mL) were added to the jar. After the jar was closed without purging with inert gas, the jar was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 5 min, the jar was opened in air and charged with propiophenone (7.5 mmol, 1.007 g). The jar was then closed without purging with inert gas and was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 15 min, the reaction mixture was quenched with a saturated aqueous solution of NH₄Cl and extracted with EtOAc (30 mL×3). The solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude material was purified by flash chromatography (SiO₂, EtOAc/hexane, 0–7:93) to give the corresponding product **4a** (1.301 g, 6.13 mmol, 82%) as a white solid.

Babier-type Weinreb ketone synthesis

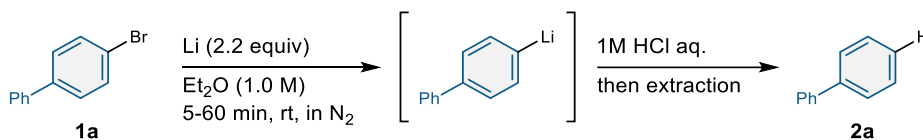


Lithium wire (28.6 mmol, 197.6 mg) was cut off into small pieces (diameter: ca. 4–5 mm) and weighed in air after wiping off the mineral oil on it with paper, which was added into a milling jar (20 mL) with two balls (10 mm, diameter) in air. An alkyl bromide (13.0 mmol, 1.964 g), Et₂O (28.6 mmol, 3.0 mL), and Weinreb amide (6.5 mmol, 1.071 g) were added to the jar. After the jar was closed without purging with inert gas, the jar was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 60 min, the reaction mixture was quenched with a saturated aqueous solution of NH₄Cl and extracted with typically EtOAc (30 mL×3). The solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude material was purified by flash

chromatography (SiO₂, typically EtOAc/hexane, 0–7:93) to give the corresponding product **5e** (0.843 g, 4.8 mmol, 74%) as a colorless oil.

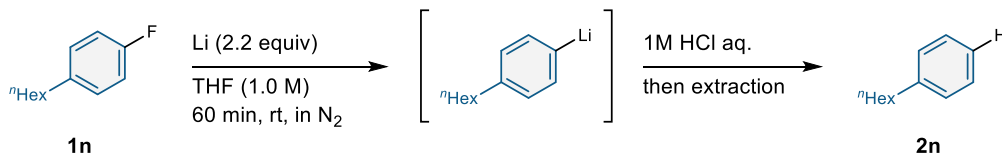
7. Experimental procedures with test tube

Protonation of aryl lithium compound generated from **1a**



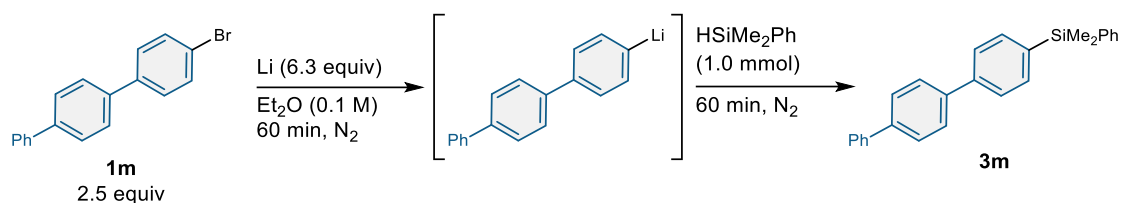
1a (1.0 mmol) was placed in an oven-dried reaction vial equipped with a glass-coated stirring bar. Lithium wire (2.2 equiv) was cut off into small pieces (diameter: ca. 4–5 mm) and weighed in air after wiping off the mineral oil on it with paper, which was then added to the vial. After the vial was sealed with a screw cap containing a Teflon-coated rubber septum, the vial was connected to a vacuum/nitrogen manifold through a needle. It was evacuated and then backfilled with nitrogen. This cycle was repeated three times. Et₂O (1.0 mL) was added to the vial via a syringe through the rubber septum. After stirring at room temperature for 5–60 min, the mixture was quenched with 1 M HCl and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. Crude yield of the corresponding product **2a** was determined by GC analysis with tetradecane as the internal standard.

Protonation of aryl lithium compound generated from **1n**



Lithium wire (2.2 mmol, 15.4 mg) was cut off into small pieces (diameter: ca. 4–5 mm) and weighed in air after wiping off the mineral oil on the lithium wire with paper, which was then added to an oven-dried reaction vial with a glass-coated stirring bar. After the vial was sealed with a screw cap containing a Teflon-coated rubber septum, the vial was connected to a vacuum/nitrogen manifold through a needle. It was evacuated and then backfilled with nitrogen. This cycle was repeated three times. **1n** (1.0 mmol, 182.3 mg) and THF (1.0 mL) were added into the vial via a syringe through the rubber septum. After stirring at room temperature for 60 min, the mixture was quenched with 1 M HCl and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, no product formation was observed.

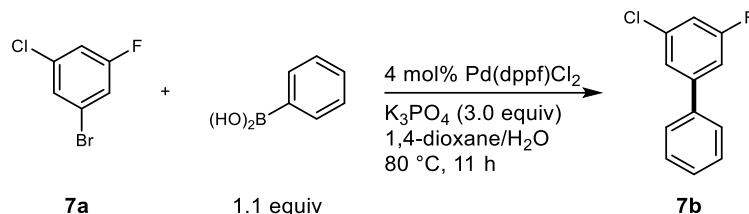
Generation of aryl lithium compound generated from **1m** and reaction with HSiMe₂Ph



1m (2.5 mmol, 775.2 mg) was placed in an oven-dried two-neck round-bottomed flask (100 mL) equipped with a glass-coated stirring bar. Lithium wire (6.3 mmol, 43.8 mg) was cut off into small pieces (diameter: ca. 4–5 mm) and weighed in air after wiping off the mineral oil on it with paper, which was then added to the flask. After the flask was sealed with a rubber septum, the flask was connected to a vacuum/nitrogen manifold through a needle. It was evacuated and then backfilled with nitrogen. This cycle was repeated three times. Et₂O (25 mL), was added to the flask via a syringe through the rubber septum. After stirring at room temperature for 60 min, HSiMe₂Ph (1.0 mmol, 136.1 mg) was added into the flask via a syringe through the rubber septum. After stirring at room temperature for 60 min, the mixture was quenched with MeOH and then extracted with CHCl₃. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. Crude yield of the corresponding products was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, no product formation was observed.

8. Application to stepwise functionalization including late-stage C–F lithiation

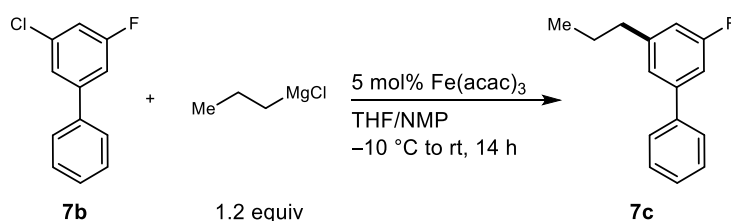
Suzuki–Miyaura cross-coupling reaction with **7a**



In a vacuum-dried two-neck round-bottomed flask, 1-bromo-3-chloro-5-fluorobenzene (**7a**) (20 mmol, 4.188 g), phenylboronic acid (22.2 mmol, 2.706 g), Pd(dppf)Cl₂ (0.89 mmol, 653.1 mg) and K₃PO₄ (60.2 mmol, 1.278 g) were dissolved in 1,4-dioxane (80 mL) and H₂O (1.8 mL) under a nitrogen atmosphere and then stirred at 80 °C for 11 hours. After the reaction was completed, the resulting suspension was diluted by H₂O. The mixture was extracted with EtOAc three times and dried over Mg₂SO₄. After filtration, the solvents were removed using a rotary evaporator. The crude mixture was then purified by flash column chromatography (SiO₂, hexane only) to give **7b** as a colorless oil (2.971 g, 14.4 mmol, 72% yield).

¹H NMR (401 MHz, CDCl₃, δ): 7.07 (dt, *J* = 2.1, 7.5 Hz, 1H), 7.19 (dt, *J* = 1.8, 9.6 Hz, 1H), 7.35–7.49 (m, 4H), 7.51–7.58 (m, 2H). ¹³C NMR (101 MHz, CDCl₃, δ): 112.4 (d, *J*_{C-F} = 22.2 Hz, CH), 114.8 (d, *J*_{C-F} = 25.1 Hz, CH), 123.1 (d, *J*_{C-F} = 2.8 Hz, CH), 127.0 (CH), 128.4 (CH), 129.0 (CH), 135.3 (d, *J*_{C-F} = 10.6 Hz, C), 138.5 (d, *J*_{C-F} = 1.9 Hz, C), 144.4 (d, *J*_{C-F} = 8.7 Hz, C), 163.0 (d, *J*_{C-F} = 248.5 Hz, C). HRMS-EI (*m/z*): [M]⁺ calcd for C₁₂H₈ClF, 206.0293; found, 206.0296.

Iron-catalyzed cross-coupling reaction with **7b**

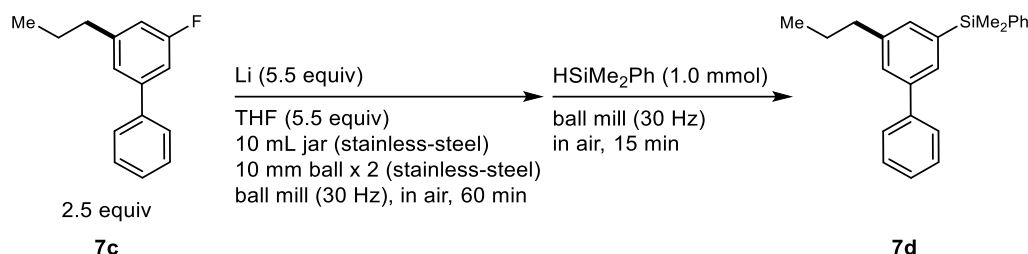


The reaction was performed according to the procedure in the literature.² In a vacuum-dried reaction vial, **7b** (2.0 mmol, 413.2 mg) and Fe(acac)₃ (0.10 mmol, 36.1 mg) were dissolved in THF (3.1 mL) and NMP (0.46 mL) under a nitrogen atmosphere. A solution of *n*-propylmagnesium chloride (2 M in Et₂O, 2.4 mmol, 1.2 mL) was slowly added via a syringe to the resulting solution at −10 °C for 1 h, and then the mixture was warmed up to room temperature and stirred for 14 hours. After the reaction was completed, the resulting suspension was quenched by 1M HCl, and the resulting mixture was extracted with EtOAc three times and dried over Mg₂SO₄. After filtration, the solvents were removed using a rotary evaporator. The crude mixture was then purified by flash column chromatography (SiO₂,

hexane only) and recycling preparative GPC to give **7c** as a colorless oil (330.9 mg, 1.54 mmol, 77% yield).

^1H NMR (401 MHz, CDCl_3 , δ): 0.97 (t, $J = 7.4$ Hz, 3H), 1.69 (sext, $J = 7.4$ Hz, 2H), 2.64 (t, $J = 7.6$ Hz, 2H), 6.84–6.90 (m, 1H), 7.10 (dt, $J = 2.0, 10.1$ Hz, 1H), 7.18 (s, 1H), 7.33–7.39 (m, 1H), 7.40–7.48 (m, 2H), 7.53–7.60 (m, 2H). ^{13}C NMR (101 MHz, CDCl_3 , δ): 13.9 (CH_3), 24.5 (CH_2), 38.0 (CH_2), 111.4 (d, $J_{\text{C-F}} = 22.2$ Hz, CH), 114.1 (d, $J_{\text{C-F}} = 21.3$ Hz, CH), 123.1 (d, $J_{\text{C-F}} = 1.9$ Hz, CH), 127.2 (CH), 127.8 (CH), 128.9 (CH), 140.3 (d, $J_{\text{C-F}} = 2.9$ Hz, C), 143.2 (d, $J_{\text{C-F}} = 8.7$ Hz, C), 145.6 (d, $J_{\text{C-F}} = 7.7$ Hz, C), 163.4 (d, $J_{\text{C-F}} = 244.7$ Hz, C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{15}\text{H}_{15}\text{F}$, 214.1152; found, 214.1160.

Mechanochemical generation of the organolithium compound from **7c** and subsequent reaction with HSiMe_2Ph

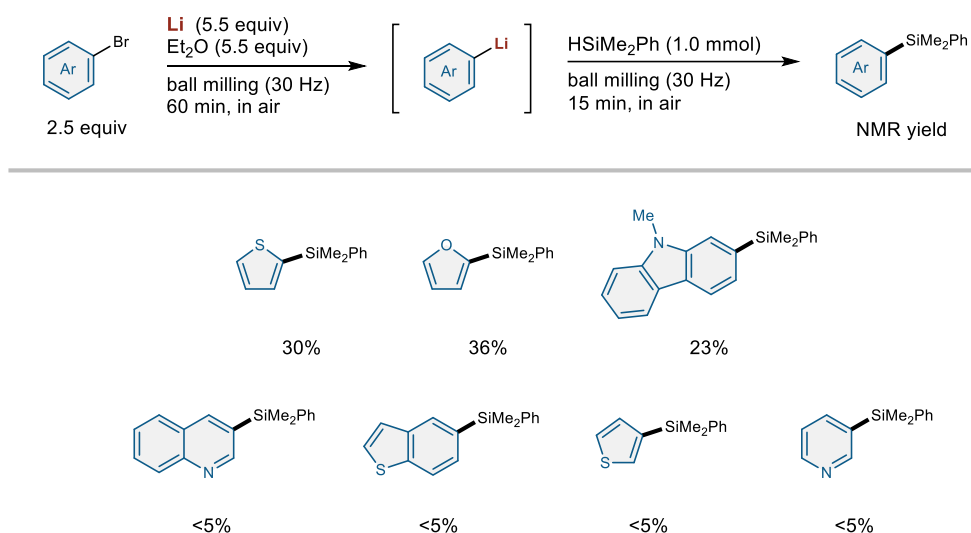


Lithium wire (2.8 mmol, 19.1 mg) was cut off into small pieces (diameter: ca. 4–5 mm) and weighed in air after wiping off the mineral oil on it with paper, which was then added into a milling jar (10 mL) with two balls (10 mm, diameter) in air. **7c** (1.3 mmol, 268.1 mg) and THF (2.8 mmol, 220 μL) were added to the jar. After the jar was closed without purging with inert gas, the jar was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 5 min, the jar was opened in air and charged with HSiMe_2Ph (0.50 mmol, 68.1 mg). The jar was then closed without purging with inert gas and was placed in the ball mill (Retsch MM 400, 30 Hz). After grinding for 15 min, the reaction mixture was quenched with MeOH and extracted with EtOAc (30 mL $\times$ 3). The solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude material was purified by flash chromatography (SiO_2 , hexane only) to give **7d** as a colorless oil (151.2 mg, 0.46 mmol, 92% yield).

^1H NMR (401 MHz, CDCl_3 , δ): 0.58 (s, 6H), 0.97 (t, $J = 7.2$ Hz, 3H), 1.67 (sext, $J = 7.4$ Hz, 2H), 2.63 (t, $J = 7.6$ Hz, 2H), 7.29–7.38 (m, 5H), 7.39–7.45 (m, 3H), 7.52–7.59 (m, 5H). ^{13}C NMR (101 MHz, CDCl_3 , δ): -2.1 (CH_3), 14.1 (CH_3), 24.9 (CH_2), 38.4 (CH_2), 127.2 (CH), 127.5 (CH), 128.0 (CH), 128.5 (CH), 128.8 (CH), 129.2 (CH), 130.6 (CH), 133.5 (CH), 134.3 (CH), 138.5 (C), 138.6 (C), 140.8 (C), 141.8 (C), 142.5 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{23}\text{H}_{26}\text{Si}$, 330.1798; found, 330.1802.

9. Investigation of the generation of heteroaromatic lithium species and their silylation

The scope of heteroaromatic bromides was investigated for a mechanochemical one-pot two-step silylation. Although several heteroaromatic compounds were tested, the results were in general poor, as shown below.

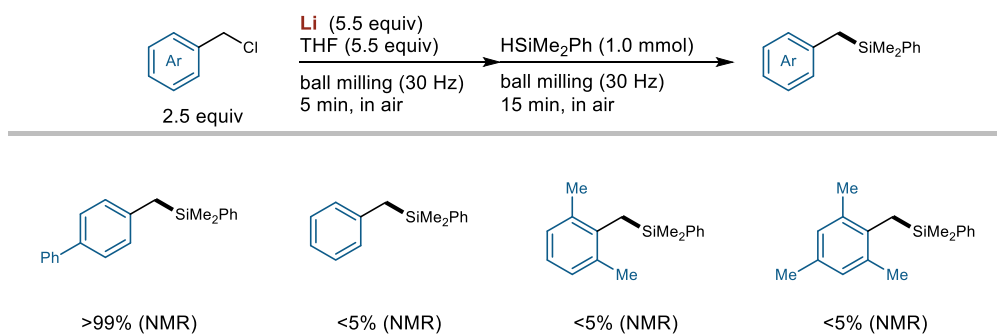


10. Investigation of the generation of benzylic lithium compounds

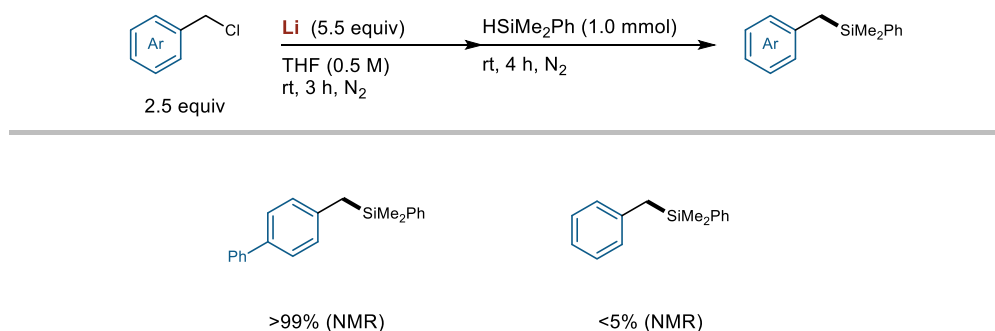
We investigated the mechanochemical generation of benzylic lithium compounds, which are difficult to prepare by direct lithiation of benzyl halides due to the rapid formation of homo-coupling products. We found that mechanochemical direct lithiation of 4-phenyl benzyl chloride was successful, and subsequent silylation proceeded quantitatively. However, other benzylic lithium compounds were not generated and furnished only homo-coupling products. We also investigated the generation of benzylic lithium compounds in THF solution. While the direct lithiation of 4-phenyl benzyl chloride was also successful, no product formation was observed for the reaction using benzyl chloride.

Scheme S1. Attempts to generate benzylic lithium compounds and subsequent silylation.

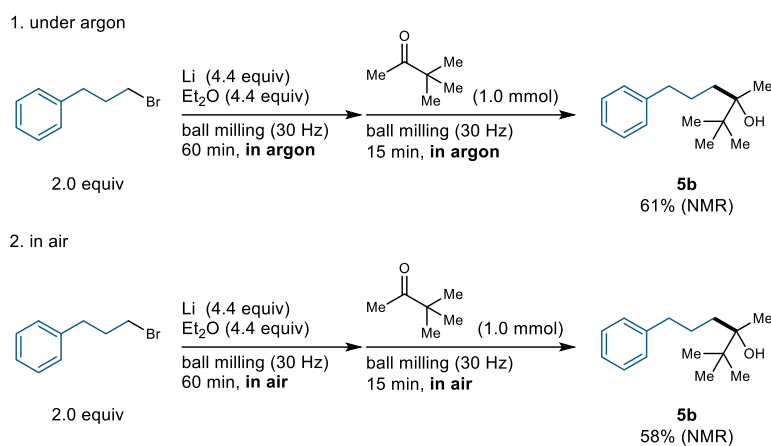
a. ball mill



b. in THF solution



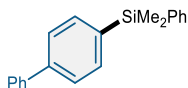
11. Mechanochemical direct lithiation and subsequent nucleophilic addition of a ketone under inert-gas conditions



We investigated whether the yield of **5b**, which was relatively poor (58%) in air, could be improved by conducting the reaction under an argon atmosphere using a bespoke jar with a screw-cap that features a small hole for the introduction of reagents. In a glove box, this jar was charged with the alkyl bromide, lithium meal, and Et₂O, before the jar was closed under an argon atmosphere. Then, the jar was removed from the glove box and placed in the ball mill. After grinding for 60 minutes, the screw was opened while flushing with Ar gas and charged with the ketone via the hole. The screw was then closed again, and the jar was placed in the ball mill. Then, ball-milling was continued for 15 minutes. This reaction afforded **5b** in 61% yield, which is almost identical to the result of the conventional procedure in air (58%). This result thus suggests that the relatively low yield of **5b** should not be attributed to decomposition of the organolithium compounds by reaction with air.

12. Characterization of products

(1,1'-Biphenyl)-4-yl dimethyl(phenyl)silane (**3a**).



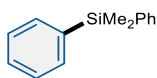
From aryl bromide (60 minutes at first step): The reaction was performed according to the general procedure A. The first metalation step was conducted with 582.8 mg (2.5 mmol) of the corresponding aryl bromide, 38.8 mg (5.6 mmol) of lithium, and 580 μ L (5.5 mmol) of Et₂O for 60 minutes, and the second addition step was conducted with 134.8 mg (0.99 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, hexane only) to afford **3a** as a white solid (251.7 mg, 0.87 mmol, 88% yield). ¹H and ¹³C NMR agreed with the literature.³

¹H NMR (392 MHz, CDCl₃, δ): 0.58 (s, 6H), 7.31–7.40 (m, 4H), 7.40–7.46 (m, 2H), 7.53–7.63 (m, 8H). ¹³C NMR (99 MHz, CDCl₃, δ): –2.2 (CH₃), 126.7 (CH), 127.3 (CH), 127.5 (CH), 128.0 (CH), 128.9 (CH), 129.3 (CH), 134.3 (CH), 134.8 (CH), 137.1 (C), 138.2 (C), 141.1 (C), 142.0 (C). HRMS-EI (m/z): [M]⁺ calcd for C₂₀H₂₀Si, 288.1329; found, 288.1329.

From aryl bromide (5 minutes at first step): The reaction was performed according to the general procedure A. The first metalation step was conducted with 587.4 mg (2.5 mmol) of the corresponding aryl bromide, 37.7 mg (5.5 mmol) of lithium, and 580 μ L (5.5 mmol) of Et₂O for 5 minutes, and the second addition step was conducted with 136.4 mg (1.0 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, >99% of **3a** was observed.

From aryl fluoride: The reaction was performed according to the general procedure A. The first metalation step was conducted with 431.7 mg (2.5 mmol) of the corresponding aryl fluoride, 38.6 mg (5.6 mmol) of lithium, and 580 μ L (5.5 mmol) of Et₂O for 15 minutes, and the second addition step was conducted with 135.7 mg (1.0 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, hexane only) to afford **3a** as a white solid (142.7 mg, 0.5 mmol, 50% yield). ¹H and ¹³C NMR agreed with the above.

Dimethyldiphenylsilane (**3b**).



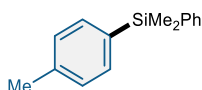
From aryl bromide (60 minutes at first step): The reaction was performed according to the general procedure A. The first metalation step was conducted with 262 μL (2.5 mmol) of the corresponding aryl bromide, 38.0 mg (5.5 mmol) of lithium, and 580 μL (5.5 mmol) of Et_2O for 60 minutes, and the second addition step was conducted with 135.9 mg (1.0 mmol) of HSiMe_2Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et_2O . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , hexane only) and recycling preparative GPC to afford **3b** as a colorless oil (190.4 mg, 0.90 mmol, 90% yield). ^1H and ^{13}C NMR agreed with the literature.⁴

^1H NMR (392 MHz, CDCl_3 , δ): 0.55 (s, 6H), 7.32–7.40 (m, 6H), 7.49–7.55 (m, 4H). ^{13}C NMR (99 MHz, CDCl_3 , δ): –2.2 (CH_3), 128.0 (CH), 129.2 (CH), 134.3 (CH), 138.3 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{14}\text{H}_{16}\text{Si}$, 212.1016; found, 212.1018.

From aryl bromide (5 minutes at first step): The reaction was performed according to the general procedure A. The first metalation step was conducted with 260 μL (2.5 mmol) of the corresponding aryl bromide, 38.3 mg (5.5 mmol) of lithium, and 580 μL (5.5 mmol) of Et_2O for 5 minutes, and the second addition step was conducted with 136.1 mg (1.0 mmol) of HSiMe_2Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et_2O . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ^1H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, >99% of **3b** was observed.

From aryl chloride: The reaction was performed according to the general procedure A. The first metalation step was conducted with 254 μL (2.5 mmol) of the corresponding aryl chloride, 38.0 mg (5.5 mmol) of lithium, and 580 μL (5.5 mmol) of Et_2O for 60 minutes, and the second addition step was conducted with 136.0 mg (1.0 mmol) of HSiMe_2Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et_2O . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , hexane only) and recycling preparative GPC to afford **3b** as a colorless oil (174.8 mg, 0.82 mmol, 82% yield). ^1H and ^{13}C NMR agreed with the above.

Dimethyl(phenyl)(*p*-tolyl)silane (**3c**).

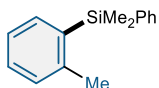


Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 427.4 mg (2.5 mmol) of the corresponding aryl bromide, 38.8 mg (5.6 mmol) of lithium, and 580 μ L (5.5 mmol) of Et₂O for 60 minutes and the second addition step was conducted with 134.9 mg (0.99 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, hexane only) and recycling preparative GPC to afford **3c** as a colorless oil (190.2 mg, 0.84 mmol, 85% yield). ¹H and ¹³C NMR agreed with the literature.⁵

¹H NMR (392 MHz, CDCl₃, δ): 0.55 (s, 6H), 2.35 (s, 3H), 7.18 (d, J = 7.4 Hz, 2H), 7.30–7.39 (m, 3H), 7.42 (d, J = 7.4 Hz, 2H), 7.48–7.55 (m, 2H). ¹³C NMR (99 MHz, CDCl₃, δ): –2.1 (CH₃), 21.6 (CH₃), 127.9 (CH), 128.8 (CH), 129.2 (CH), 134.3 (CH), 134.4 (CH), 134.6 (C), 138.6 (C), 139.1 (C). HRMS-EI (m/z): [M]⁺ calcd for C₁₅H₁₈Si, 226.1172; found, 226.1174.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 427.7 mg (2.5 mmol) of the corresponding aryl bromide, 38.1 mg (5.5 mmol) of lithium, and 580 μ L (5.5 mmol) of Et₂O for 5 minutes, and the second addition step was conducted with 136.3 mg (1.0 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, >99% of **3c** was observed.

Dimethyl(phenyl)(*o*-tolyl)silane (**3d**).



Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 301 μ L (2.5 mmol) of the corresponding aryl bromide, 38.0 mg (5.5 mmol) of lithium, and 580 μ L (5.5 mmol) of Et₂O for 60 minutes, and the second addition step was conducted with 135.8 mg (1.0 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then

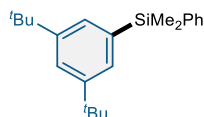
extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, hexane only) and recycling preparative GPC to afford **3d** as a colorless oil (184.7 mg, 0.82 mmol, 82% yield).

¹H and ¹³C NMR agreed with the literature.⁶

¹H NMR (392 MHz, CDCl₃, δ): 0.58 (s, 6H), 2.27 (s, 3H), 7.12–7.22 (m, 2H), 7.27–7.39 (m, 4H), 7.45–7.52 (m, 3H). ¹³C NMR (99 MHz, CDCl₃, δ): –1.2 (CH₃), 23.3 (CH₃), 125.1 (CH), 128.0 (CH), 129.1 (CH), 129.7 (CH), 130.0 (CH), 134.1 (CH), 135.5 (CH), 136.2 (C), 139.0 (C), 144.2 (C). HRMS-EI (*m/z*): [M]⁺ calcd for C₁₅H₁₈Si, 226.1172; found, 226.1175.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 300 μL (2.5 mmol) of the corresponding aryl bromide, 38.1 mg (5.5 mmol) of lithium, and 580 μL (5.5 mmol) of Et₂O for 5 minutes, and the second addition step was conducted with 136.1 mg (1.0 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 98% of **3d** was observed.

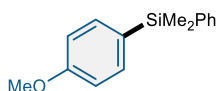
(3,5-Di-*tert*-butylphenyl)dimethyl(phenyl)silane (3e).



Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 673.1 mg (2.5 mmol) of the corresponding aryl bromide, 38.0 mg (5.5 mmol) of lithium, and 580 μL (5.5 mmol) of Et₂O for 60 minutes, and the second addition step was conducted with 137.3 mg (1.0 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, hexane only) and recycling preparative GPC to afford **3e** as a colorless oil (299.5 mg, 0.92 mmol, 92% yield). ¹H NMR (392 MHz, CDCl₃, δ): 0.55 (s, 6H), 1.31 (s, 18H), 7.33–7.37 (m, 3H), 7.39 (d, *J* = 1.6 Hz, 2H), 7.45 (t, *J* = 2.2 Hz, 1H), 7.51–7.57 (m, 2H). ¹³C NMR (99 MHz, CDCl₃, δ): –1.9 (CH₃), 31.7 (CH₃), 35.0 (C), 123.5 (CH), 127.9 (CH), 128.4 (CH), 129.1 (CH), 134.4 (CH), 137.0 (C), 138.8 (C), 149.8 (C). HRMS-EI (*m/z*): [M]⁺ calcd for C₂₂H₃₂Si, 324.2268; found, 324.2267.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 677.1 mg (2.5 mmol) of the corresponding aryl bromide, 38.1 mg (5.5 mmol) of lithium, and 580 μL (5.5 mmol) of Et_2O for 5 minutes, and the second addition step was conducted with 136.5 mg (1.0 mmol) of HSiMe_2Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ^1H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, >99% of **3e** was observed.

(4-Methoxyphenyl)dimethyl(phenyl)silane (3f).

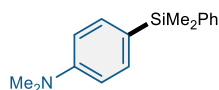


Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 312 μL (2.5 mmol) of the corresponding aryl bromide, 38.0 mg (5.5 mmol) of lithium, and 580 μL (5.5 mmol) of Et_2O for 60 minutes, and the second addition step was conducted with 134.4 mg (0.99 mmol) of HSiMe_2Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et_2O . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc /hexane, 0–3:97) and recycling preparative GPC to afford **3f** as a colorless oil (195.5 mg, 0.81 mmol, 82% yield). ^1H and ^{13}C NMR agreed with the literature.⁵

^1H NMR (392 MHz, CDCl_3 , δ): 0.53 (s, 6H), 3.81 (s, 3H), 6.91 (d, J = 8.6 Hz, 2H), 7.31–7.39 (m, 3H), 7.42–7.48 (m, 2H), 7.49–7.55 (m, 2H). ^{13}C NMR (99 MHz, CDCl_3 , δ): –2.1 (CH_3), 55.0 (CH_3), 113.7 (CH), 127.9 (CH), 129.0 (C), 129.1 (CH), 134.2 (CH), 135.7 (CH), 138.7 (C), 160.6 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{15}\text{H}_{18}\text{OSi}$, 242.1121; found, 242.1124.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 310 μL (2.5 mmol) of the corresponding aryl bromide, 38.1 mg (5.5 mmol) of lithium, and 580 μL (5.5 mmol) of Et_2O for 5 minutes, and the second addition step was conducted with 136.5 mg (1.0 mmol) of HSiMe_2Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ^1H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 81% of **3f** was observed.

4-[Dimethyl(phenyl)silyl]-*N,N*-dimethylaniline (**3g**).

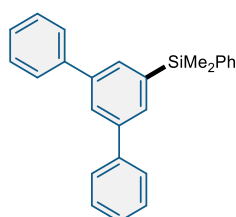


Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 505.2 mg (2.5 mmol) of the corresponding aryl bromide, 38.1 mg (5.5 mmol) of lithium, and 580 μ L (5.5 mmol) of Et₂O for 60 minutes, and the second addition step was conducted with 136.1 mg (1.0 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, EtOAc/hexane, 0–3:97) and recycling preparative GPC to afford **3g** as a colorless oil (189.6 mg, 0.74 mmol, 74% yield). ¹H and ¹³C NMR agreed with the literature.⁷

¹H NMR (399 MHz, CDCl₃, δ): 0.50 (s, 6H), 2.96 (s, 6H), 6.73 (d, *J* = 8.4 Hz, 2H), 7.30–7.36 (m, 3H), 7.39 (d, *J* = 8.8 Hz, 2H), 7.49–7.55 (m, 2H). ¹³C NMR (100 MHz, CDCl₃, δ): –2.0 (CH₃), 40.3 (CH₃), 112.1 (CH), 123.2 (C), 127.8 (CH), 128.9 (CH), 134.2 (CH), 135.4 (CH), 139.4 (C), 151.0 (C). HRMS-EI (*m/z*): [M]⁺ calcd for C₁₆H₂₁NSi, 255.1438; found, 255.1443.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 501.1 mg (2.5 mmol) of the corresponding aryl bromide, 38.2 mg (5.5 mmol) of lithium, and 580 μ L (5.5 mmol) of Et₂O for 5 minutes, and the second addition step was conducted with 136.3 mg (1.0 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 94% of **3g** was observed.

4-[Dimethyl(phenyl)silyl]-*N,N*-dimethylaniline (**3h**).



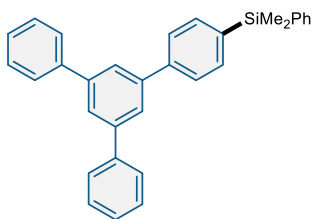
Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 773.5 mg (2.5 mmol) of the

corresponding aryl bromide, 37.5 mg (5.4 mmol) of lithium, and 580 μL (5.5 mmol) of Et_2O for 60 minutes, and the second addition step was conducted with 135.2 mg (0.99 mmol) of HSiMe_2Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with DCM . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , $\text{CHCl}_3/\text{hexane}$, 0–15:85) and recycling preparative GPC to afford **3h** as a white solid (343.7 mg, 0.94% mmol, 95% yield). ^1H and ^{13}C NMR agreed with the literature.⁸

^1H NMR (392 MHz, CDCl_3 , δ): 0.63 (s, 6H), 7.33–7.40 (m, 5H), 7.45 (t, J = 7.6 Hz, 4H), 7.55–7.64 (m, 6H), 7.72 (d, J = 1.6 Hz, 2H), 7.79 (s, 1H). ^{13}C NMR (99 MHz, CDCl_3 , δ): –2.1 (CH_3), 127.4 (CH), 127.5 (CH), 128.1 (CH), 128.9 (CH), 129.4 (CH), 132.1 (CH), 134.3 (CH), 138.0 (C), 139.6 (C), 141.3 (C), 141.5 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{26}\text{H}_{24}\text{NSi}$, 364.1642; found, 364.1651.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 778.2 mg (2.5 mmol) of the corresponding aryl bromide, 38.1 mg (5.5 mmol) of lithium, and 580 μL (5.5 mmol) of Et_2O for 5 minutes, and the second addition step was conducted with 136.3 mg (1.0 mmol) of HSiMe_2Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ^1H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 73% of **3h** was observed.

Dimethyl(phenyl)[5'-phenyl-(1,1':3',1''-terphenyl)-4-yl]silane (**3i**).

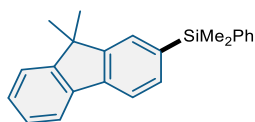


Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 854.4 mg (2.5 mmol) of the corresponding aryl chloride, 38.0 mg (5.5 mmol) of lithium, and 580 μL (5.5 mmol) of Et_2O for 60 minutes, and the second addition step was conducted with 137.0 mg (1.0 mmol) of HSiMe_2Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with CHCl_3 . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , DCM/hexane ,

(CH), 138.6 (C), 147.6 (C), 148.7 (C). HRMS-EI (m/z): $[M]^+$ calcd for $C_{26}H_{25}NSi$, 379.1751; found, 379.1753.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 810.3 mg (2.5 mmol) of the corresponding aryl bromide, 38.1 mg (5.5 mmol) of lithium, and 580 μ L (5.5 mmol) of Et_2O for 5 minutes, and the second addition step was conducted with 135.7 mg (1.0 mmol) of $HSiMe_2Ph$ for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with EtOAc. The resultant solution was dried over $MgSO_4$, filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ^1H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 46% of **3j** was observed.

(9,9-Dimethyl-9H-fluoren-2-yl)dimethyl(phenyl)silane (3k).



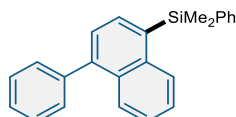
Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 682.8 mg (2.5 mmol) of the corresponding aryl bromide, 38.0 mg (5.5 mmol) of lithium, and 580 μ L (5.5 mmol) of Et_2O for 60 minutes, and the second addition step was conducted with 136.3 mg (1.0 mmol) of $HSiMe_2Ph$ for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with EtOAc. The resultant solution was dried over $MgSO_4$, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , hexane only) to afford **3k** as a white solid (324.0 mg, 0.99 mmol, 99% yield).

^1H NMR (399 MHz, $CDCl_3$, δ): 0.60 (s, 6H), 1.48 (s, 6H), 7.28–7.40 (m, 5H), 7.41–7.46 (m, 1H), 7.50 (dd, J = 0.8, 7.6 Hz, 1H), 7.53–7.58 (m, 2H), 7.59 (s, 1H), 7.69–7.75 (m, 2H). ^{13}C NMR (99 MHz, $CDCl_3$, δ): –1.9 (CH_3), 27.3 (CH_3), 46.9 (C), 119.6 (CH), 120.3 (CH), 122.7 (CH), 127.1 (CH), 127.7 (CH), 128.0 (CH), 128.2 (CH), 129.2 (CH), 133.2 (CH), 134.3 (CH), 137.0 (C), 138.6 (C), 139.1 (C), 140.4 (C), 152.9 (C), 153.9 (C). HRMS-EI (m/z): $[M]^+$ calcd for $C_{23}H_{24}Si$, 328.1642; found, 328.1649.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 683.5 mg (2.5 mmol) of the corresponding aryl bromide, 38.2 mg (5.5 mmol) of lithium, and 580 μ L (5.5 mmol) of Et_2O for 5 minutes, and the second addition step was conducted with 136.2 mg (1.0 mmol) of $HSiMe_2Ph$

for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, >99% of **3k** was observed.

Dimethyl(phenyl)(4-phenylnaphthalen-1-yl)silane (3l).

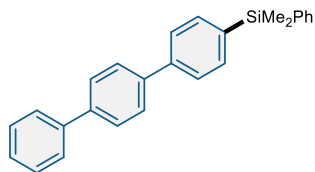


Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 707.1 mg (2.5 mmol) of the corresponding aryl bromide, 38.0 mg (5.5 mmol) of lithium, and 580 μ L (5.5 mmol) of Et₂O for 60 minutes, and the second addition step was conducted with 136.4 mg (1.0 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, hexane only) to afford **3l** as a white solid (313.0 mg, 0.92 mmol, 92% yield).

¹H NMR (392 MHz, CDCl₃, δ): 0.74 (s, 6H), 7.32–7.47 (m, 7H), 7.50 (d, J = 4.3 Hz, 4H), 7.56–7.62 (m, 2H), 7.76 (d, J = 7.1 Hz, 1H), 7.90–7.96 (m, 1H), 7.97–8.03 (m, 1H). ¹³C NMR (99 MHz, CDCl₃, δ): –0.7 (CH₃), 125.6 (CH), 125.7 (CH), 126.3 (CH), 127.1 (CH), 127.4 (CH), 128.1 (CH), 128.4 (CH), 129.1 (CH), 129.2 (CH), 130.1 (CH), 131.8 (C), 134.3 (CH), 134.4 (CH), 135.3 (C), 137.5 (C), 139.0 (C), 140.9 (C), 142.4 (C). HRMS-EI (m/z): [M]⁺ calcd for C₂₄H₂₂Si, 338.1485; found, 338.1489.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure A. The first metalation step was conducted with 708.9 mg (2.5 mmol) of the corresponding aryl bromide, 38.1 mg (5.5 mmol) of lithium, and 580 μ L (5.5 mmol) of Et₂O for 5 minutes, and the second addition step was conducted with 136.2 mg (1.0 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 91% of **3l** was observed.

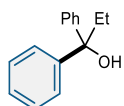
(1,1':4',1''-Terphenyl)-4-yl(dimethyl(phenyl)silane (3m).



The reaction was performed according to the general procedure A. The first metalation step was conducted with 773.4 mg (2.5 mmol) of the corresponding aryl bromide, 38.0 mg (5.5 mmol) of lithium, and 580 μ L (5.5 mmol) of Et₂O for 60 minutes, and the second addition step was conducted with 134.6 mg (0.99 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with CHCl₃. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, CHCl₃/hexane, 0–15:85) and recycling preparative GPC to afford **3m** as a white solid (283.6 mg, 0.78% mmol, 79 yield). ¹H and ¹³C NMR agreed with the literature.⁸

¹H NMR (399 MHz, CDCl₃, δ): 0.60 (s, 6H), 7.33–7.40 (m, 4H), 7.43–7.49 (m, 2H), 7.55–7.69 (m, 12H). ¹³C NMR (99 MHz, CDCl₃, δ): –2.2 (CH₃), 126.5 (CH), 127.1 (CH), 127.5 (CH), 127.6 (CH), 128.0 (CH), 128.9 (CH), 129.3 (CH), 134.3 (CH), 134.9 (CH), 137.2 (C), 138.2 (C), 140.0 (C), 140.3 (C), 140.7 (C), 141.4 (C). HRMS-EI (*m/z*): [M]⁺ calcd for C₂₆H₂₄Si, 364.1642; found, 364.1644.

1,1-Diphenylpropan-1-ol (4a).

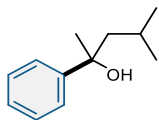


The reaction was performed according to the general procedure A. The first metalation step was conducted with 210 μ L (2.0 mmol) of the corresponding aryl bromide, 30.7 mg (4.4 mmol) of lithium, and 450 μ L (4.4 mmol) of Et₂O for 5 minutes, and the second addition step was conducted with 133.5 mg (0.99 mmol) of propiophenone for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH₄Cl and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, EtOAc/hexane, 0–10:90) to afford **4a** as a white solid (173.6 mg, 0.82 mmol, 82% yield). ¹H and ¹³C NMR agreed with the literature.⁹

¹H NMR (399 MHz, CDCl₃, δ): 0.89 (t, *J* = 7.2 Hz, 3H), 2.06 (s, 1H), 2.33 (q, *J* = 7.3 Hz, 2H), 7.22 (tt, *J* = 1.5, 7.2 Hz, 2H), 7.28–7.34 (m, 4H), 7.39–7.45 (m, 4H). ¹³C NMR (99 MHz, CDCl₃,

δ): 8.2 (CH₃), 34.4 (CH₂), 78.5 (C), 126.2 (CH), 126.8 (CH), 128.1 (CH), 147.0 (C). HRMS-EI (m/z): [M]⁺ calcd for C₁₃H₁₁O, 183.0804; found, 183.0808.

4-Methyl-2-phenylpentan-2-ol (**4b**).

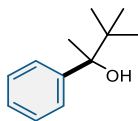


The reaction was performed according to the general procedure A. The first metalation step was conducted with 210 μ L (2.0 mmol) of the corresponding aryl bromide, 30.6 mg (4.4 mmol) of lithium, and 450 μ L (4.4 mmol) of Et₂O for 5 minutes, and the second addition step was conducted with 98.9 mg (0.99 mmol) of 4-methylpentan-2-one for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH₄Cl and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, EtOAc/hexane, 0–10:90) to afford **4b** as a colorless oil (120.4 mg, 0.68 mmol, 68% yield). ¹H and ¹³C NMR agreed with the literature.¹⁰

¹H NMR (399 MHz, CDCl₃, δ): 0.76 (d, J = 6.4 Hz, 3H), 0.88 (d, J = 6.8 Hz, 3H), 1.56 (s, 3H), 1.57–1.64 (m, 1H), 1.66 (s, 1H), 1.67–1.84 (m, 2H), 7.23 (t, J = 7.4 Hz, 1H), 7.34 (t, J = 7.6 Hz, 2H), 7.44 (d, J = 8.0 Hz, 2H). ¹³C NMR (99 MHz, CDCl₃, δ): 24.49 (CH₃), 24.51 (CH₃), 24.54 (CH₃), 31.4 (CH₃), 52.8 (CH₃), 75.3 (C), 124.9 (CH), 126.5 (CH), 128.1 (CH), 148.4 (C). HRMS-EI (m/z): [M]⁺ calcd for C₁₂H₁₈O, 178.1352; found, 178.1360.

Safety-oriented protocol: The reaction was performed according to the general procedure F. The first metalation step was conducted with 210 μ L (2.0 mmol) of the corresponding aryl bromide, 30.4 mg (4.4 mmol) of lithium, and 450 μ L (4.4 mmol) of Et₂O for 5 minutes, and the second addition step was conducted with 100.2 mg (1.0 mmol) of 4-methylpentan-2-one for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH₄Cl and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, EtOAc/hexane, 0–10:90) to afford **4b** as a colorless oil (131.2 mg, 0.74 mmol, 74% yield). ¹H and ¹³C NMR agreed with the above.

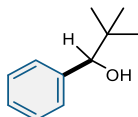
3,3-Dimethyl-2-phenylbutan-2-ol (**4c**).



The reaction was performed according to the general procedure A. The first metalation step was conducted with 210 μL (2.0 mmol) of the corresponding aryl bromide, 30.4 mg (4.4 mmol) of lithium, and 450 μL (4.4 mmol) of Et_2O for 5 minutes, and the second addition step was conducted with 99.7 mg (1.0 mmol) of 3,3-dimethylbutan-2-one for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc /hexane, 0–10:90) to afford **4c** as a white solid (150.8 mg, 0.85 mmol, 85% yield). ^1H and ^{13}C NMR agreed with the literature.¹¹

^1H NMR (399 MHz, CDCl_3 , δ): 0.93 (s, 9H), 1.61 (s, 4H), 7.20–7.25 (m, 1H), 7.28–7.34 (m, 2H), 7.43–7.47 (m, 2H). ^{13}C NMR (99 MHz, CDCl_3 , δ): 25.2 (CH_3), 25.8 (CH_3), 38.0 (C), 78.6 (C), 126.4 (CH), 127.1 (CH), 127.2 (CH), 146.2 (C). HRMS-EI (m/z): $[\text{M-Me}]^+$ calcd for $\text{C}_{11}\text{H}_{15}\text{O}$, 163.1117; found, 163.1122.

2,2-Dimethyl-1-phenylpropan-1-ol (**4d**).



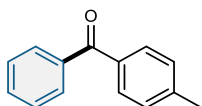
One-pot two-step reaction: The reaction was performed according to the general procedure A. The first metalation step was conducted with 210 μL (2.0 mmol) of the corresponding aryl bromide, 30.4 mg (4.4 mmol) of lithium, and 450 μL (4.4 mmol) of Et_2O for 5 minutes, and the second addition step was conducted with 86.1 mg (1.0 mmol) of pivalaldehyde for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc /hexane, 0–10:90) to afford **4d** as a colorless oil (122.3 mg, 0.74 mmol, 74% yield). ^1H and ^{13}C NMR agreed with the literature.¹²

^1H NMR (392 MHz, CDCl_3 , δ): 0.93 (s, 9H), 1.84 (d, $J = 2.7$ Hz, 1H), 4.41 (d, $J = 2.7$ Hz, 1H), 7.23–7.34 (m, 5H). ^{13}C NMR (99 MHz, CDCl_3 , δ): 26.0 (CH_3), 35.7 (C), 82.4 (CH), 127.3 (CH),

127.6 (CH), 127.7 (CH), 142.3 (C). HRMS-EI (m/z): $[M]^+$ calcd for $C_{11}H_{16}O$, 164.1196; found, 164.1200.

Barbier-type reaction: The reaction was performed according to the general procedure E. The first metalation step was conducted with 210 μ L (2.0 mmol) of bromobenzene, 30.5 mg (4.4 mmol) of lithium, 450 μ L (4.4 mmol) of Et_2O , and 86.1 mg (1.0 mmol) of pivalaldehyde for 60 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc. The resultant solution was dried over $MgSO_4$, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc/hexane, 0–10:90) to afford **4d** as a colorless oil (124.1 mg, 0.76 mmol, 76% yield). ^1H and ^{13}C NMR agreed with the above.

Phenyl(*p*-tolyl)methanone (**4e**).



One-pot two-step reaction: The reaction was performed according to the general procedure A. The first metalation step was conducted with 210 μ L (2.0 mmol) of the corresponding aryl bromide, 30.4 mg (4.4 mmol) of lithium and 450 μ L (4.4 mmol) of Et_2O for 5 minutes, and the second addition step was conducted with 179.1 mg (1.0 mmol) of *N*-methoxy-*N*,4-dimethylbenzamide for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc. The resultant solution was dried over $MgSO_4$, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc/hexane, 0–10:90) to afford **4e** as a white solid (161.5 mg, 0.82 mmol, 82% yield). ^1H and ^{13}C NMR agreed with the literature.¹³

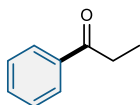
^1H NMR (392 MHz, $CDCl_3$, δ): 2.44 (s, 3H), 7.23–7.32 (m, 2H), 7.48 (t, $J = 7.4$ Hz, 2H), 7.58 (t, $J = 7.4$ Hz, 1H), 7.73 (d, $J = 7.8$ Hz, 2H), 7.79 (d, $J = 7.1$ Hz, 2H). ^{13}C NMR (99 MHz, $CDCl_3$, δ): 21.6 (CH_3), 128.2 (CH), 129.0 (CH), 129.9 (CH), 130.3 (CH), 132.2 (CH), 134.8 (C), 137.9 (C), 143.2 (C), 196.4 (C). HRMS-EI (m/z): $[M]^+$ calcd for $C_{14}H_{12}O$, 196.0883; found, 196.0890.

Barbier-type reaction: The reaction was performed according to the general procedure E. The first metalation step was conducted with 210 μ L (2.0 mmol) of bromobenzene, 30.5 mg (4.4 mmol) of lithium, 450 μ L (4.4 mmol) of Et_2O , and 179.4 mg (1.0 mmol) of *N*-methoxy-*N*,4-dimethylbenzamide for 60 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc. The resultant solution was

dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, EtOAc/hexane, 0–5:95) to afford **4e** as a white solid (178.2 mg, 0.91 mmol, 91% yield). ¹H and ¹³C NMR agreed with the above.

Safety-oriented protocol: The reaction was performed according to the general procedure F. The first metalation step was conducted with 210 μ L (2.0 mmol) of the corresponding aryl bromide, 30.5 mg (4.4 mmol) of lithium, and 450 μ L (4.4 mmol) of Et₂O for 5 minutes, and the second addition step was conducted with 175.2 mg (0.98 mmol) of *N*-methoxy-*N*,4-dimethylbenzamide for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH₄Cl and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, EtOAc/hexane, 0–7:93) to afford **4e** as a white solid (164.3 mg, 0.84 mmol, 86% yield). ¹H and ¹³C NMR agreed with the above.

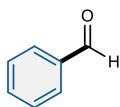
Propionphenone (**4f**).



The reaction was performed according to the general procedure A. The first metalation step was conducted with 210 μ L (2.0 mmol) of the corresponding aryl bromide, 30.0 mg (4.4 mmol) of lithium, and 450 μ L (4.4 mmol) of Et₂O for 5 minutes, and the second addition step was conducted with 116.0 mg (0.99 mmol) of *N*-methoxy-*N*-methylpropionamide for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH₄Cl and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, EtOAc/hexane, 0–10:90) to afford **4f** as a colorless oil (106.8 mg, 0.80 mmol, 80% yield). ¹H and ¹³C NMR agreed with the literature.¹¹

¹H NMR (399 MHz, CDCl₃, δ): 1.23 (t, *J* = 7.0 Hz, 3H), 3.02 (q, *J* = 7.3 Hz, 2H), 7.43–7.50 (m, 2H), 7.56 (tt, *J* = 1.5, 7.4 Hz, 1H), 7.94–8.00 (m, 2H). ¹³C NMR (99 MHz, CDCl₃, δ): 8.4 (CH₃), 31.9 (CH₂), 128.1 (CH), 128.7 (CH), 133.0 (CH), 137.0 (C), 201.0 (C). HRMS-EI (*m/z*): [M]⁺ calcd for C₉H₁₀O, 134.0726; found, 134.0728.

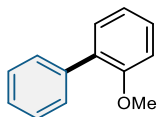
Benzaldehyde (4g).



The reaction was performed according to the general procedure A. The first metalation step was conducted with 420 μL (4.0 mmol) of the corresponding aryl bromide, 58.8 mg (8.5 mmol) of lithium, and 900 μL (8.8 mmol) of Et_2O for 5 minutes, and the second addition step was conducted with 229.3 mg (2.0 mmol) of morpholine-4-carbaldehyde for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc /hexane, 0–10:90) to afford **4g** as a colorless oil (123.0 mg, 1.16 mmol, 58% yield). ^1H and ^{13}C NMR agreed with the literature.¹⁴

^1H NMR (399 MHz, CDCl_3 , δ): 7.55 (t, $J = 7.4$ Hz, 2H), 7.65 (tt, $J = 1.6, 7.6$ Hz, 1H), 7.87–7.92 (m, 2H), 10.03 (s, 1H). ^{13}C NMR (100 MHz, CDCl_3 , δ): 129.1 (CH_2), 129.9 (CH), 134.6 (CH), 136.5 (CH), 192.5 (CH). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_7\text{H}_6\text{O}$, 106.0413; found, 106.0412.

2-Methoxy-1,1'-biphenyl (4h).

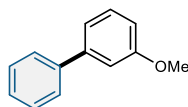


The reaction was performed according to the general procedure B. The first metalation step was conducted with 310 μL (3.0 mmol) of the corresponding aryl bromide, 41.4 mg (6.0 mmol) of lithium, and 620 μL (6.0 mmol) of Et_2O for 5 minutes and the second cross-coupling step was conducted with 141.1 mg (0.99 mmol) of 1-chloro-2-methoxybenzene and 78.3 mg (0.10 mmol) of **C1** for 30 minutes. After the reaction, the resulting mixture was quenched by H_2O and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc /hexane, 0–10:90) and recycling preparative GPC to afford **4h** as a colorless oil (106.3 mg, 0.58 mmol, 58% yield). ^1H and ^{13}C NMR agreed with the literature.¹⁵

^1H NMR (392 MHz, CDCl_3 , δ): 3.81 (s, 3H), 6.97–7.01 (m, 1H), 7.03 (dt, $J = 3.8, 10.1$ Hz, 1H), 7.29–7.36 (m, 3H), 7.38–7.44 (m, 2H), 7.50–7.56 (m, 2H). ^{13}C NMR (99 MHz, CDCl_3 , δ): 55.6 (CH_3), 111.3 (CH), 120.9 (CH), 127.0 (CH), 128.1 (CH), 128.7 (CH), 129.7 (CH), 130.8 (C),

131.0 (CH), 138.6 (C), 156.5 (C). HRMS-EI (m/z): $[M]^+$ calcd for $C_{13}H_{12}O$, 184.0883; found, 184.0886.

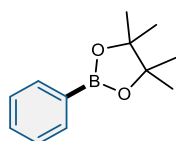
3-Methoxy-1,1'-biphenyl (4i).



The reaction was performed according to the general procedure B. The first metalation step was conducted with 310 μ L (3.0 mmol) of the corresponding aryl bromide, 41.4 mg (6.0 mmol) of lithium and 620 μ L (6.0 mmol) of Et_2O for 5 minutes, and the second cross-coupling step was conducted with 142.6 mg (1.0 mmol) of 1-chloro-3-methoxybenzene and 78.2 mg (0.10 mmol) of **C1** for 30 minutes. After the reaction, the resulting mixture was quenched by H_2O and then extracted with $EtOAc$. The resultant solution was dried over $MgSO_4$, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , $EtOAc$ /hexane, 0–10:90) and recycling preparative GPC to afford **4i** as a colorless oil (88.8 mg, 0.48 mmol, 48% yield). ^1H and ^{13}C NMR agreed with the literature.¹⁶

^1H NMR (399 MHz, $CDCl_3$, δ): 3.87 (s, 3H), 6.88–6.93 (m, 1H), 7.13 (t, $J = 2.2$ Hz, 1H), 7.16–7.21 (m, 1H), 7.32–7.39 (m, 2H), 7.41 (t, $J = 7.6$ Hz, 2H), 7.56–7.62 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$, δ): 55.3 (CH_3), 112.7 (CH), 113.0 (CH), 119.8 (CH), 127.3 (CH), 127.5 (CH), 128.8 (CH), 129.9 (CH), 141.2 (C), 142.8 (C), 160.0 (C). HRMS-EI (m/z): $[M]^+$ calcd for $C_{13}H_{12}O$, 184.0883; found, 184.0886.

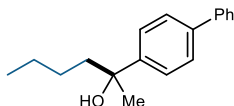
4,4,5,5-Tetramethyl-2-phenyl-1,3,2-dioxaborolane (4j).



The reaction was performed according to the general procedure C. The reaction was carried out with 314.1 mg (2.0 mmol) of bromobenzene, 30.8 mg (4.5 mmol) of lithium, 360 μ L (4.4 mmol) of THF, and 820 μ L (4.0 mmol) of *i*-PrOB(pin). After the reaction, the resulting mixture was quenched by H_2O and then extracted with $EtOAc$. The resultant solution was dried over $MgSO_4$, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , $EtOAc$ /hexane, 0–7:93) to afford **4j** as a white solid (176.0 mg, 0.86 mmol, 43% yield). ^1H and ^{13}C NMR agreed with the literature.¹⁷

^1H NMR (392 MHz, CDCl_3 , δ): 1.35 (s, 12H), 7.37 (t, $J = 7.6$ Hz, 2H), 7.46 (t, $J = 7.2$ Hz, 1H), 7.81 (d, $J = 7.4$ Hz, 2H). ^{13}C NMR (99 MHz, CDCl_3 , δ): 24.9 (CH_3), 83.8 (C), 127.8 (CH), 131.4 (CH), 134.8 (CH). The carbon directly attached to the boron atom was not detected, likely due to quadrupolar relaxation. HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{12}\text{H}_{17}\text{BO}_2$, 203.1352; found, 203.1353.

2-[(1,1'-Biphenyl)-4-yl]hexan-2-ol (5a).



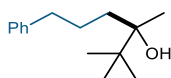
Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure D. The first metalation step was conducted with 210 μL (2.0 mmol) of the corresponding alkyl bromide, 30.4 mg (4.4 mmol) of lithium and 450 μL (4.4 mmol) of Et_2O for 60 minutes and the second addition step was conducted with 196.1 mg (1.0 mmol) of 1-[(1,1'-biphenyl)-4-yl]ethan-1-one for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc /hexane, 0–10:90) to afford **5a** as a white solid (177.1 mg, 0.70 mmol, 70% yield).

^1H NMR (392 MHz, CDCl_3 , δ): 0.87 (t, $J = 7.2$ Hz, 3H), 1.10–1.35 (m, 4H), 1.60 (s, 3H), 1.73 (s, 1H), 1.77–1.92 (m, 2H), 7.30–7.38 (m, 1H), 7.44 (t, $J = 8.0$ Hz, 2H), 7.48–7.53 (m, 2H), 7.55–7.63 (m, 4H). ^{13}C NMR (99 MHz, CDCl_3 , δ): 14.2 (CH_3), 23.2 (CH_2), 26.3 (CH_2), 30.2 (CH_3), 44.0 (CH_2), 74.7 (C), 125.4 (CH), 126.9 (CH), 127.1 (CH), 127.3 (CH), 128.8 (CH), 139.4 (C), 140.9 (C), 147.3 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{18}\text{H}_{22}\text{O}$, 254.1665; found, 254.1675.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure D. The first metalation step was conducted with 210 μL (2.0 mmol) of the corresponding alkyl bromide, 30.7 mg (4.4 mmol) of lithium and 450 μL (4.4 mmol) of Et_2O for 5 minutes and the second addition step was conducted with 196.3 mg (1.0 mmol) of 1-[(1,1'-biphenyl)-4-yl]ethan-1-one for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ^1H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 77% of **5a** was observed.

Barbier-type reaction: The reaction was performed according to the general procedure E. The first metalation step was conducted with 210 μL (2.0 mmol) of bromobenzene, 30.4 mg (4.4 mmol) of lithium, 450 μL (4.4 mmol) of Et_2O , and 196.3 mg (1.0 mmol) of 1-([1,1'-biphenyl]-4-yl)ethan-1-one for 60 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc /hexane, 0–10:90) to afford **5a** as a white solid (184.6 mg, 0.73 mmol, 73% yield). ^1H and ^{13}C NMR agreed with the above.

2,2,3-Trimethyl-6-phenylhexan-3-ol (5b).



Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure D. The first metalation step was conducted with 300 μL (2.0 mmol) of the corresponding alkyl bromide, 31.2 mg (4.5 mmol) of lithium, and 450 μL (4.4 mmol) of Et_2O for 60 minutes and the second addition step was conducted with 99.4 mg (0.99 mmol) of 3,3-dimethylbutan-2-one for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc /hexane, 0–7:93) to afford **5b** as a colorless oil (109.5 mg, 0.50 mmol, 50% yield).

^1H NMR (399 MHz, CDCl_3 , δ): 0.93 (s, 9H), 1.07 (s, 1H), 1.11 (s, 3H), 1.46–1.64 (m, 2H), 1.64–1.86 (m, 2H), 2.53–2.73 (m, 2H), 7.15–7.23 (m, 3H), 7.26–7.31 (m, 2H). ^{13}C NMR (99 MHz, CDCl_3 , δ): 20.9 (CH_3), 25.4 (CH_3), 26.2 (CH_2), 35.8 (CH_2), 36.8 (CH_2), 38.2 (C), 76.3 (C), 125.7 (CH), 128.3 (CH), 128.4 (CH), 142.8 (C). HRMS-EI (m/z): $[\text{M-Me}]^+$ calcd for $\text{C}_{14}\text{H}_{21}\text{O}$, 205.1587; found, 205.1591.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure D. The first metalation step was conducted with 300 μL (2.0 mmol) of the corresponding alkyl bromide, 30.1 mg (4.4 mmol) of lithium and 450 μL (4.4 mmol) of Et_2O for 5 minutes and the second addition step was conducted with 196.3 mg (1.0 mmol) of 3,3-dimethylbutan-2-one for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ^1H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 66% of **5b** was observed.

Safety-oriented protocol: The reaction was performed according to the general procedure F. The first metalation step was conducted with 300 μL (2.0 mmol) of the corresponding alkyl bromide, 30.1 mg (4.4 mmol) of lithium, and 450 μL (4.4 mmol) of Et_2O for 60 minutes, and the second addition step was conducted with 100.2 mg (1.0 mmol) of 3,3-dimethylbutan-2-one for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc /hexane, 0–5:95) to afford **5b** as a colorless oil (109.0 mg, 0.49 mmol, 49% yield). ^1H and ^{13}C NMR agreed with the above.

Butyldimethyl(phenyl)silane (**5c**).



Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure D. The first metalation step was conducted with 270 μL (2.5 mmol) of the corresponding alkyl bromide, 38.1 mg (5.5 mmol) of lithium, and 580 μL (5.5 mmol) of Et_2O for 60 minutes and the second addition step was conducted with 136.3 mg (1.0 mmol) of HSiMe_2Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et_2O . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , hexane only) to afford **5c** as a colorless oil (172.9 mg, 0.90 mmol, 90% yield). ^1H and ^{13}C NMR agreed with the literature.⁴

^1H NMR (399 MHz, CDCl_3 , δ): 0.25 (s, 6H), 0.71–0.78 (m, 2H), 0.86 (t, J = 6.8 Hz, 3H), 1.23–1.38 (m, 4H), 7.32–7.38 (m, 3H), 7.48–7.54 (m, 2H). ^{13}C NMR (99 MHz, CDCl_3 , δ): –2.9 (CH_3), 14.0 (CH_3), 15.6 (CH_2), 26.3 (CH_2), 26.8 (CH_2), 127.9 (CH), 128.9 (CH), 133.7 (CH), 139.8 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{12}\text{H}_{20}\text{Si}$, 192.1329; found, 192.1334.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure D. The first metalation step was conducted with 270 μL (2.5 mmol) of the corresponding alkyl bromide, 38.0 mg (5.5 mmol) of lithium and 580 μL (5.5 mmol) of Et_2O for 5 minutes and the second addition step was conducted with 136.3 mg (1.0 mmol) of HSiMe_2Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et_2O . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ^1H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, >99% of **5c** was observed.

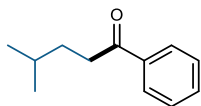
Chemical structure of a dendritic polymer fragment, showing a branched carbon chain with a SiMe_2Ph group attached.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure D. The first metalation step was conducted with 553.6 mg (2.5 mmol) of the corresponding alkyl bromide, 38.2 mg (5.5 mmol) of lithium and 580 μ L (5.5 mmol) of Et₂O for 5 minutes and the second addition step was conducted with 136.3 mg (1.0 mmol) of HSiMe₂Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 84% of **5d** was observed.

S40

GPC to afford **5d** as a colorless oil (204.6 mg, 0.74 mmol, 74% yield). ^1H and ^{13}C NMR agreed with the above.

4-Methyl-1-phenylpentan-1-one (**5e**).



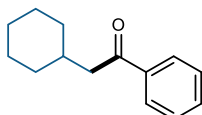
One-pot two-step reaction with 60 minutes at the first step: The reaction was performed according to the general procedure D. The first metalation step was conducted with 250 μL (2.0 mmol) of the corresponding alkyl bromide, 30.0 mg (4.4 mmol) of lithium and 450 μL (4.4 mmol) of Et_2O for 60 minutes and the second addition step was conducted with 163.9 mg (0.99 mmol) of *N*-methoxy-*N*-methylbenzamide for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc /hexane, 0–10:90) to afford **5e** as a colorless oil (142.2 mg, 0.81 mmol, 81% yield). ^1H and ^{13}C NMR agreed with the literature.¹⁸ ^1H NMR (399 MHz, CDCl_3 , δ): 0.95 (d, J = 5.9 Hz, 6H), 1.59–1.71 (m, 3H), 2.94–3.01 (m, 2H), 7.47 (t, J = 7.8 Hz, 2H), 7.56 (t, J = 7.4 Hz, 1H), 7.97 (d, J = 7.4 Hz, 2H). ^{13}C NMR (99 MHz, CDCl_3 , δ): 22.1 (CH_3), 27.4 (CH), 32.8 (CH_2), 36.1(CH_2), 127.6 (CH), 128.1 (CH), 132.4 (CH), 136.7 (CH), 199.7 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{12}\text{H}_{16}\text{O}$, 176.1196; found, 176.1201.

One-pot two-step reaction with 5 minutes at the first step: The reaction was performed according to the general procedure D. The first metalation step was conducted with 250 μL (2.0 mmol) of the corresponding alkyl bromide, 30.5 mg (4.4 mmol) of lithium and 450 μL (4.4 mmol) of Et_2O for 5 minutes and the second addition step was conducted with 196.3 mg (1.0 mmol) of *N*-methoxy-*N*-methylbenzamide for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ^1H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 85% of **5e** was observed.

Barbier-type reaction: The reaction was performed according to the general procedure E. The first metalation step was conducted with 250 μL (2.0 mmol) of the corresponding alkyl bromide, 30.5 mg (4.4 mmol) of lithium, 450 μL (4.4 mmol) of Et_2O , and 164.7 mg (1.0 mmol) of *N*-methoxy-*N*-methylbenzamide for 60 minutes. After the reaction, the resulting mixture was

quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc. The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc/hexane, 0–5:95) to afford **5e** as a colorless oil (132.2 mg, 0.75 mmol, 75% yield). ^1H and ^{13}C NMR agreed with the above.

2-Cyclohexyl-1-phenylethan-1-one (**5f**).

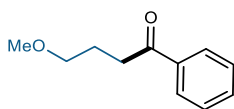


Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure D. The first metalation step was conducted with 280 μL (2.0 mmol) of the corresponding alkyl bromide, 30.8 mg (4.4 mmol) of lithium and 450 μL (4.4 mmol) of Et_2O for 60 minutes and the second addition step was conducted with 165.2 mg (1.0 mmol) of *N*-methoxy-*N*-methylbenzamide for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc. The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc/hexane, 0–5:95) to afford **5f** as a colorless oil (166.9 mg, 0.83 mmol, 83% yield). ^1H and ^{13}C NMR agreed with the literature.¹⁹

^1H NMR (392 MHz, CDCl_3 , δ): 0.95–1.09 (m, 2H), 1.09–1.37 (m, 3H), 1.61–1.81 (m, 5H), 1.91–2.05 (m, 1H), 2.83 (d, $J = 6.7$ Hz, 2H), 7.46 (t, $J = 7.6$ Hz, 2H), 7.51–7.59 (m, 1H), 7.90–7.99 (m, 2H). ^{13}C NMR (99 MHz, CDCl_3 , δ): 26.2 (CH_2), 26.3 (CH_2), 33.4 (CH_2), 34.5 (CH), 46.2 (CH_2), 128.1 (CH), 128.5 (CH), 132.8 (CH), 137.4 (C), 200.2 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{14}\text{H}_{18}\text{O}$, 202.1352; found, 202.1361.

Reaction with 5 minutes at the first step : The reaction was performed according to the general procedure D. The first metalation step was conducted with 280 μL (2.0 mmol) of the corresponding alkyl bromide, 30.6 mg (4.4 mmol) of lithium and 450 μL (4.4 mmol) of Et_2O for 5 minutes and the second addition step was conducted with 166.1 mg (1.0 mmol) of *N*-methoxy-*N*-methylbenzamide for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc. The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ^1H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 90% of **5f** was observed.

4-Methoxy-1-phenylbutan-1-one (5g).



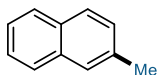
Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure D. The first metalation step was conducted with 220 μL (2.0 mmol) of the corresponding alkyl bromide, 30.4 mg (4.4 mmol) of lithium, and 450 μL (4.4 mmol) of Et_2O for 60 minutes and the second addition step was conducted with 163.6 mg (0.99 mmol) of *N*-methoxy-*N*-methylbenzamide for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc /hexane, 0–7:93) to afford **5g** as a colorless oil (95.9 mg, 0.54 mmol, 54% yield). ^1H and ^{13}C NMR agreed with the literature.²⁰ ^1H NMR (401 MHz, CDCl_3 , δ): 2.03 (quint, $J = 6.6$ Hz, 2H), 3.08 (t, $J = 7.0$ Hz, 2H), 3.34 (s, 3H), 3.48 (t, $J = 6.6$ Hz, 2H), 7.46 (t, $J = 7.8$ Hz, 2H), 7.56 (t, $J = 7.4$ Hz, 1H), 7.95–8.01 (m, 2H). ^{13}C NMR (101 MHz, CDCl_3 , δ): 24.1 (CH_2), 35.0 (CH_2), 58.5 (CH_3), 71.7 (CH_3), 128.0 (CH), 128.5 (CH), 132.9 (CH), 137.0 (C), 199.8 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{11}\text{H}_{14}\text{O}_2$, 178.0988; found, 178.0992.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure D. The first metalation step was conducted with 220 μL (2.0 mmol) of the corresponding alkyl bromide, 30.5 mg (4.4 mmol) of lithium and 450 μL (4.4 mmol) of Et_2O for 5 minutes and the second addition step was conducted with 165.6 mg (1.0 mmol) of *N*-methoxy-*N*-methylbenzamide for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ^1H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 75% of **5g** was observed.

Safety-oriented protocol: The reaction was performed according to the general procedure F. The first metalation step was conducted with 220 μL (2.0 mmol) of the corresponding alkyl bromide, 30.4 mg (4.4 mmol) of lithium, and 450 μL (4.4 mmol) of Et_2O for 60 minutes, and the second addition step was conducted with 165.2 mg (1.0 mmol) of *N*-methoxy-*N*-methylbenzamide for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated,

and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, EtOAc/hexane, 0–10:90) to afford **5g** as a colorless oil (99.9 mg, 0.56 mmol, 56% yield). ¹H and ¹³C NMR agreed with the above.

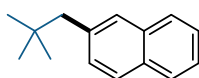
2-Methylnaphthalene (**5h**).



Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure B. The first metalation step was conducted with 190 μ L (3.0 mmol) of the corresponding alkyl iodide, 41.2 mg (6.0 mmol) of lithium, and 620 μ L (6.0 mmol) of Et₂O for 60 minutes, and the second addition step was conducted with 162.6 mg (1.0 mmol) of 2-chloronaphthalene and 78.1 mg (0.10 mmol) of **C1** for 30 minutes. After the reaction, the resulting mixture was quenched by H₂O and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, hexane only) and recycling preparative GPC to afford **5h** as a colorless oil (110.9 mg, 0.78 mmol, 78% yield). ¹H and ¹³C NMR agreed with the literature.²¹ ¹H NMR (399 MHz, CDCl₃, δ): 2.52 (s, 3H), 7.32 (dd, J = 1.4, 8.2 Hz, 1H), 7.37–7.47 (m, 2H), 7.62 (s, 1H), 7.70–7.83 (m, 3H). ¹³C NMR (99 MHz, CDCl₃, δ): 21.9 (CH₃), 125.1 (CH), 126.0 (CH), 127.0 (CH), 127.4 (CH), 127.7 (CH), 127.8 (CH), 128.2 (CH), 131.8 (C), 133.8 (C), 135.6 (C). HRMS-EI (m/z): [M]⁺ calcd for C₁₁H₁₀, 142.0777; found, 142.0770.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure B. The first metalation step was conducted with 190 μ L (3.0 mmol) of the corresponding alkyl iodide, 41.6 mg (6.0 mmol) of lithium, and 620 μ L (6.0 mmol) of Et₂O for 60 minutes, and the second addition step was conducted with 162.6 mg (1.0 mmol) of 2-chloronaphthalene and 78.2 mg (0.10 mmol) of **C1** for 30 minutes. After the reaction, the resulting mixture was quenched by H₂O and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ¹H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 79% of **5h** was observed.

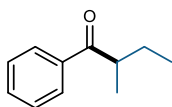
2-Neopentyl naphthalene (**5i**).



Reaction with 60 minutes at the first step: The reaction was performed according to the general procedure B. The first metalation step was conducted with 370 μL (3.0 mmol) of the corresponding alkyl chloride, 41.8 mg (6.1 mmol) of lithium, and 620 μL (6.0 mmol) of Et_2O for 60 minutes, and the second addition step was conducted with 161.9 mg (1.0 mmol) of 2-chloronaphthalene and 78.2 mg (0.10 mmol) of **C1** for 30 minutes. After the reaction, the resulting mixture was quenched by H_2O and then extracted with Et_2O . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , hexane only) and recycling preparative GPC to afford **5i** as a white solid (82.8 mg, 0.42 mmol, 42% yield). ^1H and ^{13}C NMR agreed with the literature.²² ^1H NMR (399 MHz, CDCl_3 , δ): 0.96 (s, 9H), 2.66 (s, 2H), 7.29 (dd, $J = 1.4, 8.6$ Hz, 1H), 7.39–7.47 (m, 2H), 7.57 (s, 1H), 7.74 (d, $J = 8.4$ Hz, 1H), 7.80 (t, $J = 8.6$ Hz, 2H). ^{13}C NMR (99 MHz, CDCl_3 , δ): 29.6 (CH_3), 32.2 (C), 50.5 (CH_2), 125.2 (CH), 125.8 (CH), 127.0 (CH), 127.7 (CH), 128.7 (CH), 129.6 (CH), 132.1 (C), 133.4 (CH), 137.6 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{15}\text{H}_{18}$, 198.1403; found, 198.1408.

Reaction with 5 minutes at the first step: The reaction was performed according to the general procedure B. The first metalation step was conducted with 370 μL (3.0 mmol) of the corresponding alkyl chloride, 41.5 mg (6.0 mmol) of lithium, and 620 μL (6.0 mmol) of Et_2O for 60 minutes, and the second addition step was conducted with 162.6 mg (1.0 mmol) of 2-chloronaphthalene and 78.2 mg (0.10 mmol) of **C1** for 30 minutes. After the reaction, the resulting mixture was quenched by H_2O and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude yield of the corresponding products was determined by ^1H NMR analysis with 1,1,2,2-tetrachloroethane as the internal standard. In this case, 26% of **5i** was observed.

2-Methyl-1-phenylbutan-1-one (**5j**).

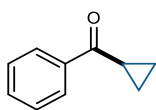


The reaction was performed according to the general procedure E. The reaction was carried out with 270 μL (2.5 mmol) of the corresponding alkyl bromide, 38.0 mg (5.5 mmol) of lithium, 580 μL (5.5 mmol) of Et_2O , and 165.2 mg (1.0 mmol) of *N*-methoxy-*N*-methylbenzamide. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 ,

EtOAc/hexane, 0–5:95) to afford **5j** as a colorless oil (123.4 mg, 0.76 mmol, 76% yield). ^1H and ^{13}C NMR agreed with the literature.²³

^1H NMR (399 MHz, CDCl_3 , δ): 0.92 (t, $J = 7.5$ Hz, 3H), 1.20 (d, $J = 6.7$ Hz, 3H), 1.50 (sept, $J = 7.1$ Hz, 1H), 1.84 (sept, $J = 7.0$ Hz, 1H), 3.41 (sext, $J = 6.7$ Hz, 1H), 7.47 (t, $J = 7.7$ Hz, 2H), 7.51–7.60 (m, 1H), 7.93–8.00 (m, 2H). ^{13}C NMR (99 MHz, CDCl_3 , δ): 11.9 (CH_3), 16.8 (CH_3), 26.7 (CH_2), 42.2 (CH), 128.3 (CH), 128.7 (CH), 132.9 (CH), 136.9 (C), 204.5 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{11}\text{H}_{14}\text{O}$, 162.1039; found, 162.1042.

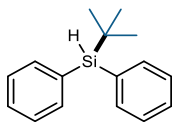
Cyclopropyl(phenyl)methanone (**5k**).



The reaction was performed according to the general procedure E. The reaction was carried out with 200 μL (2.5 mmol) of the corresponding alkyl bromide, 37.3 mg (5.4 mmol) of lithium, 580 μL (5.5 mmol) of Et_2O , and 165.6 mg (1.0 mmol) of *N*-methoxy-*N*-methylbenzamide. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc. The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc/hexane, 0–10:90) to afford **5k** as a colorless oil (121.6 mg, 0.83 mmol, 83% yield). ^1H and ^{13}C NMR agreed with the literature.²⁴

^1H NMR (399 MHz, CDCl_3 , δ): 1.02–1.08 (m, 2H), 1.25 (quint, $J = 3.8$ Hz, 2H), 2.64–2.73 (m, 1H), 7.45–7.52 (m, 2H), 7.57 (tt, $J = 1.7, 7.3$ Hz, 1H), 7.99–8.05 (m, 2H). ^{13}C NMR (99 MHz, CDCl_3 , δ): 11.7 (CH_2), 17.1 (CH), 128.0 (CH), 128.5 (CH), 132.7 (CH), 137.9 (C), 200.6 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{10}\text{H}_{10}\text{O}$, 146.0726; found, 146.0730.

tert-Butyldiphenylsilane (**5l**).

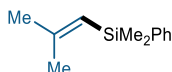


The reaction was performed according to the general procedure E using 10 ml jar and two 10 mm balls instead of 5 ml jar and a 10 mm ball. The reaction was carried out with 440 μL (4.0 mmol) of the corresponding alkyl chloride, 60.1 mg (8.7 mmol) of lithium, 930 μL (5.5 mmol) of Et_2O , and 183.2 mg (0.99 mmol) of diphenylsilane. After the reaction, the resulting mixture was quenched by MeOH and then extracted with DCM. The resultant solution was dried over MgSO_4 ,

filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, hexane only) and recycling preparative GPC to afford **5l** as a colorless oil (157.7 mg, 0.66 mmol, 66% yield). ¹H and ¹³C NMR agreed with the literature.²⁵

¹H NMR (399 MHz, CDCl₃, δ): 1.07 (s, 9H), 4.63 (s, 1H), 7.32–7.43 (m, 6H), 7.64–7.70 (m, 4H). ¹³C NMR (99 MHz, CDCl₃, δ): 18.0 (C), 27.7 (CH₃), 128.0 (CH), 129.5 (CH), 134.1 (C), 135.9 (CH). HRMS-EI (*m/z*): [M]⁺ calcd for C₁₆H₂₀Si, 240.1329; found, 240.1334.

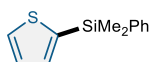
Dimethyl(2-methylprop-1-en-1-yl)(phenyl)silane (**5m**).



The reaction was performed according to the general procedure E. The reaction was carried out with 256 μL (2.5 mmol) of the corresponding vinyl bromide, 38.1 mg (5.5 mmol) of lithium, 580 μL (5.5 mmol) of Et₂O, and 137.1 mg (1.0 mmol) of HSiMe₂Ph. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, hexane only) to afford **5m** as a colorless oil (142.6 mg, 0.75 mmol, 74% yield). ¹H and ¹³C NMR agreed with the literature.²⁶

¹H NMR (399 MHz, CDCl₃, δ): 0.35 (s, 6H), 1.71 (s, 3H), 1.89 (d, *J* = 1.6 Hz, 3H), 5.32–5.37 (m, 1H), 7.30–7.39 (m, 3H), 7.50–7.58 (m, 2H). ¹³C NMR (101 MHz, CDCl₃, δ): –0.8 (CH₃), 23.7 (CH₃), 29.7 (CH₃), 122.0 (CH), 127.9 (CH), 128.8 (CH), 133.9 (CH), 140.3 (C), 153.9 (C). HRMS-EI (*m/z*): [M]⁺ calcd for C₁₂H₁₈Si, 190.1172; found, 190.1178.

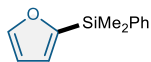
Dimethyl(phenyl)(thiophen-2-yl)silane (**5n**).



The reaction was performed according to the general procedure E. The reaction was carried out with 240 μL (2.5 mmol) of 2-bromothiophene, 38.1 mg (5.5 mmol) of lithium, 580 μL (5.5 mmol) of Et₂O, and 136.3 mg (1.0 mmol) of HSiMe₂Ph. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, hexane only) and recycling preparative GPC to afford **5n** as a colorless oil (131.2 mg, 0.60 mmol, 60% yield). ¹H and ¹³C NMR agreed with the literature.⁷

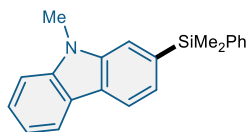
¹H NMR (401 MHz, CDCl₃, δ): 0.60 (s, 6H), 7.20 (dd, *J* = 3.2, 4.4 Hz, 1H), 7.29 (d, *J* = 3.2 Hz, 1H), 7.32–7.43 (m, 3H), 7.51–7.60 (m, 2H), 7.63 (d, *J* = 4.0 Hz, 1H). ¹³C NMR (101 MHz, CDCl₃, δ): –1.1 (CH₃), 128.0 (CH), 128.3 (CH), 129.5 (CH), 131.3 (CH), 134.0 (CH), 135.5 (CH), 137.8 (C), 137.9 (C). HRMS-EI (*m/z*): [M]⁺ calcd for C₁₂H₁₄SSi, 218.0580; found, 218.0585.

Furan-2-yl(dimethyl(phenyl)silane (5o).



The reaction was performed according to the general procedure E. The reaction was carried out with 368.1 mg (2.5 mmol) of 2-bromofuran, 38.1 mg (5.5 mmol) of lithium, 580 μ L (5.5 mmol) of Et₂O, and 136.3 mg (1.0 mmol) of HSiMe₂Ph. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, Et₂O/hexane, 0–10:90) and recycling preparative GPC to afford **5o** as a colorless oil (139.6 mg, 0.69 mmol, 69% yield). ¹H and ¹³C NMR agreed with the literature.²⁷ ¹H NMR (401 MHz, CDCl₃, δ): 0.55 (s, 6H), 6.40 (dd, J = 0.8, 3.2 Hz, 1H), 6.67 (d, J = 3.2 Hz, 1H), 7.32–7.42 (m, 3H), 7.52–7.60 (m, 2H), 7.67–7.71 (m, 1H). ¹³C NMR (101 MHz, CDCl₃, δ): –2.8 (CH₃), 109.6 (CH), 121.2 (CH), 128.0 (CH), 129.5 (CH), 134.1 (CH), 137.1 (C), 147.3 (CH), 158.3 (C). HRMS-EI (m/z): [M]⁺ calcd for C₁₂H₁₄OSi, 202.0808; found, 202.0811.

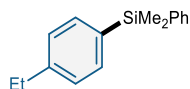
2-(Dimethyl(phenyl)silyl)-9-methyl-9H-carbazole (5p).



The reaction was performed according to the general procedure E. The reaction was carried out with 616.9 mg (2.5 mmol) of 2-bromo-9-methyl-9H-carbazole, 38.1 mg (5.5 mmol) of lithium, 580 μ L (5.5 mmol) of Et₂O, and 136.3 mg (1.0 mmol) of HSiMe₂Ph. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et₂O. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, EtOAc/hexane, 0–7:93) and recycling preparative GPC to afford **5p** as a white solid (106.1 mg, 0.34 mmol, 34% yield).

¹H NMR (401 MHz, CDCl₃, δ): 0.65 (s, 6H), 3.84 (s, 6H), 7.32 (t, J = 8.2 Hz, 1H), 7.31–7.43 (m, 5H), 7.48 (t, J = 7.8 Hz, 1H), 7.52–7.62 (m, 3H), 8.09 (d, J = 7.6 Hz, 2H). ¹³C NMR (101 MHz, CDCl₃, δ): –1.8 (CH₃), 29.1 (CH₃), 108.6 (CH), 114.2 (CH), 118.9 (CH), 119.9 (CH), 120.6 (CH), 122.7 (C), 123.7 (C), 124.6 (CH), 126.1 (CH), 127.9 (CH), 129.2 (CH), 134.4 (CH), 135.1 (C), 138.9 (C), 140.7 (C), 141.2 (C). HRMS-EI (m/z): [M]⁺ calcd for C₂₁H₂₁NSi, 315.1438; found, 315.1437.

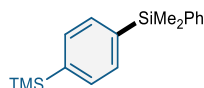
(4-Ethylphenyl)dimethyl(phenyl)silane (6a).



The reaction was performed according to the general procedure A. The first metalation step was conducted with 320 μL (2.5 mmol) of the corresponding aryl fluoride, 38.1 mg (5.5 mmol) of lithium and 450 μL (5.5 mmol) of THF for 5 minutes, and the second addition step was conducted with 136.4 mg (1.0 mmol) of HSiMe_2Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et_2O . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , hexane only) and recycling preparative GPC to afford **6a** as a colorless oil (155.1 mg, 0.65 mmol, 64% yield). ^1H and ^{13}C NMR agreed with the literature.⁷

^1H NMR (392 MHz, CDCl_3 , δ): 0.54 (s, 6H), 1.24 (t, $J = 7.8$ Hz, 3H), 2.64 (q, $J = 7.6$ Hz, 2H), 7.20 (d, $J = 8.0$ Hz, 2H), 7.30–7.39 (m, 3H), 7.45 (d, $J = 8.0$ Hz, 2H), 7.49–7.56 (m, 2H). ^{13}C NMR (99 MHz, CDCl_3 , δ): -2.2 (CH_3), 15.6 (CH_3), 29.0 (CH_2), 127.6 (CH), 127.9 (CH), 129.1 (CH), 134.3 (CH), 134.4 (CH), 135.0 (C), 138.6 (C), 145.4 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{16}\text{H}_{20}\text{Si}$, 240.1329; found, 240.1337.

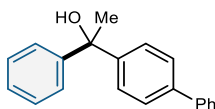
{4-[Dimethyl(phenyl)silyl]phenyl}trimethylsilane (6b).



The reaction was performed according to the general procedure A. The first metalation step was conducted with 420.1 mg (2.5 mmol) of the corresponding aryl fluoride, 38.5 mg (5.6 mmol) of lithium, and 450 μL (5.5 mmol) of THF for 5 minutes, and the second addition step was conducted with 135.3 mg (0.99 mmol) of HSiMe_2Ph for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et_2O . The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , hexane only) and recycling preparative GPC to afford **6b** as a colorless oil (170.7 mg, 0.60 mmol, 61% yield).

^1H NMR (396 MHz, CDCl_3 , δ): 0.26 (s, 9H), 0.55 (s, 6H), 7.31–7.40 (m, 3H), 7.49–7.56 (m, 6H). ^{13}C NMR (101 MHz, CDCl_3 , δ): -2.3 (CH_3), -1.1 (CH_3), 127.9 (CH), 129.3 (CH), 132.8 (CH), 133.6 (CH), 134.3 (CH), 138.3 (C), 138.9 (C), 141.5 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{17}\text{H}_{24}\text{Si}_2$, 284.1411; found, 284.1421.

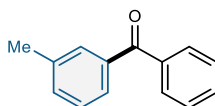
1-[(1,1'-biphenyl)-4-yl]-1-phenylethan-1-ol (**6c**).



The reaction was performed according to the general procedure A. The first metalation step was conducted with 190 μL (2.0 mmol) of the corresponding aryl fluoride, 30.4 mg (4.4 mmol) of lithium, and 360 μL (4.4 mmol) of THF for 5 minutes, and the second addition step was conducted with 196.3 mg (1.0 mmol) of 1-[(1,1'-biphenyl)-4-yl]ethan-1-one for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc. The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc/hexane, 0–10:90) to afford **6c** as a white solid (148.2 mg, 0.54 mmol, 54% yield). ^1H and ^{13}C NMR agreed with the literature.²⁸

^1H NMR (392 MHz, CDCl_3 , δ): 2.00 (s, 3H), 2.20 (s, 1H), 7.23–7.29 (m, 1H), 7.30–7.39 (m, 3H), 7.39–7.51 (m, 6H), 7.52–7.60 (m, 4H). ^{13}C NMR (99 MHz, CDCl_3 , δ): 30.9 (CH_3), 76.2 (C), 125.9 (CH), 126.4 (CH), 127.0 (CH), 127.1 (CH), 127.2 (CH), 127.4 (CH), 128.3 (CH), 128.9 (CH), 139.9 (C), 140.8 (C), 147.1 (C), 148.0 (C). HRMS-EI (m/z): $[\text{M}]^+$ calcd for $\text{C}_{20}\text{H}_{18}\text{O}$, 274.1352; found, 274.1362.

Phenyl(*m*-tolyl)methanone (**6d**).

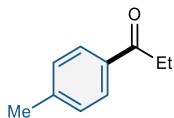


The reaction was performed according to the general procedure A. The first metalation step was conducted with 220 μL (2.0 mmol) of the corresponding aryl fluoride, 29.7 mg (4.4 mmol) of lithium, and 360 μL (4.4 mmol) of THF for 5 minutes, and the second addition step was conducted with 164.9 mg (1.0 mmol) of *N*-methoxy-*N*-methylbenzamide for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc. The resultant solution was dried over MgSO_4 , filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc/hexane, 0–10:90) to afford **6d** as a white solid (137.5 mg, 0.70 mmol, 70% yield). ^1H and ^{13}C NMR agreed with the literature.¹³

^1H NMR (396 MHz, CDCl_3 , δ): 2.42 (s, 3H), 7.33–7.44 (m, 2H), 7.44–7.53 (m, 2H), 7.55–7.67 (m, 3H), 7.76–7.84 (m, 2H). ^{13}C NMR (99 MHz, CDCl_3 , δ): 21.4 (CH_3), 127.4 (CH), 128.1 (CH),

128.3 (CH), 130.1 (CH), 130.5 (CH), 132.4 (CH), 133.2 (CH), 137.6 (C), 137.8 (C), 138.2 (C), 197.0 (C). HRMS-EI (m/z): $[M]^+$ calcd for $C_{14}H_{12}O$, 196.0883; found, 196.0885.

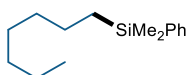
1-(*p*-Tolyl)propan-1-one (6e).



The reaction was performed according to the general procedure A. The first metalation step was conducted with 220 μ L (2.0 mmol) of the corresponding aryl fluoride, 30.7 mg (4.4 mmol) of lithium, and 360 μ L (4.4 mmol) of THF for 5 minutes, and the second addition step was conducted with 116.2 mg (0.99 mmol) of *N*-methoxy-*N*-methylpropionamide for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH_4Cl and then extracted with EtOAc. The resultant solution was dried over $MgSO_4$, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , EtOAc/hexane, 0–5:95) to afford **6e** as a colorless oil (89.9 mg, 0.61 mmol, 61% yield). ^1H and ^{13}C NMR agreed with the literature.²⁹

^1H NMR (392 MHz, $CDCl_3$, δ): 1.23 (t, J = 7.1 Hz, 3H), 2.14 (s, 3H), 2.99 (q, J = 7.2 Hz, 2H), 7.26 (d, J = 5.5 Hz, 2H), 7.87 (d, J = 7.8 Hz, 2H). ^{13}C NMR (99 MHz, $CDCl_3$, δ): 8.5 (CH_3), 21.8 (CH_3), 31.8 (CH_2), 128.2 (CH), 129.4 (CH), 134.6 (C), 143.7 (C), 200.7 (C). HRMS-EI (m/z): $[M]^+$ calcd for $C_{10}H_{12}O$, 148.0883; found, 148.0887.

Heptyldimethyl(phenyl)silane (6f).

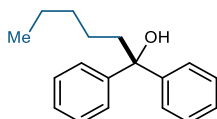


The reaction was performed according to the general procedure A. The first metalation step was conducted with 370 μ L (2.5 mmol) of the corresponding alkyl fluoride, 38.6 mg (5.6 mmol) of lithium, and 450 μ L (5.5 mmol) of THF for 5 minutes, and the second addition step was conducted with 135.0 mg (0.99 mmol) of $HSiMe_2Ph$ for 15 minutes. After the reaction, the resulting mixture was quenched by MeOH and then extracted with Et_2O . The resultant solution was dried over $MgSO_4$, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO_2 , hexane only) and recycling preparative GPC to afford **6f** as a colorless oil (121.6 mg, 0.52 mmol, 52% yield).

^1H NMR (392 MHz, $CDCl_3$, δ): 0.25 (s, 6H), 0.73 (t, J = 7.6 Hz, 2H), 0.87 (t, J = 6.9 Hz, 3H), 1.15–1.38 (m, 10H), 7.31–7.39 (m, 3H), 7.47–7.55 (m, 2H). ^{13}C NMR (99 MHz, $CDCl_3$, δ): –2.9

(CH₃), 14.3 (CH₃), 15.9 (CH₂), 22.9 (CH₂), 24.1 (CH₂), 29.2 (CH₂), 32.0 (CH₂), 33.8 (CH₂), 127.8 (CH), 128.9 (CH), 133.7 (CH), 139.9 (C). HRMS-EI (*m/z*): [M-Me]⁺ calcd for C₁₄H₂₃Si, 219.1564; found, 219.1570.

1,1-Diphenylhexan-1-ol (**6g**).

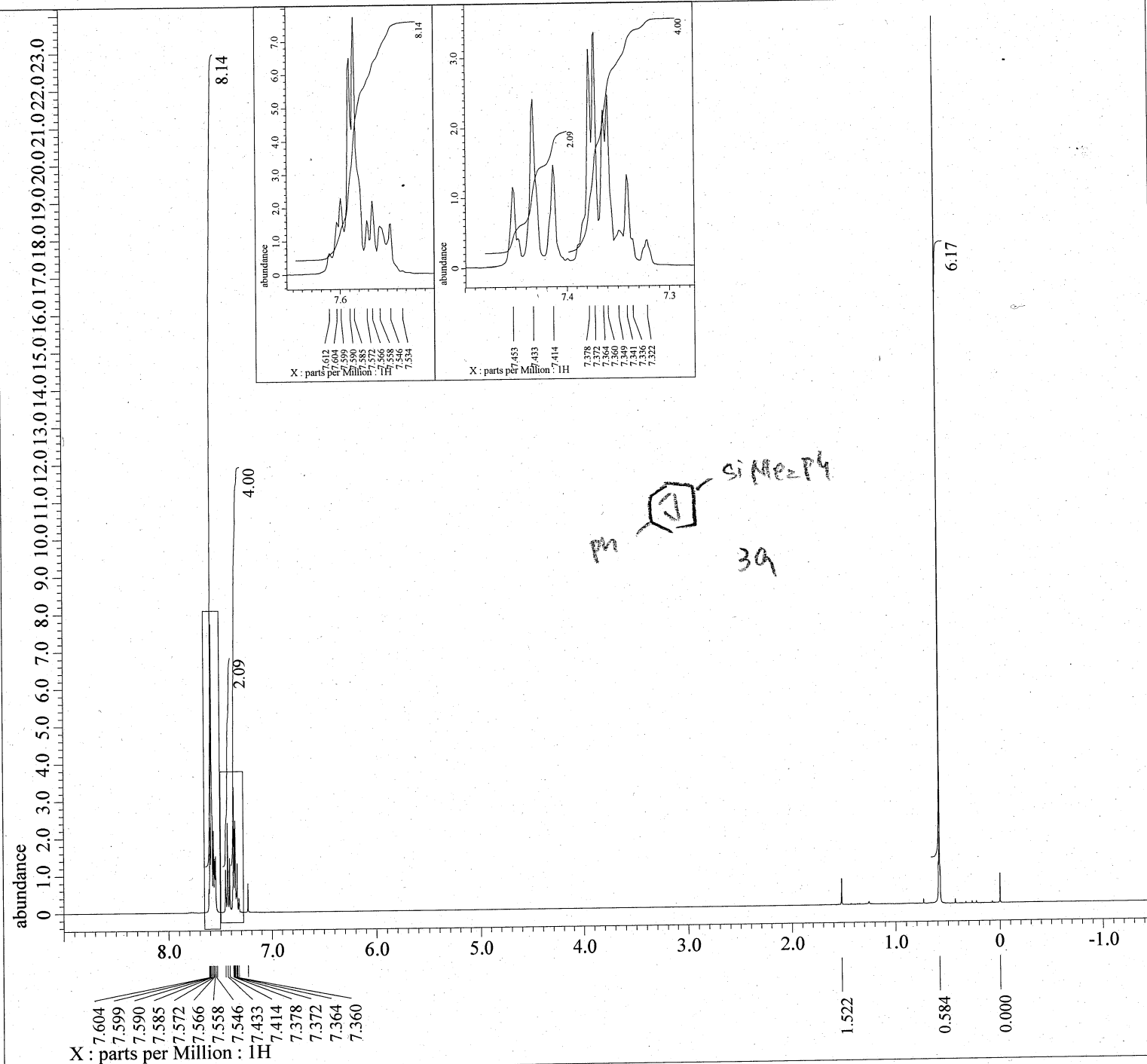


The reaction was performed according to the general procedure D. The first metalation step was conducted with 290 μ L (2.5 mmol) of the corresponding alkyl fluoride, 38.0 mg (5.5 mmol) of lithium, and 450 μ L (5.5 mmol) of THF for 5 minutes and the second addition step was conducted with 181.2 mg (0.99 mmol) of benzophenone for 15 minutes. After the reaction, the resulting mixture was quenched by a saturated aqueous solution of NH₄Cl and then extracted with EtOAc. The resultant solution was dried over MgSO₄, filtrated, and evaporated in vacuo. The crude mixture was purified by silica-gel column chromatography (SiO₂, EtOAc/hexane, 0–10:90) to afford **6g** as a colorless oil (203.0 mg, 0.80 mmol, 80% yield). ¹H and ¹³C NMR agreed with the literature.³⁰

¹H NMR (399 MHz, CDCl₃, δ): 0.80–0.90 (m, 3H), 1.20–1.36 (m, 6H), 2.09 (s, 1H), 2.21–2.32 (m, 2H), 7.18–7.24 (m, 2H), 7.31 (t, *J* = 7.2 Hz, 4H), 7.38–7.44 (m, 4H). ¹³C NMR (99 MHz, CDCl₃, δ): 14.2 (CH₃), 22.7 (CH₂), 23.5 (CH₂), 32.3 (CH₂), 42.0 (CH₂), 78.3 (C), 126.1 (CH), 126.8 (CH), 128.2 (CH), 147.3 (C). HRMS-ESI (*m/z*): [M+Na]⁺ calcd for C₁₈H₂₂ONa, 277.1563; found, 277.1563.

13. References

1. Khan, I.; Reed-Berendt, B. G.; Melen, R. L.; Morrill, L. C. *Angew. Chem. Int. Ed.* **2018**, *57*, 12356.
2. Fürstner, A.; Leitner, A.; Méndez, M.; Krause, H. *J. Am. Chem. Soc.* **2002**, *124*, 13856.
3. Kamio, S.; Nakamoto, M.; Yamagishi, T.; Oestreich, M.; Yoshida, H. *Chem. Commun.* **2024**, *60*, 6379.
4. Lee, H.-J.; Kwak, C.; Kim, D.-P.; Kim, H. *Green Chem.* **2021**, *23*, 1193.
5. Guo, H.; Chen, X.; Zhao, C.; He, W. *Chem. Commun.* **2015**, *51*, 17410.
6. Murakami, K.; Hirano, K.; Yorimitsu, H.; Oshima, K. *Angew. Chem. Int. Ed.* **2008**, *47*, 5833.
7. Zong, L.; Sun, R.; Hu, X.; Zhang, J.; Luan, Y. Xu, Z.; Xie, C.; Li, X.; Sun, F.-G.; Liu, H.; Liu, Z.-Q.; Zhao, Z.; Zhan, L. *Adv. Synth. Catal.* **2024**, *366*, 1509.
8. Mallick, S.; Xu, P.; Würthwein, E.-U.; Studr, A. *Angew. Chem. Int. Ed.* **2019**, *58*, 283.
9. Hatano, M.; Ito, O.; Suzuki, S.; Ishihara, K. *J. Org. Chem.* **2010**, *75*, 5008.
10. Nico, S.; Coraline, M.; Rino, S.; Elisabeth, O.; Antonio, T. *Eur. J. Org. Chem.* **2015**, 1925.
11. Chen, D.; Zhang, Y.; Pan, X.; Wang, F.; Huang, S. *Adv. Synth. Catal.* **2018**, *360*, 3607.
12. Ciszek, B.; Fleoscher, I. *Chem. Eur. J.* **2018**, *24*, 12259.
13. Wu, H.; Sumita, A.; Otani, Y.; Ohwada, T. *J. Org. Chem.* **2022**, *87*, 15224.
14. Ding, J.; Luo, S.; Xu, Y.; An, Q.; Yang, Y.; Zuo, Z. *Chem. Commun.* **2023**, *59*, 4055.
15. Jin, M.-J.; Lee, D.-H. *Angew. Chem. Int. Ed.* **2010**, *49*, 1119.
16. Khan, D.; Parveen, I. *Eur. J. Org. Chem.* **2021**, 4946.
17. Tang, L.; Lv, G.; Jia, F.; Zhao, R.; Wang, X.; Zhou, Q. *Adv. Synth. Catal.* **2024**, *366*, 70.
18. Zhang, Y.; Sun, H.; Chen, Y.; Shi, Y.; Yu, L. *Org. Lett.* **2023**, *25*, 7928.
19. Li, Y.-J.; Liu, D.-G.; Ren, J.-H.; Gong, T.-J.; Fu, Y. *J. Org. Chem.* **2023**, *88*, 4325.
20. Lu, Y.; Kasahara, A.; Hyodo, T.; Ohara, K.; Yamaguchi, K.; Otani, Y.; Ohwada, T. *Org. Lett.* **2023**, *25*, 3482.
21. Han, B.; Ren, C.; Jiang, M.; Wu, L. *Angew. Chem. Int. Ed.* **2022**, *61*, e202209232.
22. Takahashi, R.; Hu, A.; Gao, P.; Gao, Y.; Pang, Y.; Seo, T.; Maeda, S.; Jiang, J.; Takaya, H.; Kubota, K.; Ito, H. *Nat. Commun.* **2021**, *12*, 6691.
23. Quan, Xu.; Kerdphon, S.; Andersson, P. G. *Chem. Eur. J.* **2015**, *21*, 3576.
24. Huang, J.; Luo, Y.-X.; Wang, L.; Tang, X.-Y. *Org. Lett.* **2023**, 5613.
25. Ke, J.; Liu, W.; Zhu, X.; Tan, X.; He, C. *Angew. Chem. Int. Ed.* **2021**, *60*, 8744.
26. Zhang, L.; Oestreich, M. *Org. Lett.* **2018**, *20*, 8061.
27. Deng, X.-Z.; Chen, Z.-Y.; Song, Y.; Xue, F.; Yamane, M.; Yue, Y.-N. *J. Org. Chem.* **2021**, *86*, 12693.
28. Čubiňák, M.; Eigner, V.; Tobrman, T. *Adv. Synth. Catal.* **2018**, *360*, 4604.
29. Liang, J.-Y.; Su, Y.-W.; Zou, Y.-Q. *Chem. Commun.* **2023**, *59*, 1468.
30. Fournier, A. M.; Clayden, J. *Org. Lett.* **2012**, *14*, 142.



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(0.2[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

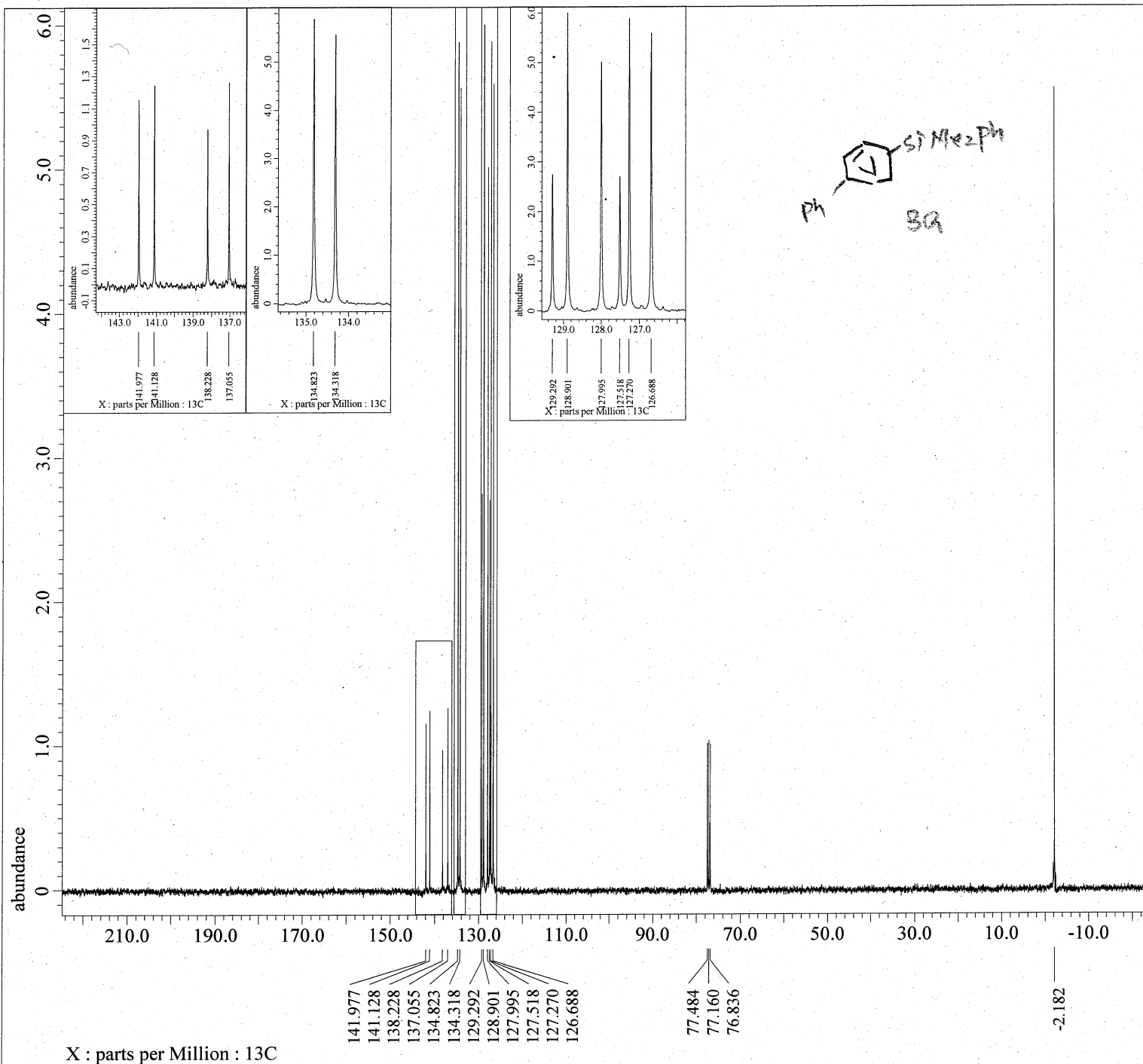
Derived from: KND_1197_pure-1.jdf

Filename = KND_1197_pure-2.jdf
 Author = element
 Experiment = single_pulse.ex2
 Sample_Id = S#775817
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 6-JAN-2024 03:50:53
 Revision_Time = 24-NOV-2024 15:32:24

Comment = single pulse
 Data_Format = 1D COMPLEX
 Dim_Size = 13107
 X_Domain = 1H
 Dim_Title = 1H
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 2.228224[s]
 X_Domain = 1H
 X_Freq = 391.78655441[MHz]
 X_Offset = 5[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.44878791[Hz]
 X_Sweep = 7.35294118[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Tri_Domain = 1H
 Tri_Freq = 391.78655441[MHz]
 Tri_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 38
 Temp_Get = 18.5[deg]
 X_90_Width = 10.79[us]
 X_Acq_Time = 2.228224[s]
 X_Angle = 45[deg]
 X_Atn = 1.9[dB]
 X_Pulse = 5.395[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.228224[s]



---- PROCESSING PARAMETERS ----
 dc_balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

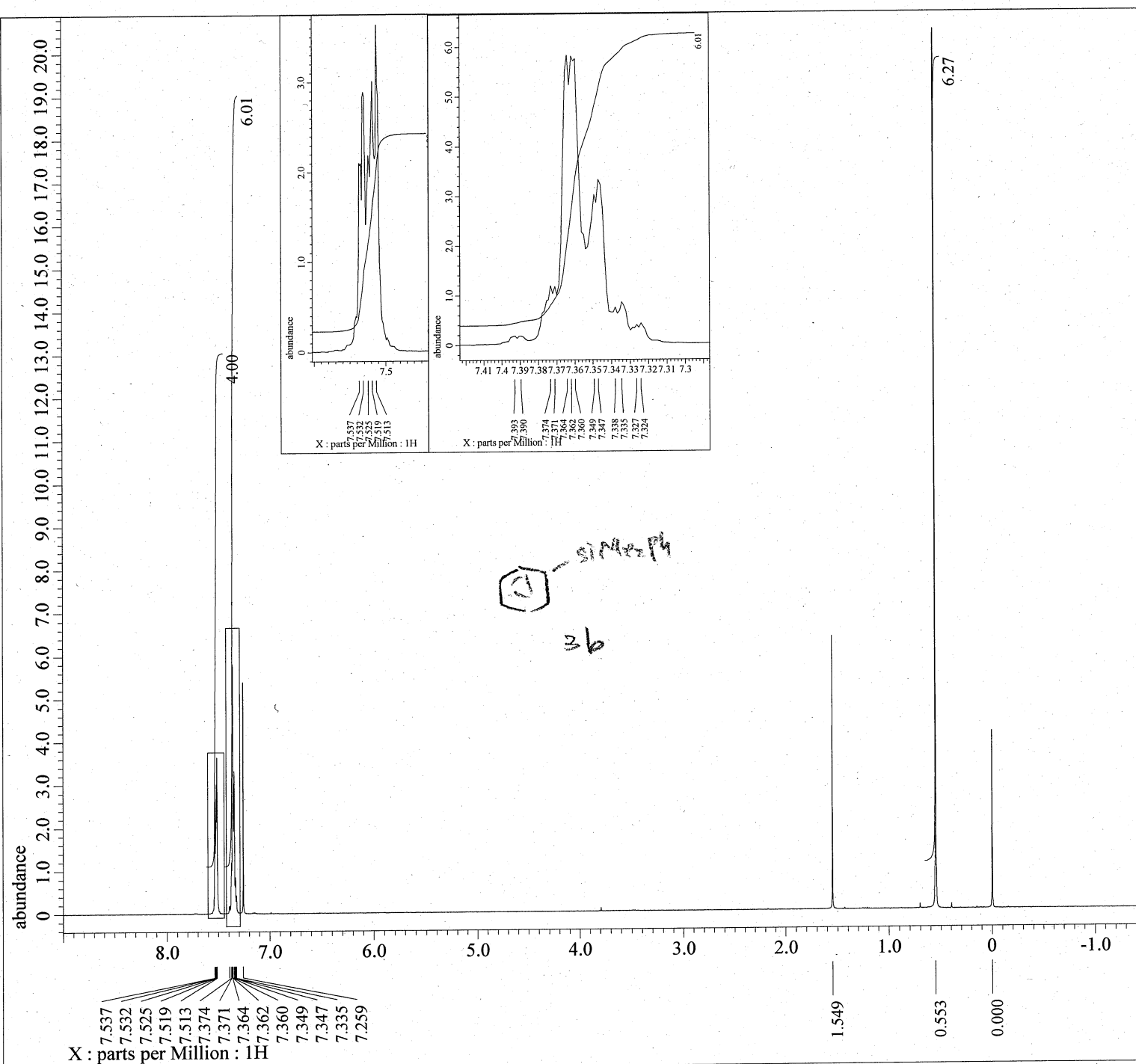
Derived from: KND_1197_13C-1.jdf

Filename = KND_1197_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 6-JAN-2024 04:02:19
 Revision_Time = 28-JAN-2024 00:01:32

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim Size = 26214
 X Domain = 13C
 Dim Title = 13C
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 34
 Total_Scans = 34

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 18.7[dC]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_No = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1205_pure-1.jdf

```

Filename      = KND_1205_pure-2.jdf
Author       = element
Experiment   = single_pulse.ex2
Sample_Id    = S#795908
Solvent      = CHLOROFORM-D
Actual_Start_Time = 6-JAN-2024 04:24:04
Revision_Time  = 24-NOV-2024 15:38:16

```

```

Comment      = single_pulse
Data_Format   = 1D_COMPLEX
Dim_Size      = 13107
X_Domain      = 1H
Dim_Title     = 1H
Dim_Units     = [ppm]
Dimensions    = X
Site          = ECS 400
Spectrometer  = JNM-ECS400

```

```

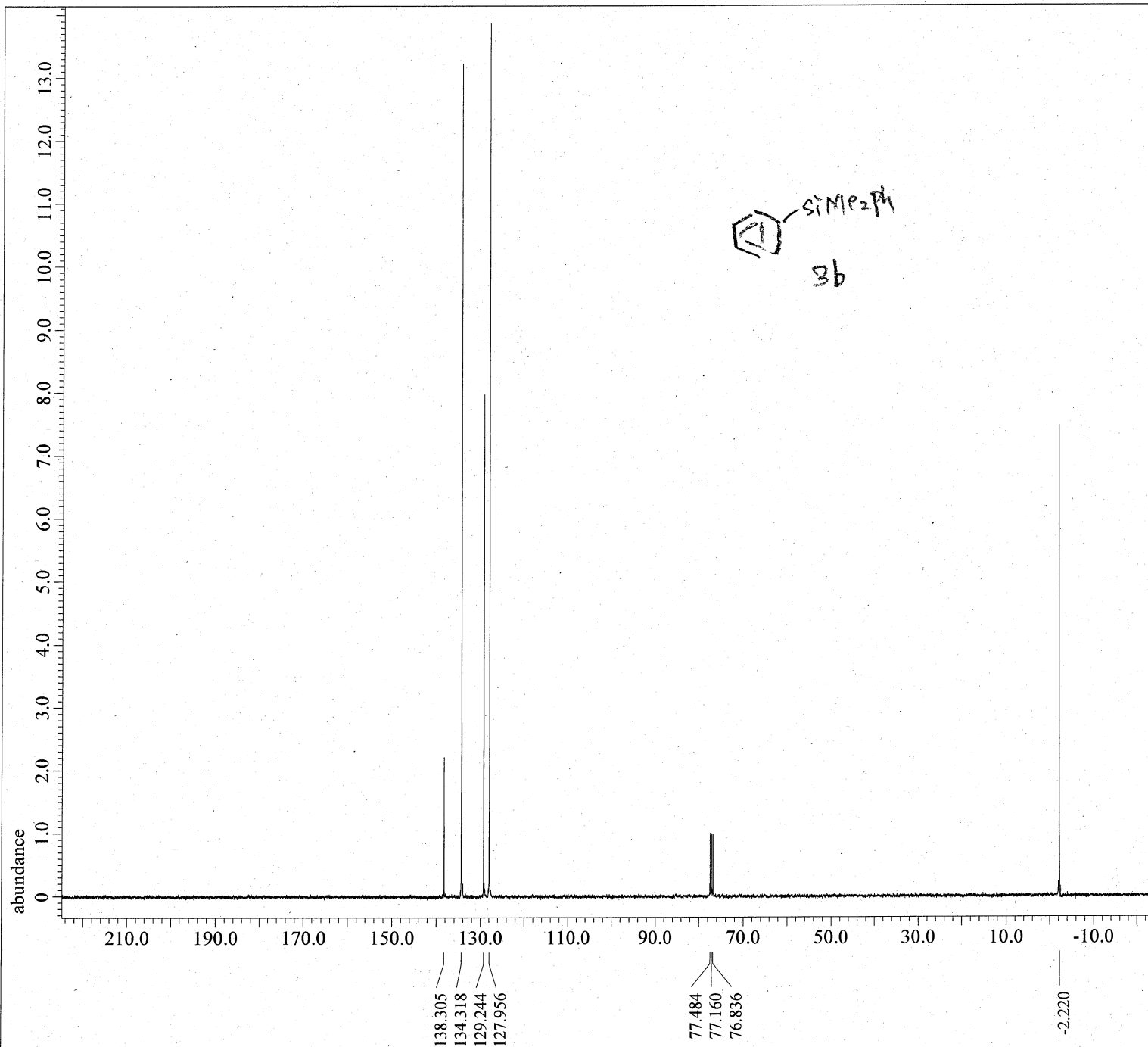
Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 2.228224[s]
X_Domain       = 1H
X_Freq         = 391.78655441[MHz]
X_Offset       = 5[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.44878791[Hz]
X_Sweep        = 7.35294118[kHz]
Irr_Domain     = 1H
Irr_Freq       = 391.78655441[MHz]
Irr_Offset     = 5[ppm]
Tri_Domain     = 1H
Tri_Freq       = 391.78655441[MHz]
Tri_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

```

```

Relaxation_Delay = 5[s]
Recvr_Gain       = 54
Temp_Get         = 18.4[dC]
X_90_Width       = 10.79[us]
X_Acq_Time       = 2.228224[s]
X_Angle          = 45[deg]
X_Atn            = 1.9[dB]
X_Pulse          = 5.395[us]
Irr_Mode         = Off
Tri_Mode         = Off
Dante_Preset     = FALSE
Initial_Wait     = 1[s]
Repetition_Time  = 7.228224[s]

```



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 2.0[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1205_13C-1.jdf

```

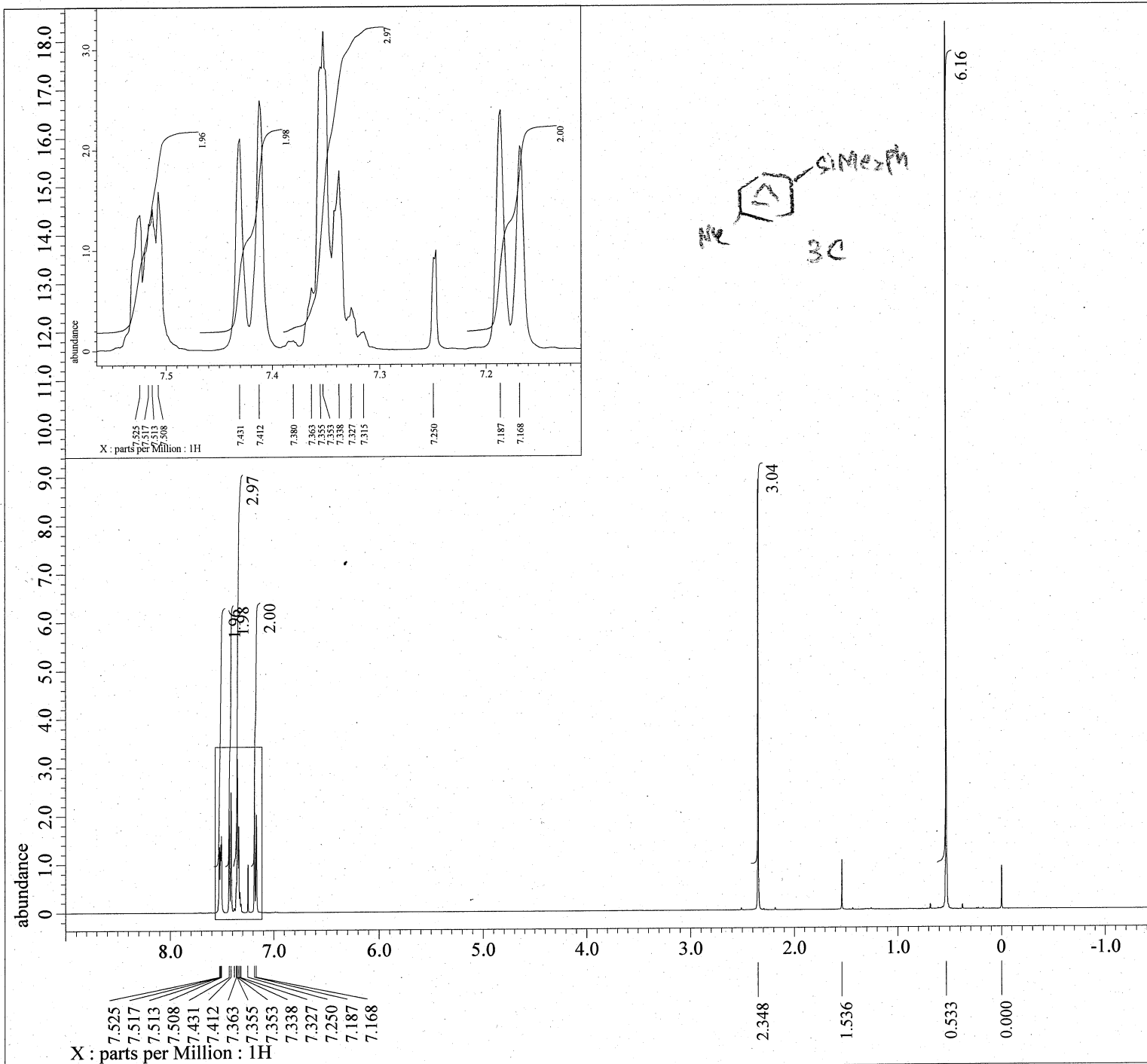
Filename      = KND_1205_13C-2.jdf
Author       = element
Experiment   = single_pulse_dec
Sample_Id    = 1
Solvent      = CHLOROFORM-D
Actual_Start_Time = 6-JAN-2024 04:35:19
Revision_Time  = 28-JAN-2024 00:14:10

Comment      = single pulse decoupled ga
Data_Format  = 1D COMPLEX
Dim_Size     = 26214
X_Domain     = 13C
Dim_Title    = 13C
Dim_Units    = [ppm]
Dimensions   = X
Site         = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain       = 13C
X_Freq         = 98.51479726[MHz]
X_Offset       = 100[ppm]
X_Points       = 32768
X_Prescans     = 4
X_Resolution   = 0.93958061[Hz]
X_Sweep        = 30.78817734[kHz]
Irr_Domain     = 1H
Irr_Freq       = 391.78655441[MHz]
Irr_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 23
Total_Scans    = 23

Relaxation_Delay = 2[s]
Recvr_Gain       = 60
Temp_Get         = 18.6[dC]
X_90_Width       = 9.46[us]
X_Acq_Time       = 1.06430464[s]
X_Angle          = 30[deg]
X_Atn            = 4.9[dB]
X_Pulse          = 3.15333333[us]
Irr_Atn_Dec      = 22.45[dB]
Irr_Atn_Noise    = 22.45[dB]
Irr_Noise        = WALTZ
Decoupling       = TRUE
Initial_Wait     = 1[s]
Noe              = TRUE
Noe_Time         = 2[s]
Repetition_Time  = 3.06430464[s]

```



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(0.2[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

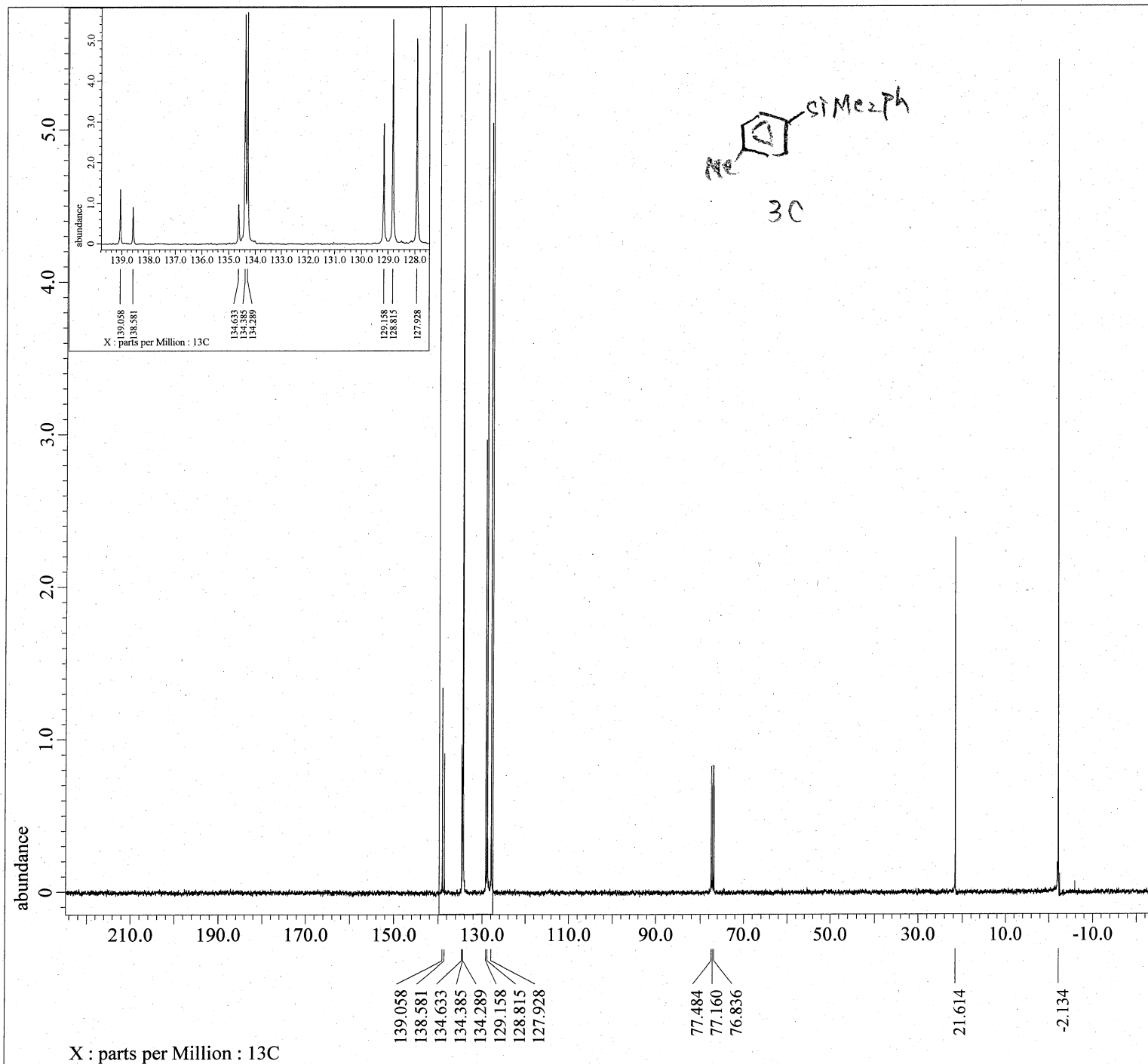
Derived from: KND_1206_pure-1.jdf

Filename = KND_1206_pure-2.jdf
 Author = element
 Experiment = single_pulse.ex2
 Sample_Id = S#813590
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 6-JAN-2024 04:53:49
 Revision_Time = 24-NOV-2024 15:42:03

Comment = single_pulse
 Data_Format = 1D COMPLEX
 Dim_Size = 13107
 X_Domain = 1H
 Dim_Title = 1H
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 2.228224[s]
 X_Domain = 1H
 X_Freq = 391.78655441[MHz]
 X_Offset = 5[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.44878791[Hz]
 X_Sweep = 7.35294118[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Tri_Domain = 1H
 Tri_Freq = 391.78655441[MHz]
 Tri_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 42
 Temp_Get = 18.4[dC]
 X_90_Width = 10.79[us]
 X_Acq_Time = 2.228224[s]
 X_Angle = 45[deg]
 X_Atn = 1.9[dB]
 X_Pulse = 5.395[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.228224[s]



----- PROCESSING PARAMETERS -----
dc_balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid3(0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

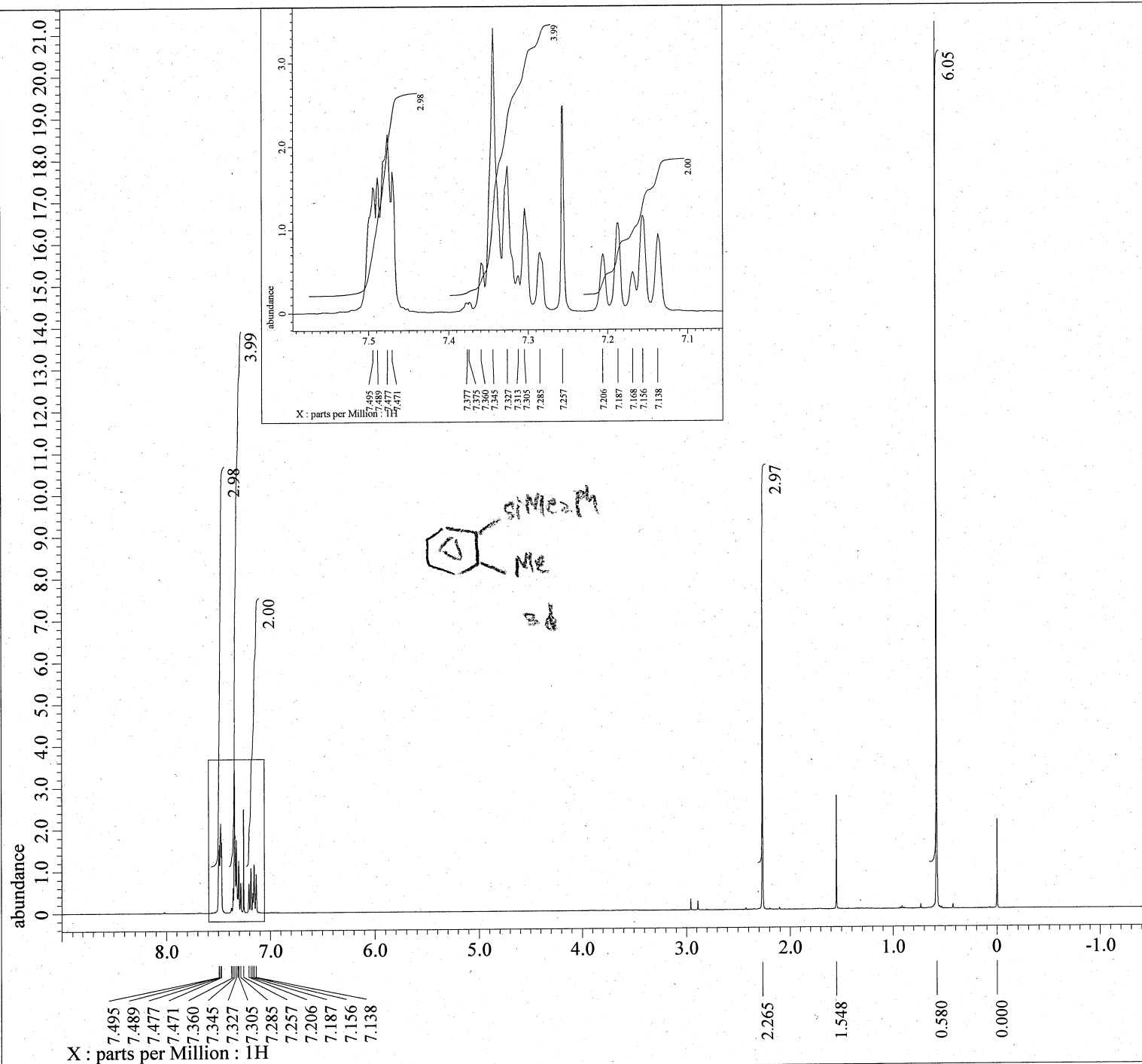
Derived from: KND_1206_13C-1.jdf

Filename = KND_1206_13C-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = 1
Solvent = CHLOROFORM-D
Actual_Start_Time = 6-JAN-2024 05:05:49
Revision_Time = 28-JAN-2024 00:23:29

Comment = single pulse decoupled ga
Data Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = ^{13}C
Dim_Title = ^{13}C
Dim_Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain = ^{13}C
X_Freq = 98.51479726[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.93958061[Hz]
X_Sweep = 30.78817734[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 71
Total_Scans = 71

Relaxation_Delay = 2[s]
Recvr_Gain = 60
Temp_Get = 18.7[dC]
X_90_Width = 9.46[us]
X_Acq_Time = 1.06430464[s]
X_Angle = 30[deg]
X_Atn = 4.9[dB]
X_Pulse = 3.15333333[us]
Irr_Atn_Dec = 22.45[dB]
Irr_Atn_Noise = 22.45[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.06430464[s]



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

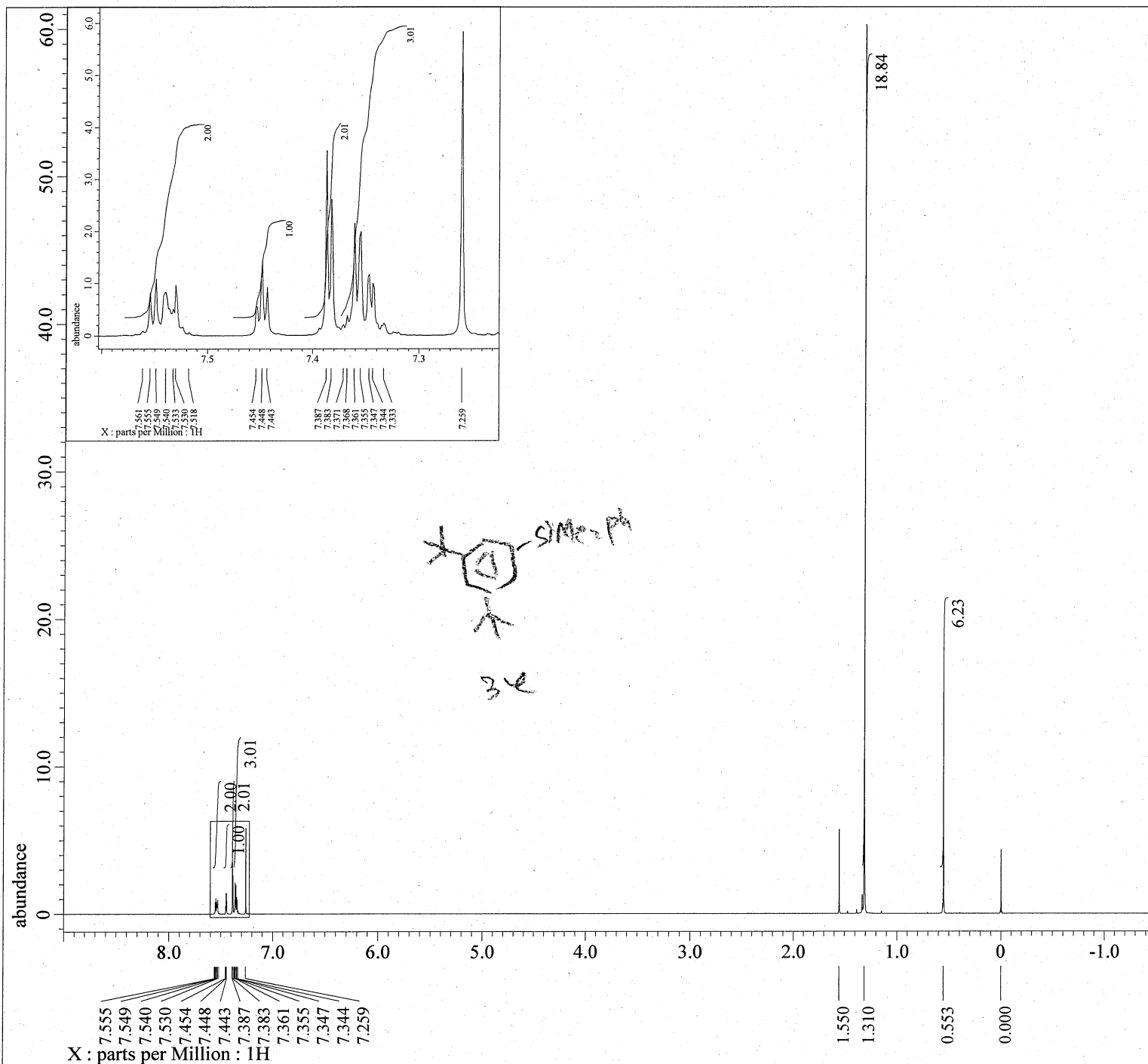
```

```

Filename      = KND_1211_pure-2.jdf
Author        = element
Experiment     = single_pulse.ex2
Sample Id     = S#835735
Solvent        = CHLOROFORM-D
Actual_Start_Time = 6-JAN-2024 05:30:27
Revision_Time  = 24-NOV-2024 15:46:05

```

```
Field_Strength      = 9.20197068[T]   (390[MHz])
X_Acq_Duration      = 2.228224[s]
X_Domain            = 1H
X_Freq              = 391.78655441[MHz]
X_Offset            = 5[ppm]
X_Points            = 16384
X_Prescans          = 1
X_Resolution        = 0.44878791[Hz]
X_Sweep             = 7.352941118[kHz]
Irr_Domain          = 1H
Irr_Freq            = 391.78655441[MHz]
Irr_Offset          = 5[ppm]
Tri_Domain          = 1H
Tri_Freq            = 391.78655441[MHz]
Tri_Offset          = 5[ppm]
Clipped             = FALSE
Scans               = 8
Total_Scans        = 8
```

----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(0.2[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

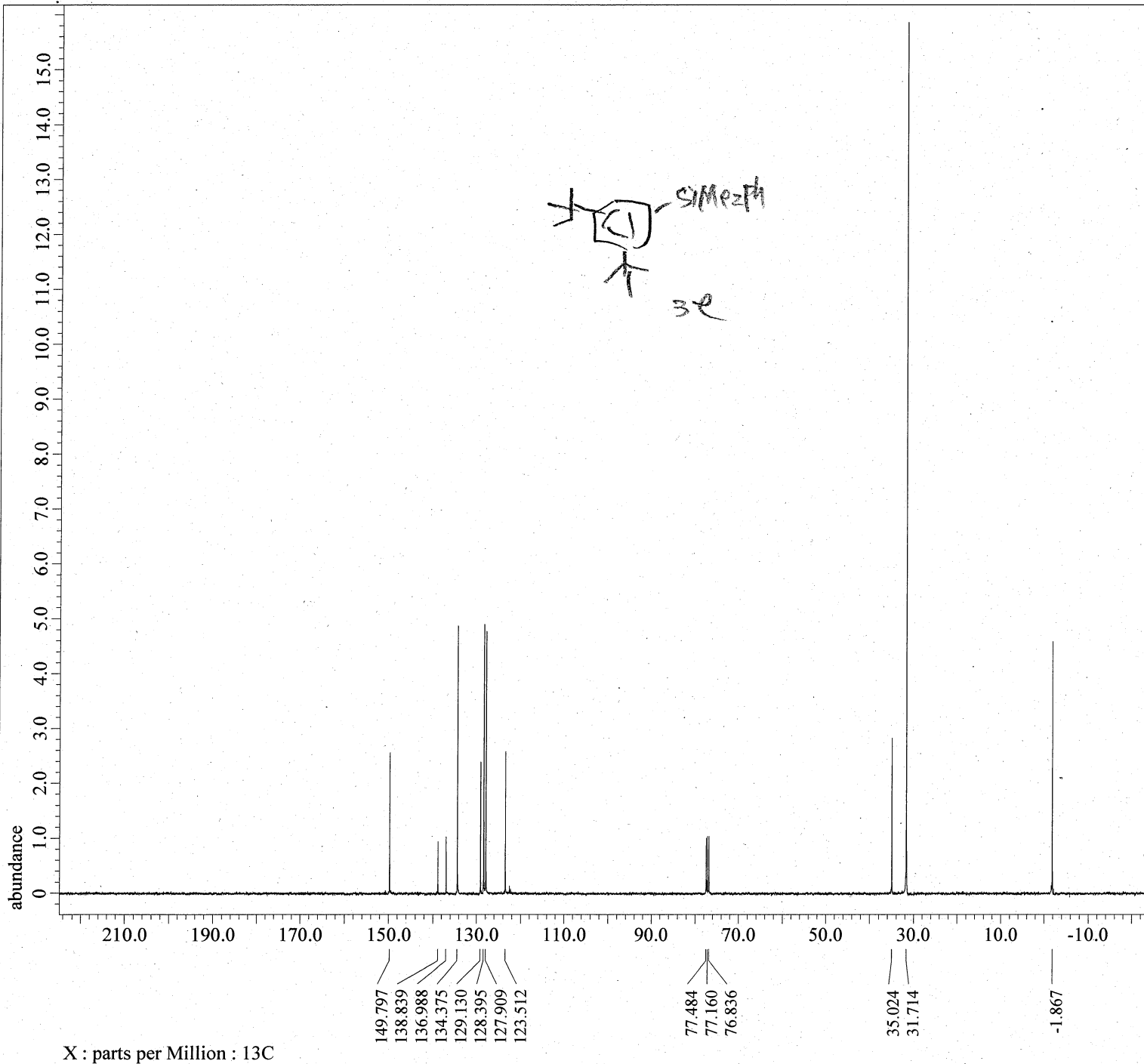
Derived from: KND_1503_pure-1.jdf

Filename = KND_1503_pure-2.jdf
 Author = element
 Experiment = single_pulse.ex2
 Sample_Id = S#661169
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 7-JAN-2024 00:39:12
 Revision_Time = 24-NOV-2024 15:53:27

Comment = single_pulse
 Data Format = 1D COMPLEX
 Dim_Size = 13107
 X_Domain = 1H
 Dim_Title = 1H
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 2.228224[s]
 X_Domain = 1H
 X_Freq = 391.78655441[MHz]
 X_Offset = 5[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.44878791[Hz]
 X_Sweep = 7.35294118[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Tri_Domain = 1H
 Tri_Freq = 391.78655441[MHz]
 Tri_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 50
 Temp_Get = 18.5[dC]
 X_90_Width = 10.79[us]
 X_Acq_Time = 2.228224[s]
 X_Angle = 45[deg]
 X_Atn = 1.9[dB]
 X_Pulse = 5.395[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.228224[s]



----- PROCESSING PARAMETERS -----
dc_balance(0, FALSE)
sexf(2.0[Hz], 0.0[s])
trapezoid3(0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

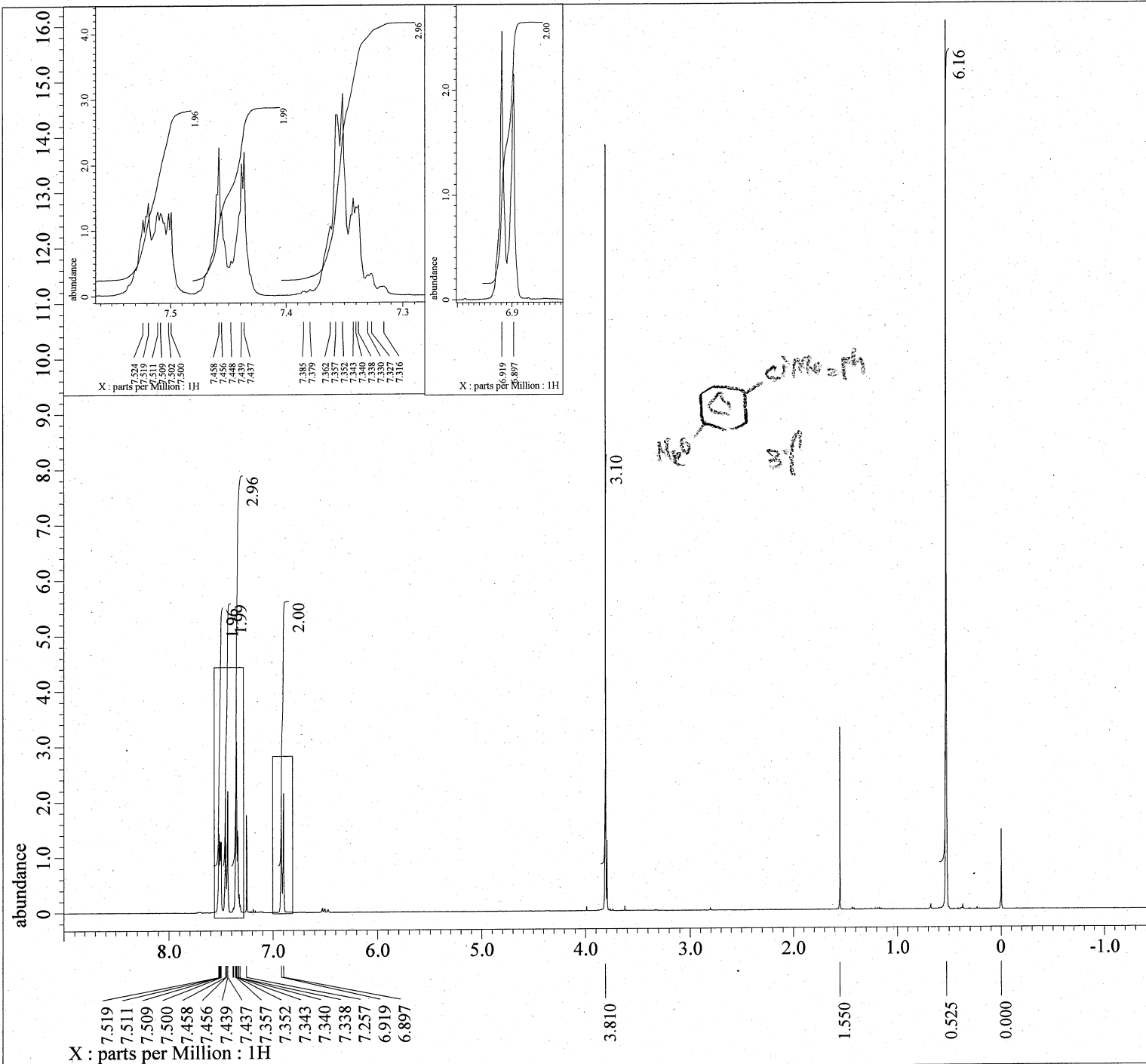
Derived from: KND_1503_13C-1.jdf

Filename = KND_1503_13C-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = 1
Solvent = CHLOROFORM-D
Actual_Start_Time = 7-JAN-2024 00:49:35
Revision_Time = 28-JAN-2024 00:38:44

Comment = single pulse decoupled ga
Data Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain = 13C
X_Freq = 98.51479726[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.93958061[Hz]
X_Sweep = 30.78817734[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 32
Total_Scans = 32

Relaxation_Delay = 2[s]
Recvr_Gain = 60
Temp_Get = 18.6[dC]
X_90_Width = 9.46[us]
X_Acq_Time = 1.06430464[s]
X_Angle = 30[deg]
X_Atn = 4.9[dB]
X_Pulse = 3.15333333[us]
Irr_Atn_Dec = 22.45[dB]
Irr_Atn_No = 22.45[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.06430464[s]



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1204_pure-1.jdf

```

Filename      = KND_1204_pure-2.jdf
Author       = element
Experiment   = single_pulse.ex2
Sample Id    = S#687112
Solvent      = CHLOROFORM-D
Actual_Start_Time = 7-JAN-2024 01:22:39
Revision_Time  = 24-NOV-2024 15:59:30

```

```

Comment      = single_pulse
Data Format   = 1D COMPLEX
Dim Size     = 13107
X Domain     = 1H
Dim Title    = 1H
Dim Units    = [ppm]
Dimensions   = X
Site         = ECS 400
Spectrometer = JNM-ECS400

```

```

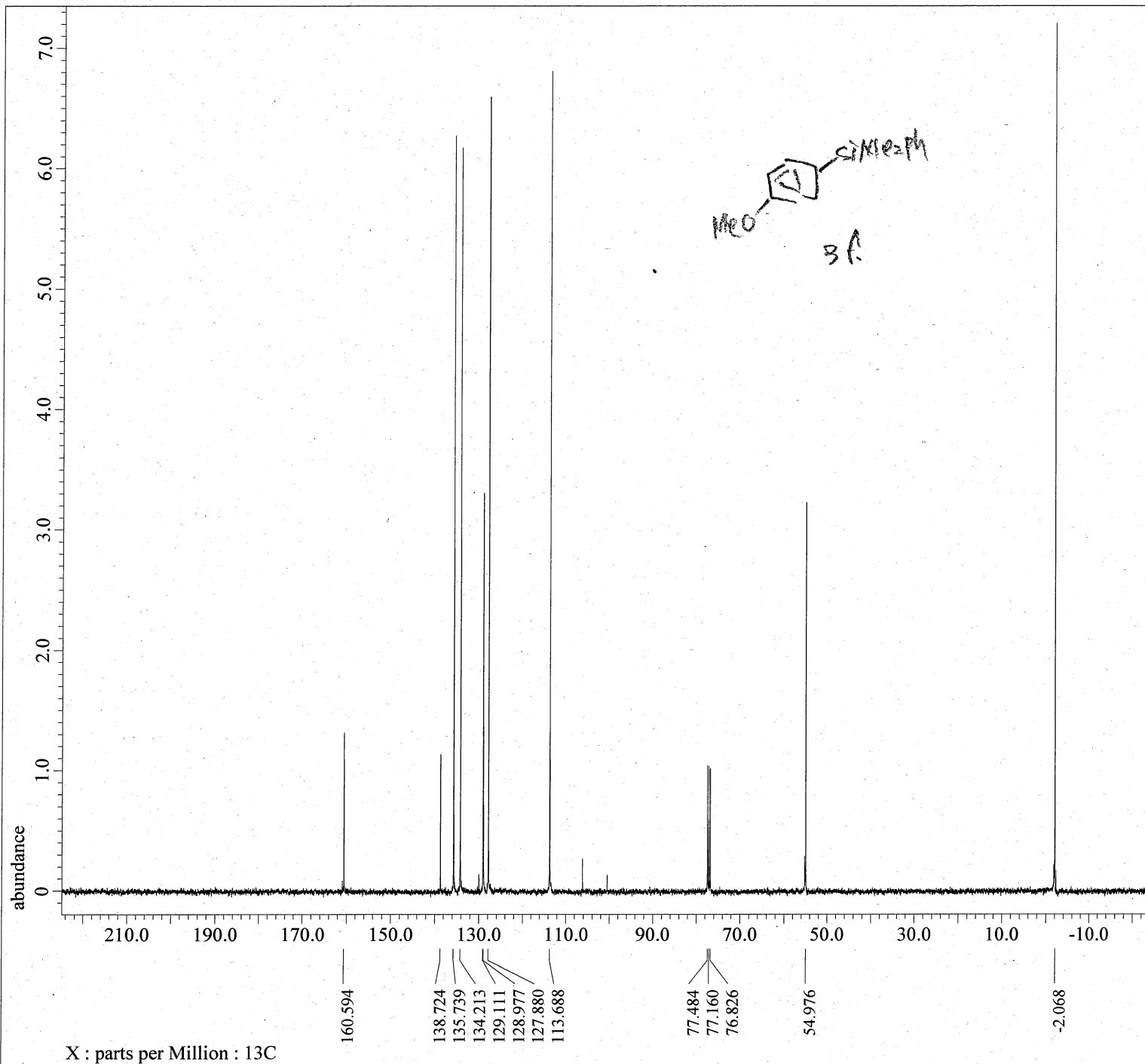
Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 2.228224[s]
X_Domain       = 1H
X_Freq         = 391.78655441[MHz]
X_Offset       = 5[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.44878791[Hz]
X_Sweep        = 7.35294118[kHz]
Irr_Domain     = 1H
Irr_Freq       = 391.78655441[MHz]
Irr_Offset     = 5[ppm]
Tri_Domain     = 1H
Tri_Freq       = 391.78655441[MHz]
Tri_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

```

```

Relaxation_Delay = 5[s]
Recvr_Gain       = 46
Temp_Get         = 18.4[dC]
X_90_Width       = 10.79[us]
X_Acq_Time       = 2.228224[s]
X_Angle          = 45[deg]
X_Atn            = 1.9[dB]
X_Pulse          = 5.395[us]
Irr_Mode         = Off
Tri_Mode         = Off
Dante_Presat     = FALSE
Initial_Wait     = 1[s]
Repetition_Time  = 7.228224[s]

```



---- PROCESSING PARAMETERS ----
dc_balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid3(0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

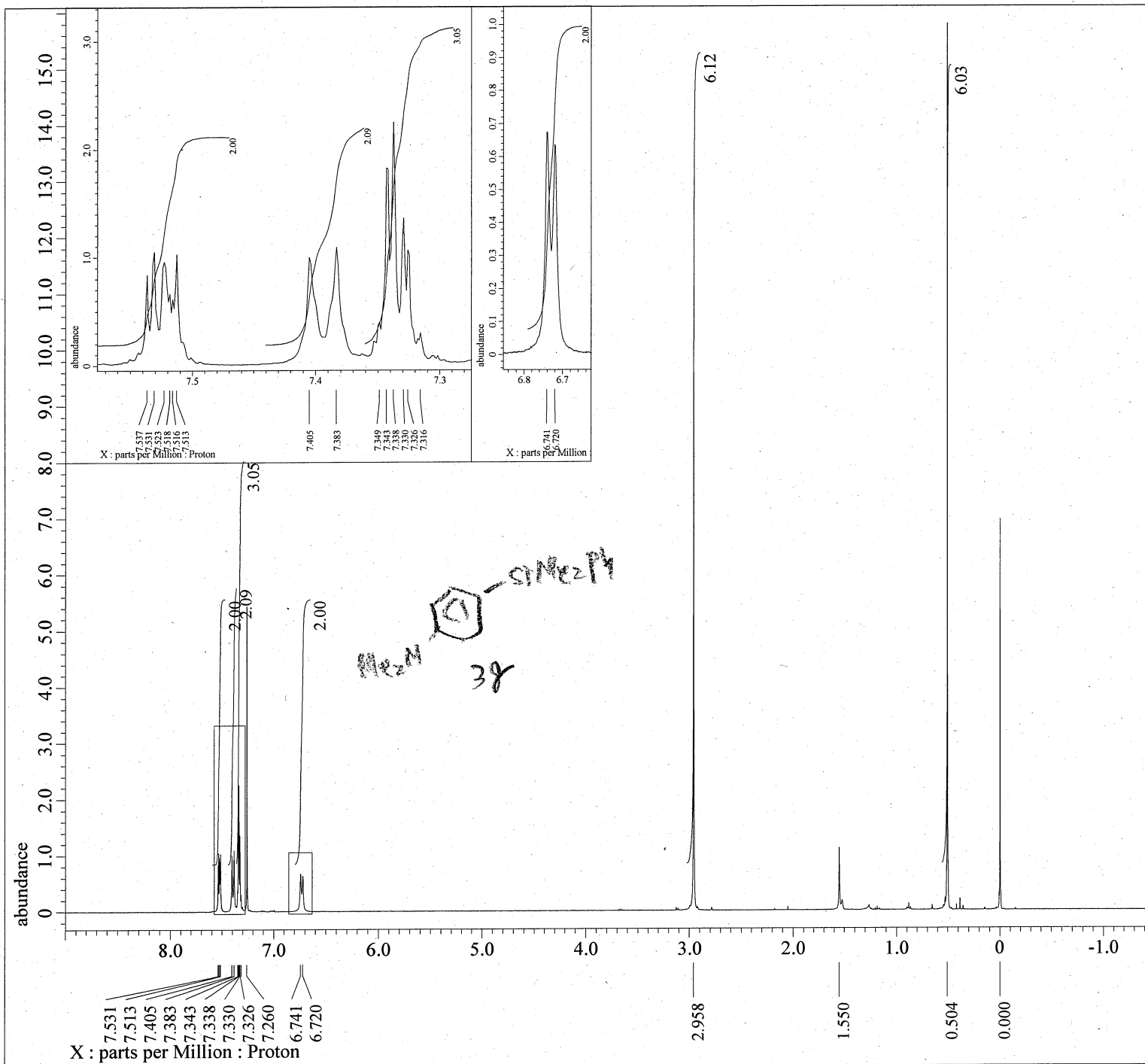
Derived from: KND_1204_13C-1.jdf

Filename = KND_1204_13C-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = 1
Solvent = CHLOROFORM-D
Actual_Start_Time = 7-JAN-2024 01:32:12
Revision_Time = 28-JAN-2024 00:47:58

Comment = single pulse decoupled ga
Data Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain = 13C
X_Freq = 98.51479726[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.93958061[Hz]
X_Sweep = 30.78817734[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 32
Total_Scans = 32

Relaxation_Delay = 2[s]
Recvr_Gain = 60
Temp_Get = 18.6[dC]
X_90_Width = 9.46[us]
X_Acq_Time = 1.06430464[s]
X_Angle = 30[deg]
X_Atn = 4.9[dB]
X_Pulse = 3.15333333[us]
Irr_Atn_Dec = 22.45[dB]
Irr_Atn_No = 22.45[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.06430464[s]



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexf( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinphase
ppm

```

Derived from: KND_1749_pure_Proton-1-1.jdf

```

Filename      = KND_1749_pure_Proton-1-2.
Author        = element
Experiment     = proton.jxp
Sample_Id     = KND_1749_pure
Solvent       = CHLOROFORM-D
Actual_Start_Time = 26-JAN-2024 22:16:29
Revision_Time  = 24-NOV-2024 16:06:05

```

```

Comment       = single pulse
Data Format    = 1D COMPLEX
Dim_Size      = 13107
X_Domain      = Proton
Dim_Title     = Proton
Dim_Units     = [ppm]
Dimensions    = X
Site          = JNM-ECS400
Spectrometer  = DELTA2_NMR

```

```

Field_Strength = 9.37221[T] (400[MHz])
X_Acq_Duration = 2.1889024[s]
X_Domain       = 1H
X_Freq         = 399.03472754[MHz]
X_Offset       = 5.0[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.45684997[Hz]
X_Sweep        = 7.48502994[kHz]
X_Sweep_Clipped = 5.98802395[kHz]
Irr_Domain     = Proton
Irr_Freq       = 399.03472754[MHz]
Irr_Offset     = 5.0[ppm]
Tri_Domain     = Proton
Tri_Freq       = 399.03472754[MHz]
Tri_Offset     = 5.0[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

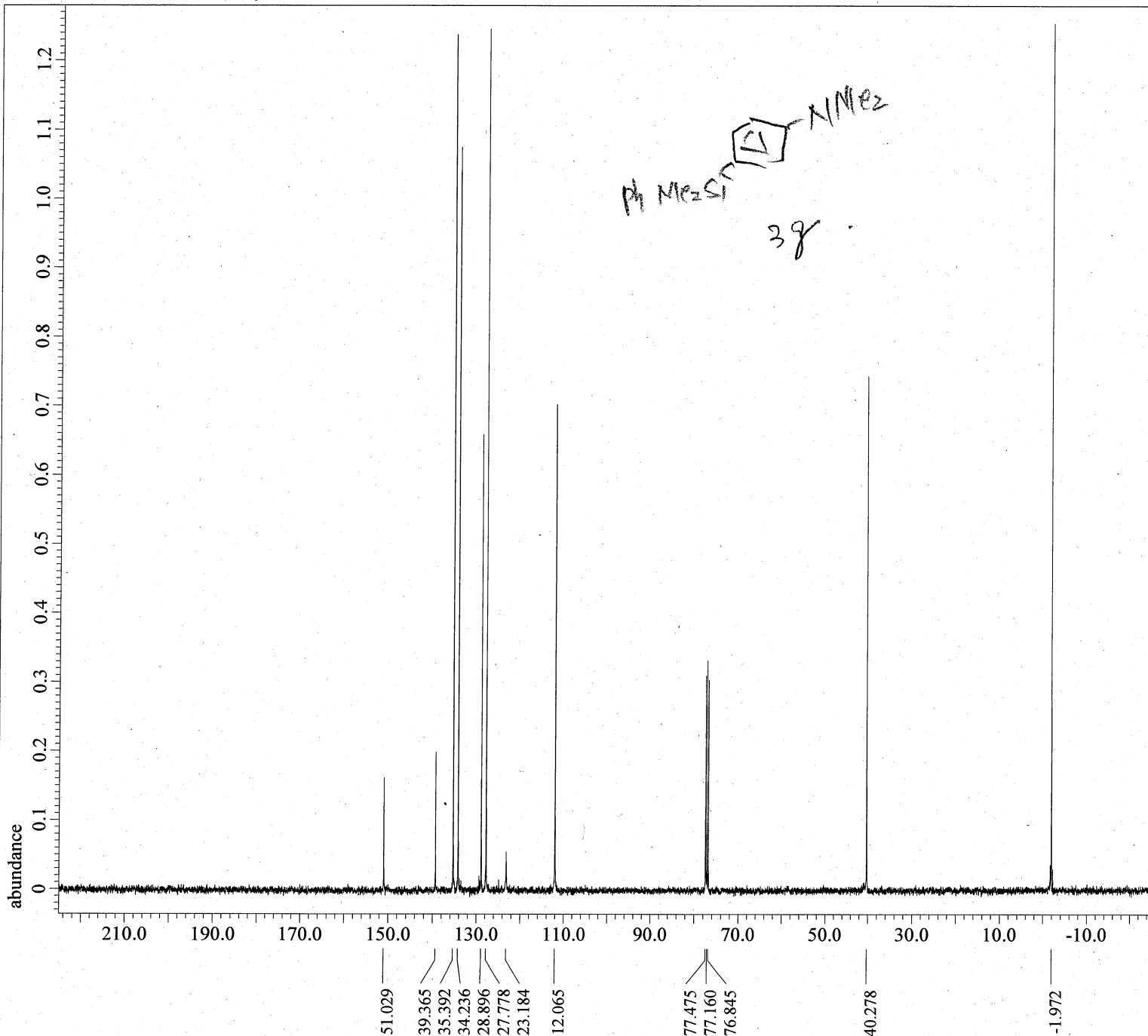
```

```

Relaxation_Delay = 5[s]
Recvr_Gain       = 46
Temp_Get         = 19.2[dC]
X_90_Width       = 6.6[us]
X_Acq_Time       = 2.1889024[s]
X_Angle          = 45[deg]
X_Atn            = 1[dB]
X_Pulse          = 3.3[us]
Irr_Mode         = Off
Tri_Mode         = Off
Dante_Presat     = FALSE
Initial_Wait     = 1[s]
Repetition_Time  = 7.1889024[s]

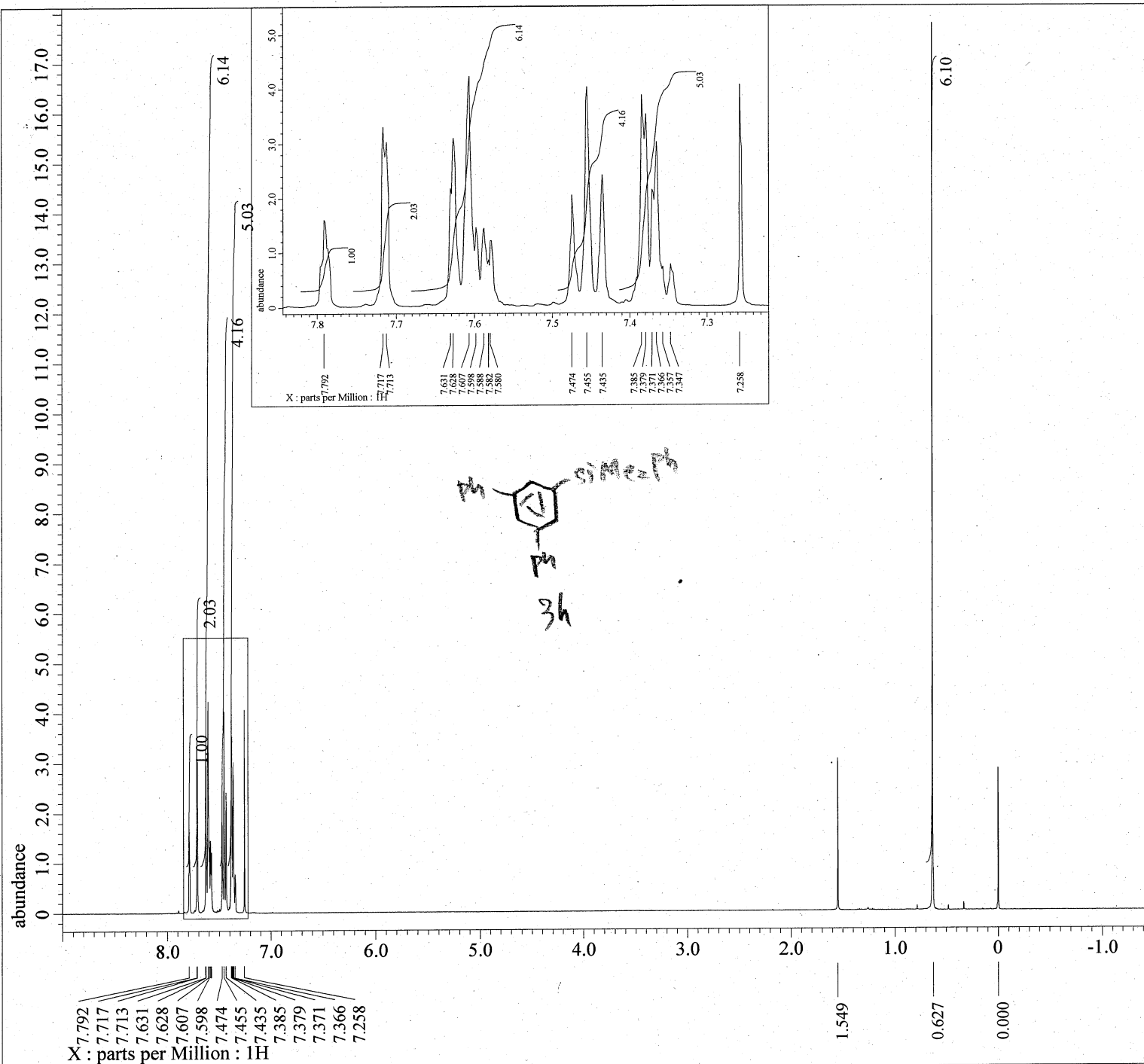
```

Ph-NMe2
Ph-NMe2
 38



---- PROCESSING PARAMETERS ---- dc_balance(0, FALSE) sexp(2.0[Hz], 0.0[s]) trapezoid(0[%], 0[%], 80[%], 100[%]) zerofill(1) fft(1, TRUE, TRUE) machinephase ppm Derived from: KND_1749_13C_Carbon-1-1.jdf	
Filename	= KND_1749_13C_Carbon-1-2.j
Author	= element
Experiment	= carbon.jxp
Sample_Id	= KND_1749_13C
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 26-JAN-2024 22:27:30
Revision_Time	= 28-JAN-2024 20:09:09
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= Carbon
Dim_Title	= Carbon13
Dim_Units	= [ppm]
Dimensions	= X
Site	= JNM-ECS400
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.37221[T] (400[MHz])
X_Acq_Duration	= 1.0433312[s]
X_Domain	= 13C
X_Freq	= 100.33735165[MHz]
X_Offset	= 100.0[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95846665[Hz]
X_Sweep	= 31.40703518[kHz]
X_Sweep_Clippped	= 25.12562814[kHz]
Irr_Domain	= Proton
Irr_Freq	= 399.03472754[MHz]
Irr_Offset	= 5.0[ppm]
Clipped	= FALSE
Scans	= 73
Total_Scans	= 73
Relaxation_Delay	= 2[s]
Recvr_Gain	= 50
Temp_Get	= 19.6[dC]
X_90_Width	= 10.9[us]
X_Acq_Time	= 1.04333312[s]
X_Angle	= 30[deg]
X_Atn	= 5.4[dB]
X_Pulse	= 3.63333333[us]
Irr_Atn_Dec	= 25.823[dB]
Irr_Atn_No	= 25.823[dB]
Irr_Noise	= WALTZ
Irr_Pwidth	= 0.115[ms]
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.04333312[s]

X : parts per Million : Carbon13



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1239_pure-1.jdf

```

Filename      = KND_1239_pure-3.jdf
Author       = element
Experiment   = single_pulse.ex2
Sample Id    = S#755957
Solvent      = CHLOROFORM-D
Actual_Start_Time = 7-JAN-2024 03:17:11
Revision_Time  = 24-NOV-2024 16:12:47

```

```

Comment      = single_pulse
Data_Format   = 1D COMPLEX
Dim_Size      = 13107
X_Domain      = 1H
Dim_Title     = 1H
Dim_Units     = [ppm]
Dimensions    = X
Site          = ECS 400
Spectrometer   = JNM-ECS400

```

```

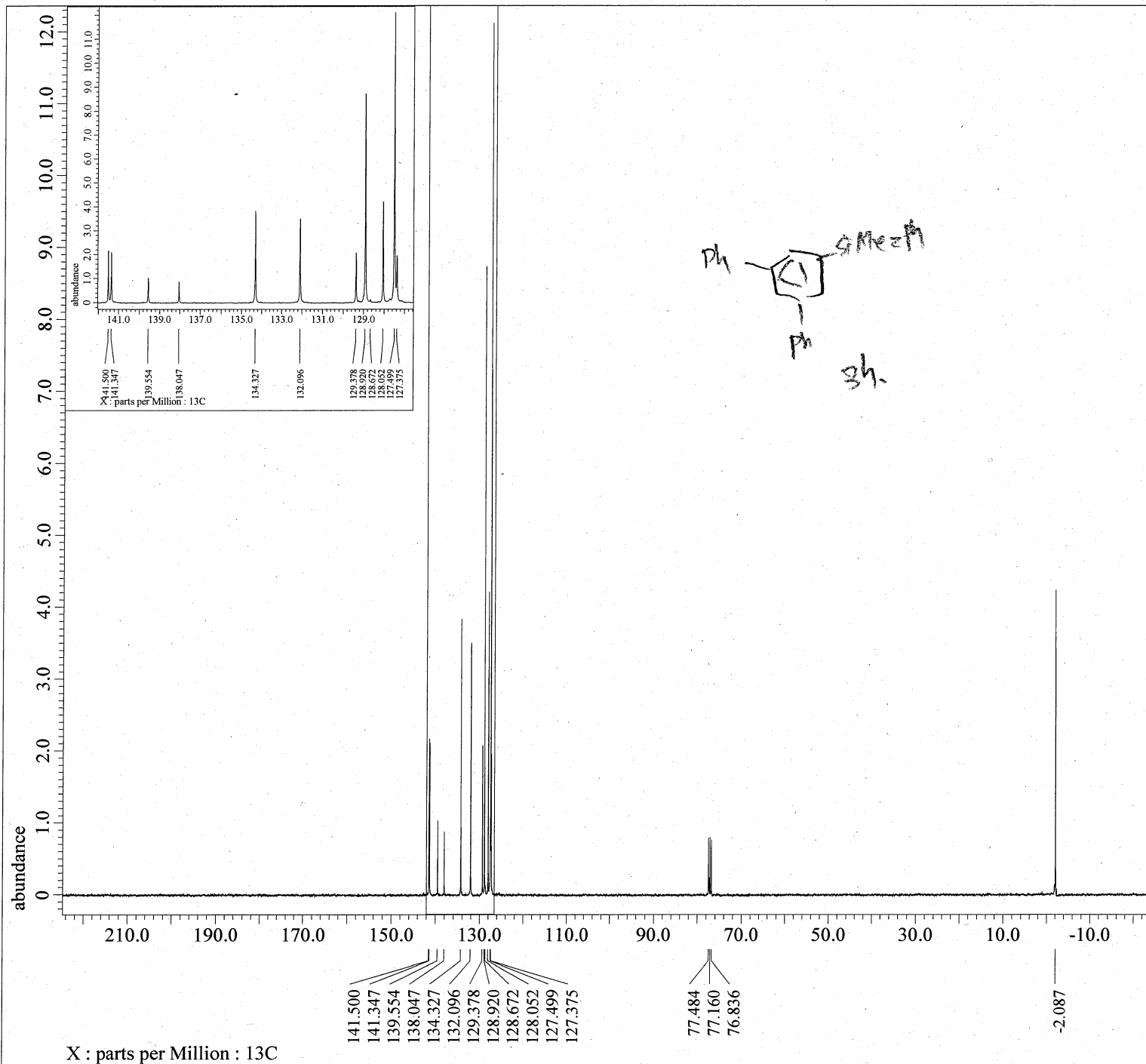
Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 2.228224[s]
X_Domain       = 1H
X_Freq         = 391.78655441[MHz]
X_Offset       = 5[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.44878791[Hz]
X_Sweep        = 7.35294118[kHz]
Irr_Domain     = 1H
Irr_Freq       = 391.78655441[MHz]
Irr_Offset     = 5[ppm]
Tri_Domain     = 1H
Tri_Freq       = 391.78655441[MHz]
Tri_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

```

```

Relaxation_Delay = 5[s]
Recvr_Gain       = 50
Temp_Get         = 18.4[dC]
X_90_Width       = 10.79[us]
X_Acq_Time       = 2.228224[s]
X_Angle          = 45[deg]
X_Atn            = 1.9[dB]
X_Pulse          = 5.395[us]
Irr_Mode         = Off
Tri_Mode         = Off
Dante_Presat     = FALSE
Initial_Wait     = 1[s]
Repetition_Time  = 7.228224[s]

```



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 secp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

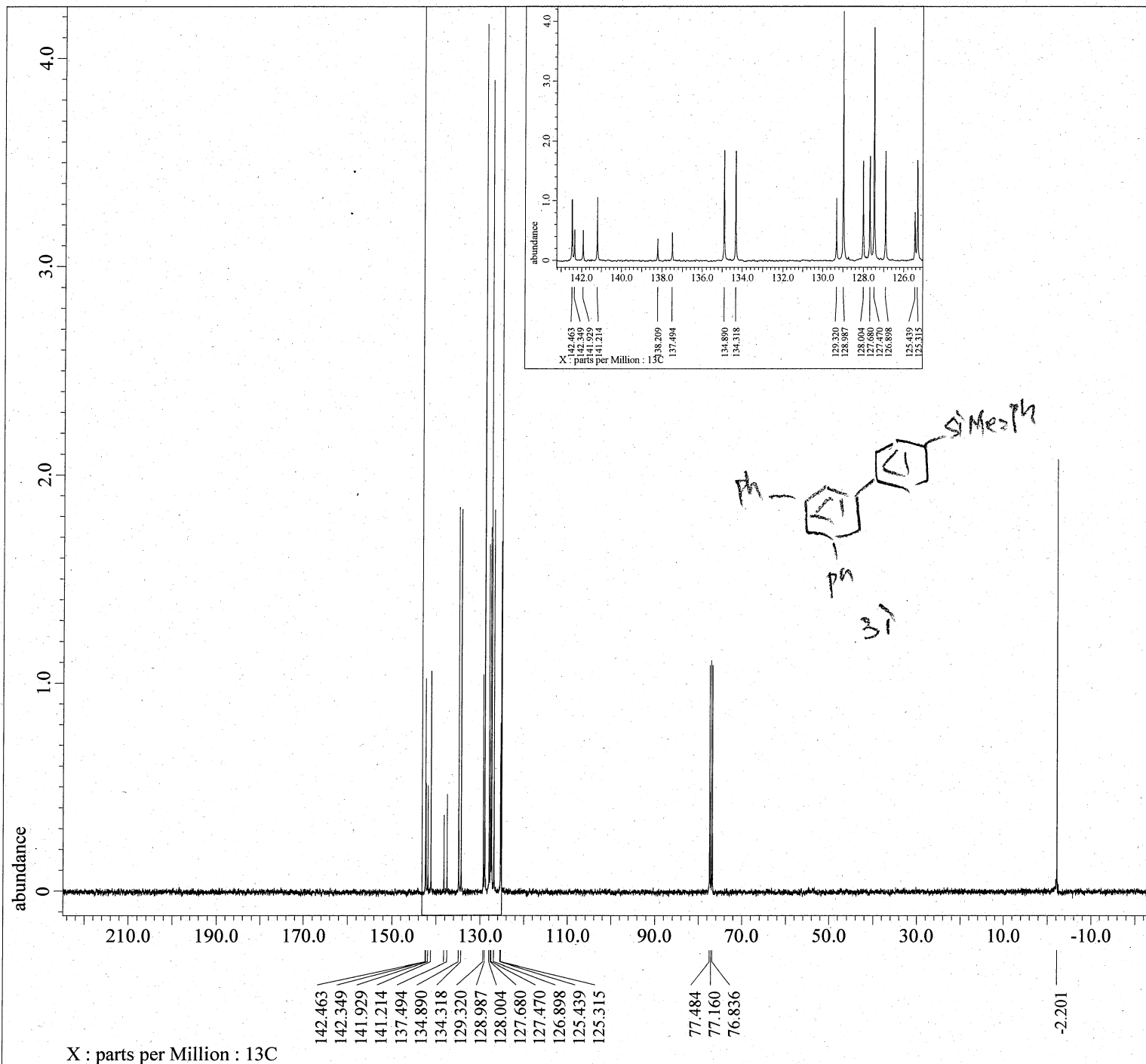
Derived from: KND_1239_13C-2.jdf

Filename = KND_1239_13C-3.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 7-JAN-2024 03:38:44
 Revision_Time = 28-JAN-2024 01:13:14

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim_Size = 26214
 X_Domain = 13C
 Dim_Title = 13C
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 39
 Total_Scans = 39

Relaxation_Delay = 2[s]
 Recvr_Gain = 58
 Temp_Get = 18.6[dC]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_No = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

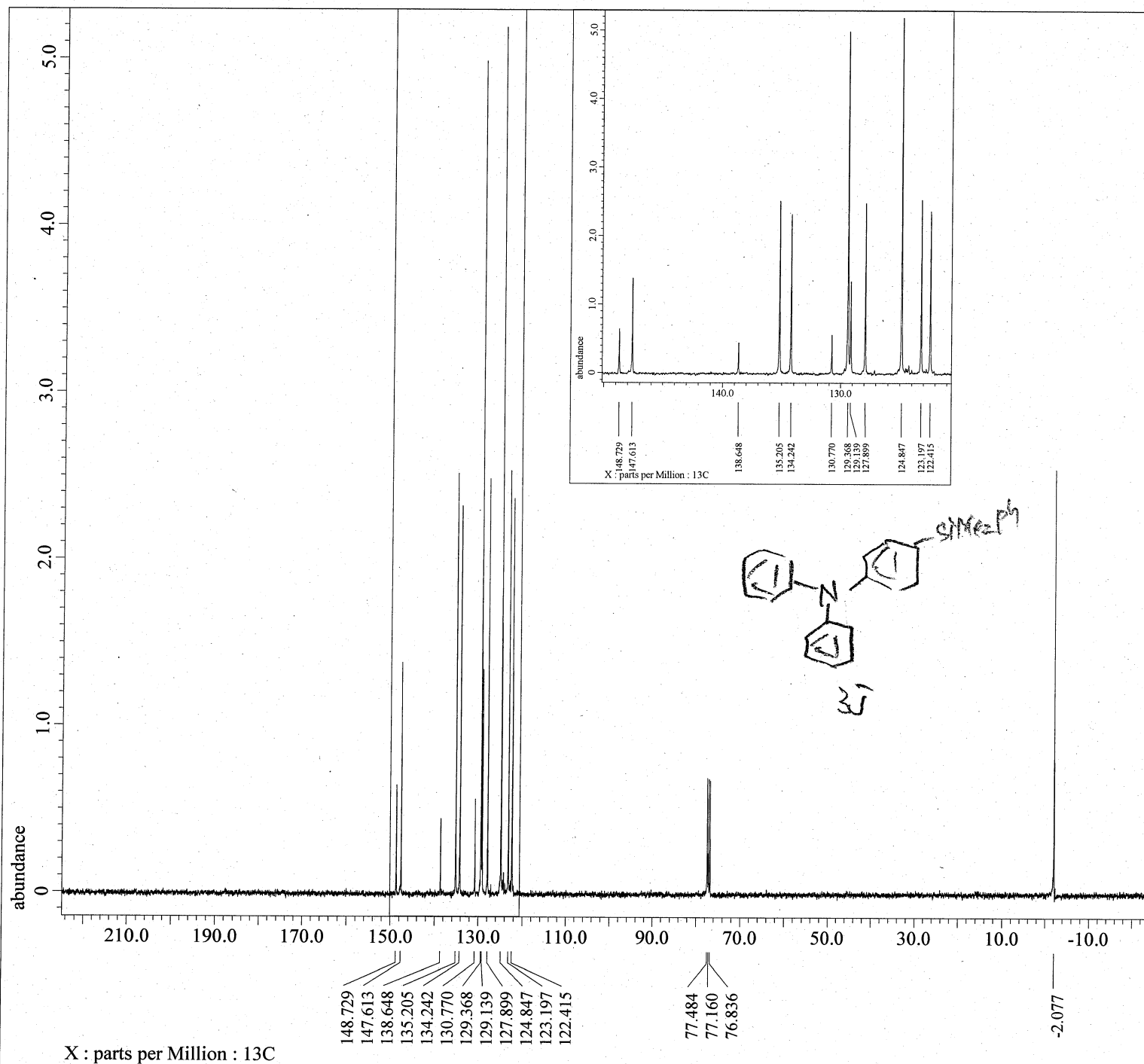
Derived from: KND_1248_13C-1.jdf

Filename = KND_1248_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 7-JAN-2024 04:31:47
 Revision_Time = 28-JAN-2024 01:24:17

Comment = single pulse decoupled ga
 Data_Format = 1D COMPLEX
 Dim_Size = 26214
 X_Domain = 13C
 Dim_Title = 13C
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 94
 Total_Scans = 94

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 18.6[dC]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_No = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

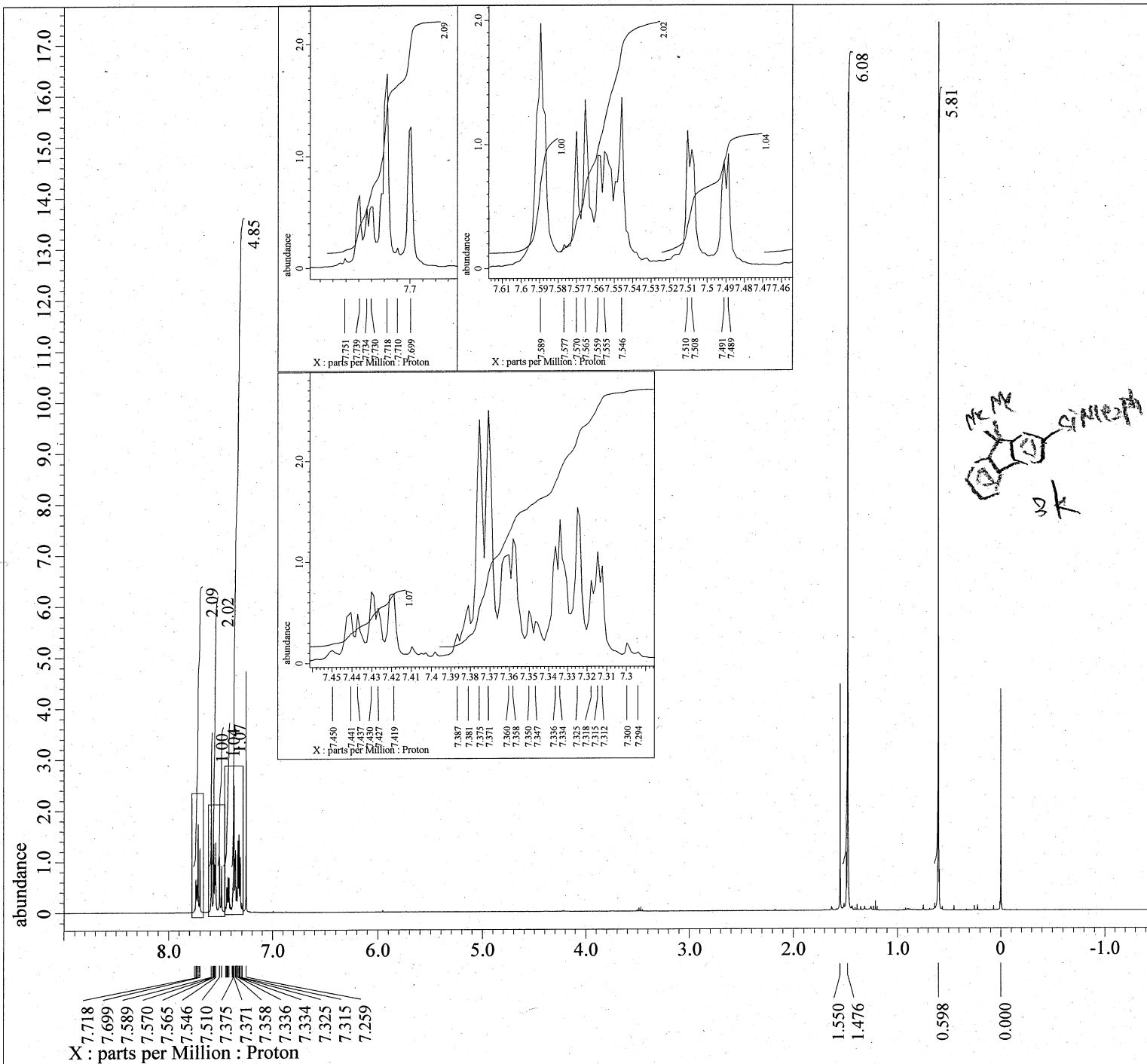
Derived from: KND_1494_13C-1.jdf

Filename = KND_1494_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 27-JAN-2024 01:50:35
 Revision_Time = 28-JAN-2024 20:23:19

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim Size = 26214
 X_Domain = 13C
 Dim Title = 13C
 Dim Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 63
 Total_Scans = 63

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 19.9[dC]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_Noise = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexf( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KN1510_pure_Proton-1-1.jdf

```

Filename      = KN1510_pure_Proton-1-2.
Author        = element
Experiment     = proton.jxp
Sample Id     = KN1510_pure
Solvent       = CHLOROFORM-D
Actual_Start_Time = 8-JAN-2024 13:22:41
Revision_Time  = 24-NOV-2024 16:39:37

```

```

Comment       = single pulse
Data_Format   = 1D COMPLEX
Dim_Size      = 13107
X_Domain      = Proton
Dim_Title     = Proton
Dim_Units     = [ppm]
Dimensions    = X
Site          = JNM-ECS400
Spectrometer   = DELTA2_NMR

```

```

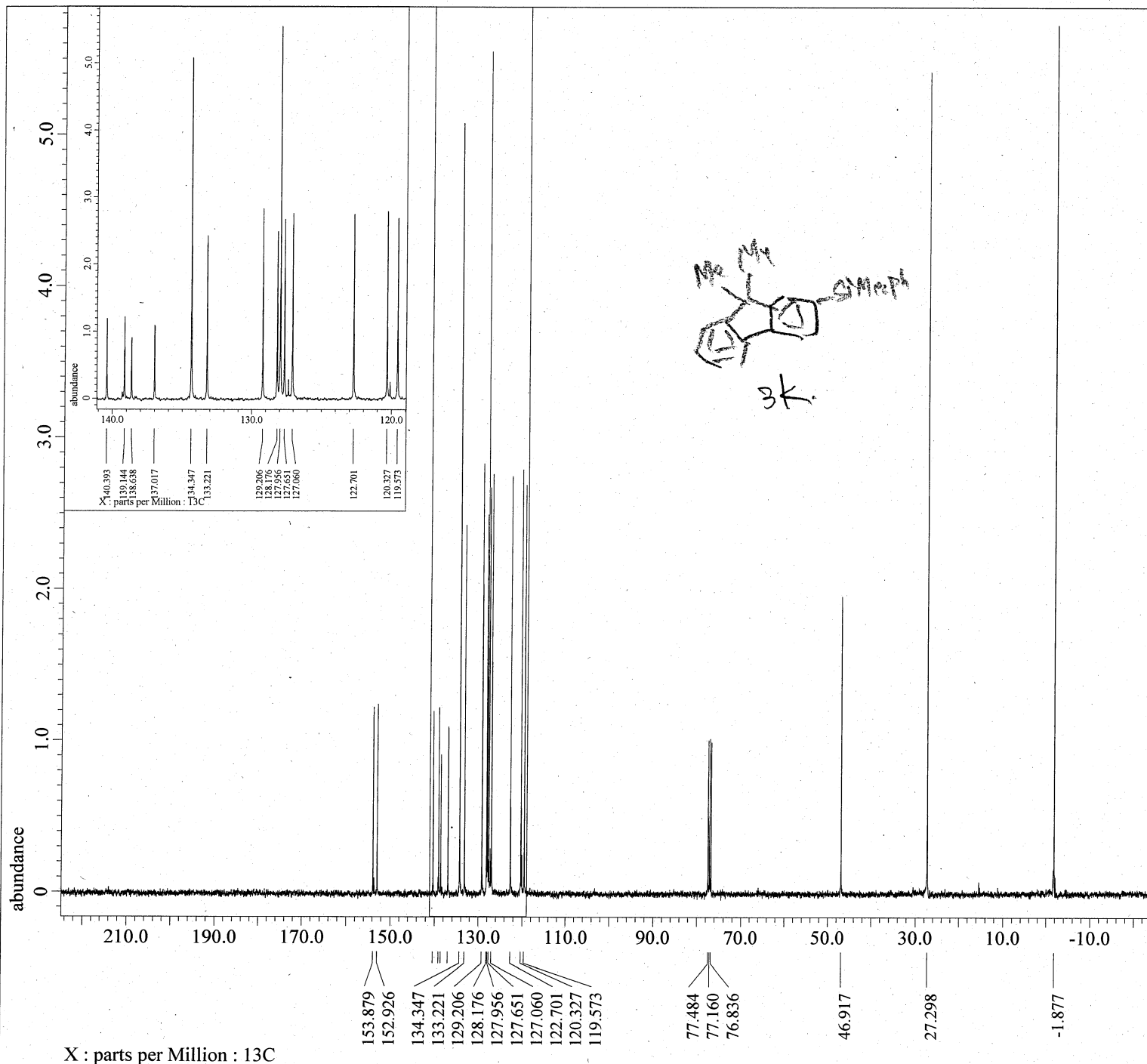
Field Strength = 9.37221[T] (400[MHz])
X_Acq_Duration = 2.1889024[s]
X_Domain       = 1H
X_Freq         = 399.03472754[MHz]
X_Offset       = 5.0[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.45684997[Hz]
X_Sweep        = 7.48502994[kHz]
X_Sweep_Clipped = 5.98802395[kHz]
Irr_Domain     = Proton
Irr_Freq       = 399.03472754[MHz]
Irr_Offset     = 5.0[ppm]
Tri_Domain     = Proton
Tri_Freq       = 399.03472754[MHz]
Tri_Offset     = 5.0[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

```

```

Relaxation_Delay = 5[s]
Recvr_Gain       = 46
Temp_Get         = 17.9[dc]
X_90_Width      = 6.6[us]
X_Acq_Time       = 2.1889024[s]
X_Angle         = 45[deg]
X_Atn           = 1[db]
X_Pulse         = 3.3[us]
Irr_Mode        = Off
Tri_Mode        = Off
Dante_Presat    = FALSE
Initial_Wait     = 1[s]
Repetition_Time  = 7.1889024[s]

```



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

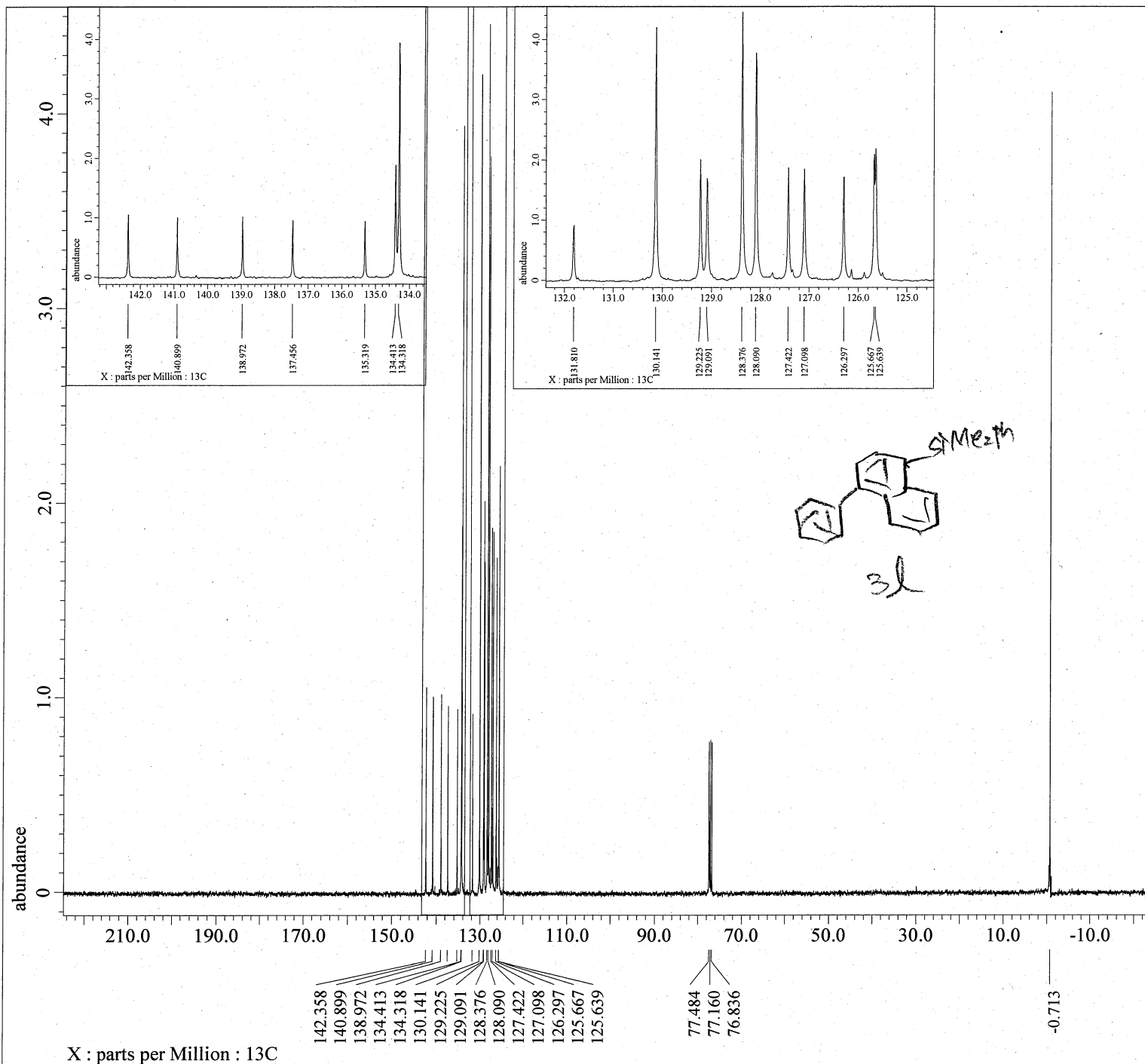
Derived from: KND_1510_13C-1.jdf

Filename = KND_1510_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 8-JAN-2024 18:45:04
 Revision_Time = 28-JAN-2024 01:45:36

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim_Size = 26214
 X_Domain = 13C
 Dim_Title = 13C
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 43
 Total_Scans = 43

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 18.1[dC]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_No = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

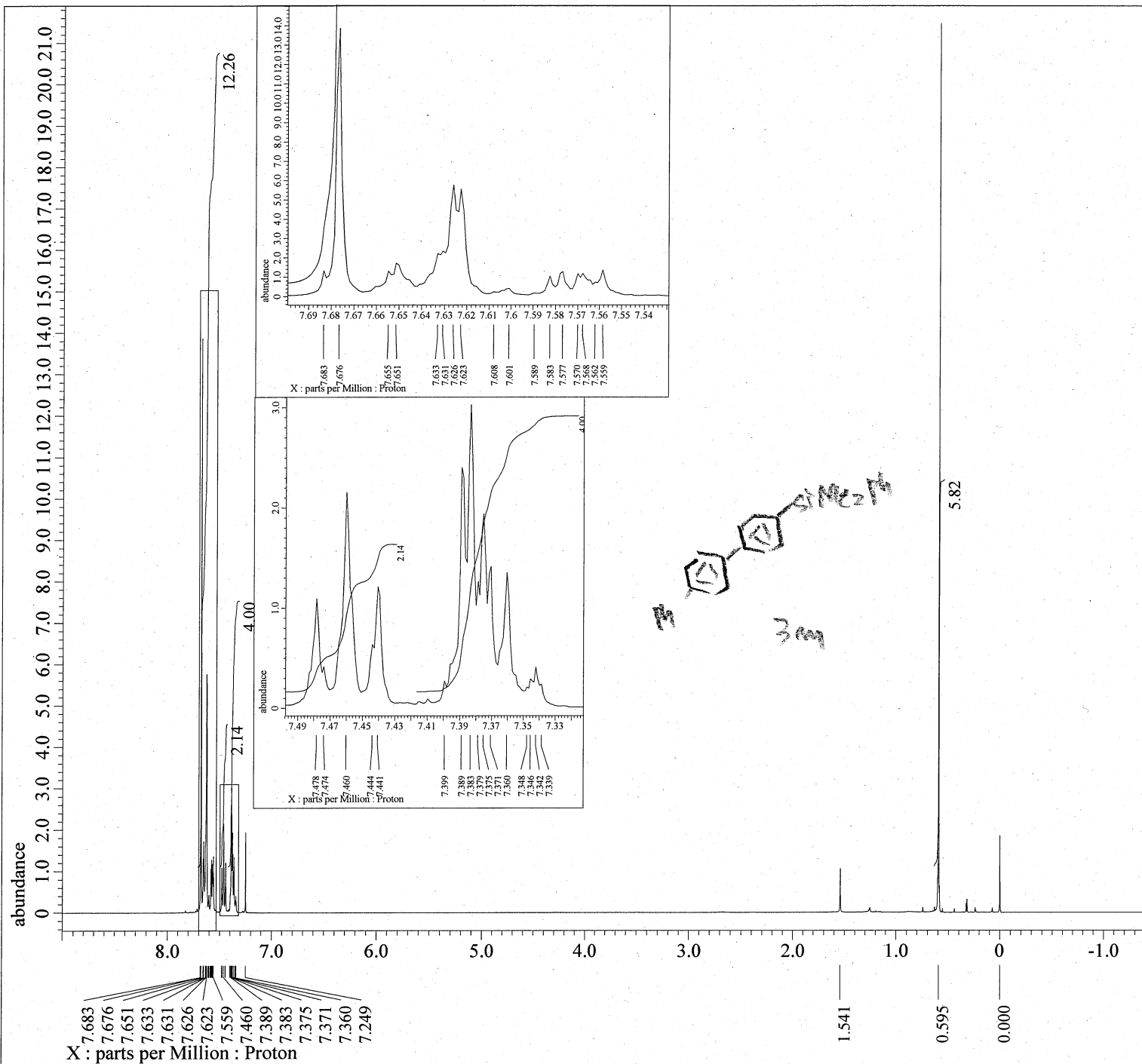
Derived from: KND_1516_13C-1.jdf

Filename = KND_1516_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 7-JAN-2024 02:46:46
 Revision_Time = 28-JAN-2024 00:59:20

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim Size = 26214
 X_Domain = 13C
 Dim_Title = 13C
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 80
 Total_Scans = 80

Relaxation_Delay = 2[s]
 Recvr_Gain = 58
 Temp_Get = 18.6[dC]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_No = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



---- PROCESSING PARAMETERS ----
 dc_balance(0, FALSE)
 secp(0.2[Hz], 0.0[s])
 trapezoid(0[%], 0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

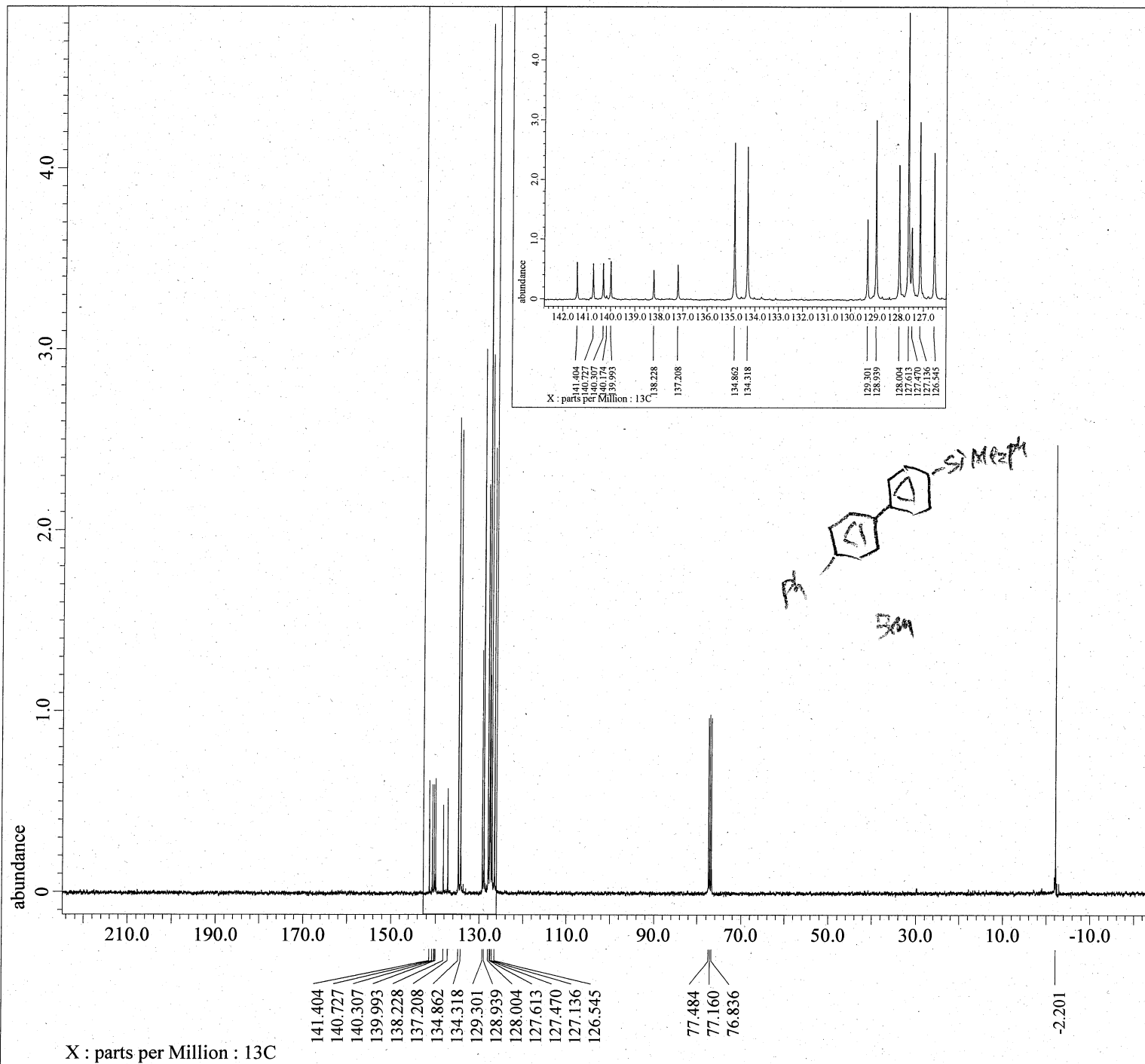
Derived from: KND_1255_pure_Proton-1-1.jdf

Filename = KND_1255_pure_Proton-1-2.
 Author = element
 Experiment = proton.jxp
 Sample_Id = KND_1255_pure
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 6-JAN-2024 23:49:51
 Revision_Time = 24-NOV-2024 16:51:28

Comment = single pulse
 Data Format = 1D COMPLEX
 Dim_Size = 13107
 X_Domain = Proton
 Dim_Title = Proton
 Dim_Units = [ppm]
 Dimensions = X
 Site = JNM-ECS400
 Spectrometer = DELTA2_NMR

Field_Strength = 9.37221[T] (400[MHz])
 X_Acq_Duration = 2.1889024[s]
 X_Domain = 1H
 X_Freq = 399.03472754[MHz]
 X_Offset = 5.0[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.45684997[Hz]
 X_Sweep = 7.48502994[kHz]
 X_Sweep_Clippped = 5.98802395[kHz]
 Irr_Domain = Proton
 Irr_Freq = 399.03472754[MHz]
 Irr_Offset = 5.0[ppm]
 Tri_Domain = Proton
 Tri_Freq = 399.03472754[MHz]
 Tri_Offset = 5.0[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 40
 Temp_Get = 18.4[dC]
 X_90_Width = 6.6[us]
 X_Acq_Time = 2.1889024[s]
 X_Angle = 45[deg]
 X_Atn = 1[dB]
 X_Pulse = 3.3[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.1889024[s]



----- PROCESSING PARAMETERS -----
dc_balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid3(0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

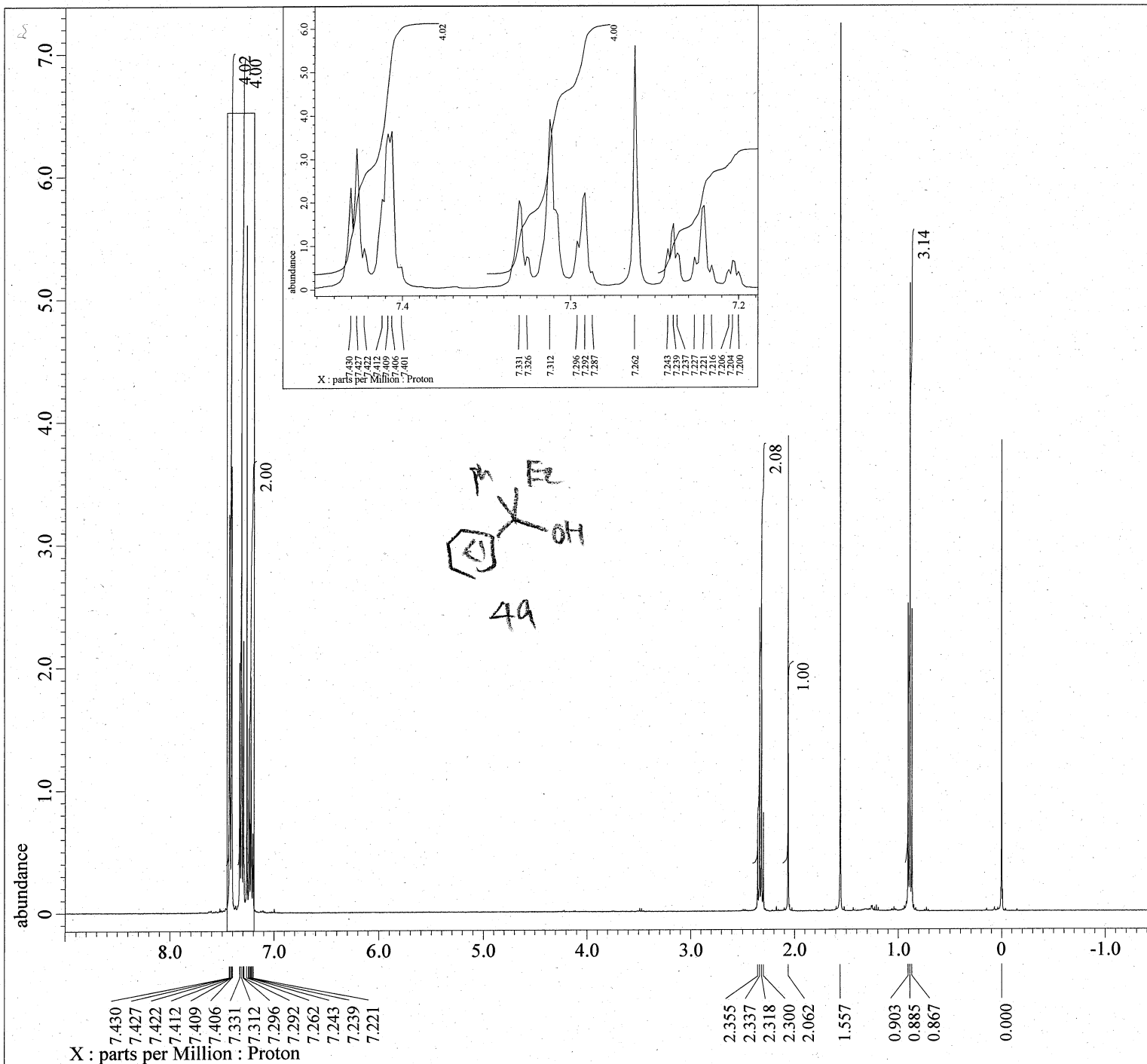
Derived from: KND_1255_13C-1.jdf

Filename = KND_1255_13C-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = 1
Solvent = CHLOROFORM-D
Actual_Start_Time = 7-JAN-2024 05:17:52
Revision_Time = 28-JAN-2024 01:34:38

Comment = single pulse decoupled ga
Data Format = 1D COMPLEX
Dim Size = 26214
X Domain = 13C
Dim Title = 13C
Dim Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400

Field Strength = 9.20197068[T] (390[MHz])
X Acq_Duration = 1.06430464[s]
X Domain = 13C
X Freq = 98.51479726[MHz]
X Offset = 100[ppm]
X Points = 32768
X Prescans = 4
X Resolution = 0.93958061[Hz]
X Sweep = 30.78817734[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 160
Total_Scans = 160

Relaxation_Delay = 2[s]
Recvr_Gain = 60
Temp_Get = 18.7[dC]
X 90_Width = 9.46[us]
X Acq_Time = 1.06430464[s]
X Angle = 30[deg]
X Atn = 4.9[dB]
X Pulse = 3.15333333[us]
Irr_Atn_Dec = 22.45[dB]
Irr_Atn_No = 22.45[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.06430464[s]



---- PROCESSING PARAMETERS ----

```
dc_balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm
```

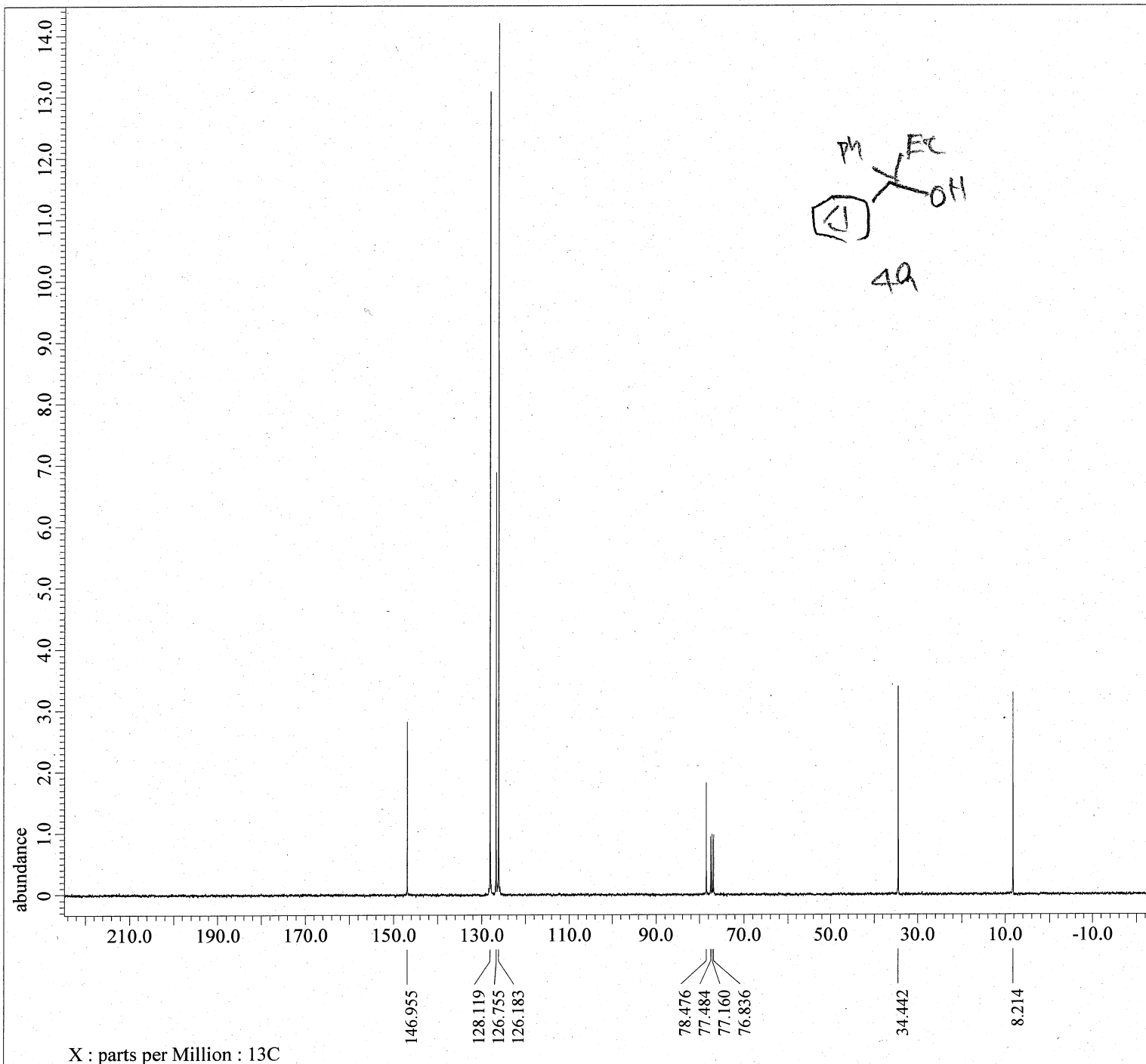
Derived from: KND_1485_pure_Proton-1-1.jdf

Filename = KND_1485_pure_Proton-1-2.
Author = element
Experiment = proton.jxp
Sample Id = KND_1485 pure
Solvent = CHLOROFORM-D
Actual_Start_Time = 8-JAN-2024 14:02:16
Revision_Time = 24-NOV-2024 16:56:23

Comment = single pulse
Data_Format = 1D COMPLEX
Dim_Size = 13107
X_Domain = Proton
Dim_Title = Proton
Dim_Units = [ppm]
Dimensions = X
Site = JNM-ECS400
Spectrometer = DELTA2_NMR

Field_Strength = 9.37221[T] (400[MHz])
X_Acq_Duration = 2.1889024[s]
X_Domain = 1H
X_Freq = 399.03472754[MHz]
X_Offset = 5.0[ppm]
X_Points = 16384
X_Prescans = 1
X_Resolution = 0.45684997[Hz]
X_Sweep = 7.48502994[kHz]
X_Sweep_Clipped = 5.98802395[kHz]
Irr_Domain = Proton
Irr_Freq = 399.03472754[MHz]
Irr_Offset = 5.0[ppm]
Tri_Domain = Proton
Tri_Freq = 399.03472754[MHz]
Tri_Offset = 5.0[ppm]
Clipped = FALSE
Scans = 8
Total_Scans = 8

Relaxation_Delay = 5[s]
Recvr_Gain = 48
Temp_Get = 18[dc]
X_90_Width = 6.6[us]
X_Acq_Time = 2.1889024[s]
X_Angle = 45[deg]
X_Atn = 1[dB]
X_Pulse = 3.3[us]
Irr_Mode = Off
Tri_Mode = Off
Dante_Presat = FALSE
Initial_Wait = 1[s]
Repetition_Time = 7.1889024[s]



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 secp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

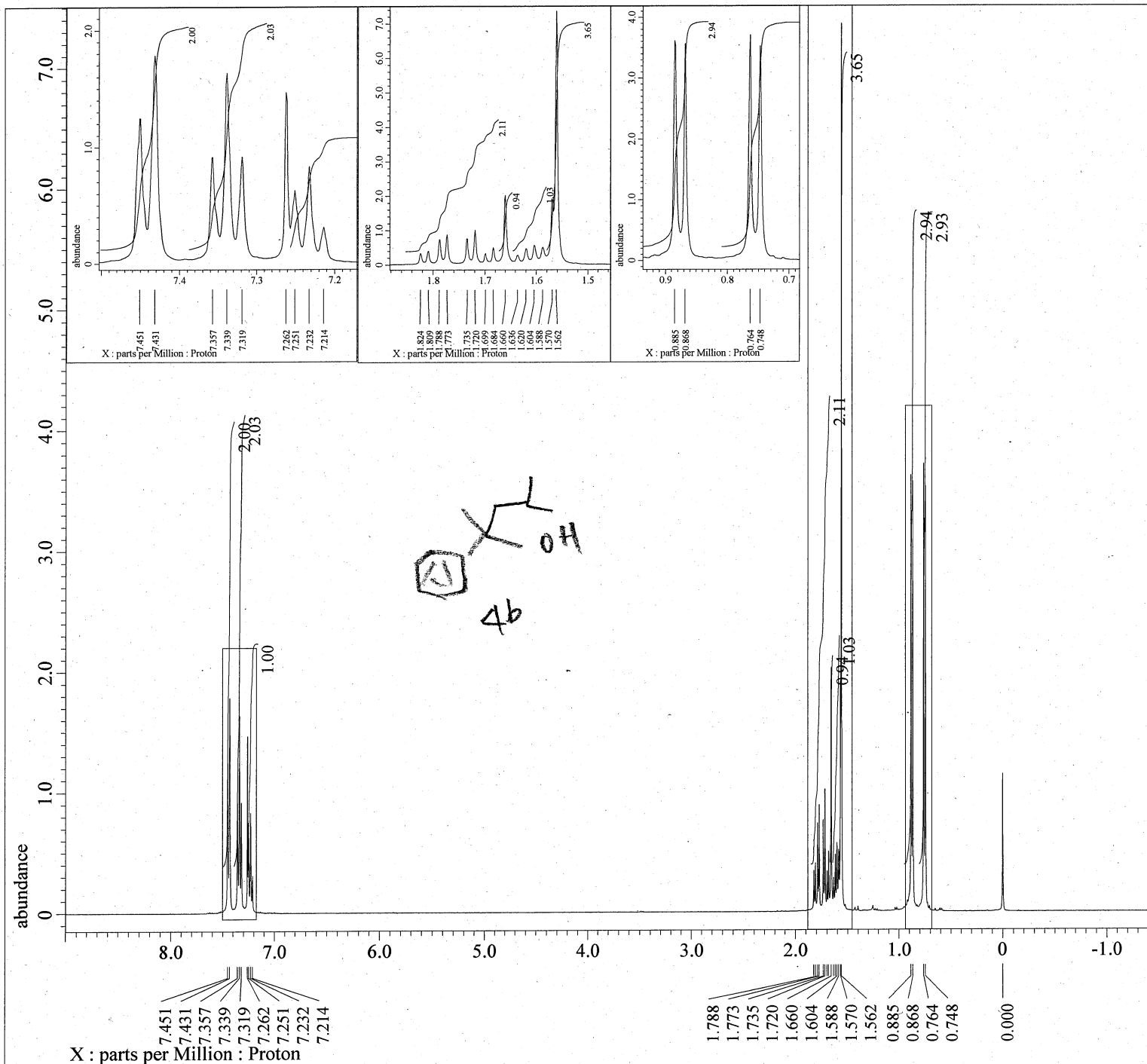
Derived from: KND_1485_13C-1.jdf

Filename = KND_1485_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 8-JAN-2024 19:25:37
 Revision_Time = 28-JAN-2024 14:02:36

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim Size = 26214
 X Domain = 13C
 Dim Title = 13C
 Dim Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field Strength = 9.20197068[T] (390[MHz])
 X Acq_Duration = 1.06430464[s]
 X Domain = 13C
 X Freq = 98.51479726[MHz]
 X Offset = 100[ppm]
 X Points = 32768
 X Prescans = 4
 X Resolution = 0.93958061[Hz]
 X Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 40
 Total_Scans = 40

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 18.2[dC]
 X 90_Width = 9.46[us]
 X Acq_Time = 1.06430464[s]
 X Angle = 30[deg]
 X Atn = 4.9[dB]
 X Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_No = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(0.2[Hz], 0.0[s])
 trapezoid(0[%], 0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

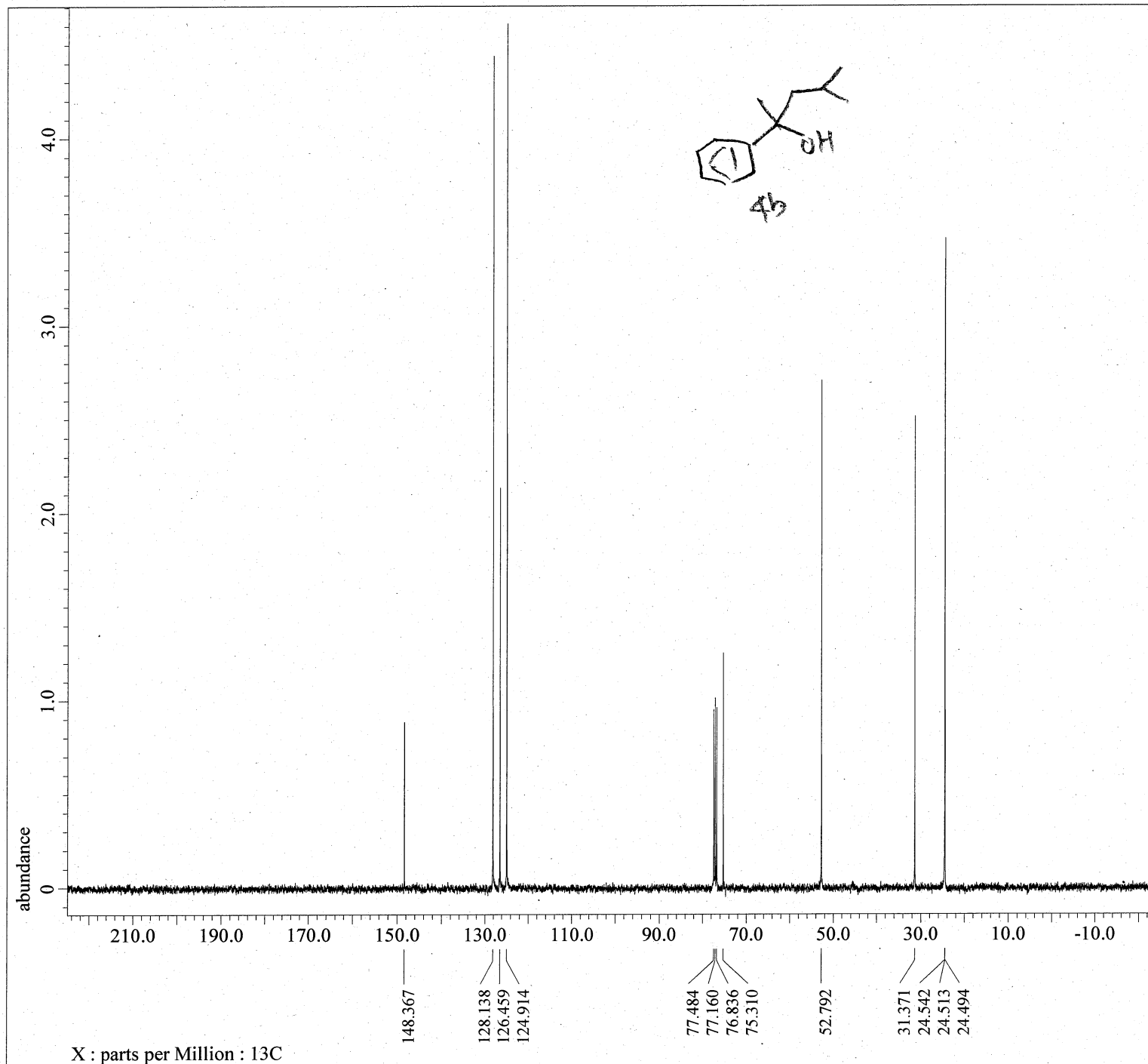
Derived from: KND_1486_pure_Proton-1-1.jdf

Filename = KND_1486_pure_Proton-1-3.
 Author = element
 Experiment = proton.jxp
 Sample Id = KND_1486_pure
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 8-JAN-2024 14:39:02
 Revision_Time = 24-NOV-2024 17:04:11

Comment = single pulse
 Data Format = 1D COMPLEX
 Dim Size = 13107
 X Domain = Proton
 Dim Title = Proton
 Dim Units = [ppm]
 Dimensions = X
 Site = JNM-ECS400
 Spectrometer = DELTA2_NMR

Field Strength = 9.37221[T] (400[MHz])
 X Acq_Duration = 2.1889024[s]
 X_Domain = 1H
 X Freq = 399.03472754[MHz]
 X Offset = 5.0[ppm]
 X Points = 16384
 X_Prescans = 1
 X Resolution = 0.45684997[Hz]
 X Sweep = 7.48502994[kHz]
 X_Sweep_Clippped = 5.98802395[kHz]
 Irr_Domain = Proton
 Irr_Freq = 399.03472754[MHz]
 Irr_Offset = 5.0[ppm]
 Tri_Domain = Proton
 Tri_Freq = 399.03472754[MHz]
 Tri_Offset = 5.0[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 42
 Temp_Get = 18[dC]
 X_90_Width = 6.6[us]
 X_Acq_Time = 2.1889024[s]
 X_Angle = 45[deg]
 X_Atn = 1[dB]
 X_Pulse = 3.3[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Preset = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.1889024[s]



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 2.0[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1486_13C-3.jdf

```

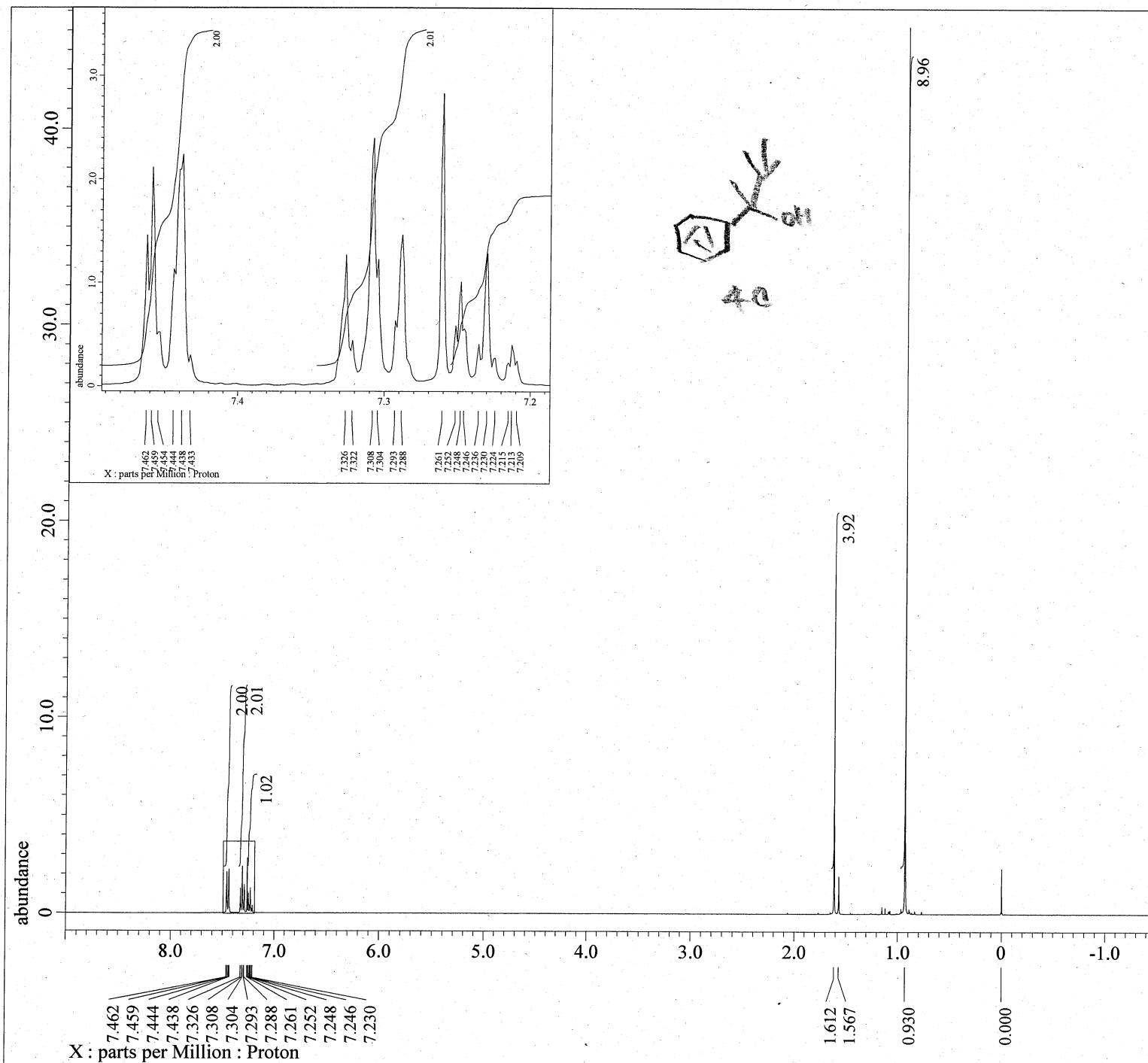
Filename      = KND_1486_13C-4.jdf
Author       = element
Experiment    = single_pulse_dec
Sample_Id    = S#498490
Solvent      = CHLOROFORM-D
Actual_Start_Time = 8-JAN-2024 20:06:53
Revision_Time  = 28-JAN-2024 14:20:21

Comment      = single pulse decoupled ga
Data Format   = 1D COMPLEX
Dim_Size     = 26214
X_Domain     = 13C
Dim_Title    = 13C
Dim_Units    = [ppm]
Dimensions   = X
Site         = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain       = 13C
X_Freq         = 98.51479726[MHz]
X_Offset       = 100[ppm]
X_Points       = 32768
X_Prescans     = 4
X_Resolution   = 0.93958061[Hz]
X_Sweep        = 30.78817734[kHz]
Irr_Domain     = 1H
Irr_Freq       = 391.78655441[MHz]
Irr_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 41
Total_Scans    = 41

Relaxation_Delay = 2[s]
Recvr_Gain       = 60
Temp_Get        = 18.2[dC]
X_90_Width      = 9.46[us]
X_Acq_Time      = 1.06430464[s]
X_Angle         = 30[deg]
X_Atn           = 4.9[dB]
X_Pulse         = 3.15333333[us]
Irr_Atn_Dec     = 22.45[dB]
Irr_Atn_No     = 22.45[dB]
Irr_Noise       = WALTZ
Decoupling      = TRUE
Initial_Wait    = 1[s]
Noe              = TRUE
Noe_Time        = 2[s]
Repetition_Time = 3.06430464[s]

```



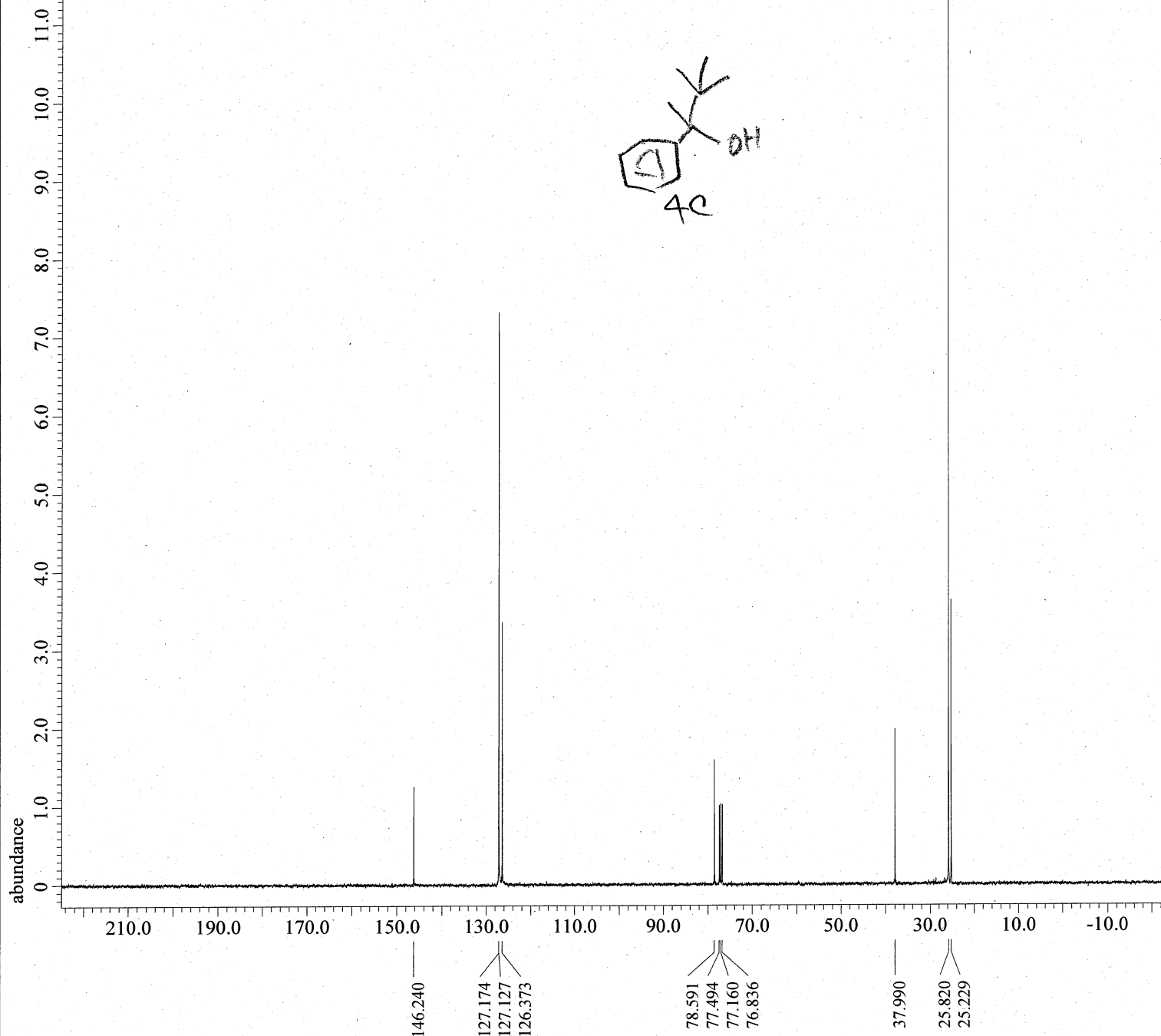
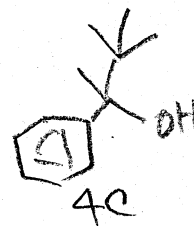
----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 secp(0.2[Hz], 0.0[s])
 trapezoid(0[%], 0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm
 Derived from: KND_1524_pure_Proton-1-1.jdf

Filename = KND_1524_pure_Proton-1-2.
 Author = element
 Experiment = proton.jxp
 Sample_Id = KND_1524_pure
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 8-JAN-2024 15:17:15
 Revision_Time = 24-NOV-2024 17:09:16

Comment = single pulse
 Data_Format = 1D COMPLEX
 Dim_Size = 13107
 X_Domain = Proton
 Dim_Title = Proton
 Dim_Units = [ppm]
 Dimensions = X
 Site = JNM-ECS400
 Spectrometer = DELTA2_NMR

Field_Strength = 9.37221[T] (400[MHz])
 X_Acq_Duration = 2.1889024[s]
 X_Domain = 1H
 X_Freq = 399.03472754[MHz]
 X_Offset = 5.0[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.45684997[Hz]
 X_Sweep = 7.48502994[kHz]
 X_Sweep_Clipped = 5.98802395[kHz]
 Irr_Domain = Proton
 Irr_Freq = 399.03472754[MHz]
 Irr_Offset = 5.0[ppm]
 Tri_Domain = Proton
 Tri_Freq = 399.03472754[MHz]
 Tri_Offset = 5.0[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 42
 Temp_Get = 18[dC]
 X_90_Width = 6.6[us]
 X_Acq_Time = 2.1889024[s]
 X_Angle = 45[deg]
 X_Atn = 1[dB]
 X_Pulse = 3.3[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.1889024[s]



X : parts per Million : 13C

----- PROCESSING PARAMETERS -----
 dc balance(0, FALSE)
 secp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

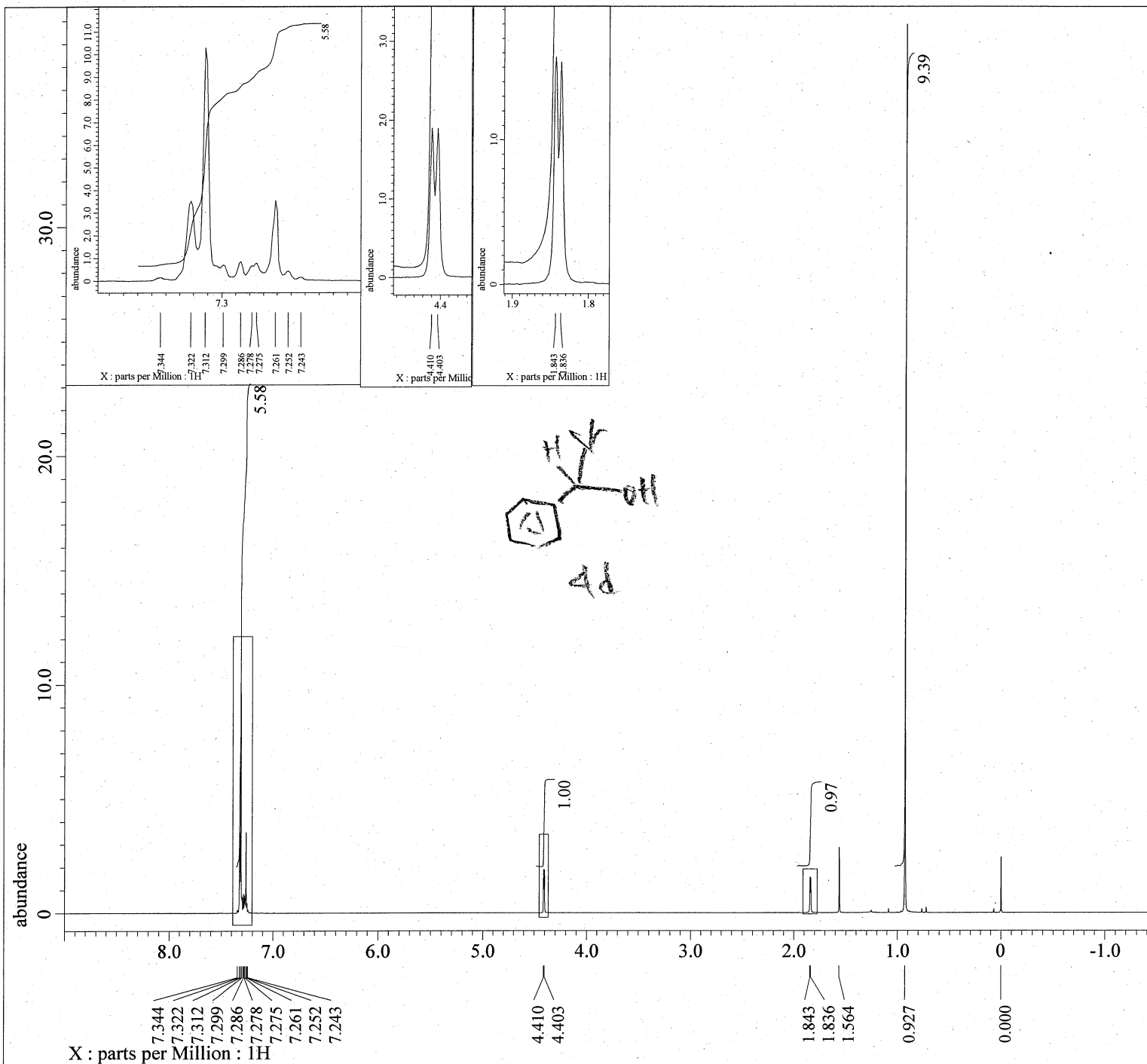
Derived from: KND_1524_13C-1.jdf

Filename = KND_1524_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 8-JAN-2024 20:38:48
 Revision_Time = 28-JAN-2024 14:32:03

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim Size = 26214
 X Domain = 13C
 Dim Title = 13C
 Dim Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 42
 Total_Scans = 42

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 18.2[dc]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_Noise = 22.45[dB]
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 secp(0.2[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

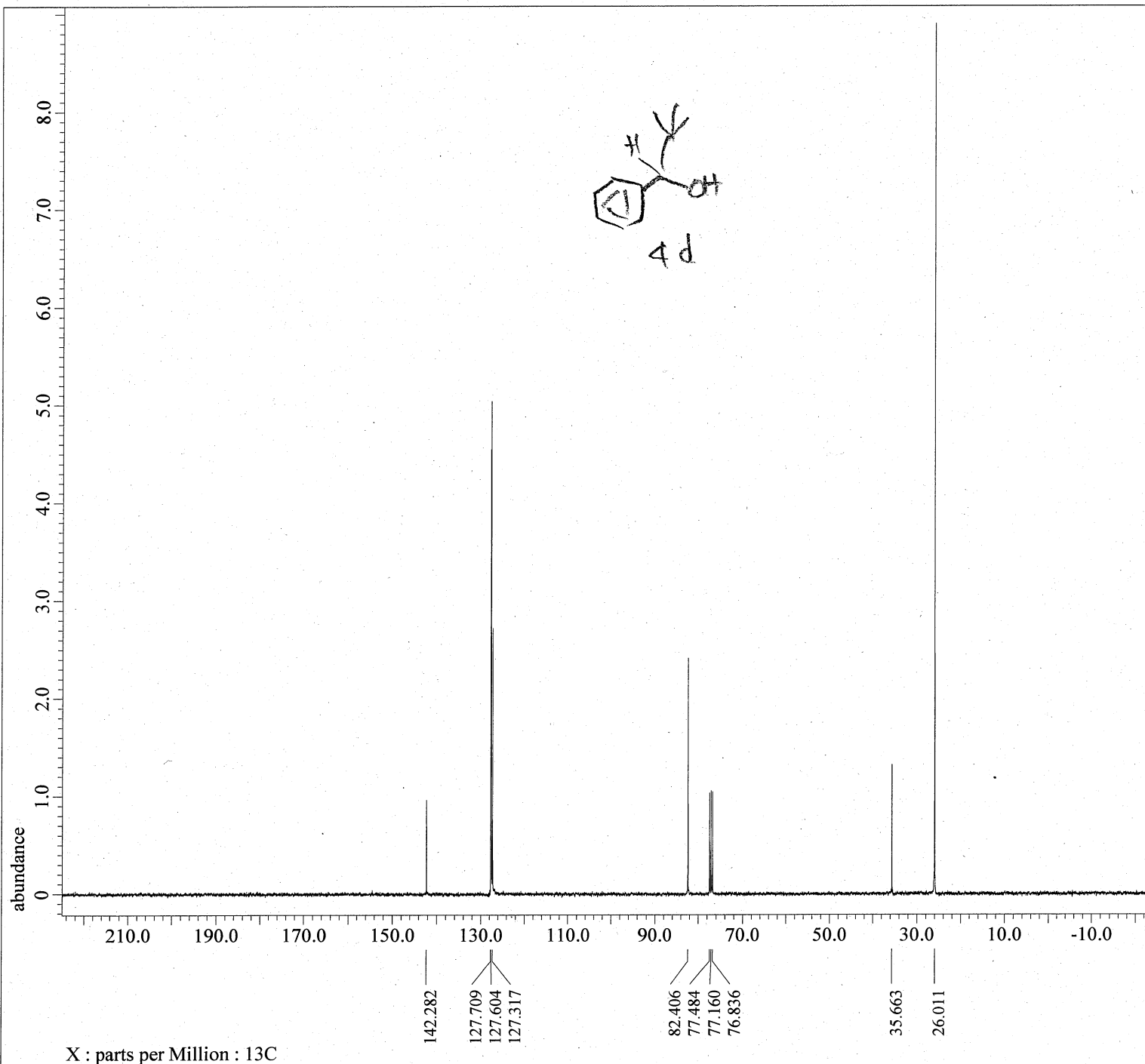
Derived from: KND_1489_pure-1.jdf

Filename = KND_1489_pure-2.jdf
 Author = element
 Experiment = single_pulse.ex2
 Sample_Id = S#532006
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 8-JAN-2024 21:03:40
 Revision_Time = 24-NOV-2024 17:13:31

Comment = single pulse
 Data_Format = 1D COMPLEX
 Dim_Size = 13107
 X_Domain = 1H
 Dim_Title = 1H
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 2.228224[s]
 X_Domain = 1H
 X_Freq = 391.78655441[MHz]
 X_Offset = 5[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.44878791[Hz]
 X_Sweep = 7.35294118[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Tri_Domain = 1H
 Tri_Freq = 391.78655441[MHz]
 Tri_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 50
 Temp_Get = 18[dC]
 X_90_Width = 10.79[us]
 X_Acq_Time = 2.228224[s]
 X_Angle = 45[deg]
 X_Atn = 1.9[dB]
 X_Pulse = 5.395[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.228224[s]



----- PROCESSING PARAMETERS -----
dc_balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid3(0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

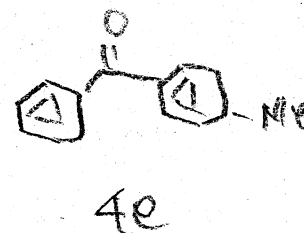
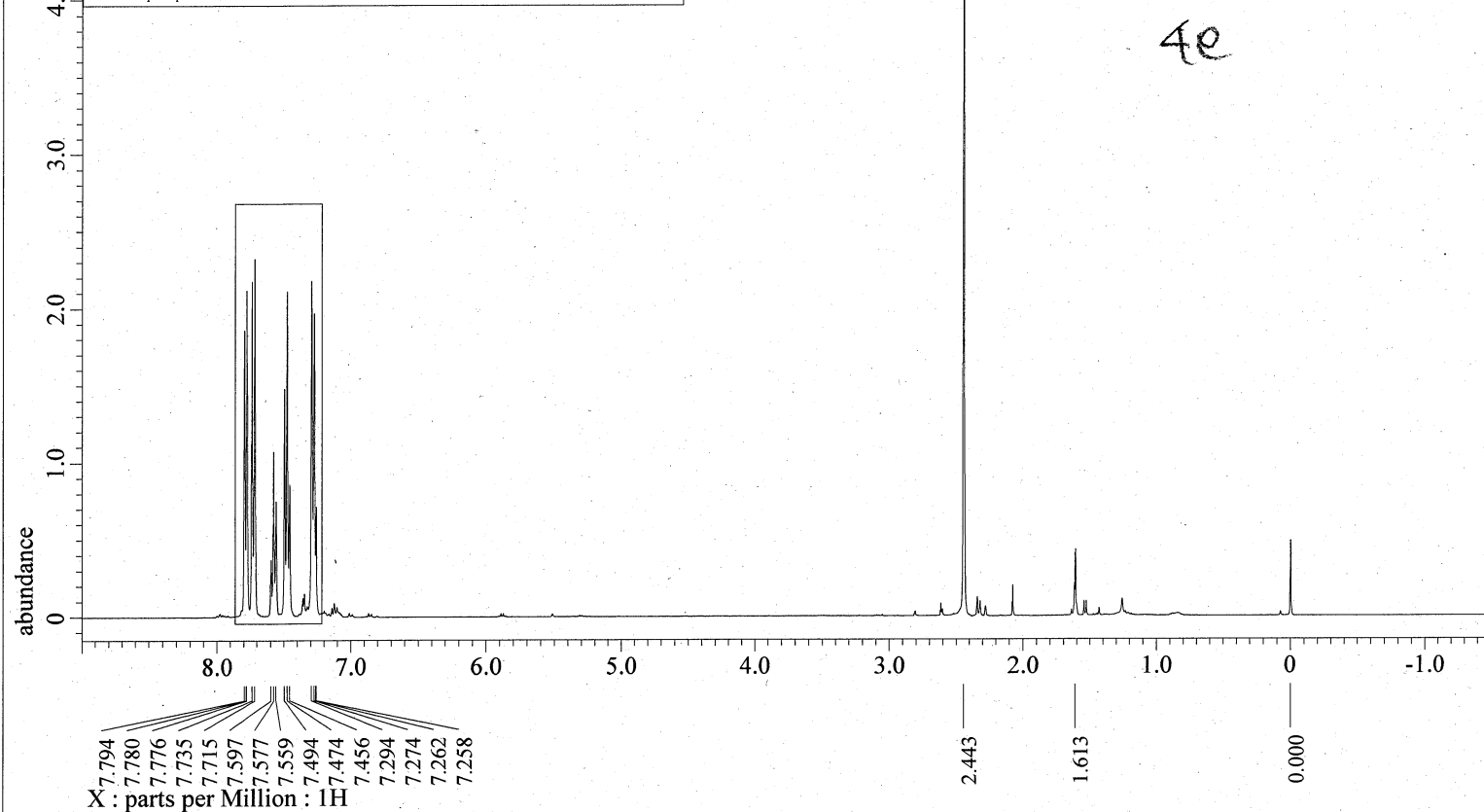
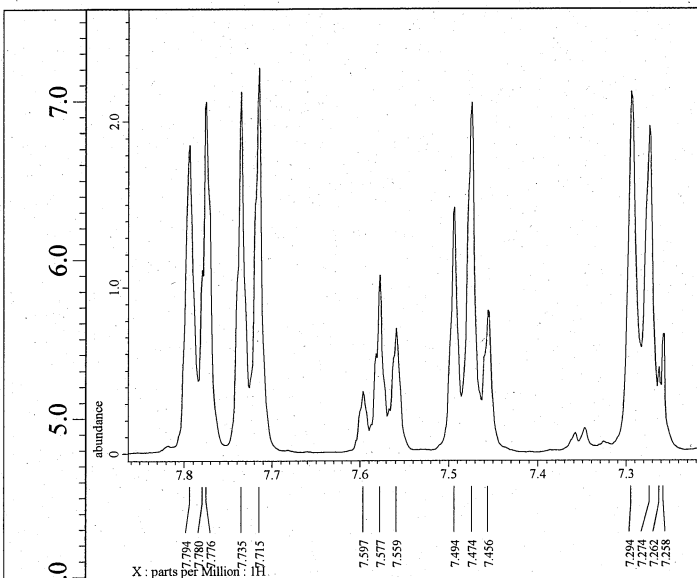
Derived from: KND_1489_13C-1.jdf

Filename = KND_1489_13C-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = 1
Solvent = CHLOROFORM-D
Actual_Start_Time = 8-JAN-2024 21:15:10
Revision_Time = 28-JAN-2024 14:42:33

Comment = single pulse decoupled ga
Data Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain = 13C
X_Freq = 98.51479726[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.93958061[Hz]
X_Sweep = 30.78817734[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 58
Total_Scans = 58

Relaxation_Delay = 2[s]
Recvr_Gain = 60
Temp_Get = 18.2[dC]
X_90_Width = 9.46[us]
X_Acq_Time = 1.06430464[s]
X_Angle = 30[deg]
X_Atn = 4.9[dB]
X_Pulse = 3.15333333[us]
Irr_Atn_Dec = 22.45[dB]
Irr_Atn_No = 22.45[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.06430464[s]



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND 1487 pure-1.jdf

```

Filename      = KND_1487_pure-2.jdf
Author        = element
Experiment     = single_pulse.ex2
Sample Id     = S#555084
Solvent        = CHLOROFORM-D
Actual_Start_Time = 8-JAN-2024 21:42:34
Revision Time  = 24-NOV-2024 17:16:53

```

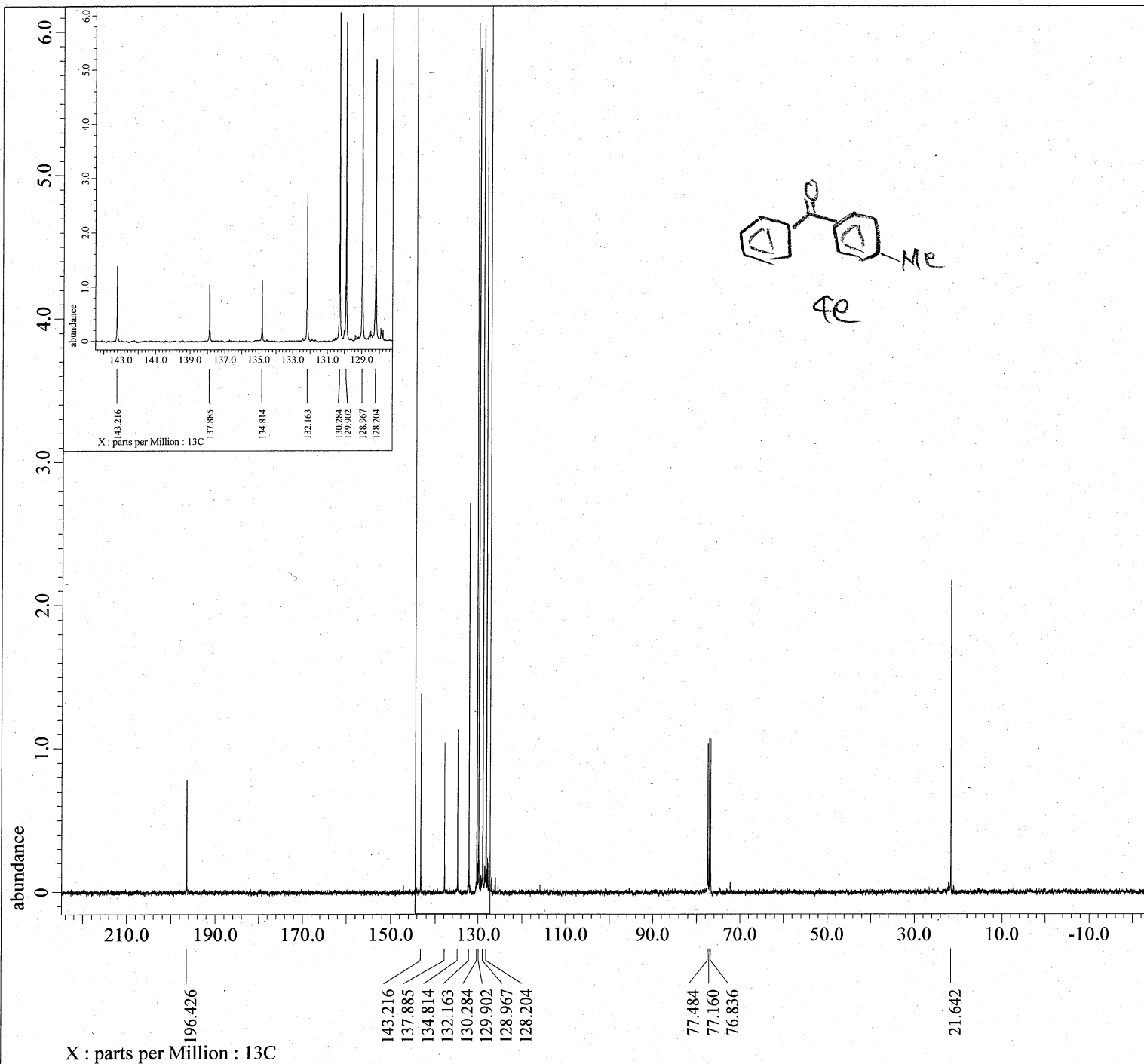
```

Comment           = single_pulse
Data Format        = 1D COMPLEX
Dim_Size          = 13107
X_Domain          = 1H
Dim_Title         = 1H
Dim_Units         = [ppm]
Dimensions        = X
Site              = ECS 400
Spectrometer      = JNM-ECS400

```

```
Field Strength      = 9.20197068[T] (390[MHz])
X_Acq_Duration      = 2.228224[s]
X_Domain            = 1H
X_Freq              = 391.78655441[MHz]
X_Offset            = 5[ppm]
X_Points            = 16384
X_Prescans          = 1
X_Resolution        = 0.44878791[Hz]
X_Sweep             = 7.35294118[kHz]
Irr_Domain          = 1H
Irr_Freq            = 391.78655441[MHz]
Irr_Offset          = 5[ppm]
Tri_Domain          = 1H
Tri_Freq            = 391.78655441[MHz]
Tri_Offset          = 5[ppm]
Clipped             = FALSE
Scans               = 8
Total Scans        = 8
```

```
Relaxation_Delay = 5[s]
Recvr_Gain       = 40
Temp_Get         = 18[dC]
X_90_Width       = 10.79[us]
X_Acq_Time       = 2.228224[s]
X_Angle          = 45[deg]
X_Atn            = 1.9[dB]
X_Pulse          = 5.395[us]
Irr_Mode         = Off
Tri_Mode         = Off
Dante_Presat     = FALSE
Initial_Wait     = 1[s]
Repetition_Time  = 7.228224[s]
```



```

---- PROCESSING PARAMETERS ----
dc balance( 0, FALSE )
sexp( 2.0[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1487_13C-1.jdf

```

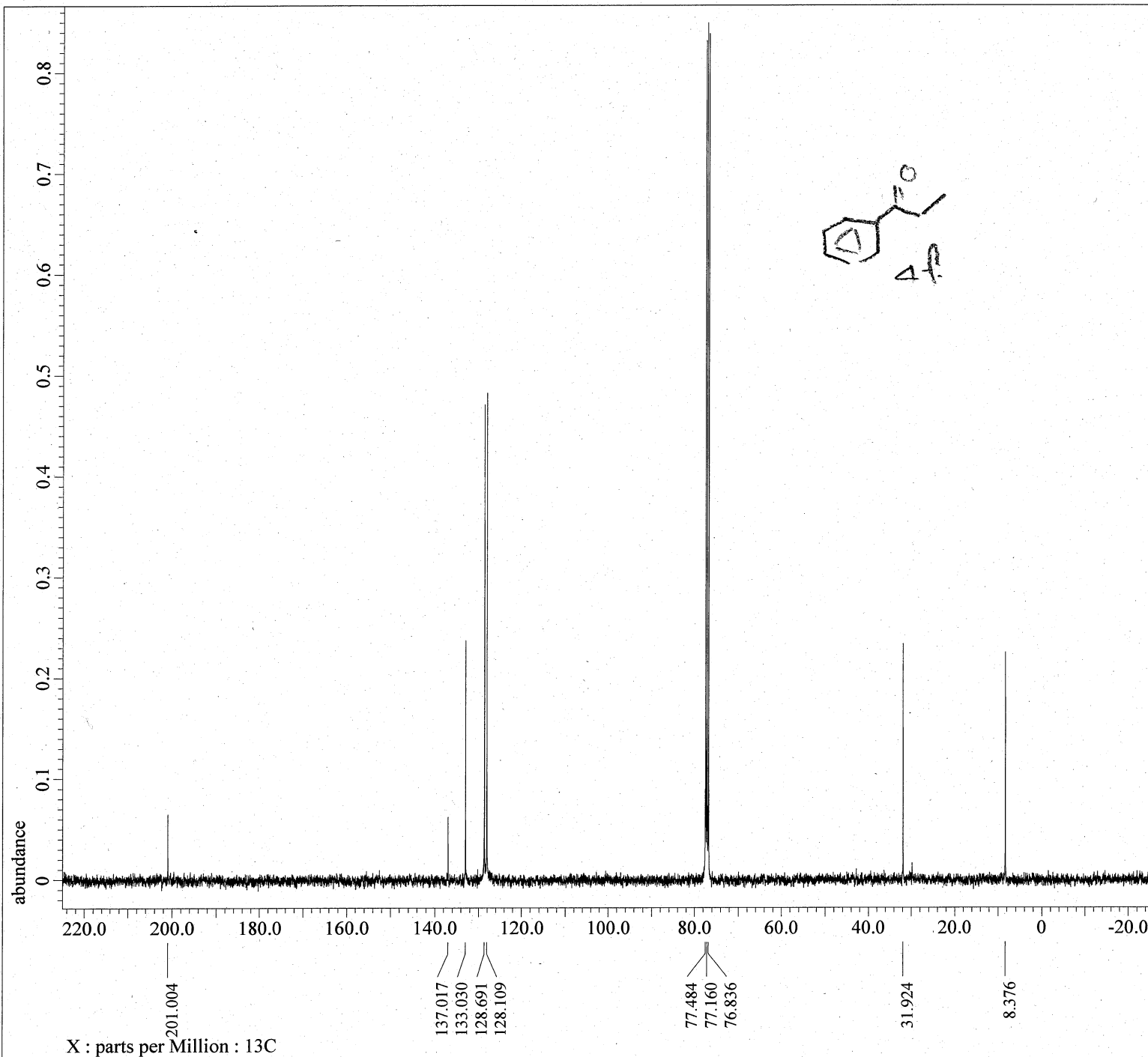
Filename      = KND_1487_13C-2.jdf
Author       = element
Experiment    = single_pulse_dec
Sample_Id    = 1
Solvent      = CHLOROFORM-D
Actual_Start_Time = 8-JAN-2024 21:55:10
Revision_Time = 28-JAN-2024 14:54:50

Comment      = single pulse decoupled ga
Data Format   = 1D COMPLEX
Dim Size     = 26214
X Domain     = 13C
Dim Title    = 13C
Dim Units    = [ppm]
Dimensions   = X
Site         = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain       = 13C
X_Freq         = 98.51479726[MHz]
X_Offset       = 100[ppm]
X_Points       = 32768
X_Prescans     = 4
X_Resolution   = 0.93958061[Hz]
X_Sweep        = 30.78817734[kHz]
Irr_Domain     = 1H
Irr_Freq       = 391.78655441[MHz]
Irr_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 61
Total_Scans    = 61

Relaxation_Delay = 2[s]
Recvr_Gain       = 60
Temp_Get         = 18.2[degC]
X_90_Width       = 9.46[us]
X_Acq_Time       = 1.06430464[s]
X_Angle          = 30[deg]
X_Atn            = 4.9[dB]
X_Pulse          = 3.15333333[us]
Irr_Atn_Dec      = 22.45[dB]
Irr_Atn_No     = 22.45[dB]
Irr_Noise        = WALTZ
Decoupling       = TRUE
Initial_Wait     = 1[s]
Noe              = TRUE
Noe_Time         = 2[s]
Repetition_Time  = 3.06430464[s]

```

----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 secp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

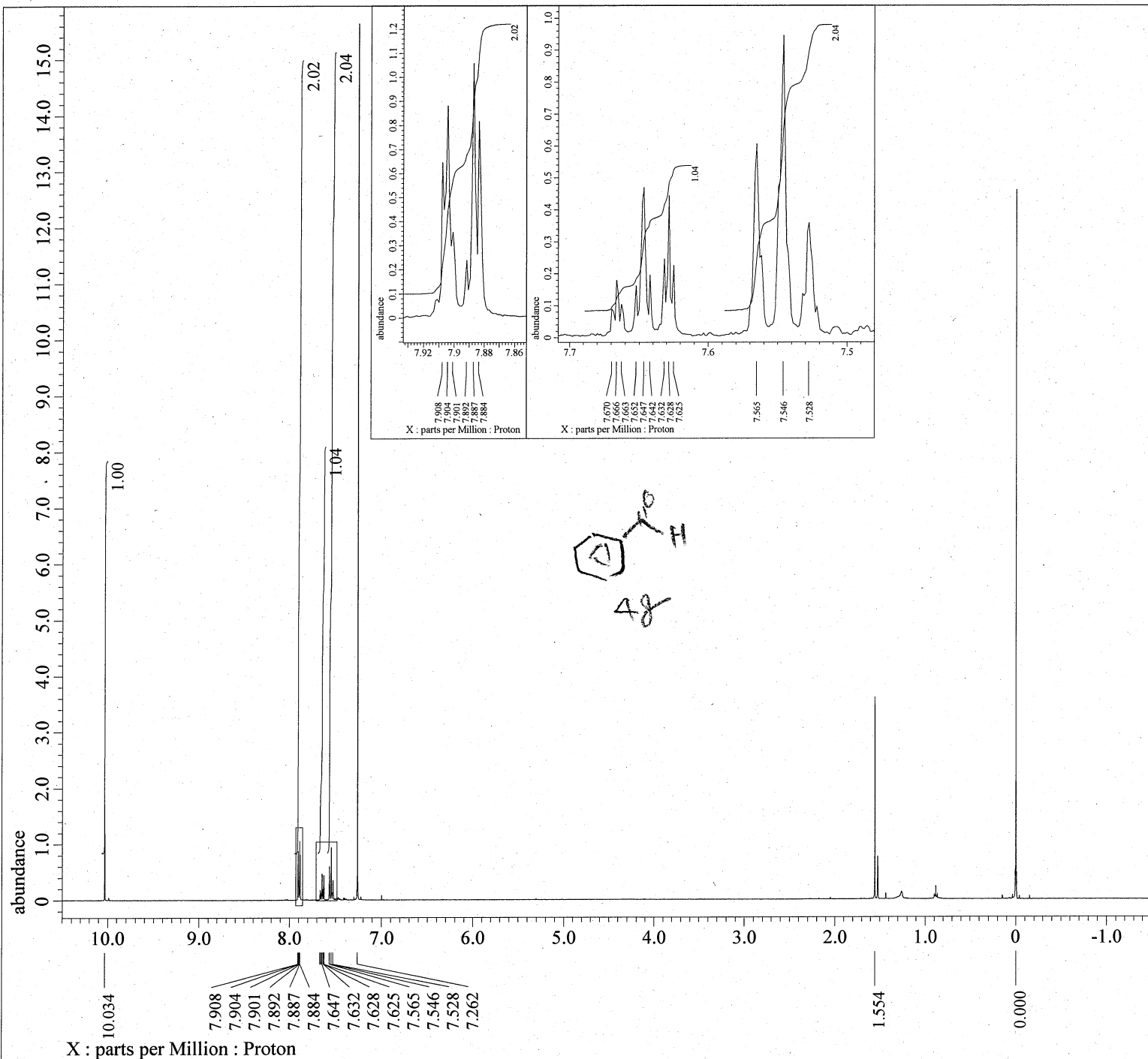
Derived from: KND_1488_13C-2.jdf

Filename = KND_1488_13C-3.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 8-JAN-2024 23:03:15
 Revision_Time = 28-JAN-2024 15:05:29

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim_Size = 26214
 X_Domain = 13C
 Dim_Title = 13C
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 600
 Total_Scans = 600

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 18.2[dc]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_Noise = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(0.2[Hz], 0.0[s])
 trapezoid(0[%], 0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

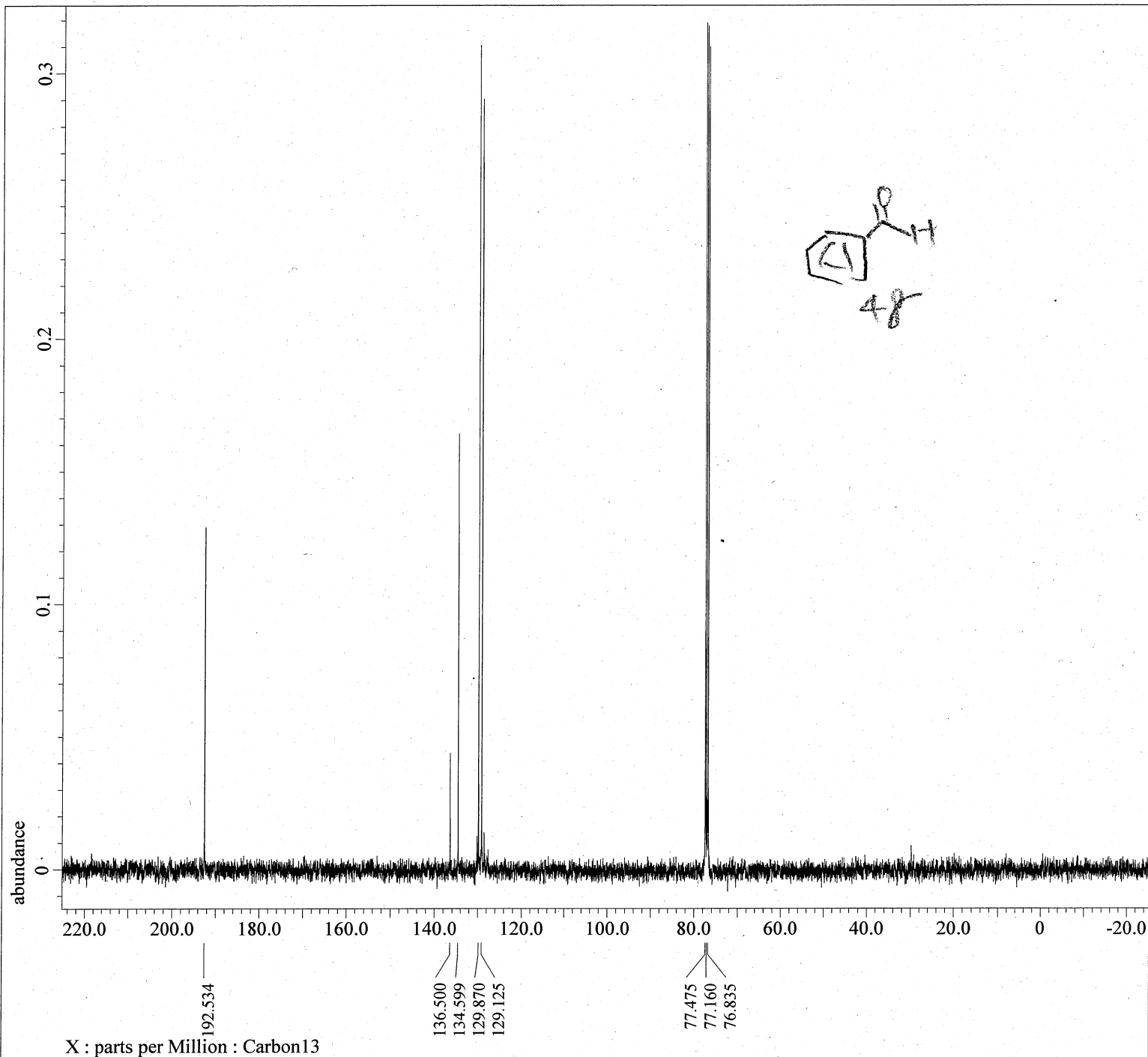
Derived from: KND_1747_pure_Proton-1-1.jdf

Filename = KND_1747_pure_Proton-1-2.
 Author = element
 Experiment = proton.jxp
 Sample Id = KND_1747_pure
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 25-JAN-2024 17:31:31
 Revision_Time = 24-NOV-2024 17:32:37

Comment = single_pulse
 Data_Format = 1D COMPLEX
 Dim_Size = 13107
 X_Domain = Proton
 Dim_Title = Proton
 Dim_Units = [ppm]
 Dimensions = X
 Site = JNM-ECS400
 Spectrometer = DELTA2_NMR

Field_Strength = 9.37221[T] (400[MHz])
 X_Acq_Duration = 2.1889024[s]
 X_Domain = 1H
 X_Freq = 399.03472754[MHz]
 X_Offset = 5.0[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.45684997[Hz]
 X_Sweep = 7.48502994[kHz]
 X_Sweep_Clipped = 5.98802395[kHz]
 Irr_Domain = Proton
 Irr_Freq = 399.03472754[MHz]
 Irr_Offset = 5.0[ppm]
 Tri_Domain = Proton
 Tri_Freq = 399.03472754[MHz]
 Tri_Offset = 5.0[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 50
 Temp_Get = 19.3[dC]
 X_90_Width = 6.6[us]
 X_Acq_Time = 2.1889024[s]
 X_Angle = 45[deg]
 X_Atn = 1[dB]
 X_Pulse = 3.3[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.1889024[s]



----- PROCESSING PARAMETERS -----
dc balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid(0[%], 0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

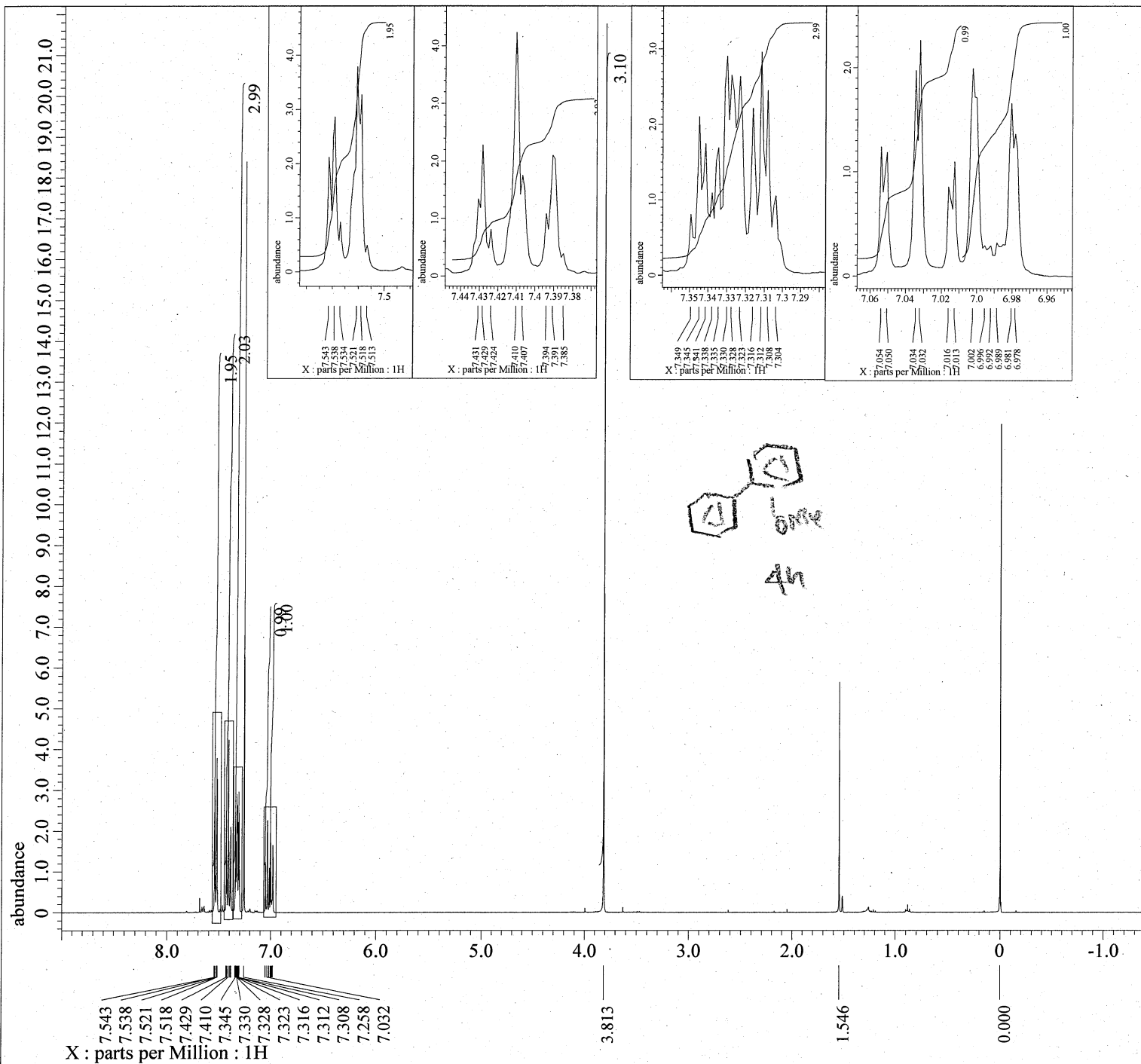
Derived from: KND_1747_13C_Carbon-1-1.jdf

Filename = KND_1747_13C_Carbon-1-2.j
Author = element
Experiment = carbon.jxp
Sample_Id = KND_1747_13C
Solvent = CHLOROFORM-D
Actual_Start_Time = 25-JAN-2024 17:45:00
Revision_Time = 28-JAN-2024 15:32:03

Comment = single pulse decoupled ga
Data Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = Carbon
Dim_Title = Carbon13
Dim_Units = [ppm]
Dimensions = X
Site = JNM-ECS400
Spectrometer = DELTA2_NMR

Field_Strength = 9.37221[T] (400[MHz])
X_Acq_Duration = 1.04333312[s]
X_Domain = 13C
X_Freq = 100.33735165[MHz]
X_Offset = 100.0[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.95846665[Hz]
X_Sweep = 31.40703518[kHz]
X_Sweep_Clippped = 25.12562814[kHz]
Irr_Domain = Proton
Irr_Freq = 399.03472754[MHz]
Irr_Offset = 5.0[ppm]
Clipped = FALSE
Scans = 159
Total_Scans = 159

Relaxation_Delay = 2[s]
Recvr_Gain = 50
Temp_Get = 19.9[dC]
X_90_Width = 10.9[us]
X_Acq_Time = 1.04333312[s]
X_Angle = 30[deg]
X_Atn = 5.4[dB]
X_Pulse = 3.63333333[us]
Irr_Atn_Dec = 25.823[dB]
Irr_Atn_No = 25.823[dB]
Irr_Noise = WALTZ
Irr_Pwidth = 0.115[ms]
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.04333312[s]



----- PROCESSING PARAMETERS -----
 dc balance(0, FALSE)
 sexp(0.2[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

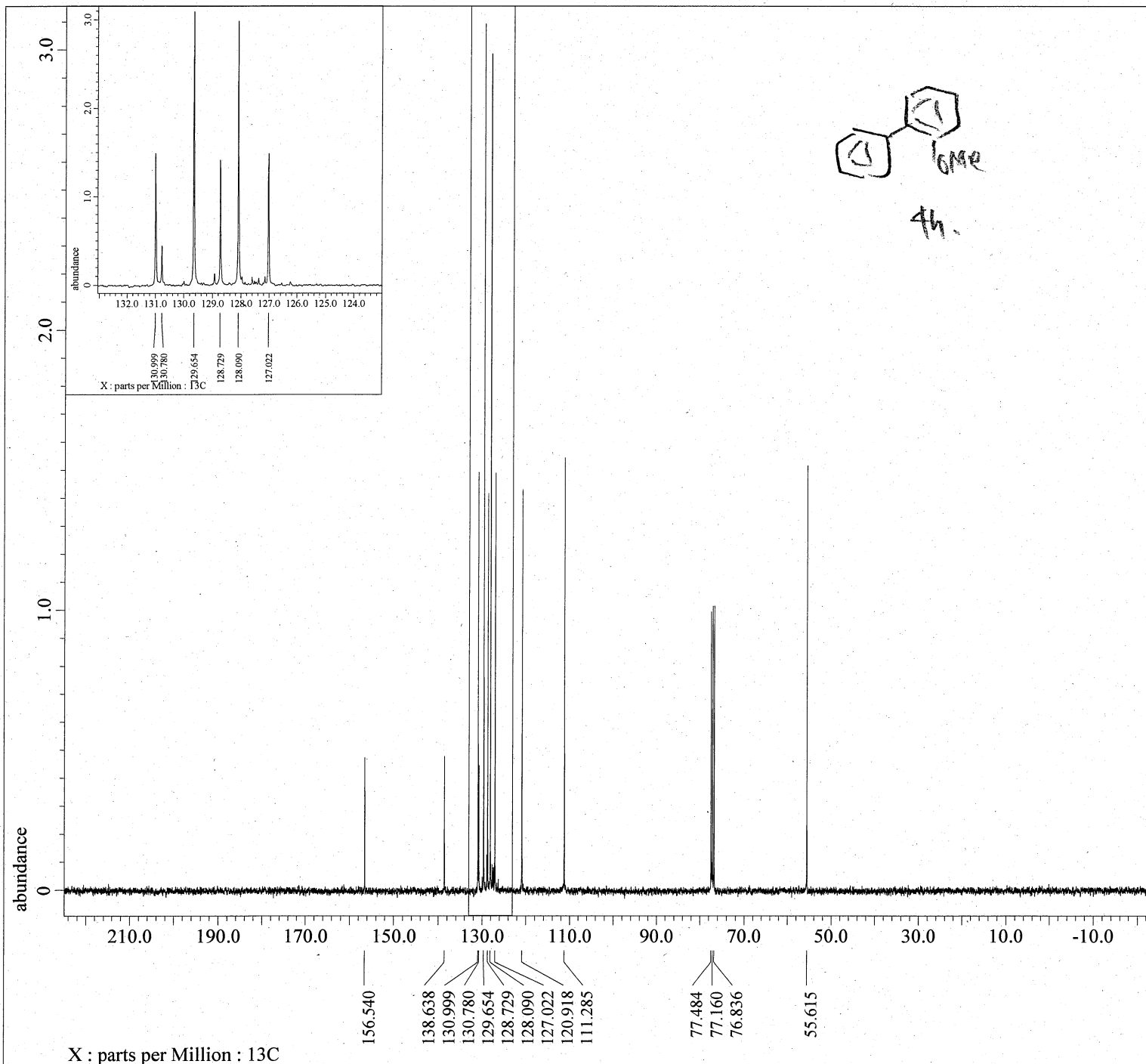
Derived from: KND_1675_gpc2-1.jdf

Filename = KND_1675_gpc2-2.jdf
 Author = element
 Experiment = single pulse.ex2
 Sample_Id = S#556455
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 27-JAN-2024 21:42:02
 Revision_Time = 24-NOV-2024 17:41:26

Comment = single_pulse
 Data Format = 1D COMPLEX
 Dim Size = 13107
 X Domain = 1H
 Dim Title = 1H
 Dim Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 2.228224[s]
 X Domain = 1H
 X_Freq = 391.78655441[MHz]
 X_Offset = 5[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.44878791[Hz]
 X_Sweep = 7.35294118[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Tri_Domain = 1H
 Tri_Freq = 391.78655441[MHz]
 Tri_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 54
 Temp_Get = 19.4[dC]
 X_90_Width = 10.79[us]
 X_Acq_Time = 2.228224[s]
 X_Angle = 45[deg]
 X_Atn = 1.9[dB]
 X_Pulse = 5.395[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.228224[s]



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

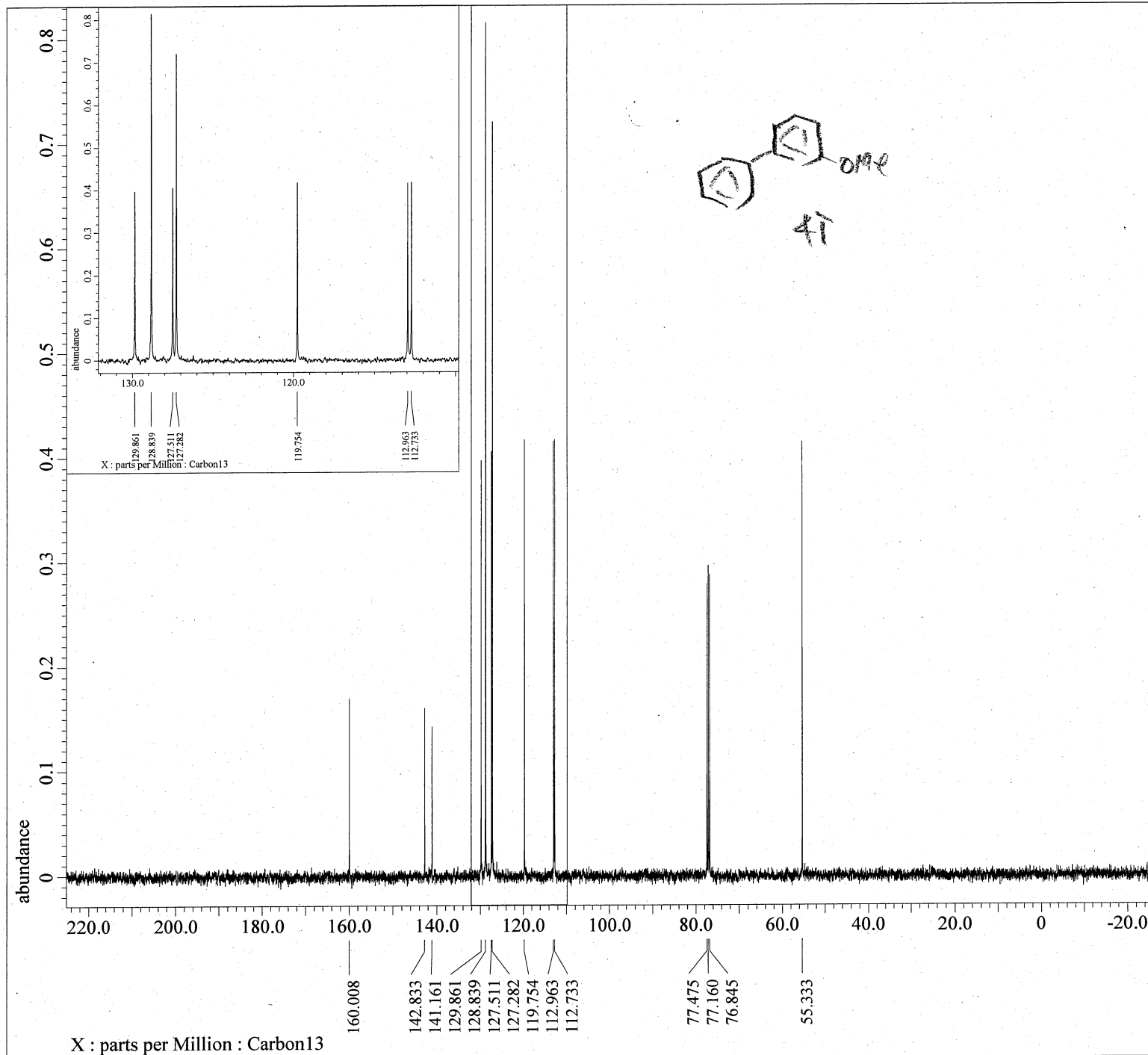
Derived from: KND_1675_13C-2.jdf

Filename = KND_1675_13C-3.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 28-JAN-2024 01:05:09
 Revision_Time = 30-JAN-2024 01:24:11

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim_Size = 26214
 X_Domain = 13C
 Dim_Title = 13C
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 110
 Total_Scans = 110

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 19.7[dc]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_No = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----

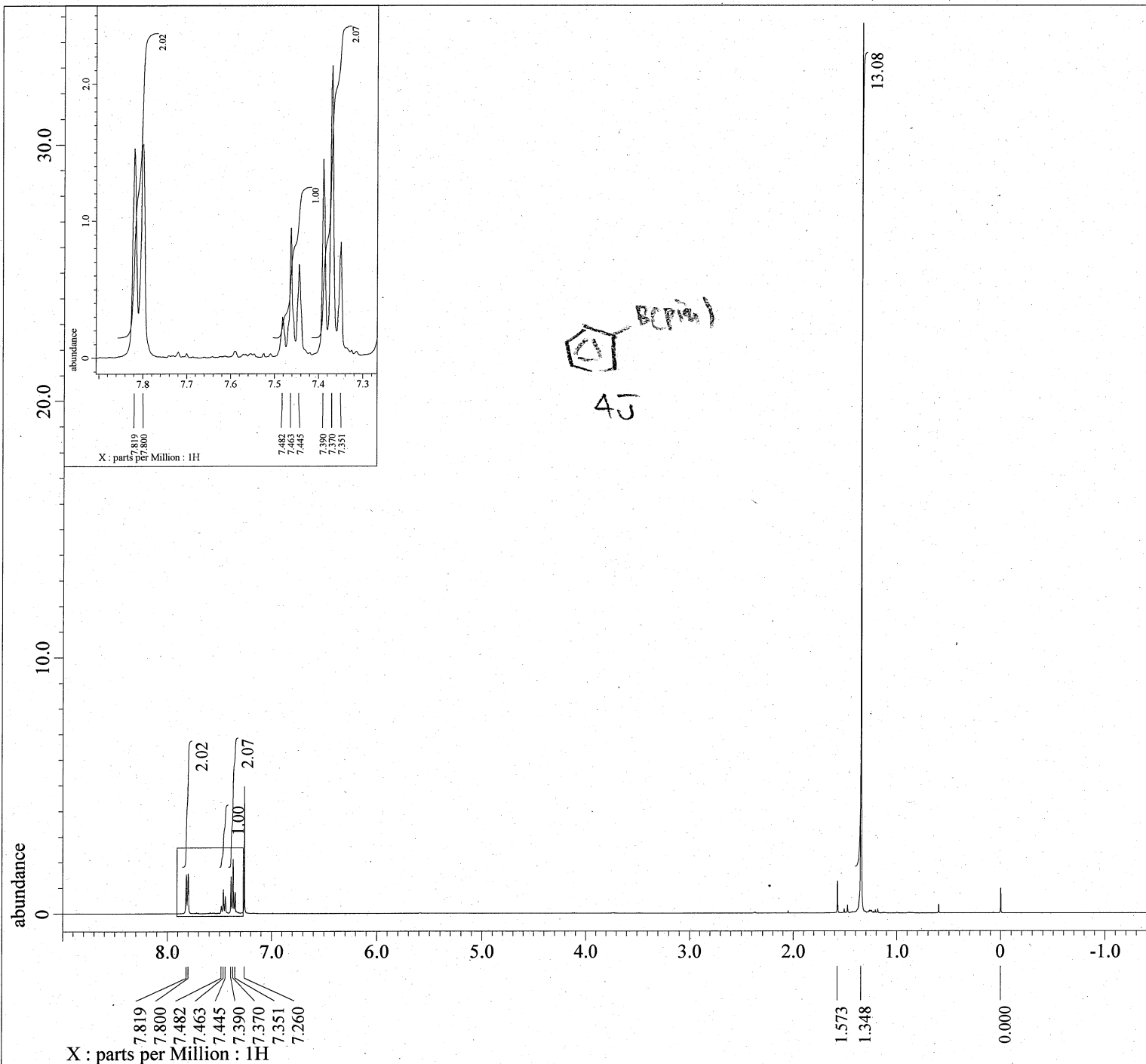
```

dc_balance( 0, FALSE )
sexp( 2.0[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1528_13C_Carbon-1-1.jdf

Filename	= KND_1528_13C_Carbon-1-2.j
Author	= element
Experiment	= carbon.jxp
Sample_Id	= KND_1528_13C
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 8-JAN-2024 18:31:07
Revision_Time	= 28-JAN-2024 15:17:30
Comment	= single pulse decoupled ga
Data Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= Carbon
Dim_Title	= Carbon13
Dim_Units	= [ppm]
Dimensions	= X
Site	= JNM-ECS400
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.37221[T] (400[MHz])
X_Acq_Duration	= 1.04333312[s]
X_Domain	= 13C
X_Freq	= 100.33735165[MHz]
X_Offset	= 100.0[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95846665[Hz]
X_Sweep	= 31.40703518[kHz]
X_Sweep_Clippped	= 25.12562814[kHz]
Irr_Domain	= Proton
Irr_Freq	= 399.03472754[MHz]
Irr_Offset	= 5.0[ppm]
Clipped	= FALSE
Scans	= 50
Total_Scans	= 50
Relaxation_Delay	= 2[s]
Recvr_Gain	= 50
Temp_Get	= 18[dC]
X_90_Width	= 10.9[us]
X_Acq_Time	= 1.04333312[s]
X_Angle	= 30[deg]
X_Atn	= 5.4[dB]
X_Pulse	= 3.63333333[us]
Irr_Atn_Dec	= 25.823[dB]
Irr_Atn_No	= 25.823[dB]
Irr_Noise	= WALTZ
Irr_Pwidth	= 0.115[ms]
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.04333312[s]



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1658_pure-1.jdf

```

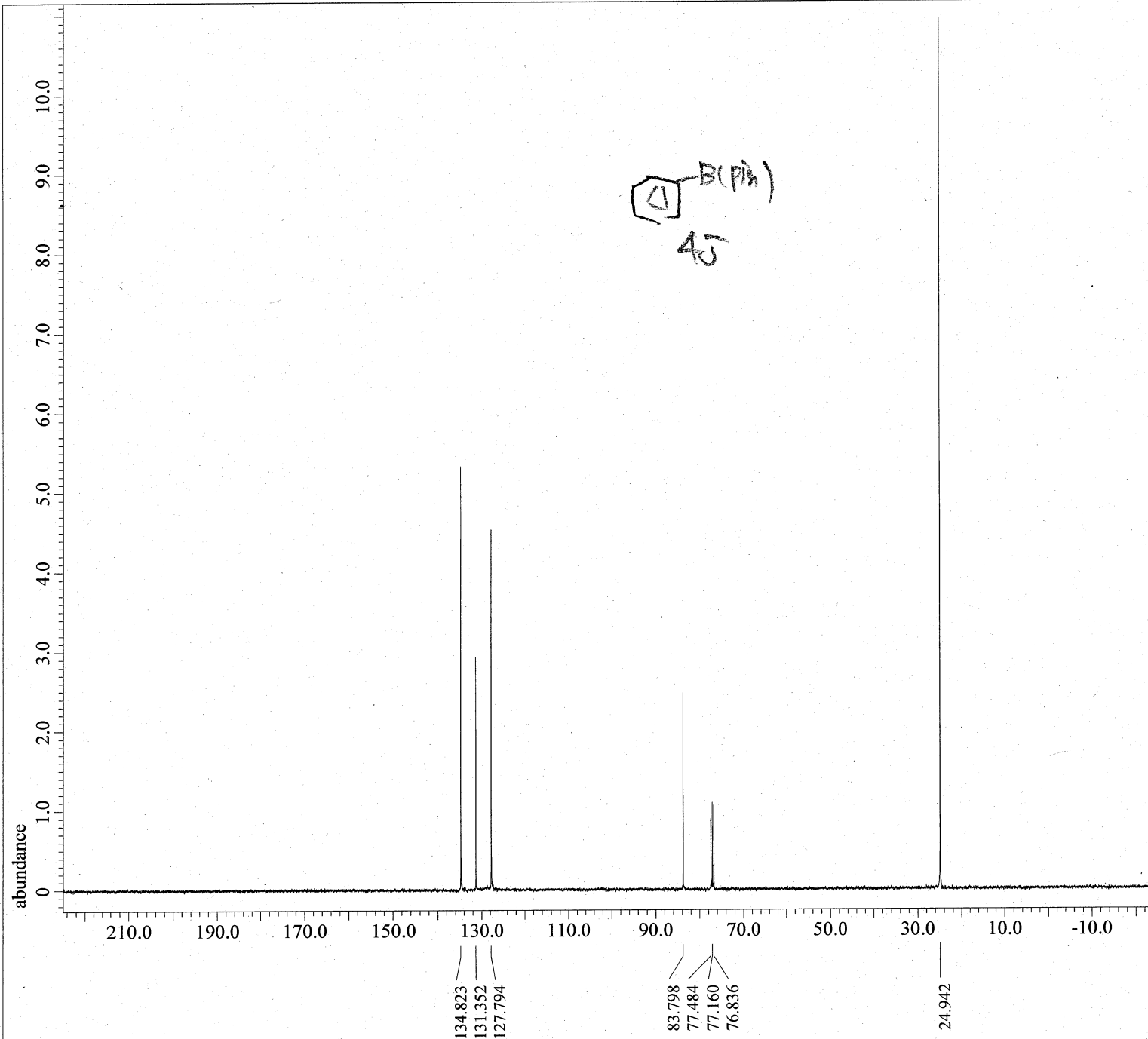
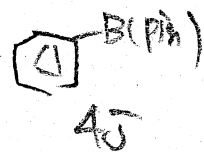
Filename      = KND_1658_pure-2.jdf
Author        = element
Experiment     = single_pulse.ex2
Sample_Id     = S#759033
Solvent       = CHLOROFORM-D
Actual_Start_Time = 12-JAN-2024 03:21:46
Revision_Time  = 24-NOV-2024 17:53:49

Comment       = single_pulse
Data Format    = 1D COMPLEX
Dim Size      = 13107
X Domain      = 1H
Dim Title     = 1H
Dim Units     = [ppm]
Dimensions    = X
Site          = ECS 400
Spectrometer  = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 2.228224[s]
X_Domain       = 1H
X_Freq         = 391.78655441[MHz]
X_Offset       = 5[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.44878791[Hz]
X_Sweep        = 7.35294118[kHz]
Irr_Domain     = 1H
Irr_Freq       = 391.78655441[MHz]
Irr_Offset     = 5[ppm]
Tri_Domain     = 1H
Tri_Freq       = 391.78655441[MHz]
Tri_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

Relaxation_Delay = 5[s]
Recvr_Gain       = 46
Temp_Get         = 16.4[dC]
X_90_Width      = 10.79[us]
X_Acq_Time      = 2.228224[s]
X_Angle         = 45[deg]
X_Atn           = 1.9[dB]
X_Pulse         = 5.395[us]
Irr_Mode        = Off
Tri_Mode        = Off
Dante_Presat    = FALSE
Initial_Wait    = 1[s]
Repetition_Time = 7.228224[s]

```



X : parts per Million : 13C

---- PROCESSING PARAMETERS ----
 dc_balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

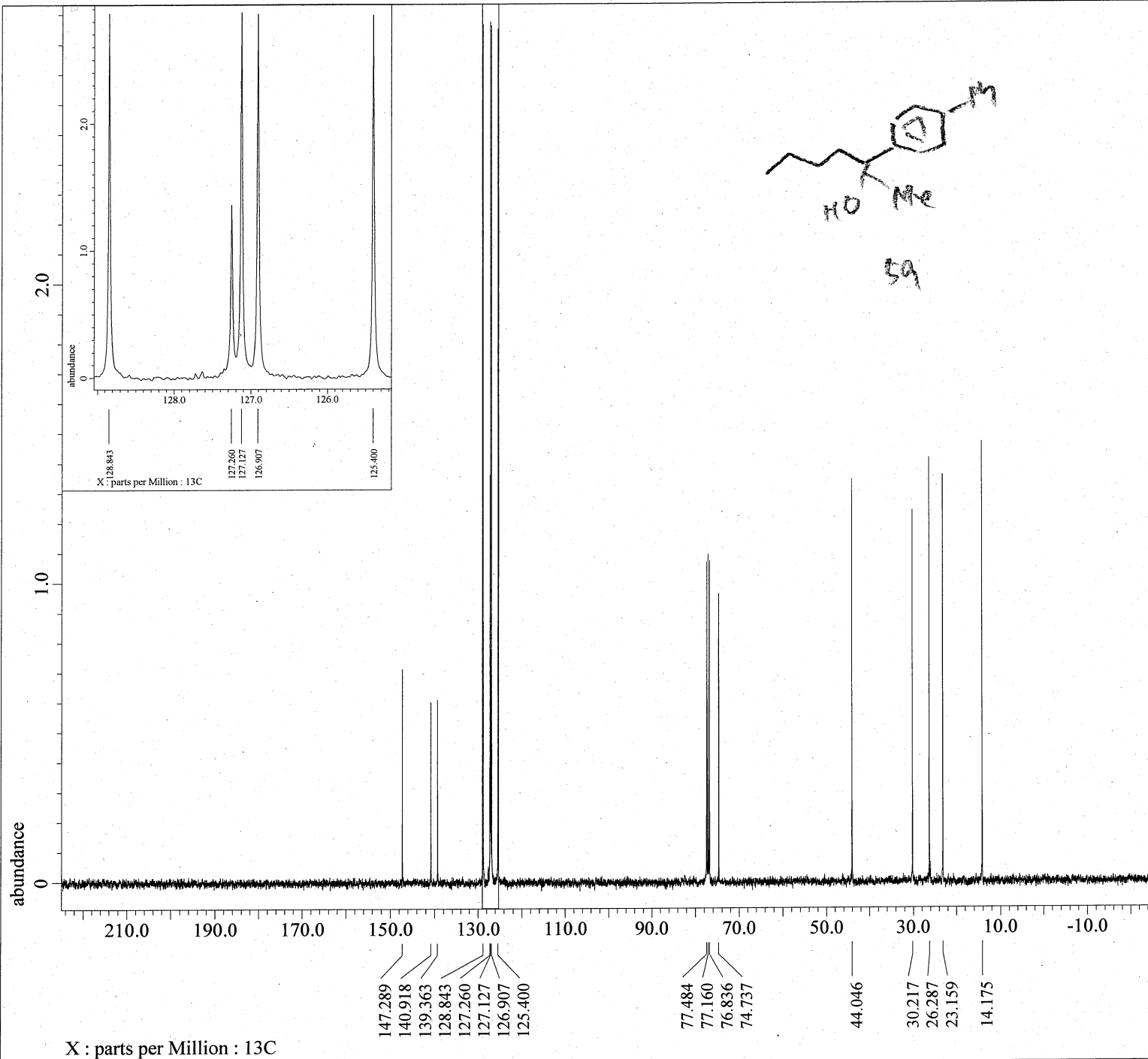
Derived from: KND_1658_13C-1.jdf

Filename = KND_1658_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 12-JAN-2024 03:38:45
 Revision_Time = 28-JAN-2024 15:24:32

 Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim_Size = 26214
 X_Domain = 13C
 Dim_Title = 13C
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

 Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 44
 Total_Scans = 44

 Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 16.7[dC]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_Noe = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----
 dc balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

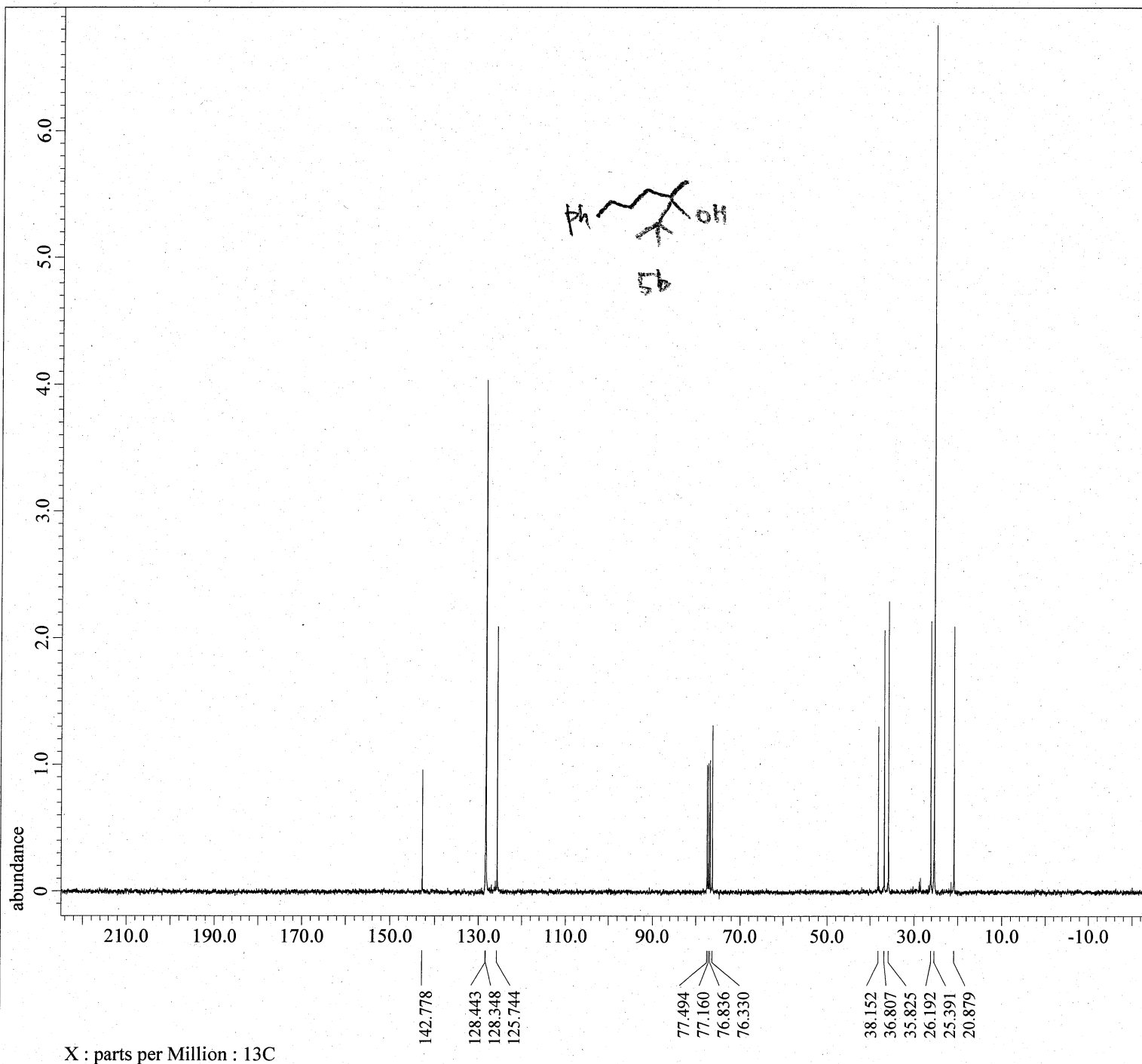
Derived from: KND_1559_13C-1.jdf

Filename = KND_1559_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 9-JAN-2024 03:27:12
 Revision_Time = 28-JAN-2024 15:46:19

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim_Size = 26214
 X Domain = 13C
 Dim_Title = 13C
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 86
 Total_Scans = 86

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 17.9[dC]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_Noe = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

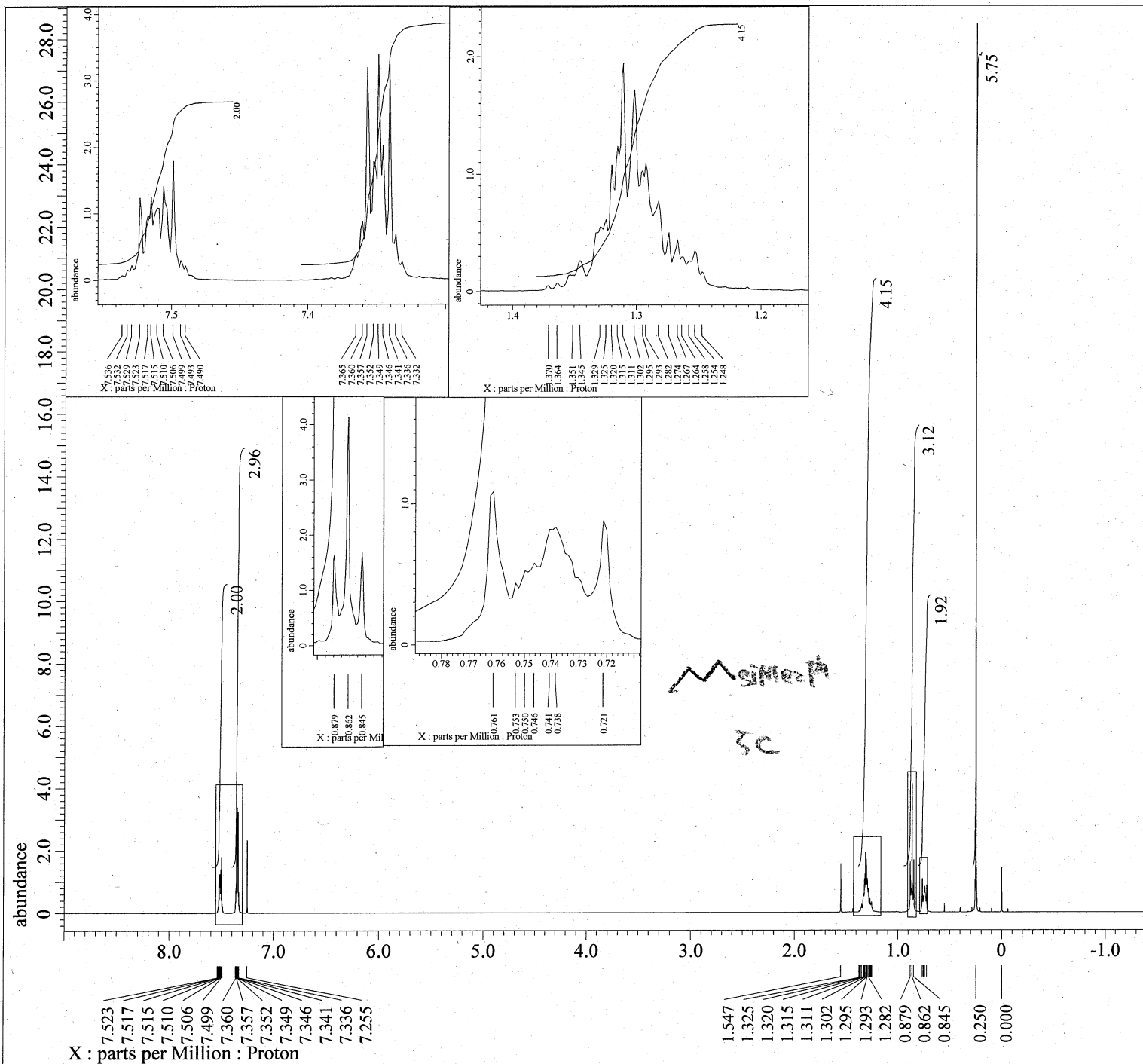
Derived from: KND_1566_13C-1.jdf

Filename = KND_1566_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 9-JAN-2024 04:19:47
 Revision_Time = 28-JAN-2024 16:08:29

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim_Size = 26214
 X_Domain = 13C
 Dim_Title = 13C
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 55
 Total_Scans = 55

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 17.9[dC]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_No = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----

dc_balance(0, FALSE)

sexf(0.2[Hz], 0.0[s])

trapezoid(0[%], 0[%], 80[%], 100[%])

zerofill(1)

fft(1, TRUE, TRUE)

machinephase

ppm

Derived from: KND_1659_pure_Proton-1-1.jdf

Filename = KND_1659_pure_Proton-1-2.

Author = element

Experiment = proton.jxp

Sample Id = KND_1656_pure

Solvent = CHLOROFORM-D

Actual_Start_Time = 9-JAN-2024 00:21:04

Revision_Time = 24-NOV-2024 18:23:18

Comment = single_pulse

Data Format = 1D COMPLEX

Dim Size = 13107

X_Domain = Proton

Dim Title = Proton

Dim Units = [ppm]

Dimensions = X

Site = JNM-ECS400

Spectrometer = DELTA2_NMR

Field_Strength = 9.37221[T] (400[MHz])

X_Acq_Duration = 2.1889024[s]

X_Domain = 1H

X_Freq = 399.03472754[MHz]

X_Offset = 5.0[ppm]

X_Points = 16384

X_Prescans = 1

X_Resolution = 0.45684997[Hz]

X_Sweep = 7.48502994[kHz]

X_Sweep_Clipped = 5.98802395[kHz]

Irr_Domain = Proton

Irr_Freq = 399.03472754[MHz]

Irr_Offset = 5.0[ppm]

Tri_Domain = Proton

Tri_Freq = 399.03472754[MHz]

Tri_Offset = 5.0[ppm]

Clipped = FALSE

Scans = 8

Total_Scans = 8

Relaxation_Delay = 5[s]

Recvr_Gain = 36

Temp_Get = 17.7[dC]

X_90_Width = 6.6[us]

X_Acq_Time = 2.1889024[s]

X_Angle = 45[deg]

X_Atn = 1[dB]

X_Pulse = 3.3[us]

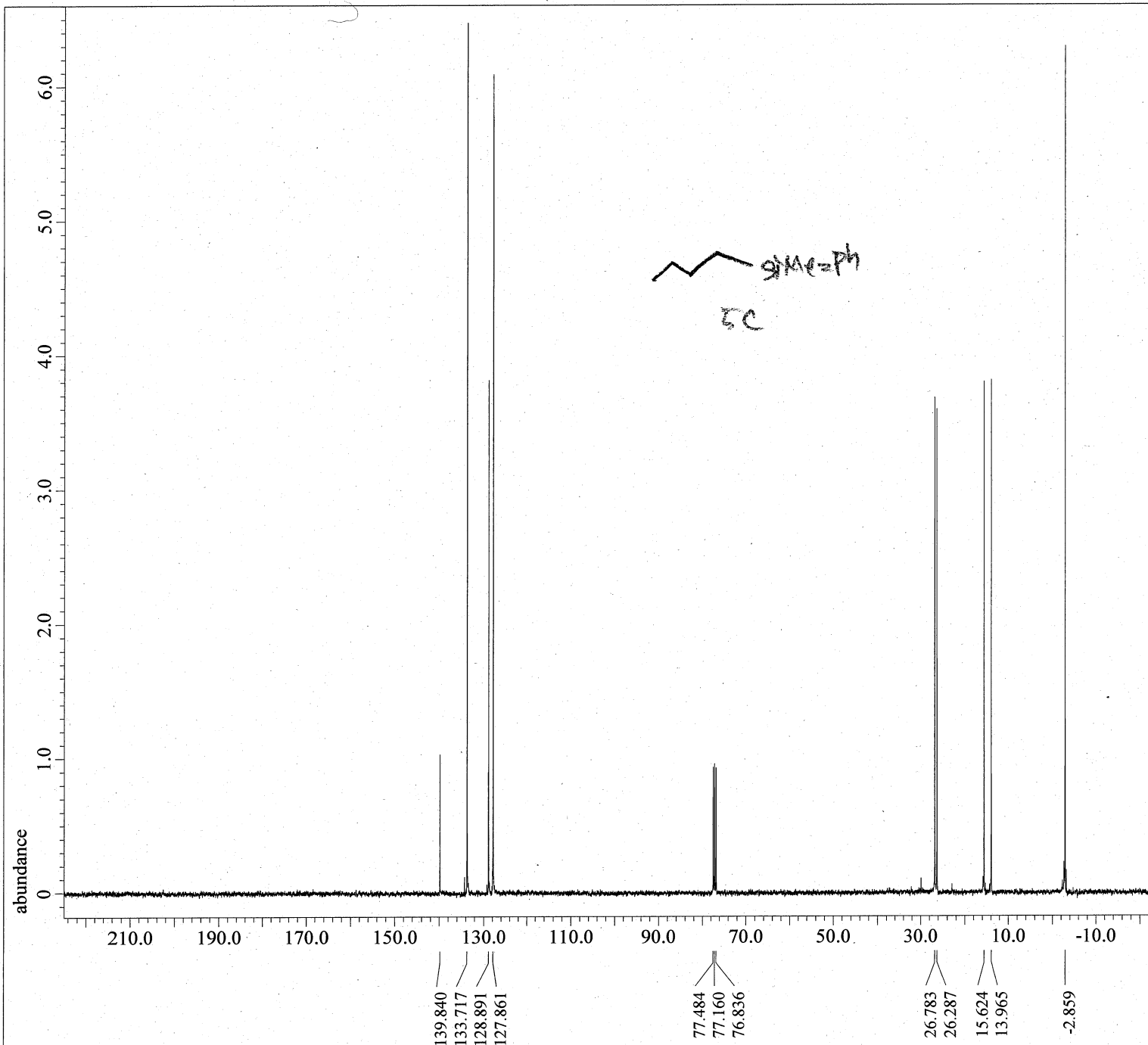
Irr_Mode = Off

Tri_Mode = Off

Dante_Presat = FALSE

Initial_Wait = 1[s]

Repetition_Time = 7.1889024[s]



----- PROCESSING PARAMETERS -----
dc balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid3(0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

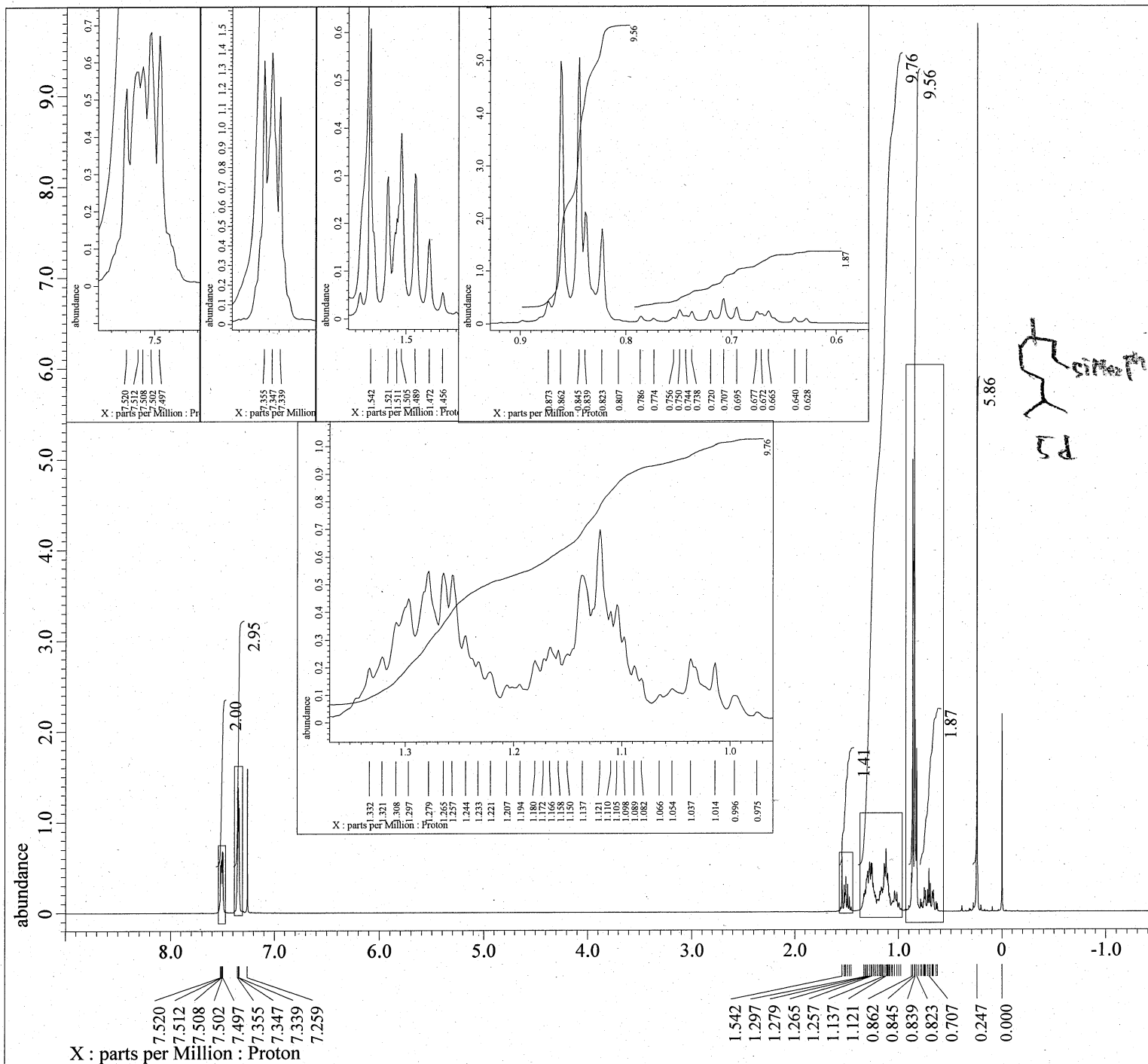
Derived from: KND_1659_13C-1.jdf

Filename = KND_1659_13C-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = 1
Solvent = CHLOROFORM-D
Actual_Start_Time = 9-JAN-2024 05:41:59
Revision_Time = 28-JAN-2024 16:36:57

Comment = single pulse decoupled ga
Data Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400

Field Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain = 13C
X_Freq = 98.51479726[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.93958061[Hz]
X_Sweep = 30.78817734[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 50
Total_Scans = 50

Relaxation_Delay = 2[s]
Recvr_Gain = 60
Temp_Get = 18[dC]
X_90_Width = 9.46[us]
X_Acq_Time = 1.06430464[s]
X_Angle = 30[deg]
X_Atn = 4.9[dB]
X_Pulse = 3.15333333[us]
Irr_Atn_Dec = 22.45[dB]
Irr_Atn_Noe = 22.45[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----
 dc balance(0, FALSE)
 sexp(0.2[Hz], 0.0[s])
 trapezoid(0[%], 0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

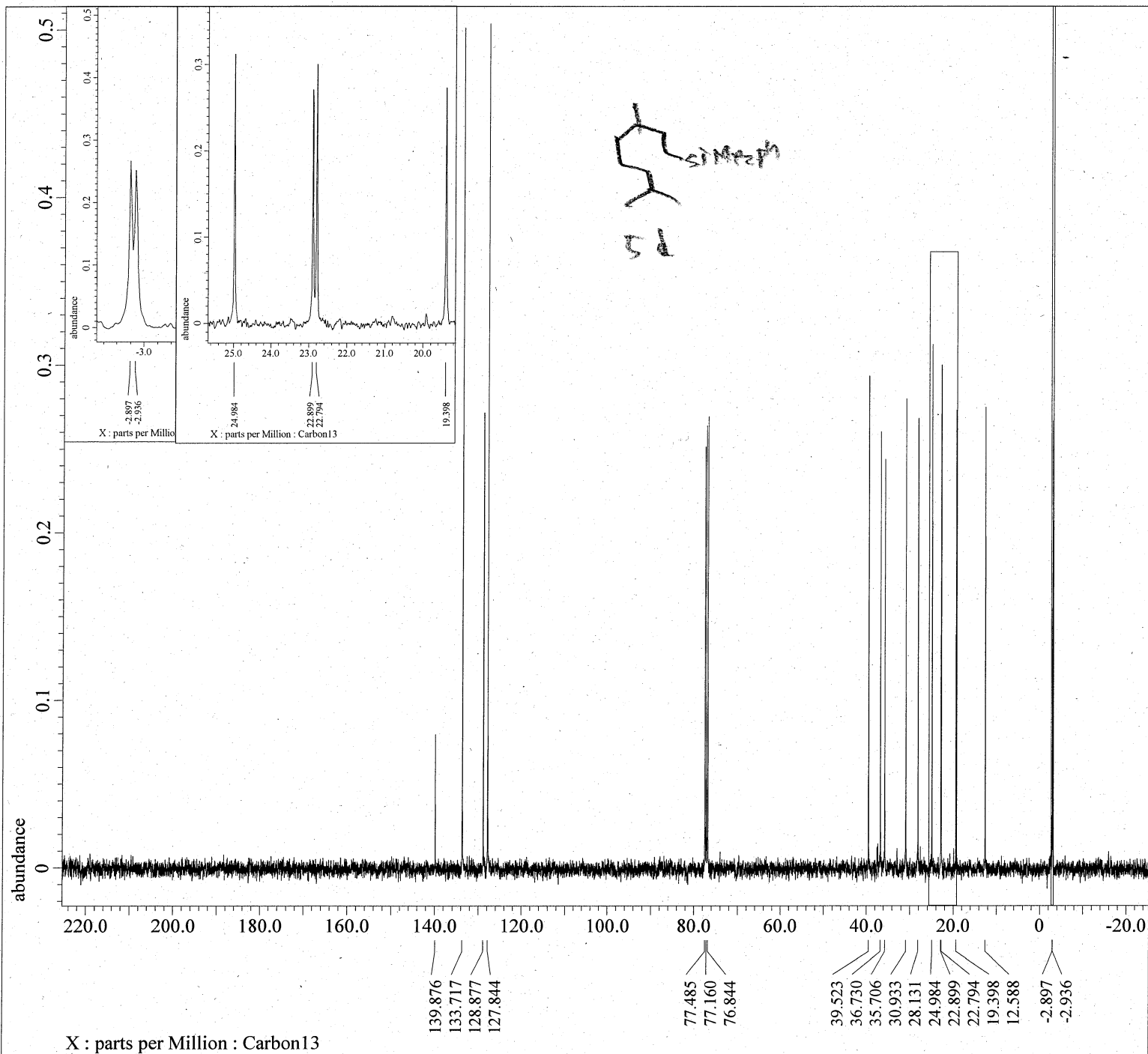
Derived from: KND_1746_pure_Proton-1-1.jdf

Filename = KND_1746_pure_Proton-1-2.
 Author = element
 Experiment = proton.jxp
 Sample Id = KND_1746_pure
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 6-MAR-2024 22:21:17
 Revision_Time = 24-NOV-2024 18:35:47

Comment = single_pulse
 Data Format = 1D COMPLEX
 Dim Size = 13107
 X_Domain = Proton
 Dim Title = Proton
 Dim Units = [ppm]
 Dimensions = X
 Spectrometer = DELTA2_NMR

Field Strength = 9.4073814[T] (400[MHz])
 X_Acq_Duration = 2.18103808[s]
 X_Domain = 1H
 X_Freq = 400.53219825[MHz]
 X_Offset = 5[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.45849727[Hz]
 X_Sweep = 7.51201923[kHz]
 X_Sweep_Clippped = 6.00961538[kHz]
 Irr_Domain = Proton
 Irr_Freq = 400.53219825[MHz]
 Irr_Offset = 5[ppm]
 Tri_Domain = Proton
 Tri_Freq = 400.53219825[MHz]
 Tri_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 40
 Temp_Get = 19.9[dC]
 X_90_Width = 6.7[us]
 X_Acq_Time = 2.18103808[s]
 X_Angle = 45[deg]
 X_Atn = 0.8[dB]
 X_Pulse = 3.35[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.18103808[s]



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 2.0[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

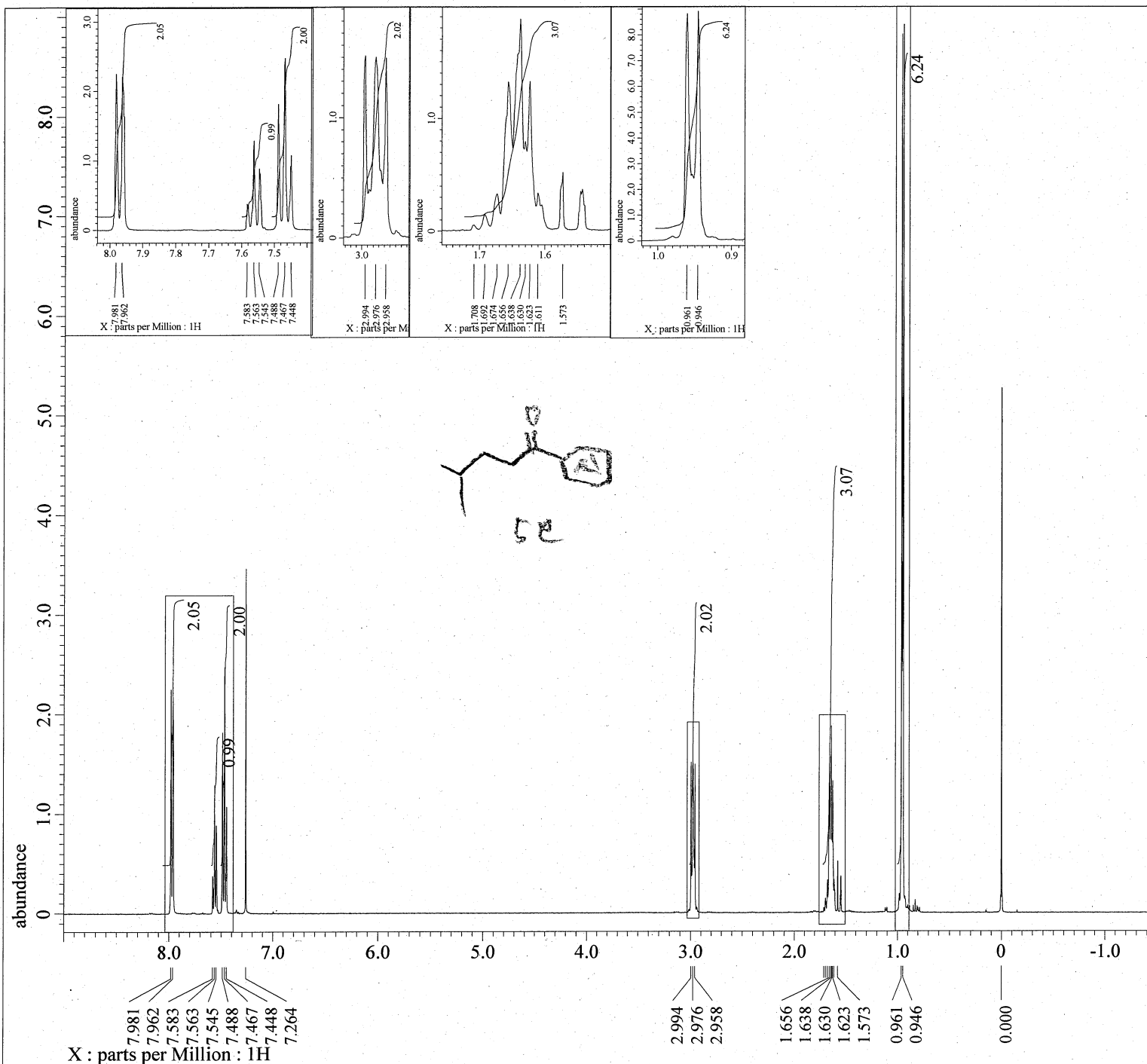
Derived from: KND_1746_13C_Carbon-1-1.jdf

Filename      = KND_1746_13C_Carbon-1-2.j
Author       = element
Experiment   = carbon.jxp
Sample_Id    = KND_1746_13C
Solvent      = CHLOROFORM-D
Actual_Start_Time = 6-MAR-2024 22:35:54
Revision_Time  = 14-JUL-2024 14:52:01

Comment      = single pulse decoupled ga
Data Format   = 1D COMPLEX
Dim_Size     = 26214
X_Domain     = Carbon
Dim_Title    = Carbon13
Dim_Units    = [ppm]
Dimensions   = X
Spectrometer = DELTA2_NMR

Field_Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 1.03809024[s]
X_Domain      = 13C
X_Freq        = 100.71389092[MHz]
X_Offset      = 100[ppm]
X_Points      = 32768
X_Prescans    = 4
X_Resolution  = 0.96330739[Hz]
X_Sweep       = 31.56565657[kHz]
X_Sweep_Clipped = 25.25252525[kHz]
Irr_Domain    = Proton
Irr_Freq      = 400.53219825[MHz]
Irr_Offset    = 5[ppm]
Clipped       = FALSE
Scans         = 63
Total_Scans   = 63

Relaxation_Delay = 2[s]
Recvr_Gain       = 50
Temp_Get         = 19.7[dc]
X_90_Width       = 12.68[us]
X_Acq_Time       = 1.03809024[s]
X_Angle          = 30[deg]
X_Atn            = 4[dB]
X_Pulse          = 4.22666667[us]
Irr_Atn_Dec      = 26.45[dB]
Irr_Atn_Noise    = 26.45[dB]
Irr_Noise        = WALTZ
Irr_Pwidth       = 0.115[ms]
Decoupling       = TRUE
Initial_Wait     = 1[s]
Noe              = TRUE
Noe_Time         = 2[s]
Repetition_Time  = 3.03809024[s]
  
```



```

---- PROCESSING PARAMETERS ----
dc balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1568_pure-1.jdf

```

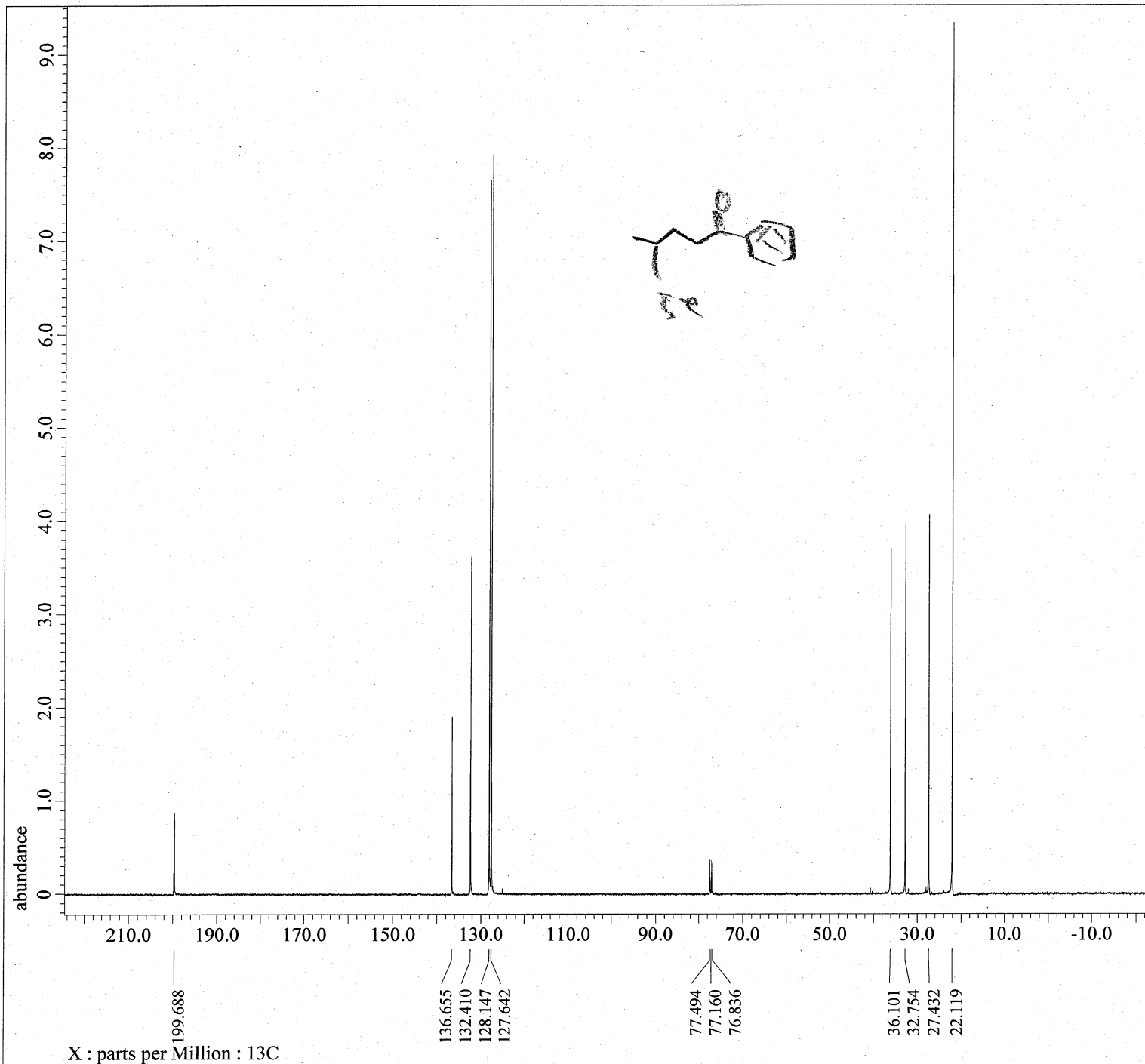
Filename      = KND_1568_pure-2.jdf
Author        = element
Experiment     = single_pulse.ex2
Sample_Id     = S#793397
Solvent       = CHLOROFORM-D
Actual_Start_Time = 12-JAN-2024 04:18:48
Revision_Time  = 24-NOV-2024 18:42:19

Comment       = single_pulse
Data Format    = 1D COMPLEX
Dim Size      = 13107
X_Domain      = 1H
Dim Title     = 1H
Dim Units     = [ppm]
Dimensions    = X
Site          = ECS 400
Spectrometer  = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 2.228224[s]
X_Domain       = 1H
X_Freq         = 391.78655441[MHz]
X_Offset       = 5[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.44878791[Hz]
X_Sweep        = 7.35294118[kHz]
Irr_Domain     = 1H
Irr_Freq       = 391.78655441[MHz]
Irr_Offset     = 5[ppm]
Tri_Domain     = 1H
Tri_Freq       = 391.78655441[MHz]
Tri_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

Relaxation_Delay = 5[s]
Recvr_Gain       = 50
Temp_Get         = 16.4[dC]
X_90_Width      = 10.79[us]
X_Acq_Time       = 2.228224[s]
X_Angle         = 45[deg]
X_Atn           = 1.9[dB]
X_Pulse         = 5.395[us]
Irr_Mode        = Off
Tri_Mode        = Off
Dante_Presat    = FALSE
Initial_Wait     = 1[s]
Repetition_Time = 7.228224[s]

```



----- PROCESSING PARAMETERS -----
dc balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid3(0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

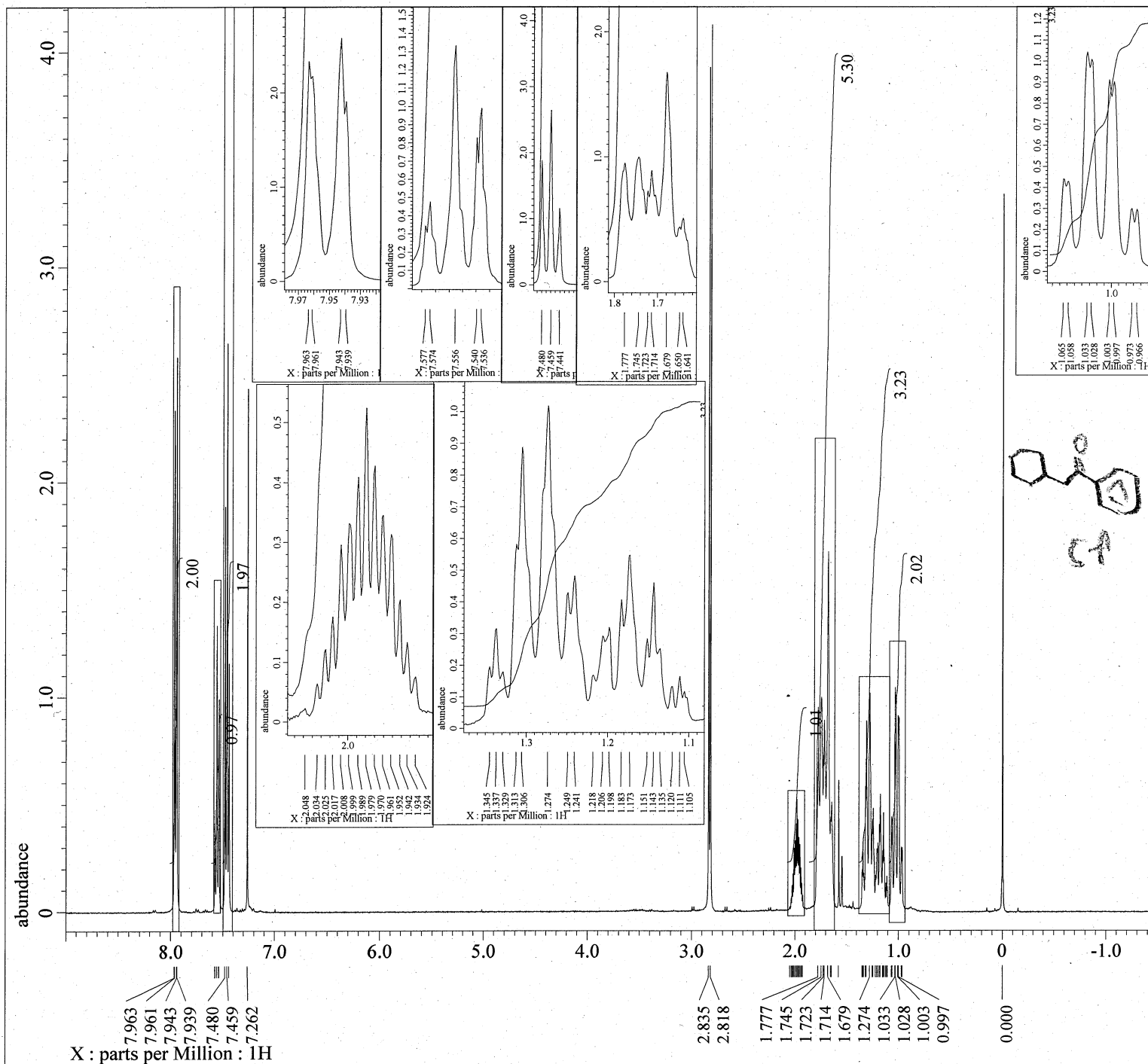
Derived from: KND_1568_13C-1.jdf

Filename = KND_1568_13C-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = 1
Solvent = CHLOROFORM-D
Actual_Start_Time = 12-JAN-2024 04:40:04
Revision_Time = 28-JAN-2024 16:58:27

Comment = single pulse decoupled ga
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain = 13C
X_Freq = 98.51479726[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.93958061[Hz]
X_Sweep = 30.78817734[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 60
Total_Scans = 60

Relaxation_Delay = 2[s]
Recvr_Gain = 56
Temp_Get = 16.7[dC]
X_90_Width = 9.46[us]
X_Acq_Time = 1.06430464[s]
X_Angle = 30[deg]
X_Atn = 4.9[dB]
X_Pulse = 3.15333333[us]
Irr_Atn_Dec = 22.45[dB]
Irr_Atn_Noe = 22.45[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.06430464[s]



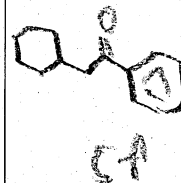
----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(0.2[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

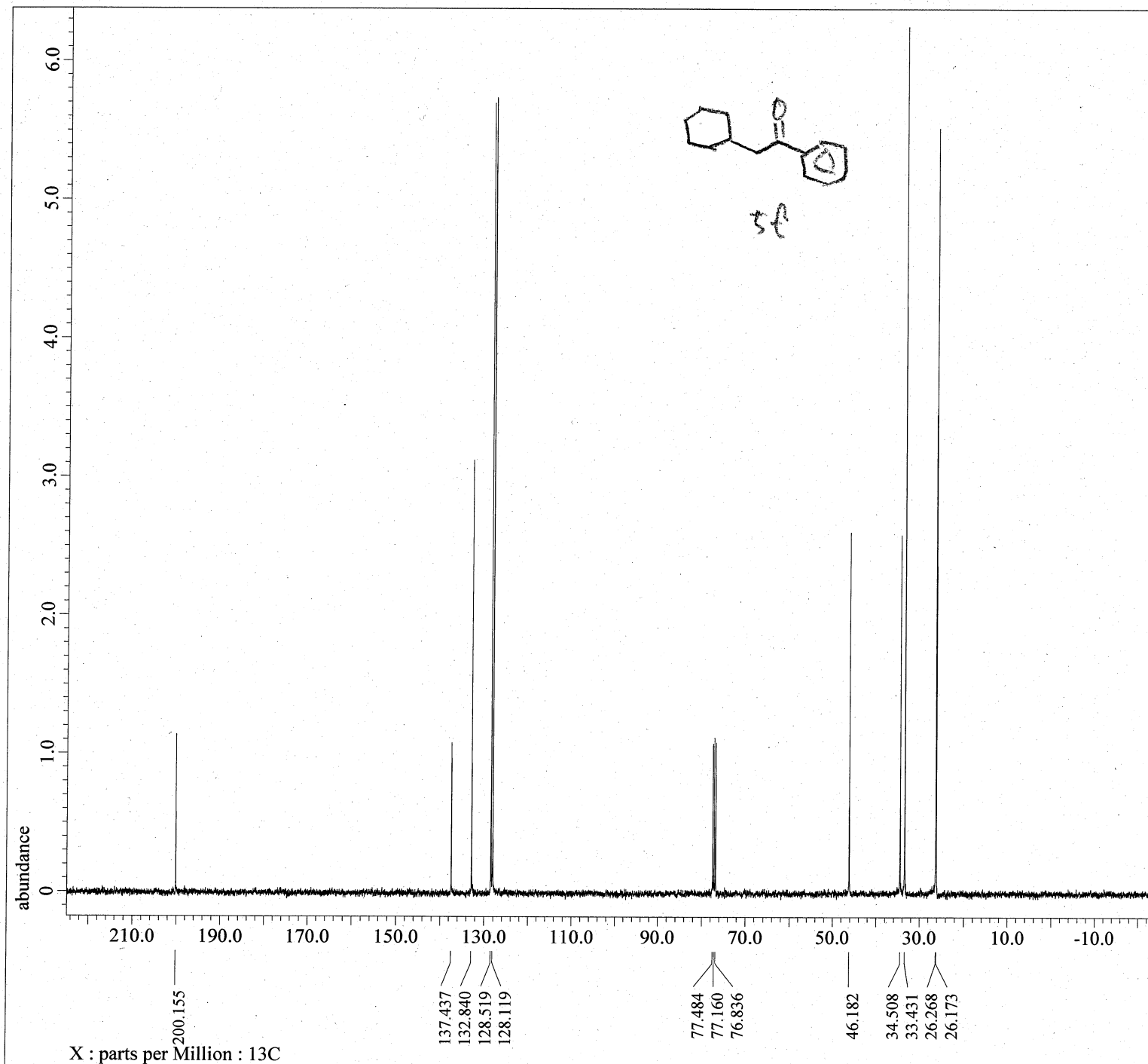
Derived from: KND_1743_pure-1.jdf

Filename = KND_1743_pure-2.jdf
 Author = element
 Experiment = single_pulse.ex2
 Sample_Id = S#662664
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 25-JAN-2024 00:39:22
 Revision_Time = 24-NOV-2024 18:55:38

Comment = single_pulse
 Data Format = 1D COMPLEX
 Dim_Size = 13107
 X_Domain = 1H
 Dim Title = 1H
 Dim Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400
 Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 2.228224[s]
 X_Domain = 1H
 X_Freq = 391.78655441[MHz]
 X_Offset = 5[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.44878791[Hz]
 X_Sweep = 7.35294118[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Tri_Domain = 1H
 Tri_Freq = 391.78655441[MHz]
 Tri_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 48
 Temp_Get = 19.5[dC]
 X_90_Width = 10.79[us]
 X_Acq_Time = 2.228224[s]
 X_Angle = 45[deg]
 X_Atn = 1.9[dB]
 X_Pulse = 5.395[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.228224[s]





```

---- PROCESSING PARAMETERS ----
dc balance( 0, FALSE )
sexp( 2.0[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1743_13C-1.jdf

```

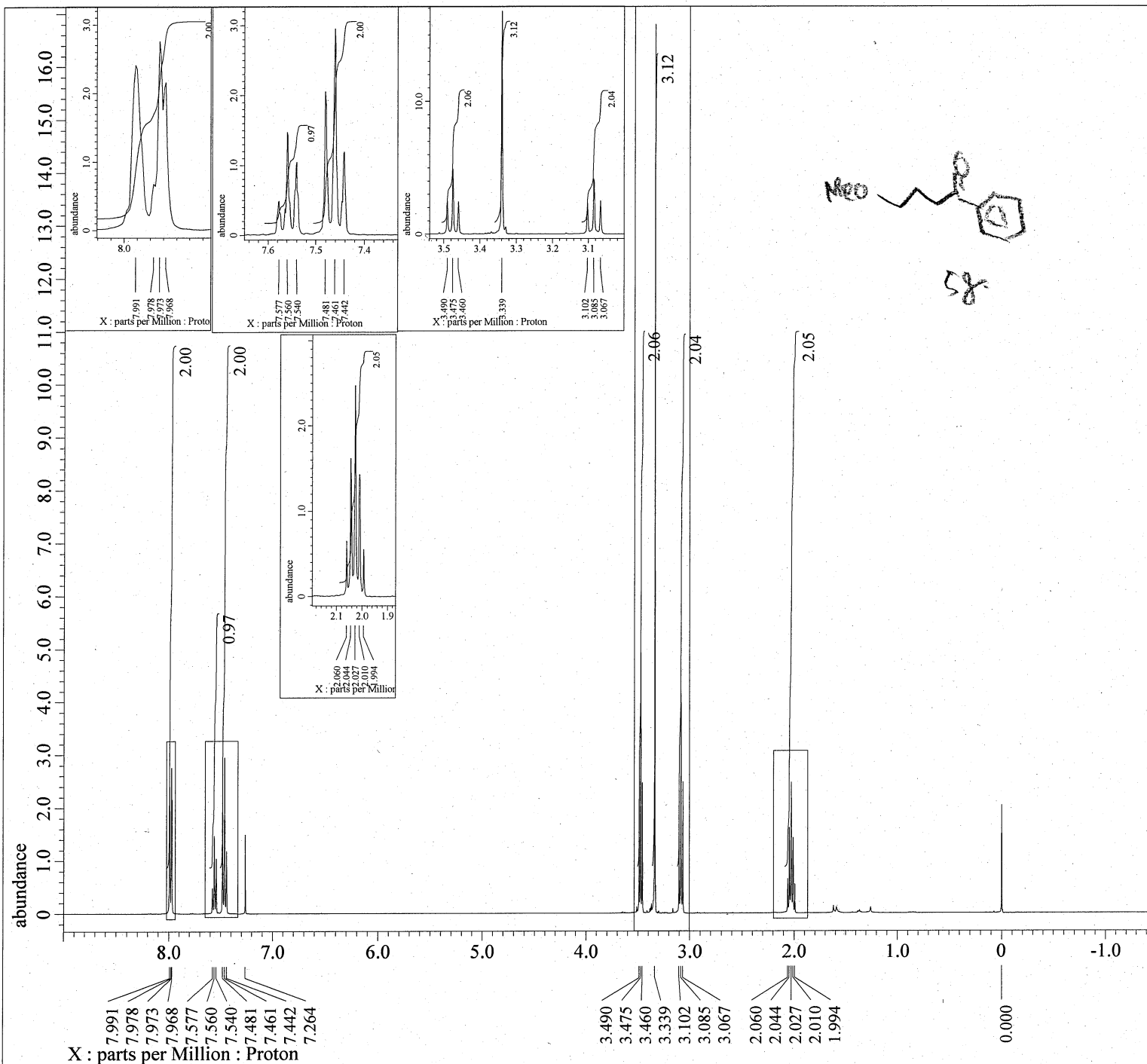
Filename      = KND_1743_13C-2.jdf
Author       = element
Experiment    = single_pulse_dec
Sample_Id    = 1
Solvent      = CHLOROFORM-D
Actual_Start_Time = 25-JAN-2024 00:52:17
Revision_Time = 28-JAN-2024 19:53:46

Comment      = single pulse decoupled ga
Data Format   = 1D COMPLEX
Dim Size     = 26214
X Domain     = 13C
Dim Title    = 13C
Dim Units    = [ppm]
Dimensions   = X
Site         = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain       = 13C
X_Freq         = 98.51479726[MHz]
X_Offset       = 100[ppm]
X_Points       = 32768
X_Prescans     = 4
X_Resolution   = 0.93958061[Hz]
X_Sweep        = 30.78817734[kHz]
Irr_Domain     = 1H
Irr_Freq       = 391.78655441[MHz]
Irr_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 32
Total_Scans    = 32

Relaxation_Delay = 2[s]
Recvr_Gain       = 60
Temp_Get         = 19.5[dC]
X_90_Width       = 9.46[us]
X_Acq_Time       = 1.06430464[s]
X_Angle          = 30[deg]
X_Atn            = 4.9[dB]
X_Pulse          = 3.15333333[us]
Irr_Atn_Dec      = 22.45[dB]
Irr_Atn_Noise    = 22.45[dB]
Irr_Noise        = WALTZ
Decoupling       = TRUE
Initial_Wait     = 1[s]
Noe              = TRUE
Noe_Time         = 2[s]
Repetition_Time  = 3.06430464[s]

```



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

Derived from: KND_1549_pure_Proton-1-1.jdf

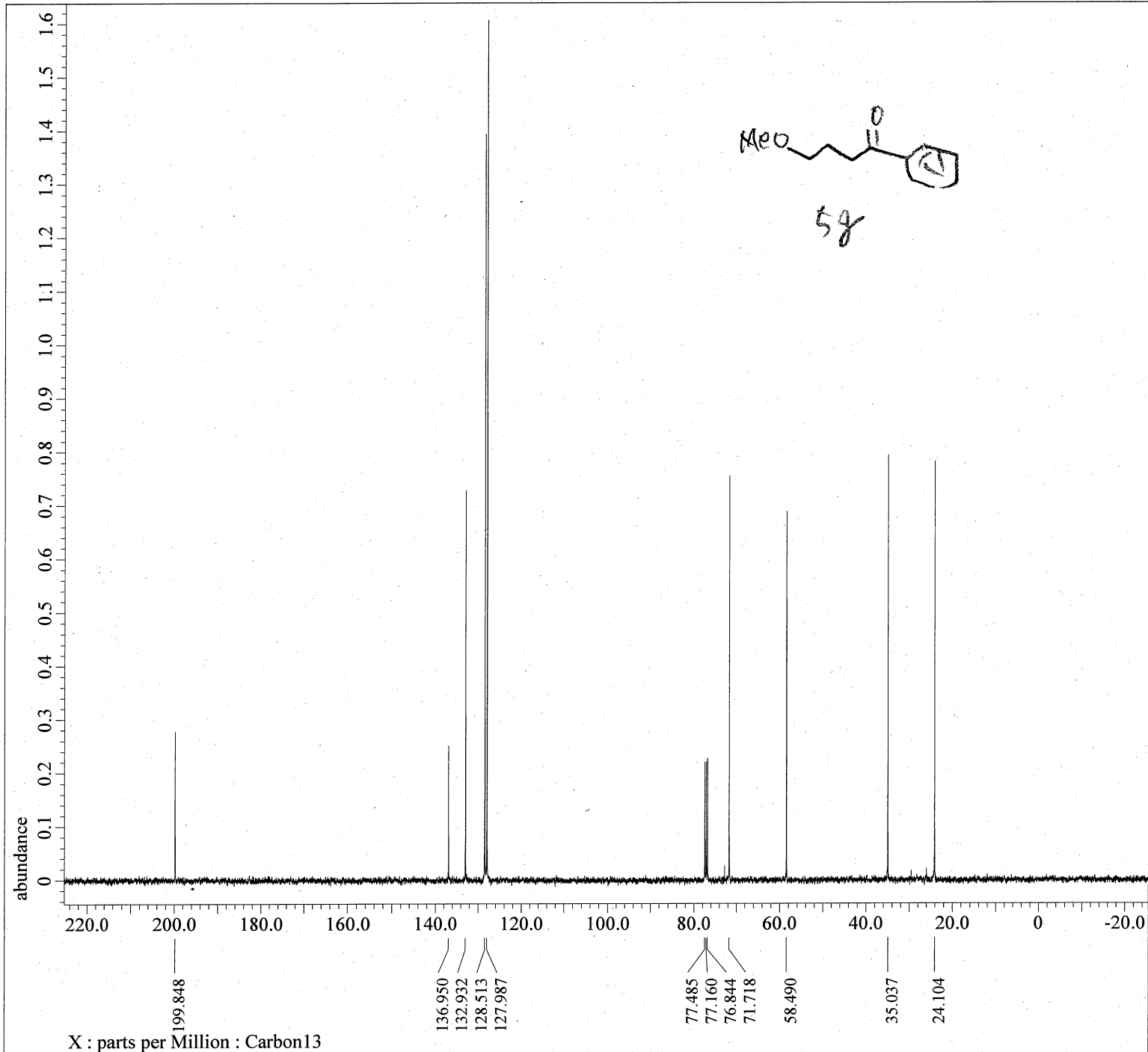
Filename      = KND_1549_pure_Proton-1-2.
Author        = element
Experiment     = proton.jxp
Sample_Id     = KND_1549_pure
Solvent       = CHLOROFORM-D
Actual_Start_Time = 12-JAN-2024 22:12:03
Revision_Time  = 24-NOV-2024 19:01:10

Comment       = single_pulse
Data Format    = 1D COMPLEX
Dim_Size      = 13107
X_Domain      = Proton
Dim_Title     = Proton
Dim_Units     = [ppm]
Dimensions    = X
Spectrometer  = DELTA2_NMR

Field_Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 2.18103808[s]
X_Domain       = 1H
X_Freq         = 400.53219825[MHz]
X_Offset       = 5[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.45849727[Hz]
X_Sweep        = 7.51201923[kHz]
X_Sweep_Clipped = 6.00961538[kHz]
Irr_Domain     = Proton
Irr_Freq       = 400.53219825[MHz]
Irr_Offset     = 5[ppm]
Tri_Domain     = Proton
Tri_Freq       = 400.53219825[MHz]
Tri_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

Relaxation_Delay = 5[s]
Recvr_Gain       = 38
Temp_Get         = 19.6[degC]
X_90_Width      = 6.7[us]
X_Acq_Time       = 2.18103808[s]
X_Angle         = 45[deg]
X_Atn           = 0.8[dB]
X_Pulse         = 3.35[us]
Irr_Mode        = Off
Tri_Mode        = Off
Dante_Presat    = FALSE
Initial_Wait     = 1[s]
Repetition_Time  = 7.18103808[s]

```



----- PROCESSING PARAMETERS -----

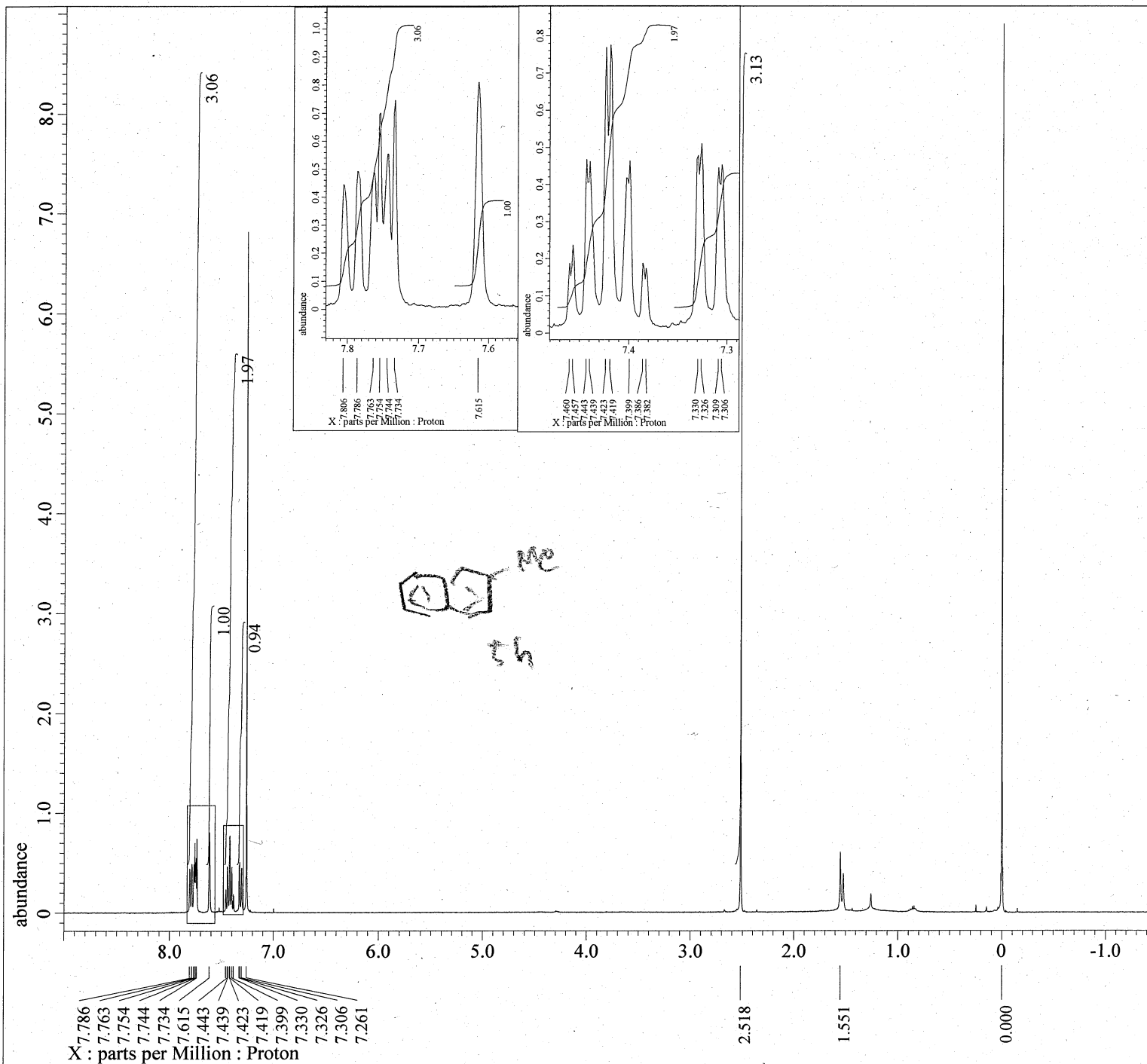
```

dc balance( 0, FALSE )
sexp( 2.0[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1549_13C_Carbon-1-1.jdf

Filename	= KND_1549_13C_Carbon-1-2.j
Author	= element
Experiment	= carbon.jxp
Sample_Id	= KND_1549_13C
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 12-JAN-2024 22:26:08
Revision_Time	= 28-JAN-2024 17:13:44
Comment	= single pulse decoupled ga
Data Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= Carbon
Dim_Title	= Carbon13
Dim_Units	= [ppm]
Dimensions	= X
Spectrometer	= DELTA2_NMR
Field Strength	= 9.4073814[T] (400[MHz])
X_Acq_Duration	= 1.03809024[s]
X_Domain	= 13C
X_Freq	= 100.71389092[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.96330739[Hz]
X_Sweep	= 31.56565657[kHz]
X_Sweep_Clippped	= 25.25252525[kHz]
Irr_Domain	= Proton
Irr_Freq	= 400.53219825[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 50
Total_Scans	= 50
Relaxation_Delay	= 2[s]
Recvr_Gain	= 50
Temp_Get	= 19.7[dC]
X_90_Width	= 12.68[us]
X_Acq_Time	= 1.03809024[s]
X_Angle	= 30[deg]
X_Atn	= 4[dB]
X_Pulse	= 4.22666667[us]
Irr_Atn_Dec	= 26.45[dB]
Irr_Atn_Noe	= 26.45[dB]
Irr_Noise	= WALTZ
Irr_Pwidth	= 0.115[ms]
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.03809024[s]



```

---- PROCESSING PARAMETERS ----
dc balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

Derived from: KND_1677_Proton-1-1.jdf

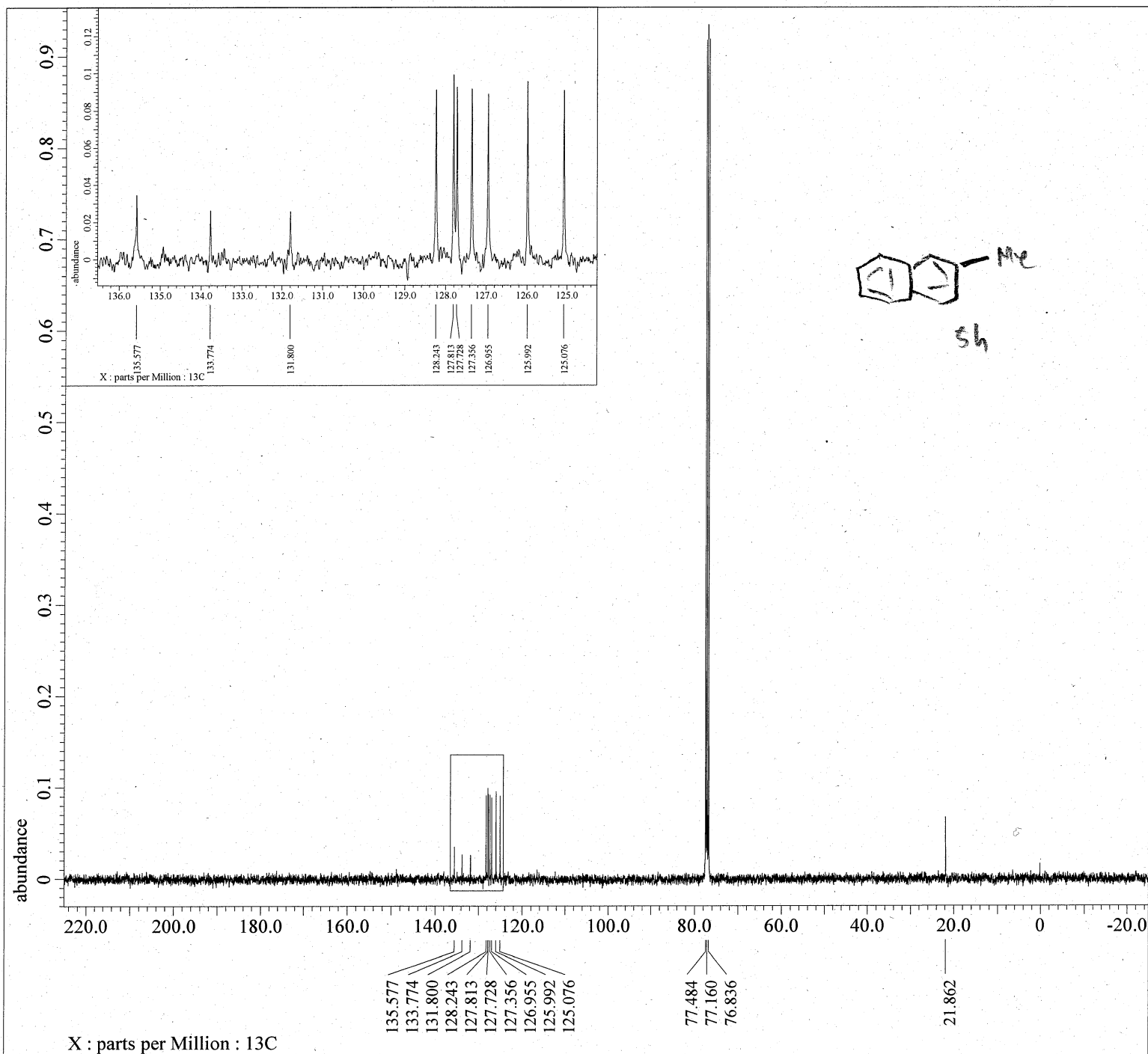
Filename      = KND_1677_Proton-1-2.jdf
Author        = element
Experiment     = proton.jxp
Sample_Id     = KND_xx
Solvent       = CHLOROFORM-D
Actual_Start_Time = 1-APR-2024 15:27:11
Revision_Time  = 24-NOV-2024 19:08:16

Comment       = single_pulse
Data Format    = 1D COMPLEX
Dim_Size      = 13107
X_Domain      = Proton
Dim Title     = Proton
Dim Units     = [ppm]
Dimensions    = X
Site          = JNM-ECS400
Spectrometer   = DELTA2_NMR

Field_Strength = 9.37221[T] (400[MHz])
X_Acq_Duration = 2.1889024[s]
X_Domain       = 1H
X_Freq         = 399.03472754[MHz]
X_Offset       = 5.0[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.45684997[Hz]
X_Sweep        = 7.48502994[kHz]
X_Sweep_Clippped = 5.98802395[kHz]
Irr_Domain     = Proton
Irr_Freq       = 399.03472754[MHz]
Irr_Offset     = 5.0[ppm]
Tri_Domain     = Proton
Tri_Freq       = 399.03472754[MHz]
Tri_Offset     = 5.0[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

Relaxation_Delay = 5[s]
Recvr_Gain       = 50
Temp_Get         = 20.6[dC]
X_90_Width       = 6.6[us]
X_Acq_Time       = 2.1889024[s]
X_Angle          = 45[deg]
X_Atn            = 1[dB]
X_Pulse          = 3.3[us]
Irr_Mode         = Off
Tri_Mode         = Off
Dante_Presat     = FALSE
Initial_Wait     = 1[s]
Repetition_Time  = 7.1889024[s]

```



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

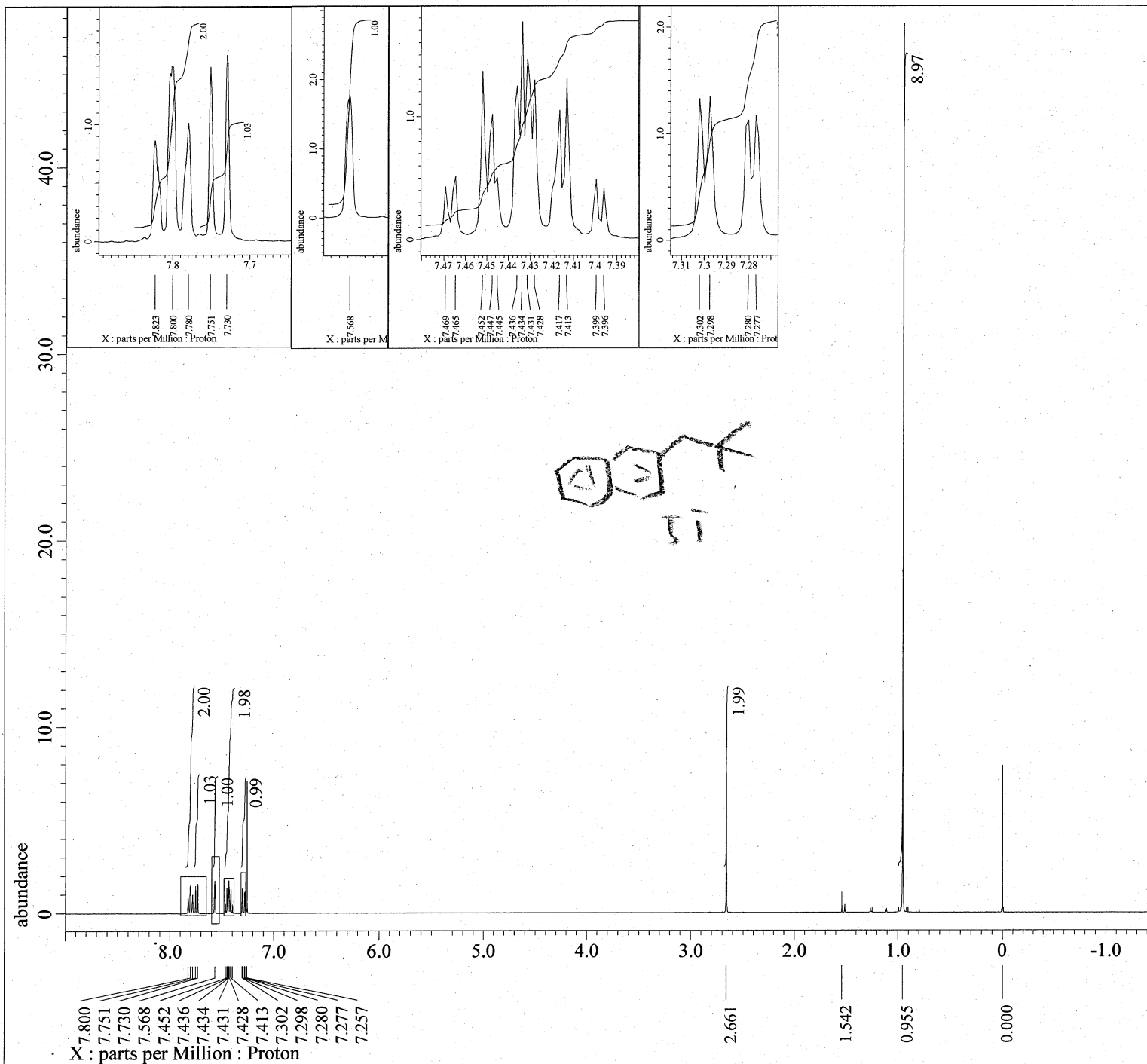
Derived from: KND_1677_13C-1.jdf

Filename = KND_1677_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 1-APR-2024 20:35:22
 Revision_Time = 14-JUL-2024 15:20:18

Comment = single pulse decoupled ga
 Data_Format = 1D COMPLEX
 Dim_Size = 26214
 X_Domain = 13C
 Dim_Title = 13C
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 600
 Total_Scans = 600

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 20.7[dC]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_Noise = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----

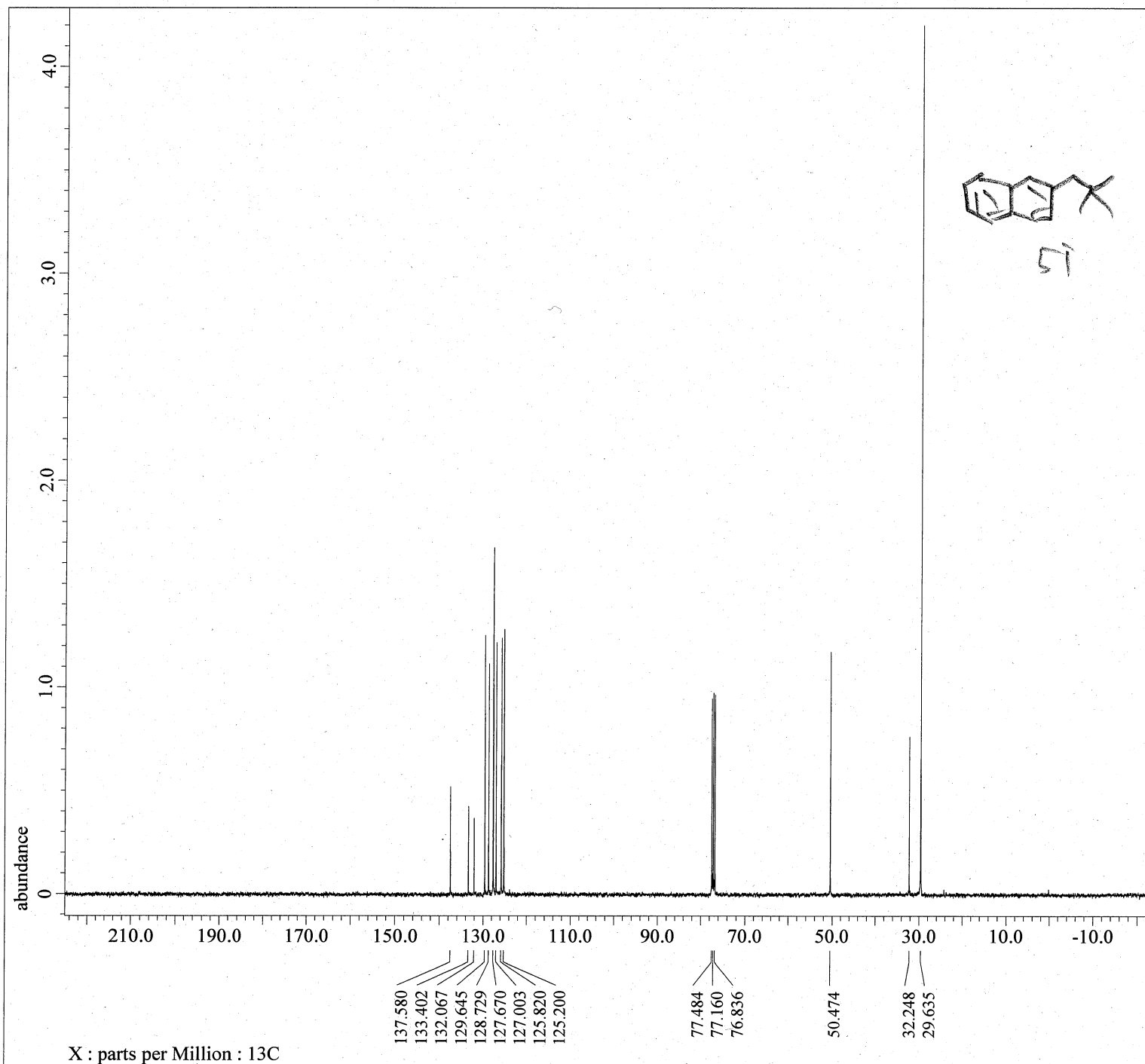
```

dc_balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1445_pure_Proton-1-1.jdf

Filename	= KND_1445_pure_Proton-1-2.
Author	= element
Experiment	= proton.jxp
Sample Id	= KND_1445_pure
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 13-JAN-2024 00:11:17
Revision_Time	= 24-NOV-2024 19:13:48
Comment	= single_pulse
Data Format	= 1D COMPLEX
Dim Size	= 13107
X_Domain	= Proton
Dim Title	= Proton
Dim Units	= [ppm]
Dimensions	= X
Site	= JNM-ECS400
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.37221[T] (400[MHz])
X_Acq_Duration	= 2.1889024[s]
X_Domain	= 1H
X_Freq	= 399.03472754[MHz]
X_Offset	= 5.0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45684997[Hz]
X_Sweep	= 7.48502994[kHz]
X_Sweep_Clippped	= 5.98802395[kHz]
Irr_Domain	= Proton
Irr_Freq	= 399.03472754[MHz]
Irr_Offset	= 5.0[ppm]
Tri_Domain	= Proton
Tri_Freq	= 399.03472754[MHz]
Tri_Offset	= 5.0[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 44
Temp_Get	= 20.4[dC]
X_90_Width	= 6.6[us]
X_Acq_Time	= 2.1889024[s]
X_Angle	= 45[deg]
X_Atn	= 1[dB]
X_Pulse	= 3.3[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.1889024[s]



---- PROCESSING PARAMETERS ----
dc_balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid3(0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

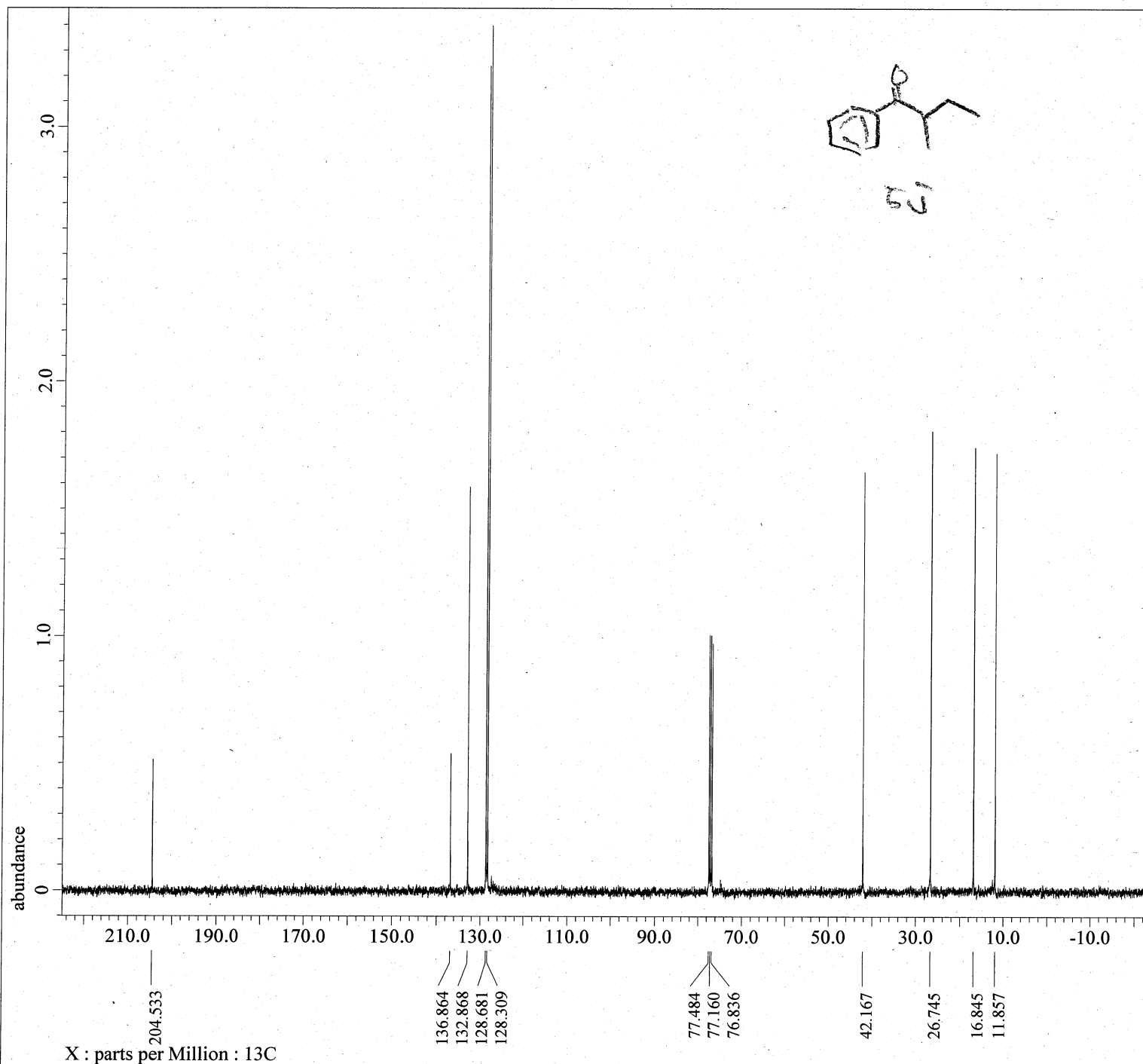
Derived from: KND_1445_13C-1.jdf

Filename = KND_1445_13C-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = 1
Solvent = CHLOROFORM-D
Actual_Start_Time = 13-JAN-2024 05:35:43
Revision_Time = 28-JAN-2024 17:26:16

Comment = single pulse decoupled ga
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain = 13C
X_Freq = 98.51479726[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.93958061[Hz]
X_Sweep = 30.78817734[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 184
Total_Scans = 184

Relaxation_Delay = 2[s]
Recvr_Gain = 60
Temp_Get = 20.2[dC]
X_90_Width = 9.46[us]
X_Acq_Time = 1.06430464[s]
X_Angle = 30[deg]
X_Atn = 4.9[dB]
X_Pulse = 3.15333333[us]
Irr_Atn_Dec = 22.45[dB]
Irr_Atn_No = 22.45[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.06430464[s]



---- PROCESSING PARAMETERS ----
dc balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid3(0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

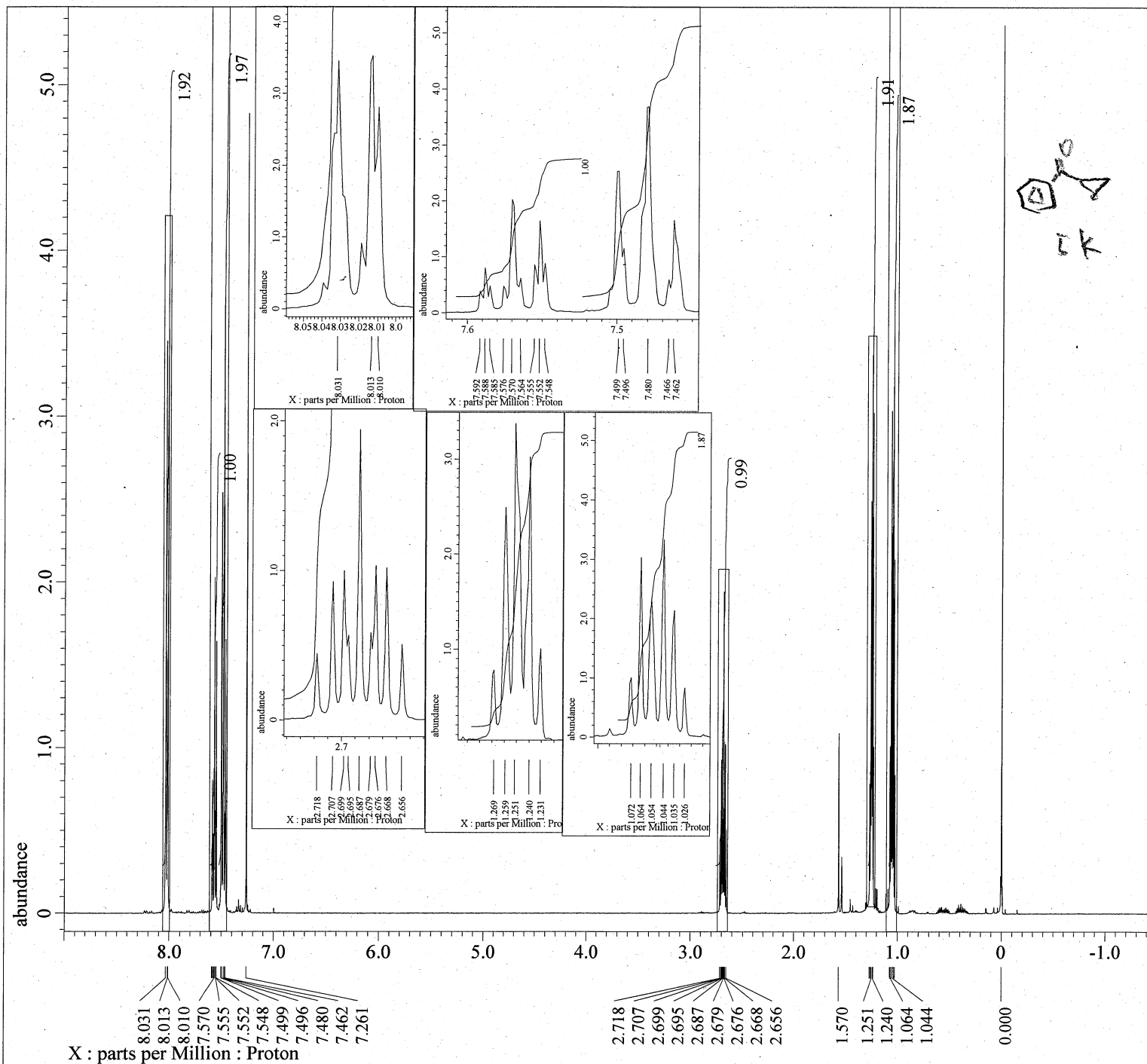
Derived from: KND_1740_13C-1.jdf

Filename = KND_1740_13C-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = 1
Solvent = CHLOROFORM-D
Actual_Start_Time = 24-JAN-2024 03:03:57
Revision_Time = 28-JAN-2024 17:45:56

Comment = single pulse decoupled ga
Data Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain = 13C
X_Freq = 98.51479726[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.93958061[Hz]
X_Sweep = 30.78817734[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 56
Total_Scans = 56

Relaxation_Delay = 2[s]
Recvr_Gain = 60
Temp_Get = 19.8[dC]
X_90_Width = 9.46[us]
X_Acq_Time = 1.06430464[s]
X_Angle = 30[deg]
X_Atn = 4.9[dB]
X_Pulse = 3.15333333[us]
Irr_Atn_Dec = 22.45[dB]
Irr_Atn_No = 22.45[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----

```

dc_balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

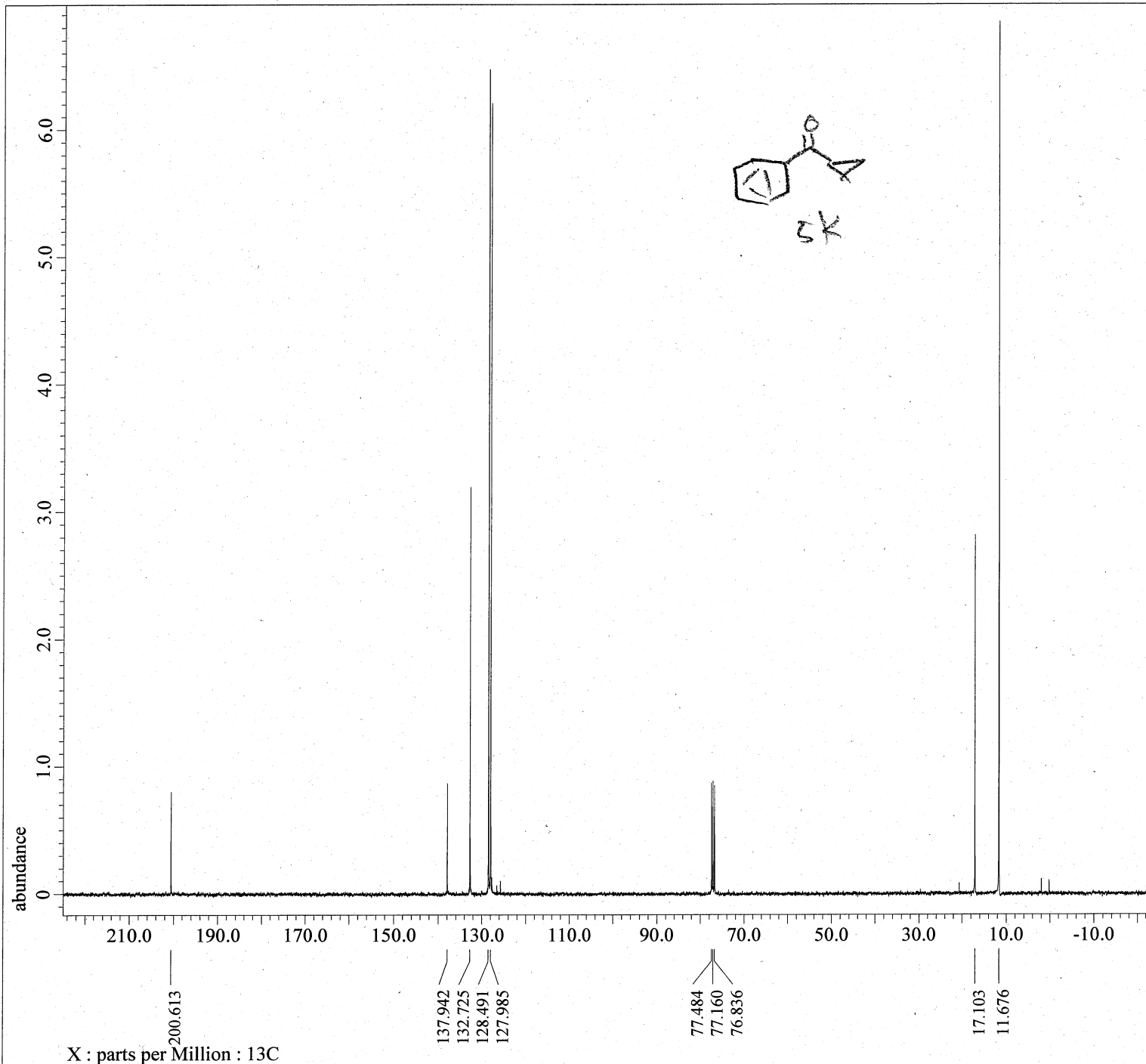
Derived from: KND_1569_pure_Proton-3-1.jdf

Filename = KND_1569_pure_Proton-3-2.
 Author = element
 Experiment = proton.jxp
 Sample_Id = KND_1569_pure
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 13-JAN-2024 22:23:05
 Revision_Time = 24-NOV-2024 19:31:00

Comment = single_pulse
 Data Format = 1D COMPLEX
 Dim Size = 13107
 X_Domain = Proton
 Dim Title = Proton
 Dim Units = [ppm]
 Dimensions = X
 Site = JNM-ECS400
 Spectrometer = DELTA2_NMR

Field_Strength = 9.37221[T] (400[MHz])
 X_Acq_Duration = 2.1889024[s]
 X_Domain = 1H
 X_Freq = 399.03472754[MHz]
 X_Offset = 5.0[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.45684997[Hz]
 X_Sweep = 7.48502994[kHz]
 X_Sweep_Clippped = 5.98802395[kHz]
 Irr_Domain = Proton
 Irr_Freq = 399.03472754[MHz]
 Irr_Offset = 5.0[ppm]
 Tri_Domain = Proton
 Tri_Freq = 399.03472754[MHz]
 Tri_Offset = 5.0[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 44
 Temp_Get = 20.5[dC]
 X_90_Width = 6.6[us]
 X_Acq_Time = 2.1889024[s]
 X_Angle = 45[deg]
 X_Atn = 1[dB]
 X_Pulse = 3.3[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.1889024[s]



----- PROCESSING PARAMETERS -----
dc balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid3(0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

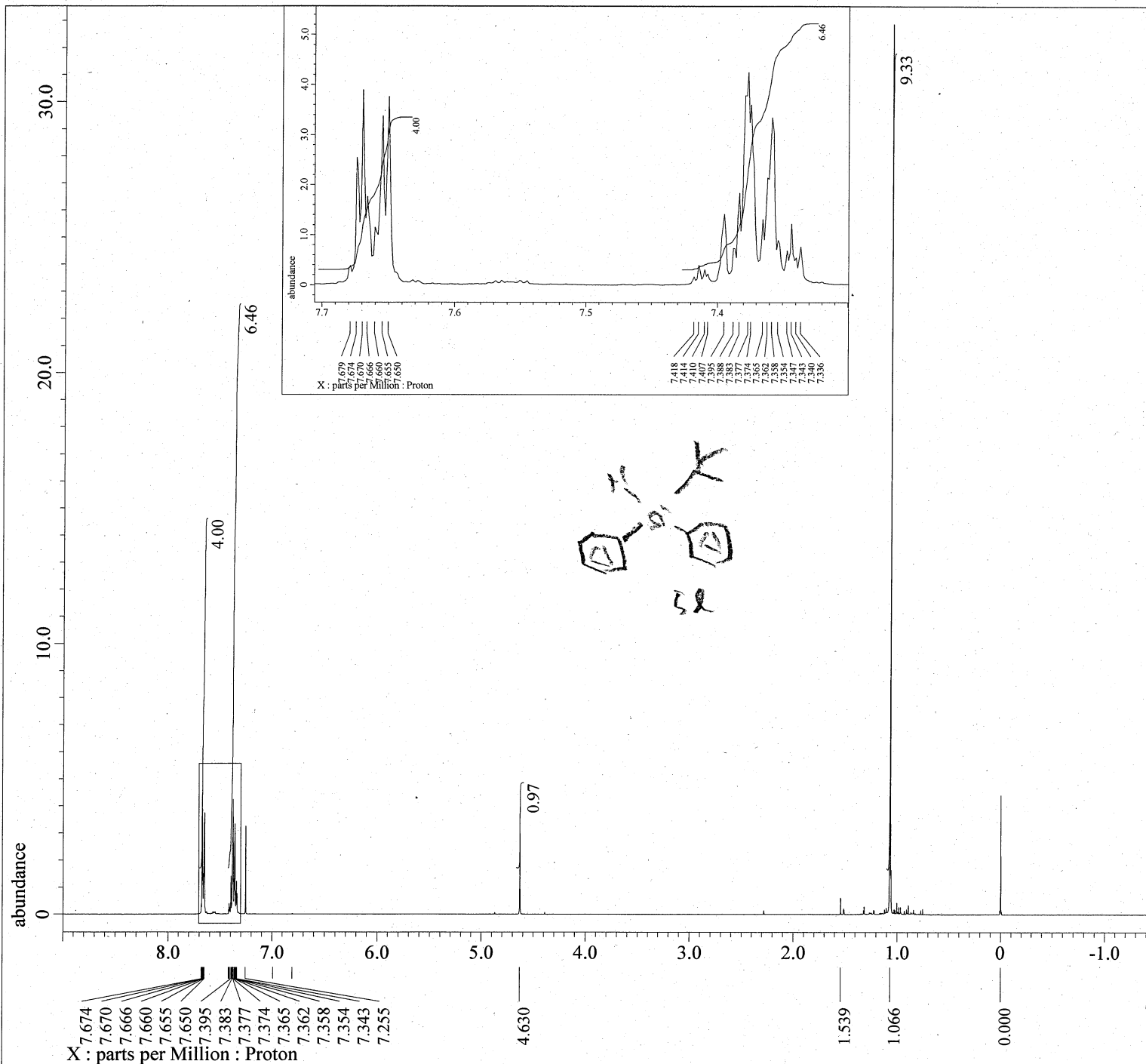
Derived from: KND_1569_13C-1.jdf

Filename = KND_1569_13C-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = 1
Solvent = CHLOROFORM-D
Actual_Start_Time = 14-JAN-2024 03:43:14
Revision_Time = 28-JAN-2024 18:05:36

Comment = single pulse decoupled ga
Data Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim Title = 13C
Dim Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain = 13C
X_Freq = 98.51479726[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.93958061[Hz]
X_Sweep = 30.78817734[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 87
Total_Scans = 87

Relaxation_Delay = 2[s]
Recvr_Gain = 60
Temp_Get = 20.6[dC]
X_90_Width = 9.46[us]
X_Acq_Time = 1.06430464[s]
X_Angle = 30[deg]
X_Atn = 4.9[dB]
X_Pulse = 3.15333333[us]
Irr_Atn_Dec = 22.45[dB]
Irr_Atn_Noe = 22.45[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.06430464[s]



---- PROCESSING PARAMETERS ----

```
dc balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm
```

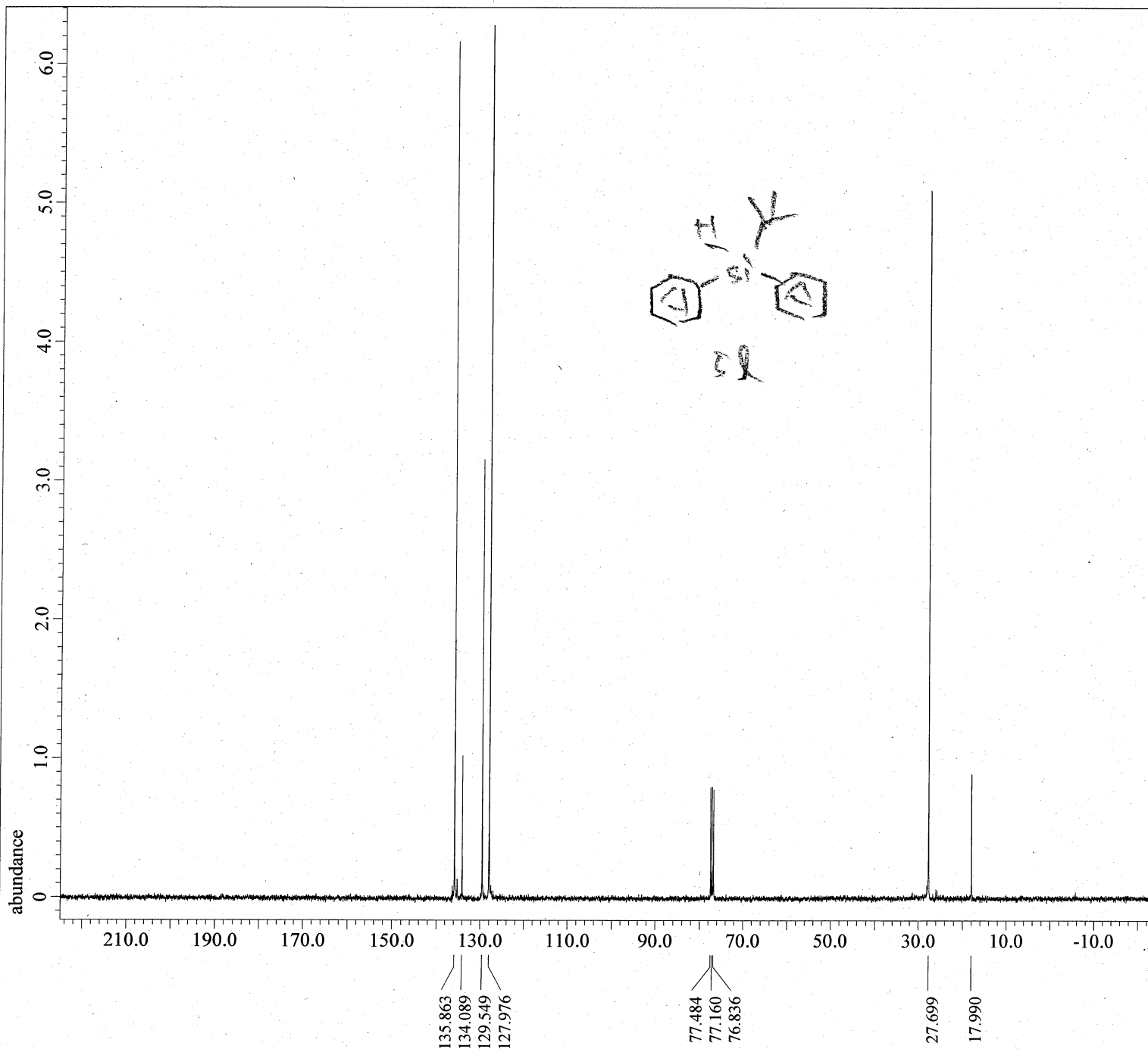
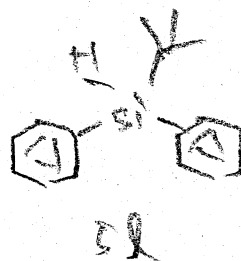
Derived from: KND_1298_pure_Proton-1-1.jdf

Filename = KND_1298_pure_Proton-1-2.
 Author = element
 Experiment = proton.jxp
 Sample_Id = KND_1298_pure
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 13-JAN-2024 21:00:41
 Revision_Time = 24-NOV-2024 19:34:55

Comment = single_pulse
 Data Format = 1D COMPLEX
 Dim Size = 13107
 X Domain = Proton
 Dim Title = Proton
 Dim Units = [ppm]
 Dimensions = X
 Site = JNM-ECS400
 Spectrometer = DELTA2_NMR

Field_Strength = 9.37221[T] (400[MHz])
 X_Acq_Duration = 2.1889024[s]
 X_Domain = 1H
 X_Freq = 399.03472754[MHz]
 X_Offset = 5.0[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.45684997[Hz]
 X_Sweep = 7.48502994[kHz]
 X_Sweep_Clipped = 5.98802395[kHz]
 Irr_Domain = Proton
 Irr_Freq = 399.03472754[MHz]
 Irr_Offset = 5.0[ppm]
 Tri_Domain = Proton
 Tri_Freq = 399.03472754[MHz]
 Tri_Offset = 5.0[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 40
 Temp_Get = 20.6[dC]
 X_90_Width = 6.6[us]
 X_Acq_Time = 2.1889024[s]
 X_Angle = 45[deg]
 X_Atn = 1[dB]
 X_Pulse = 3.3[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.1889024[s]



X : parts per Million : 13C

----- PROCESSING PARAMETERS -----
 dc balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

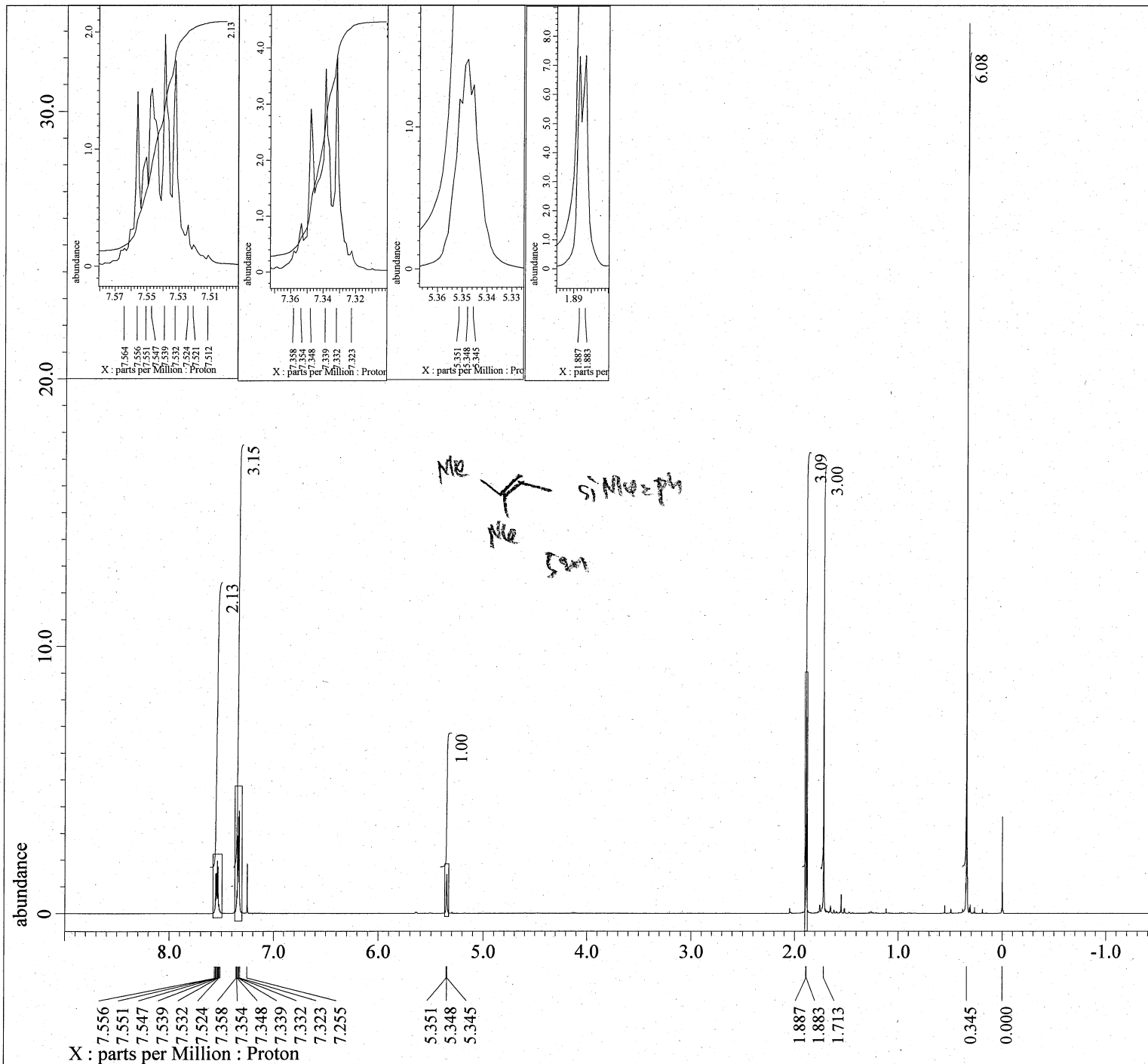
Derived from: KND_1298_13C-1.jdf

Filename = KND_1298_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 14-JAN-2024 02:22:12
 Revision_Time = 28-JAN-2024 18:13:01

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim_Size = 26214
 X_Domain = 13C
 Dim Title = 13C
 Dim Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 50
 Total_Scans = 50

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 20.5[dc]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_No = 22.45[dB]
 Irr_Noise = WAITZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----

```

dc_balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

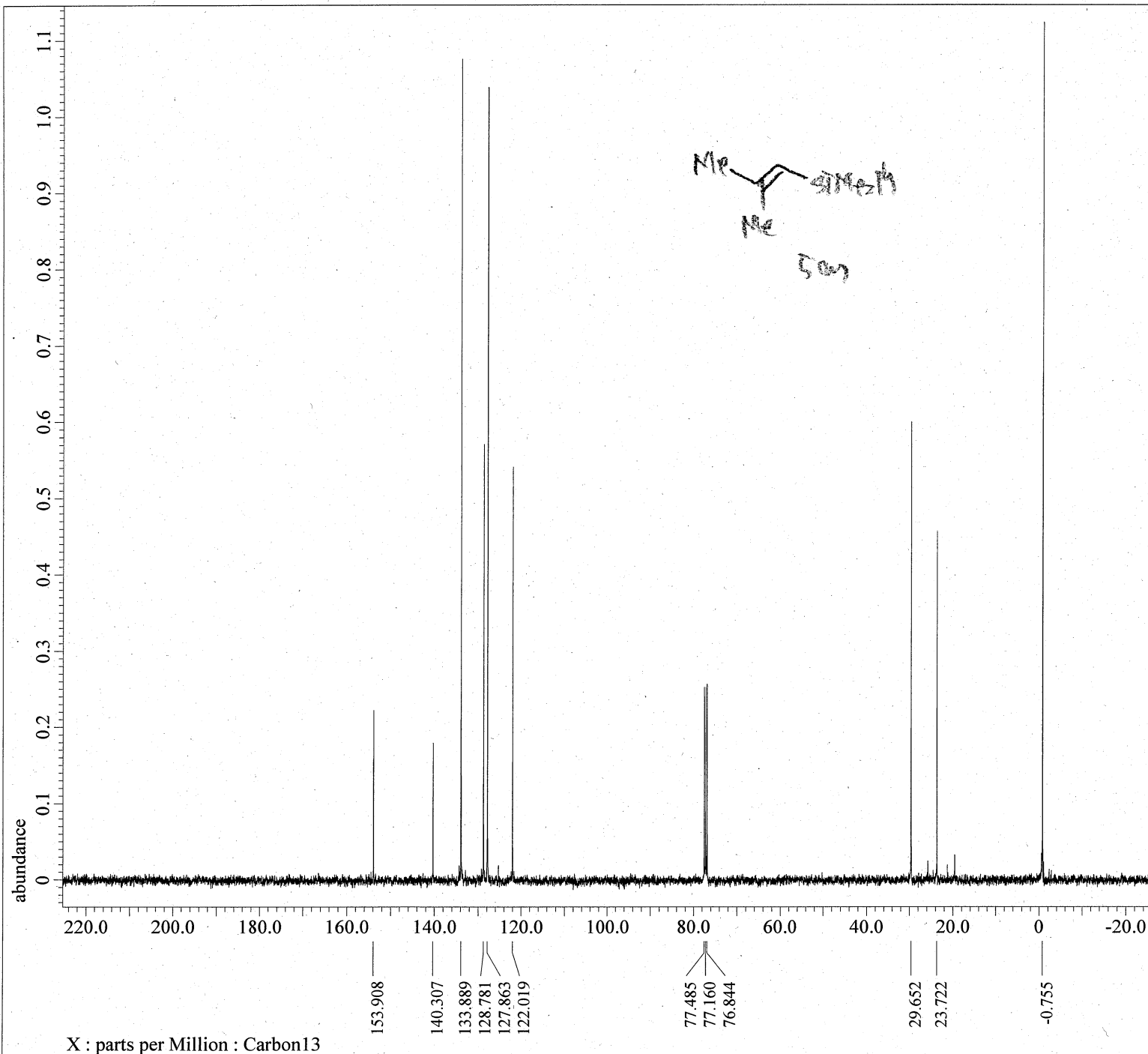
Derived from: KND_1810_pure_Proton-1-1.jdf

Filename = KND_1810_pure_Proton-1-2.
 Author = element
 Experiment = proton.jxp
 Sample_Id = KND_1810_pure
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 11-MAR-2024 23:12:47
 Revision_Time = 24-NOV-2024 19:40:43

Comment = single_pulse
 Data Format = 1D COMPLEX
 Dim Size = 13107
 X Domain = Proton
 Dim Title = Proton
 Dim Units = [ppm]
 Dimensions = X
 Site = JNM-ECS400
 Spectrometer = DELTA2_NMR

Field_Strength = 9.37221[T] (400[MHz])
 X_Acq_Duration = 2.1889024[s]
 X_Domain = 1H
 X_Freq = 399.03472754[MHz]
 X_Offset = 5.0[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.45684997[Hz]
 X_Sweep = 7.48502994[kHz]
 X_Sweep_Clippped = 5.98802395[kHz]
 Irr_Domain = Proton
 Irr_Freq = 399.03472754[MHz]
 Irr_Offset = 5.0[ppm]
 Tri_Domain = Proton
 Tri_Freq = 399.03472754[MHz]
 Tri_Offset = 5.0[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 38
 Temp_Get = 19.6[dC]
 X_90_Width = 6.6[us]
 X_Acq_Time = 2.1889024[s]
 X_Angle = 45[deg]
 X_Atn = 1[dB]
 X_Pulse = 3.3[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.1889024[s]



----- PROCESSING PARAMETERS -----

dc_balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid(0[%], 0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

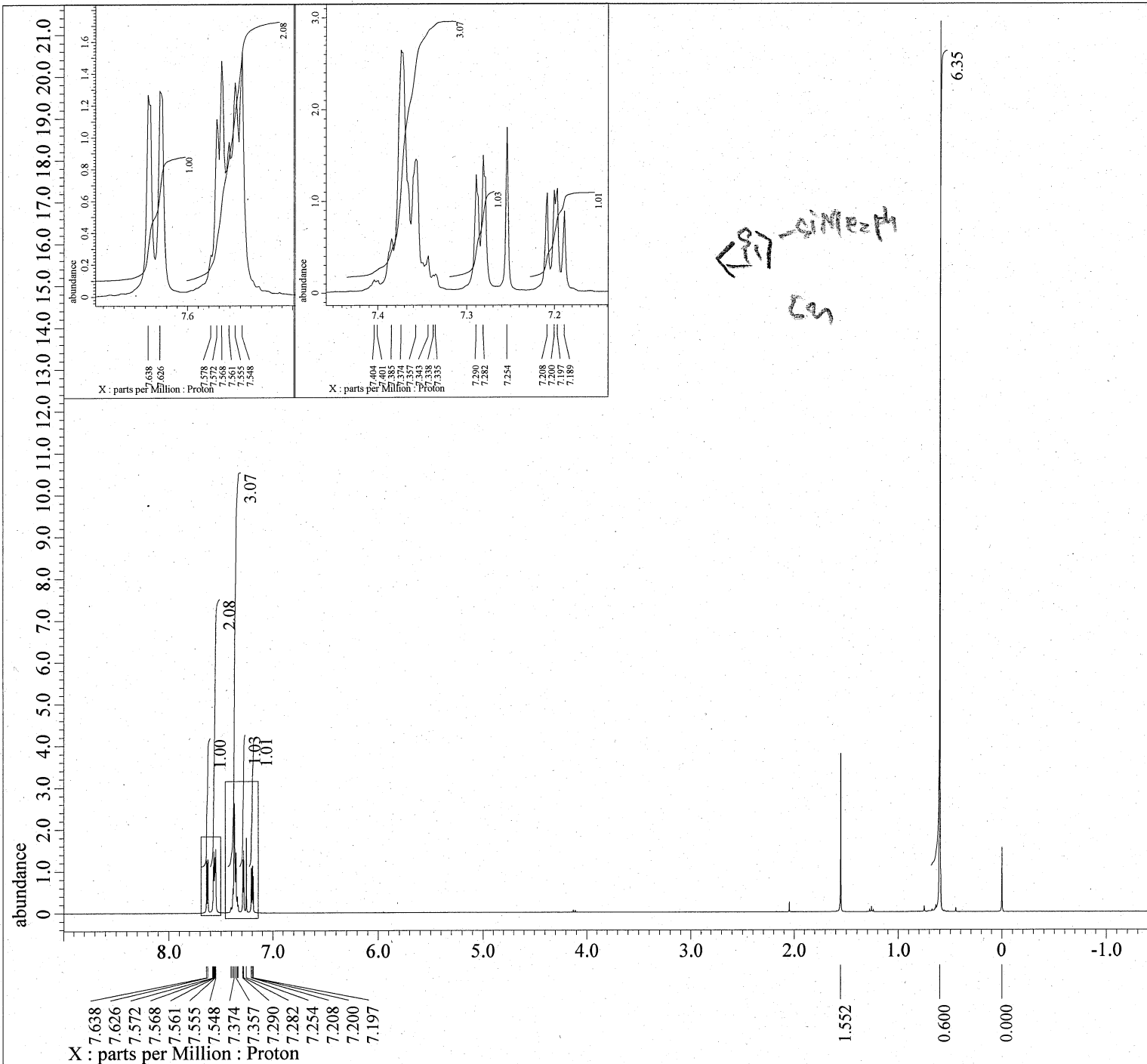
Derived from: KND_1810_13C_Carbon-1-1.jdf

Filename = KND_1810_13C_Carbon-1-2.j
Author = element
Experiment = carbon.jxp
Sample_Id = KND_1810_13C
Solvent = CHLOROFORM-D
Actual_Start_Time = 11-MAR-2024 22:52:31
Revision_Time = 14-JUL-2024 15:59:11

Comment = single pulse decoupled ga
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = Carbon
Dim_Title = Carbon13
Dim_Units = [ppm]
Dimensions = X
Spectrometer = DELTA2_NMR

Field_Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 1.03809024[s]
X_Domain = 13C
X_Freq = 100.71389092[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.96330739[Hz]
X_Sweep = 31.56565657[kHz]
X_Sweep_Clipped = 25.25252525[kHz]
Irr_Domain = Proton
Irr_Freq = 400.53219825[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 46
Total_Scans = 46

Relaxation_Delay = 2[s]
Recvr_Gain = 50
Temp_Get = 20.2[dC]
X_90_Width = 12.68[us]
X_Acq_Time = 1.03809024[s]
X_Angle = 30[deg]
X_Atn = 4[dB]
X_Pulse = 4.22666667[us]
Irr_Atn_Dec = 26.45[dB]
Irr_Atn_Noe = 26.45[dB]
Irr_Noise = WALTZ
Irr_Pwidth = 0.115[ms]
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.03809024[s]



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(0.2[Hz], 0.0[s])
 trapezoid(0[%], 0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

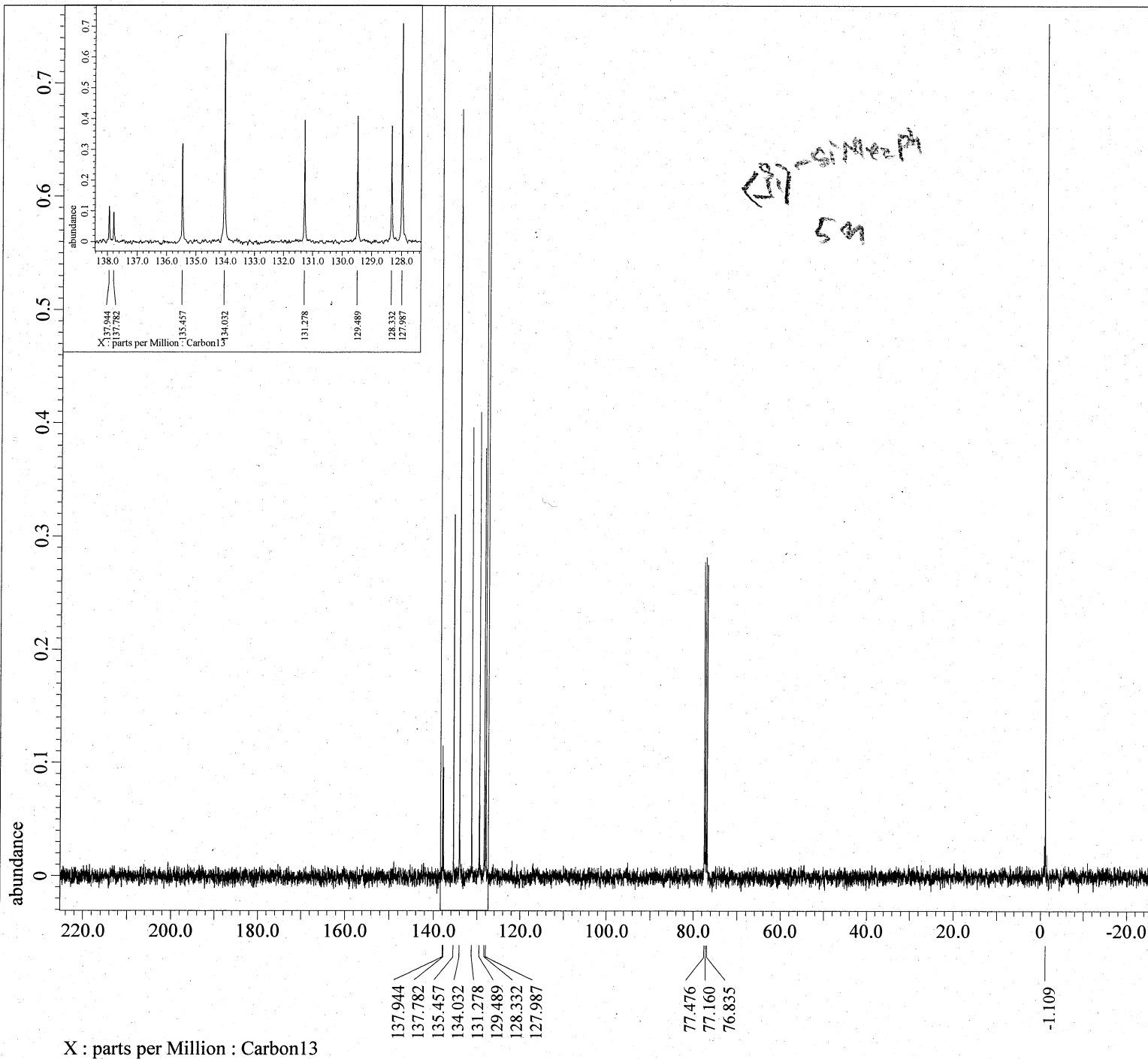
Derived from: KND_2369_pure_Proton-1-1.jdf

Filename = KND_2369_pure_Proton-1-2.
 Author = element
 Experiment = proton.jxp
 Sample_Id = KND_2369_pure
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 2-NOV-2024 17:38:16
 Revision_Time = 21-NOV-2024 13:24:31

Comment = single_pulse
 Data_Format = 1D COMPLEX
 Dim_Size = 13107
 X_Domain = Proton
 Dim_Title = Proton
 Dim_Units = [ppm]
 Dimensions = X
 Spectrometer = DELTA2_NMR

Field_Strength = 9.4073814[T] (400[MHz])
 X_Acq_Duration = 2.18103808[s]
 X_Domain = 1H
 X_Freq = 400.53219825[MHz]
 X_Offset = 5[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.45849727[Hz]
 X_Sweep = 7.51201923[kHz]
 X_Sweep_Clippped = 6.00961538[kHz]
 Irr_Domain = Proton
 Irr_Freq = 400.53219825[MHz]
 Irr_Offset = 5[ppm]
 Tri_Domain = Proton
 Tri_Freq = 400.53219825[MHz]
 Tri_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 40
 Temp_Get = 18.7[dC]
 X_90_Width = 6.7[us]
 X_Acq_Time = 2.18103808[s]
 X_Angle = 45[deg]
 X_Atn = 0.8[dB]
 X_Pulse = 3.35[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.18103808[s]



----- PROCESSING PARAMETERS -----

dc balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid(0[%], 0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

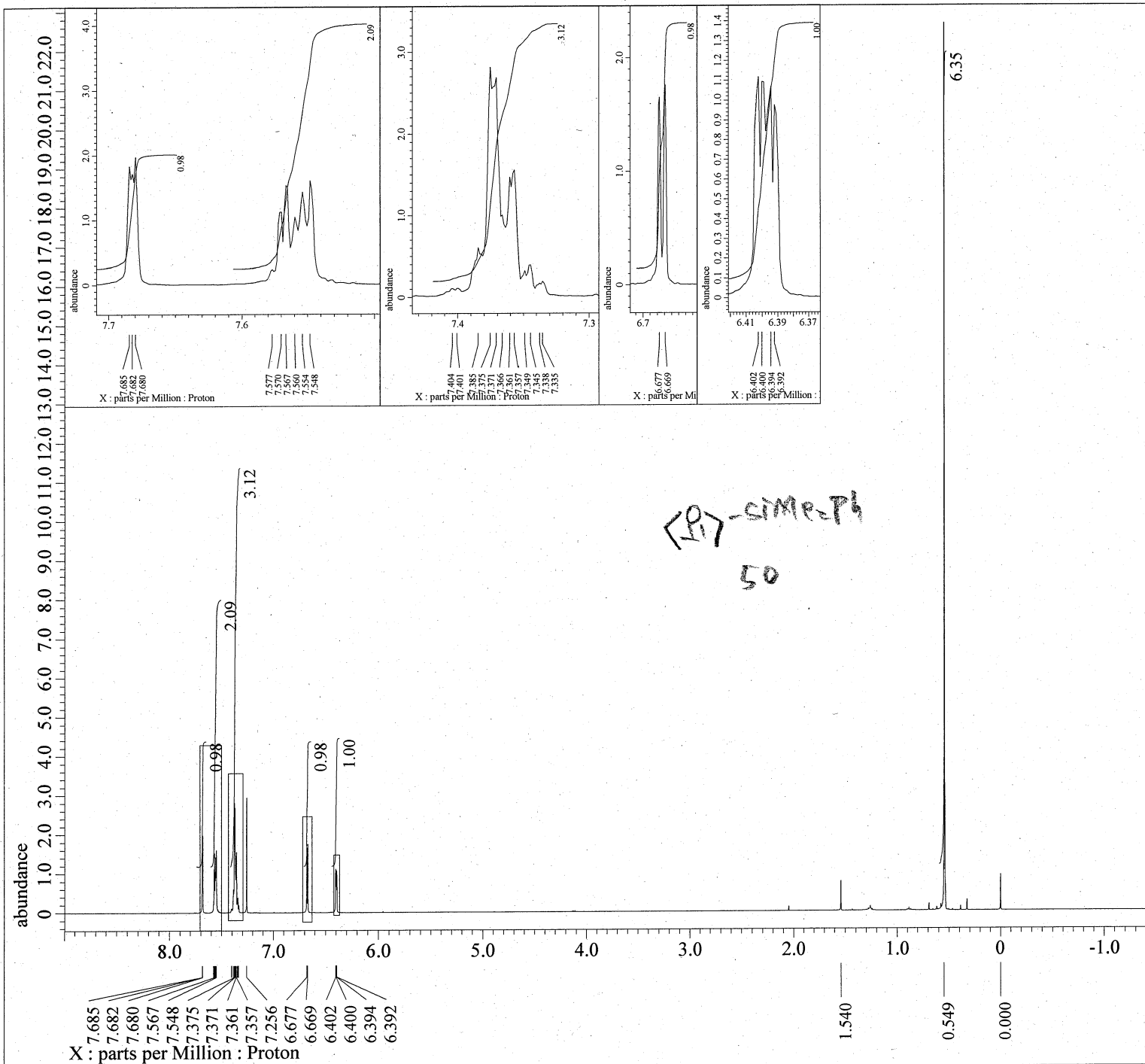
Derived from: KND_2369_13C_Carbon-1-1.jdf

Filename = KND_2369_13C_Carbon-1-2.j
Author = element
Experiment = carbon.jxp
Sample_Id = KND_2369_13C
Solvent = CHLOROFORM-D
Actual_Start_Time = 2-NOV-2024 18:13:31
Revision_Time = 21-NOV-2024 13:27:44

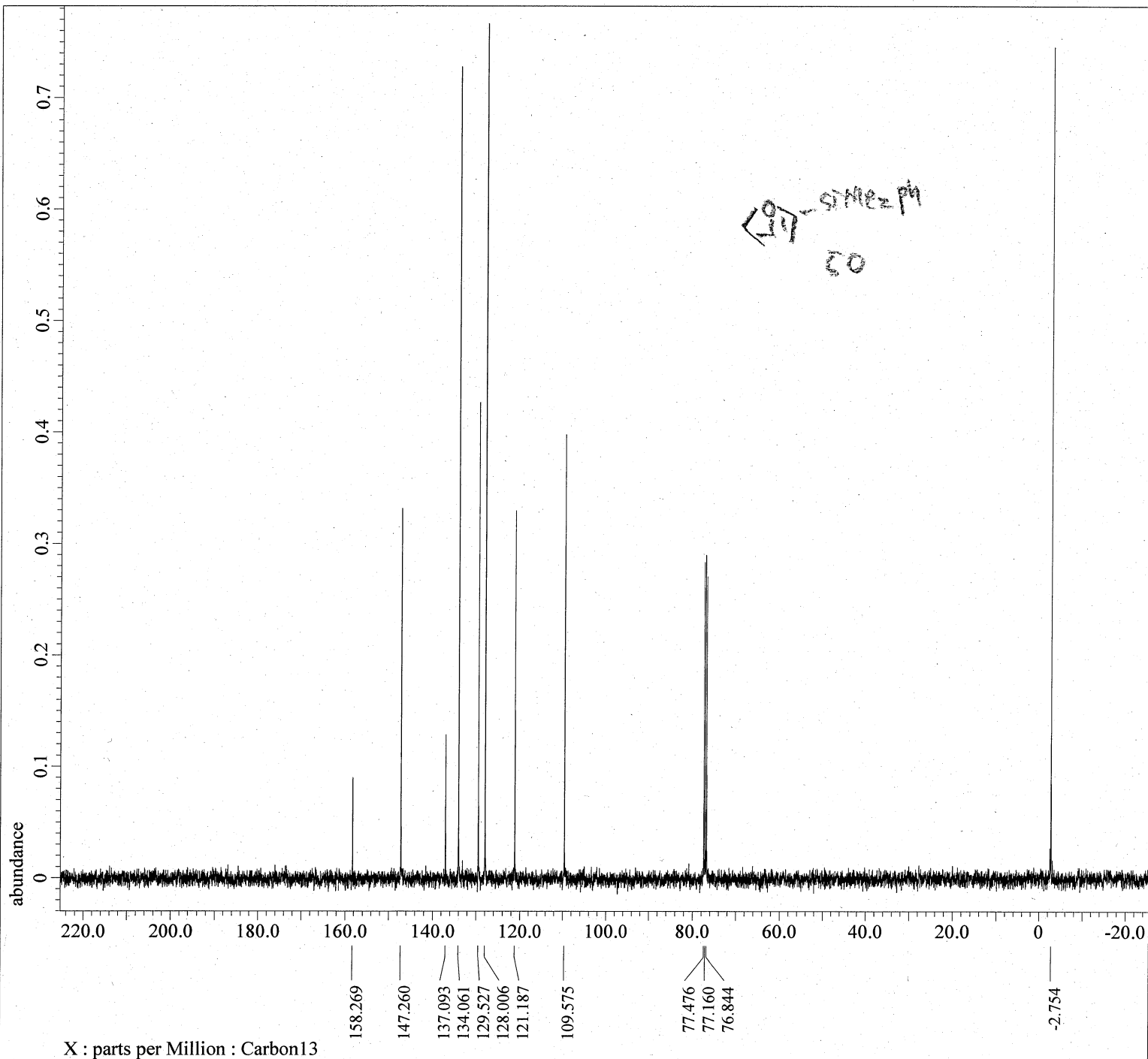
Comment = single pulse decoupled ga
Data Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = Carbon
Dim_Title = Carbon13
Dim_Units = [ppm]
Dimensions = X
Spectrometer = DELTA2_NMR

Field_Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 1.03809024[s]
X_Domain = 13C
X_Freq = 100.71389092[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.96330739[Hz]
X_Sweep = 31.56565657[kHz]
X_Sweep_Clippped = 25.25252525[kHz]
Irr_Domain = Proton
Irr_Freq = 400.53219825[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 25
Total_Scans = 25

Relaxation_Delay = 2[s]
Recvr_Gain = 50
Temp_Get = 18.3[dC]
X_90_Width = 12.68[us]
X_Acq_Time = 1.03809024[s]
X_Angle = 30[deg]
X_Atn = 4[dB]
X_Pulse = 4.22666667[us]
Irr_Atn_Dec = 26.45[dB]
Irr_Atn_No = 26.45[dB]
Irr_Noise = WALTZ
Irr_Pwidth = 0.115[ms]
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.03809024[s]



----- PROCESSING PARAMETERS ----- <pre> dc_balance(0, FALSE) sexp(0.2[Hz], 0.0[s]) trapezoid(0[%], 0[%], 80[%], 100[%]) zerofill(1) fft(1, TRUE, TRUE) machinephase ppm </pre> Derived from: KND_2402_pure_Proton-1-1.jdf	
Filename	= KND_2402_pure_Proton-1-2.
Author	= element
Experiment	= proton.jxp
Sample_Id	= KND_2402_pure
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 3-NOV-2024 16:28:27
Revision_Time	= 21-NOV-2024 13:52:16
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= Proton
Dim_Title	= Proton
Dim_Units	= [ppm]
Dimensions	= X
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.4073814[T] (400[MHz])
X_Acq_Duration	= 2.18103808[s]
X_Domain	= 1H
X_Freq	= 400.53219825[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45849727[Hz]
X_Sweep	= 7.51201923[kHz]
X_Sweep_Clipped	= 6.00961538[kHz]
Irr_Domain	= Proton
Irr_Freq	= 400.53219825[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= Proton
Tri_Freq	= 400.53219825[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 42
Temp_Get	= 18.8[dC]
X_90_Width	= 6.7[us]
X_Acq_Time	= 2.18103808[s]
X_Angle	= 45[deg]
X_Atn	= 0.8[dB]
X_Pulse	= 3.35[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.18103808[s]



----- PROCESSING PARAMETERS -----

dc_balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid(0[%], 0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

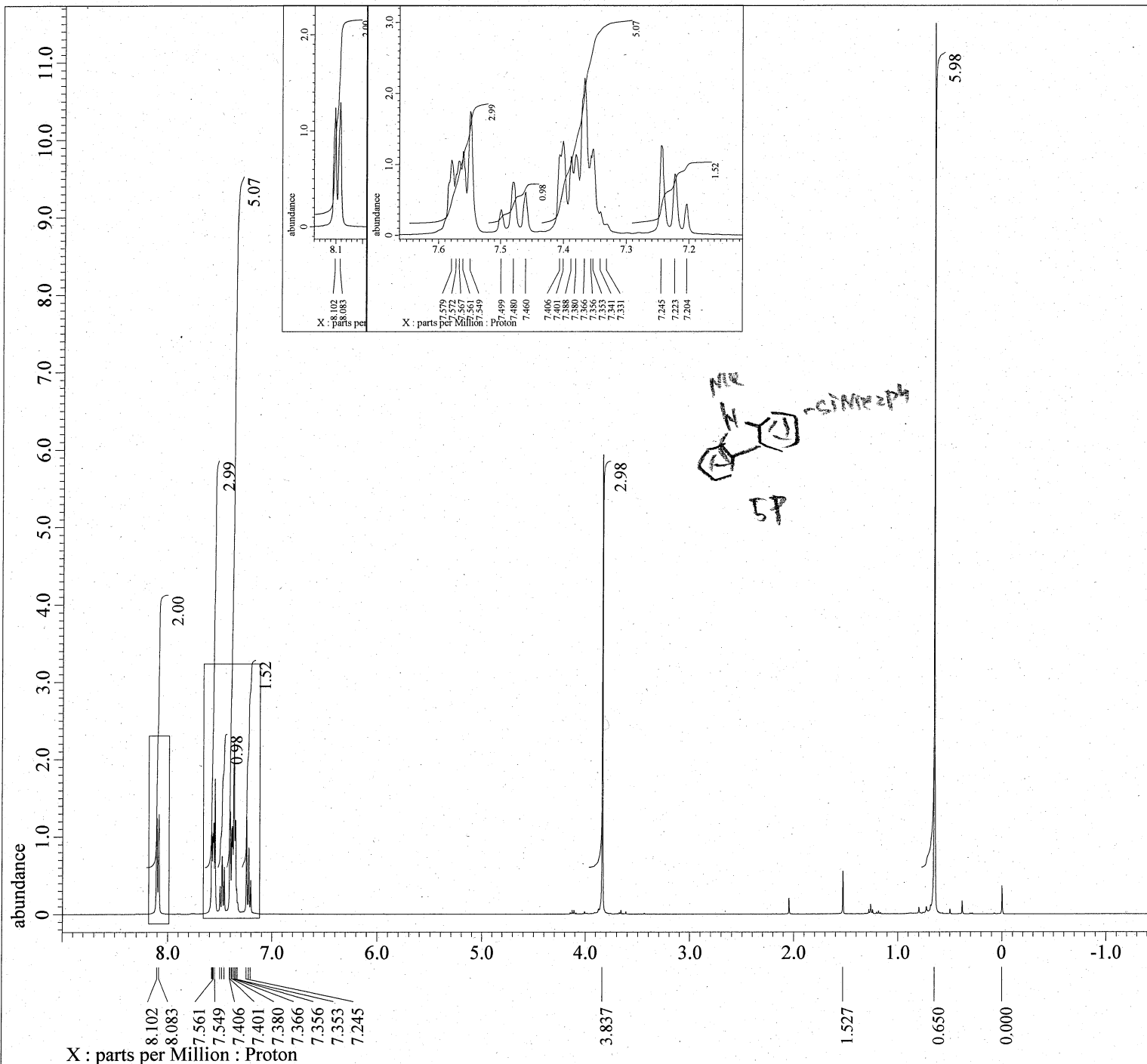
Derived from: KND_2402_13C_Carbon-1-1.jdf

Filename = KND_2402_13C_Carbon-1-2.j
Author = element
Experiment = carbon.jpg
Sample Id = KND 2402 13C
Solvent = CHLOROFORM-D
Actual_Start_Time = 3-NOV-2024 17:23:27
Revision_Time = 21-NOV-2024 13:54:57

Comment = single pulse decoupled ga
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = Carbon
Dim_Title = Carbon13
Dim_Units = [ppm]
Dimensions = X
Spectrometer = DELTA2_NMR

Field_Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 1.03809024[s]
X_Domain = 13C
X_Freq = 100.71389092[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.96330739[Hz]
X_Sweep = 31.56565657[kHz]
X_Sweep_Clippped = 25.25252525[kHz]
Irr_Domain = Proton
Irr_Freq = 400.53219825[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 26
Total_Scans = 26

Relaxation_Delay = 2[s]
Recvr_Gain = 50
Temp_Get = 18.4[deg]
X_90_Width = 12.68[us]
X_Acq_Time = 1.03809024[s]
X_Angle = 30[deg]
X_Atn = 4[dB]
X_Pulse = 4.22666667[us]
Irr_Atn_Dec = 26.45[dB]
Irr_Atn_Noe = 26.45[dB]
Irr_Noise = WALTZ
Irr_Pwidth = 0.115[ms]
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.03809024[s]



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

Derived from: KND_2376_pure_Proton-1-1.jdf

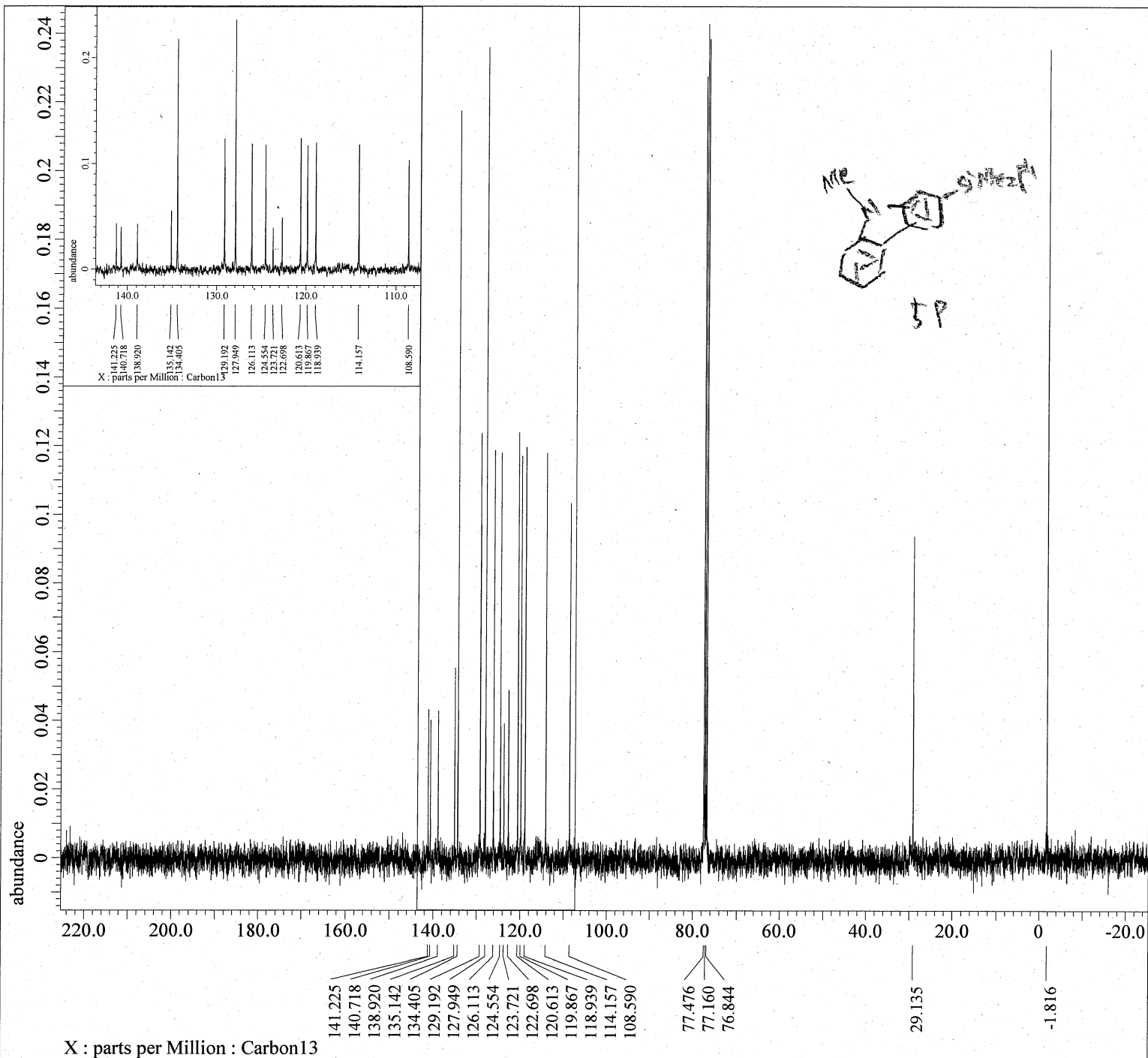
Filename      = KND_2376_pure_Proton-1-2.
Author        = element
Experiment     = proton.jxp
Sample_Id     = KND_2376_pure
Solvent       = CHLOROFORM-D
Actual_Start_Time = 4-NOV-2024 13:16:48
Revision_Time  = 21-NOV-2024 13:37:01

Comment       = single pulse
Data Format    = 1D COMPLEX
Dim_Size      = 13107
X_Domain      = Proton
Dim_Title     = Proton
Dim_Units     = [ppm]
Dimensions    = X
Spectrometer  = DELTA2_NMR

Field_Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 2.18103808[s]
X_Domain       = 1H
X_Freq         = 400.53219825[MHz]
X_Offset       = 5[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.45849727[Hz]
X_Sweep        = 7.51201923[kHz]
X_Sweep_Clippped = 6.00961538[kHz]
Irr_Domain     = Proton
Irr_Freq       = 400.53219825[MHz]
Irr_Offset     = 5[ppm]
Tri_Domain     = Proton
Tri_Freq       = 400.53219825[MHz]
Tri_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

Relaxation_Delay = 5[s]
Recvr_Gain       = 40
Temp_Get         = 18.9[dC]
X_90_Width      = 6.7[us]
X_Acq_Time      = 2.18103808[s]
X_Angle         = 45[deg]
X_Atn           = 0.8[dB]
X_Pulse         = 3.35[us]
Irr_Mode        = Off
Tri_Mode        = Off
Dante_Presat    = FALSE
Initial_Wait    = 1[s]
Repetition_Time = 7.18103808[s]

```



----- PROCESSING PARAMETERS -----

```
dc_balance( 0, FALSE )
sexp( 2.0[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm
```

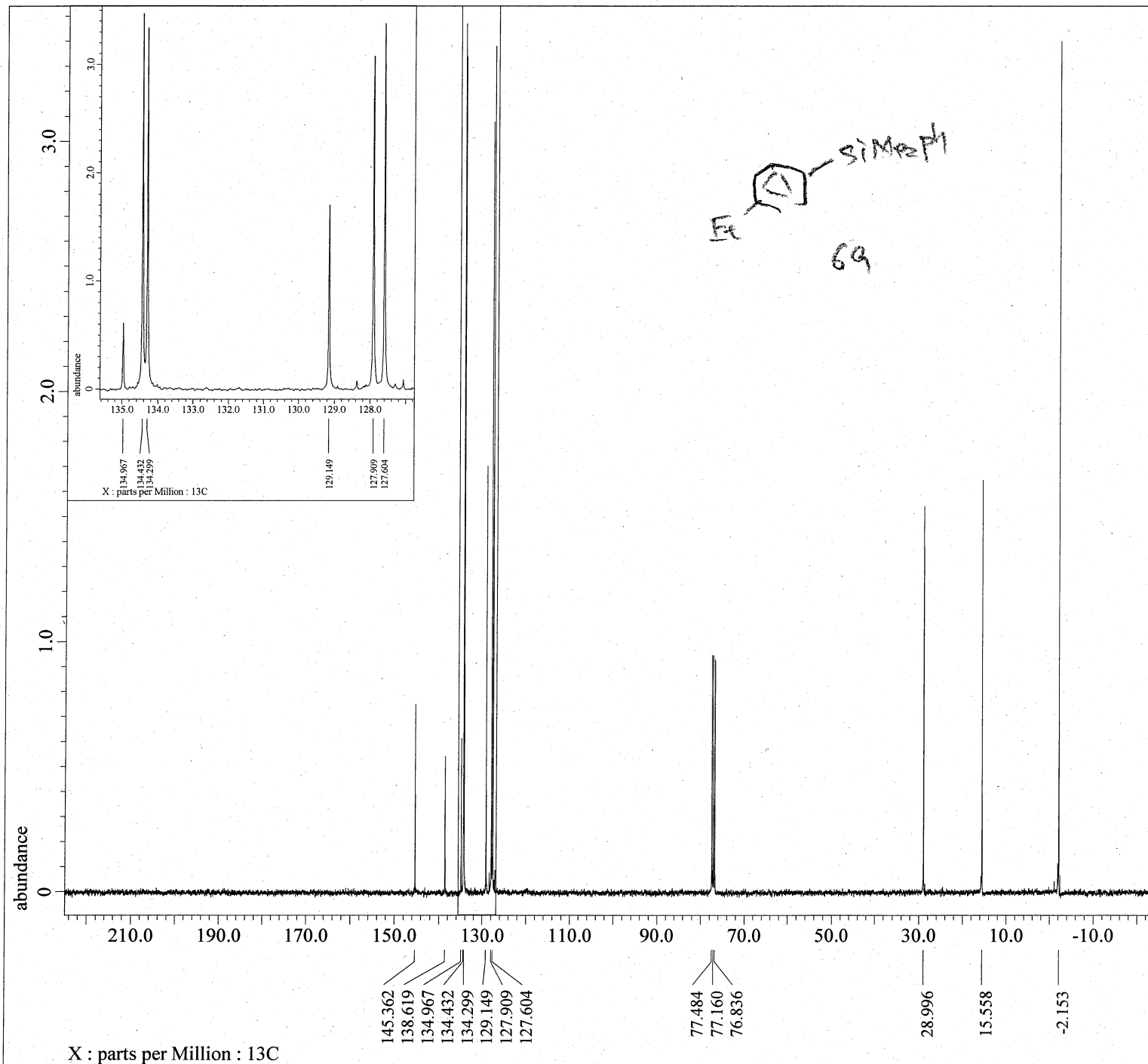
Derived from: KND_2376_13C_Carbon-1-1.jdf

Filename = KND_2376_13C_Carbon-1-2.j
Author = element
Experiment = carbon.jpg
Sample Id = KND_2372_13C
Solvent = CHLOROFORM-D
Actual_Start_Time = 4-NOV-2024 13:29:32
Revision_Time = 21-NOV-2024 13:40:45

Comment = single pulse decoupled ga
Data Format = 1D COMPLEX
Dim Size = 26214
X Domain = Carbon
Dim Title = Carbon13
Dim Units = [ppm]
Dimensions = X
Spectrometer = DELTA2_NMR

Field_Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 1.03809024[s]
X_Domain = 13C
X_Freq = 100.71389092[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.96330739[Hz]
X_Sweep = 31.56565657[kHz]
X_Sweep_Clippped = 25.25252525[kHz]
Irr_Domain = Proton
Irr_Freq = 400.53219825[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 65
Total_Scans = 65

Relaxation_Delay = 2[s]
Recvr_Gain = 50
Temp_Get = 18.6[dC]
X_90_Width = 12.68[us]
X_Acq_Time = 1.03809024[s]
X_Angle = 30[deg]
X_Atn = 4[dB]
X_Pulse = 4.22666667[us]
Irr_Atn_Dec = 26.45[dB]
Irr_Atn_No = 26.45[dB]
Irr_Noise = WALTZ
Irr_Pwidth = 0.115[ms]
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.03809024[s]



----- PROCESSING PARAMETERS -----
 dc balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

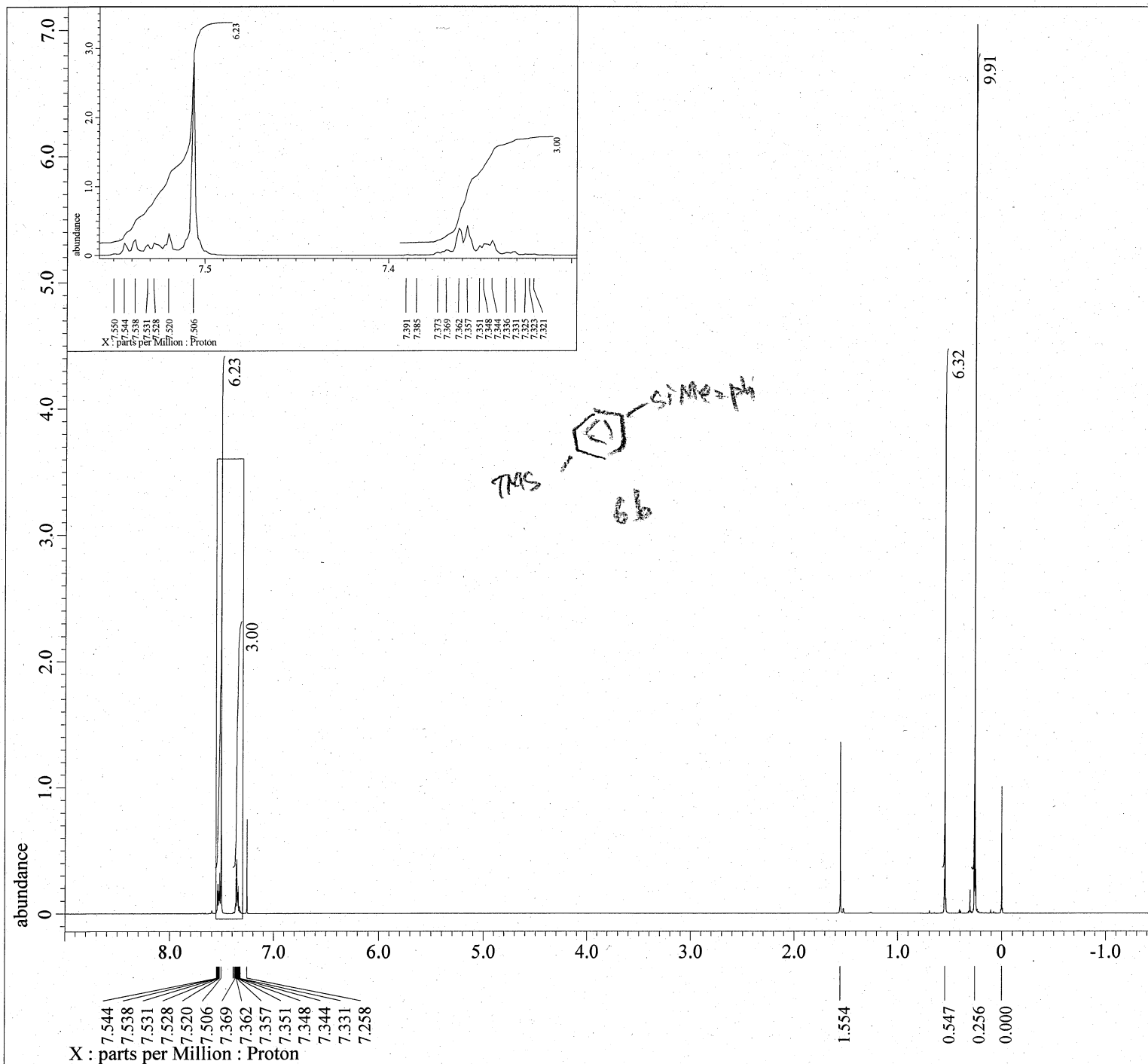
Derived from: KND_1589_13C-1.jdf

Filename = KND_1589_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 14-JAN-2024 04:27:04
 Revision_Time = 28-JAN-2024 18:26:09

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim_Size = 26214
 X_Domain = 13C
 Dim Title = 13C
 Dim Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 145
 Total_Scans = 145

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 20.3[dC]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_No = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



```

---- PROCESSING PARAMETERS ----
sexf( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

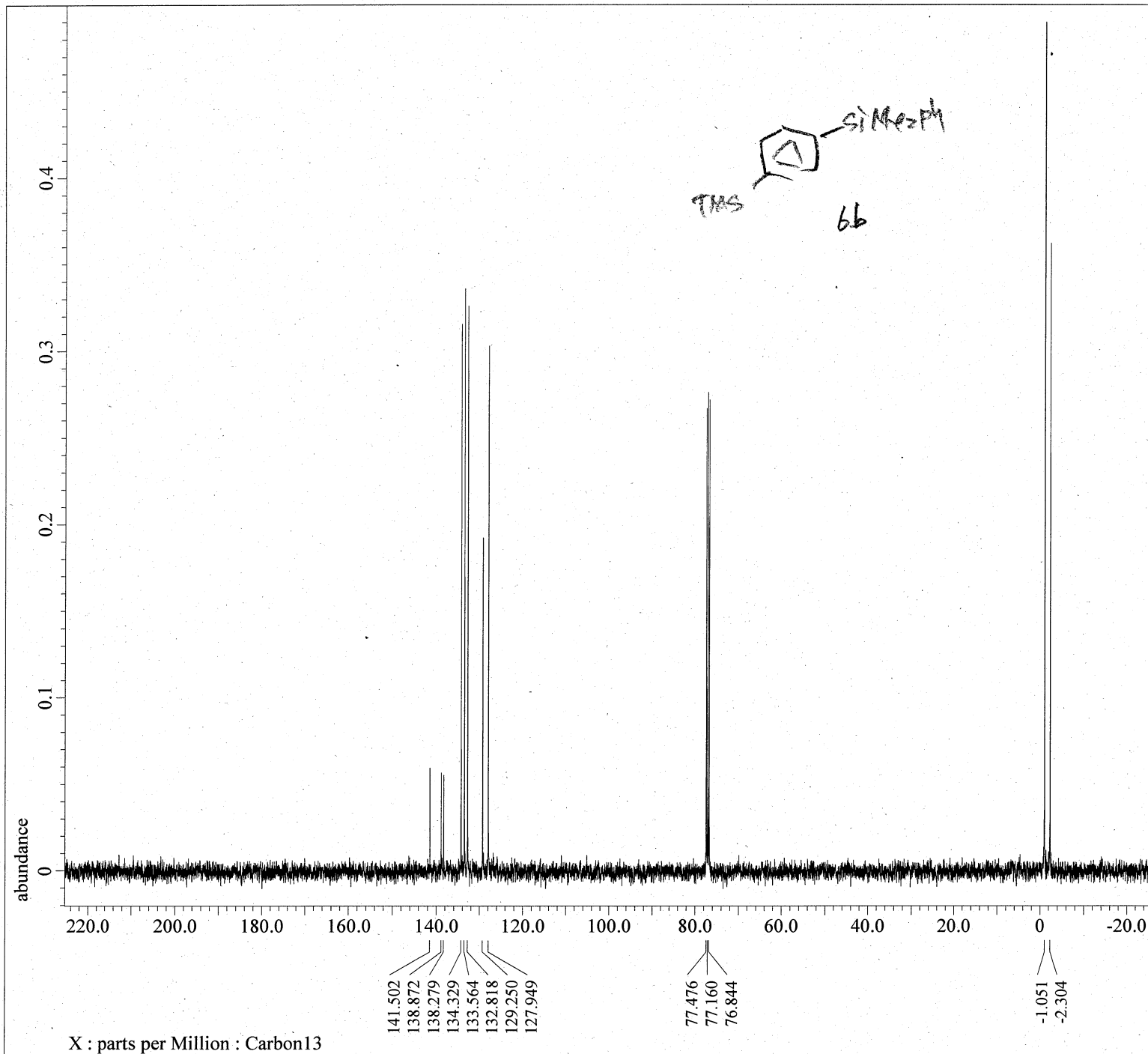
Derived from: KND_1739_pure2_Proton-1-1.jdf

Filename           = KND_1739_pure2_Proton
Author             = element
Experiment          = proton_auto.jxp
Sample_Id          = KND_1739_pure2
Solvent             = CHLOROFORM-D
Actual_Start_Time   = 14-JUL-2024 16:38:14
Revision_Time       = 24-NOV-2024 19:50:52

Comment            = single_pulse
Data_Format         = 1D COMPLEX
Dim_Size            = 13107
X_Domain            = Proton
Dim_Title           = Proton
Dim_Units            = [ppm]
Dimensions          = X
Spectrometer        = DELTA2_NMR

Field_Strength      = 9.2982153[T] (400[MHz]
X_Acq_Duration       = 2.20725248[s]
X_Domain            = Proton
X_Freq              = 395.88430144[MHz]
X_Offset            = 5[ppm]
X_Points            = 16384
X_Prescans          = 1
X_Resolution        = 0.45305193[Hz]
X_Sweep             = 7.42280285[kHz]
X_Sweep_Clippped    = 5.93824228[kHz]
Irr_Domain           = Proton
Irr_Freq            = 395.88430144[MHz]
Irr_Offset          = 5[ppm]
Tri_Domain           = Proton
Tri_Freq            = 395.88430144[MHz]
Tri_Offset          = 5[ppm]
Blanking            = 2[us]
Clipped             = FALSE
Scans               = 8
Total_Scans         = 8

Relaxation_Delay     = 5[s]
Recvr_Gain           = 56
Temp_Get             = 20.5[dC]
X_90_Width           = 6.34[us]
X_Acq_Time           = 2.20725248[s]
X_Angle              = 45[deg]
X_Atn               = 5[dB]
X_Pulse              = 3.17[us]
Irr_Mode             = Off
Tri_Mode             = Off
Dante_Loop           = 500
Dante_Presat         = FALSE
Decimation_Rate      = 0
Experiment_Path       = C:\Program Files\JEOL
Initial_Wait         = 1[s]
Phase                = {0, 90, 270, 180, 180
Presat_Time          = 5[s]
  
```



----- PROCESSING PARAMETERS -----

dc_balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid(0[%], 0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

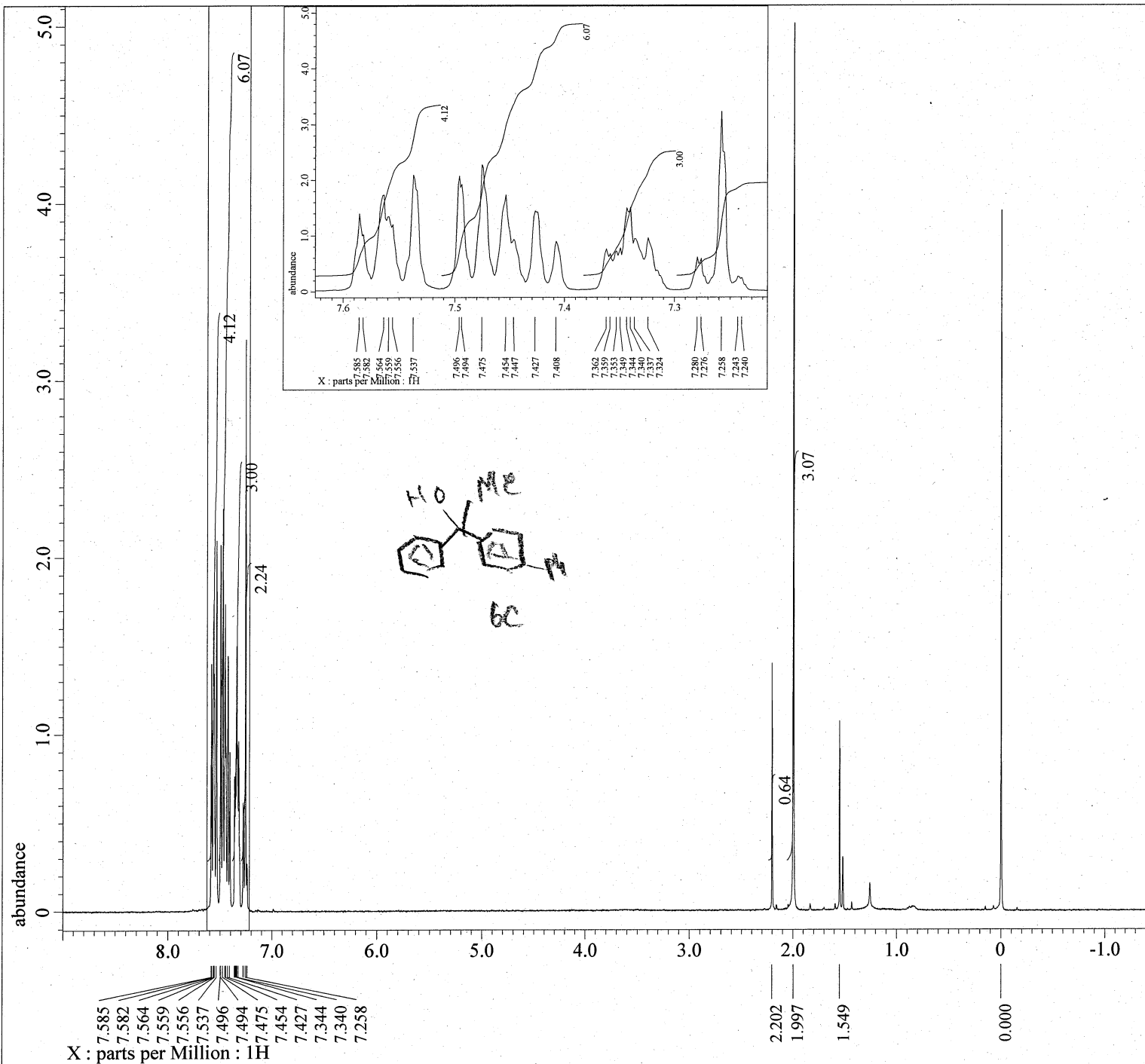
Derived from: KND_1739_13C_Carbon-1-1.jdf

Filename = KND_1739_13C_Carbon-1-2.j
Author = element
Experiment = carbon.jxp
Sample_Id = KND_1739_13C
Solvent = CHLOROFORM-D
Actual_Start_Time = 16-MAR-2024 00:21:19
Revision_Time = 14-JUL-2024 16:57:02

Comment = single pulse decoupled ga
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = Carbon
Dim_Title = Carbon13
Dim_Units = [ppm]
Dimensions = X
Spectrometer = DELTA2_NMR

Field_Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 1.03809024[s]
X_Domain = 13C
X_Freq = 100.71389092[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.96330739[Hz]
X_Sweep = 31.56565657[kHz]
X_Sweep_Clippped = 25.25252525[kHz]
Irr_Domain = Proton
Irr_Freq = 400.53219825[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 58
Total_Scans = 58

Relaxation_Delay = 2[s]
Recvr_Gain = 50
Temp_Get = 20.3[dC]
X_90_Width = 12.68[us]
X_Acq_Time = 1.03809024[s]
X_Angle = 30[deg]
X_Atn = 4[dB]
X_Pulse = 4.22666667[us]
Irr_Atn_Dec = 26.45[dB]
Irr_Atn_No = 26.45[dB]
Irr_Noise = WALTZ
Irr_Pwidth = 0.115[ms]
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.03809024[s]



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1604_pure-2.jdf

```

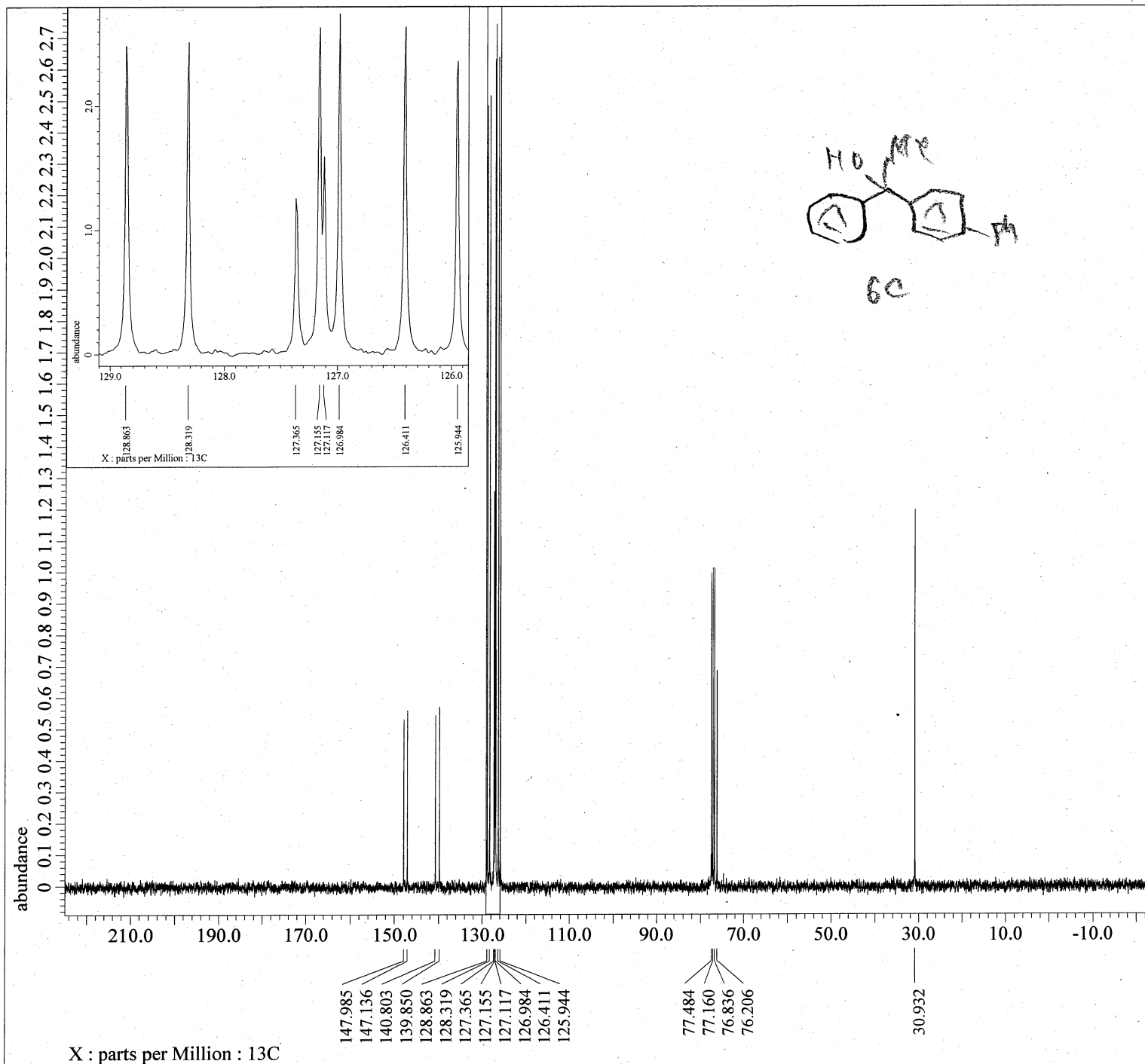
Filename      = KND_1604_pure-3.jdf
Author       = element
Experiment    = single_pulse.ex2
Sample_Id    = S#597192
Solvent      = CHLOROFORM-D
Actual_Start_Time = 23-JAN-2024 22:50:24
Revision_Time = 24-NOV-2024 19:54:46

Comment      = single_pulse
Data Format   = 1D COMPLEX
Dim_Size     = 13107
X_Domain     = 1H
Dim_Title    = 1H
Dim_Units    = [ppm]
Dimensions   = X
Site         = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 2.228224[s]
X_Domain       = 1H
X_Freq         = 391.78655441[MHz]
X_Offset       = 5[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.44878791[Hz]
X_Sweep        = 7.35294118[kHz]
Irr_Domain     = 1H
Irr_Freq       = 391.78655441[MHz]
Irr_Offset     = 5[ppm]
Tri_Domain     = 1H
Tri_Freq       = 391.78655441[MHz]
Tri_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

Relaxation_Delay = 5[s]
Recvr_Gain       = 52
Temp_Get         = 19.6[dC]
X_90_Width       = 10.79[us]
X_Acq_Time       = 2.228224[s]
X_Angle          = 45[deg]
X_Atn            = 1.9[dB]
X_Pulse          = 5.395[us]
Irr_Mode         = Off
Tri_Mode         = Off
Dante_Presat     = FALSE
Initial_Wait     = 1[s]
Repetition_Time  = 7.228224[s]

```



----- PROCESSING PARAMETERS -----
 dc balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

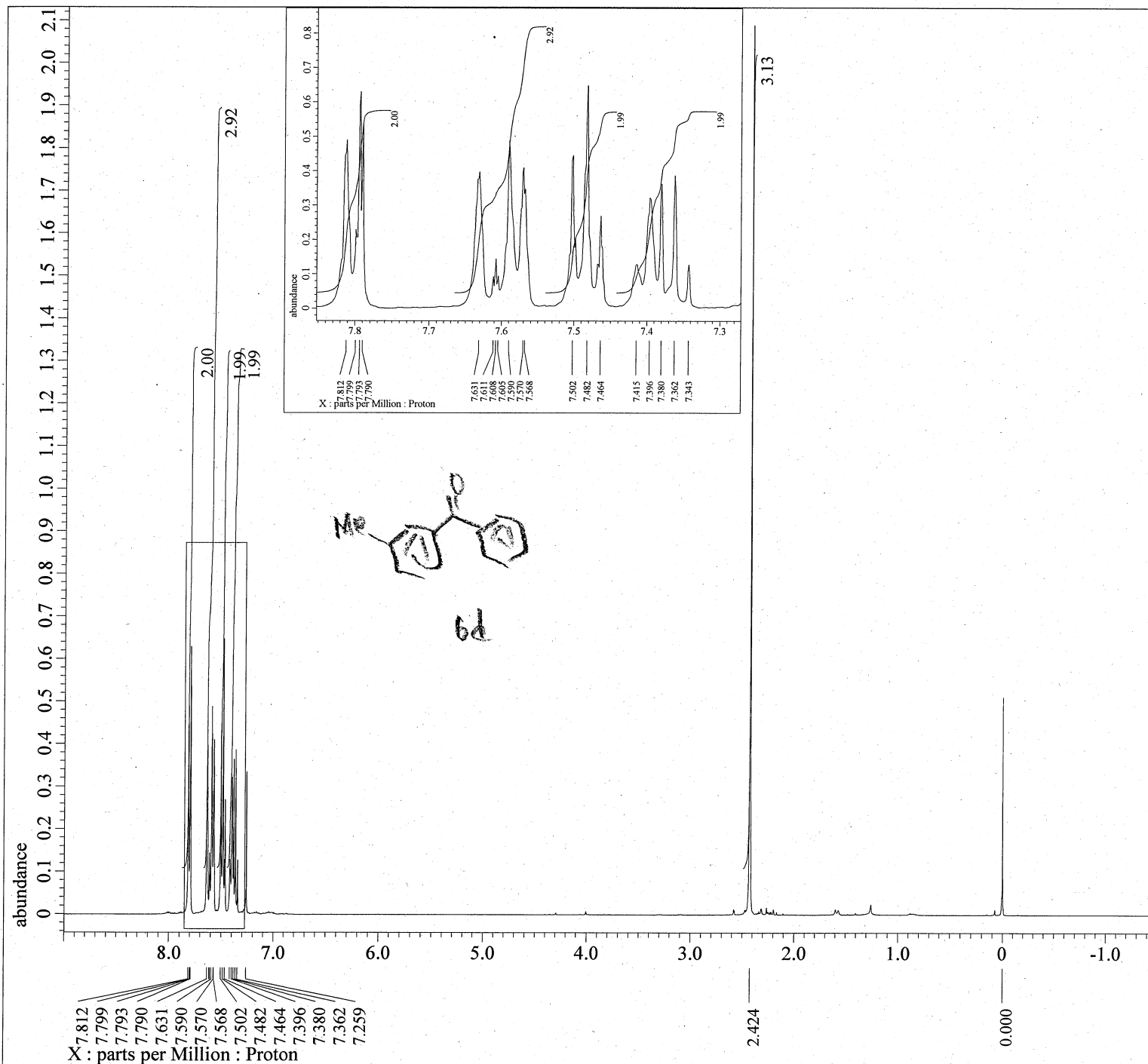
Derived from: KND_1604_13C-1.jdf

Filename = KND_1604_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 23-JAN-2024 23:00:31
 Revision_Time = 28-JAN-2024 18:49:02

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim_Size = 26214
 X_Domain = 13C
 Dim_Title = 13C
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 55
 Total_Scans = 55

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 19.7[dc]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_No = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----
 sexp(0.2[Hz], 0.0[s])
 trapezoid(0[%], 0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

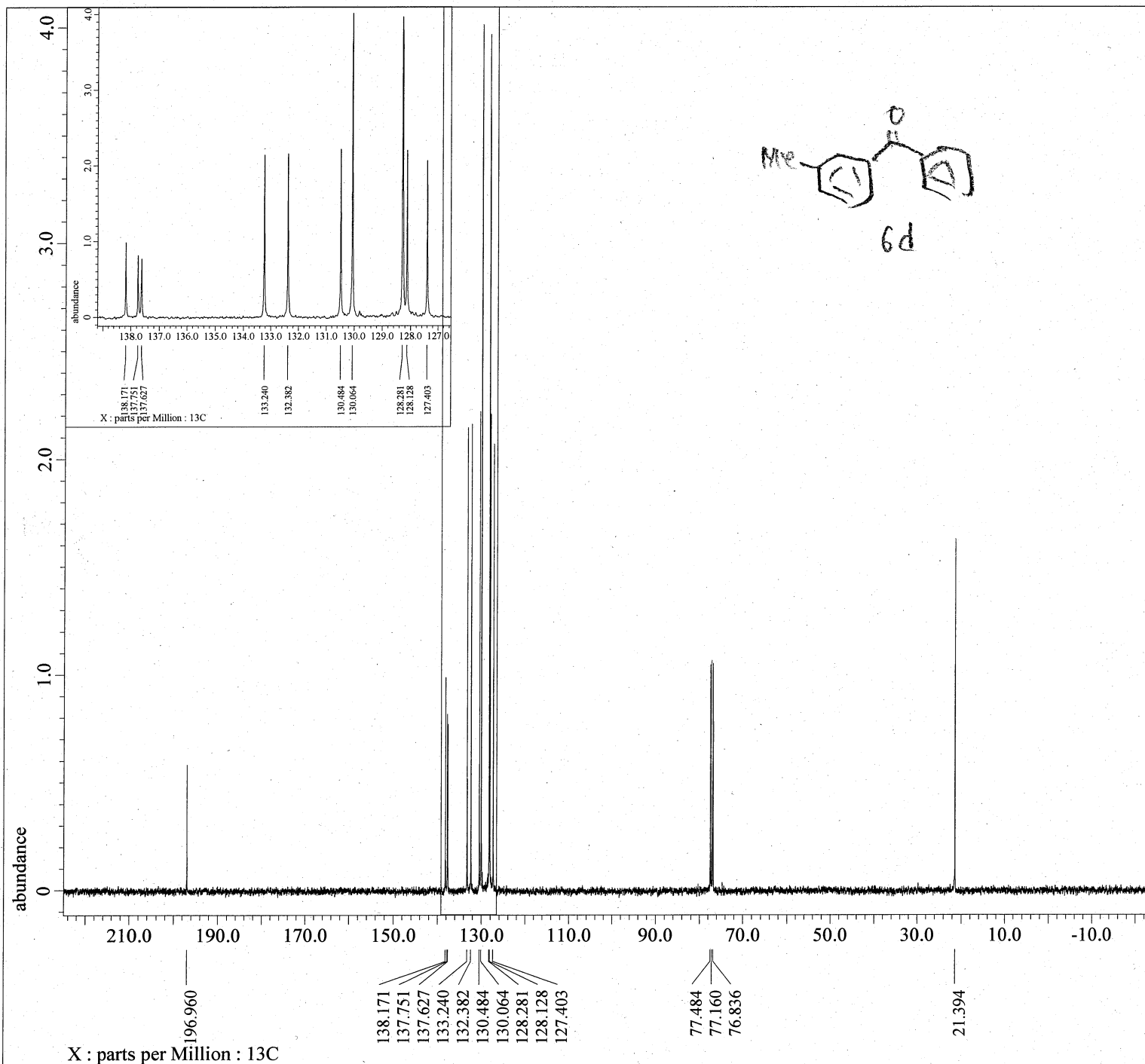
Derived from: KND_1576_pure_Proton-1-1.jdf

Filename = KND_1576_pure_Proton-
 Author = element
 Experiment = proton auto.jxp
 Sample_Id = KND_1576_pure
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 23-JAN-2024 23:25:55
 Revision_Time = 24-NOV-2024 19:59:00

Comment = single_pulse
 Data Format = 1D COMPLEX
 Dim Size = 13107
 X Domain = Proton
 Dim Title = Proton
 Dim Units = [ppm]
 Dimensions = X
 Spectrometer = DELTA2_NMR

Field Strength = 9.2982153[T] (400[MHz]
 X_Acq_Duration = 2.20725248[s]
 X_Domain = Proton
 X_Freq = 395.88430144[MHz]
 X_Offset = 5[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.45305193[Hz]
 X_Sweep = 7.42280285[kHz]
 X_Sweep_Clippped = 5.93824228[kHz]
 Irr_Domain = Proton
 Irr_Freq = 395.88430144[MHz]
 Irr_Offset = 5[ppm]
 Tri_Domain = Proton
 Tri_Freq = 395.88430144[MHz]
 Tri_Offset = 5[ppm]
 Blanking = 2[us]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 46
 Temp_Get = 18.8[dC]
 X_90_Width = 6.34[us]
 X_Acq_Time = 2.20725248[s]
 X_Angle = 45[deg]
 X_Atn = 5[dB]
 X_Pulse = 3.17[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Loop = 500
 Dante_Presat = FALSE
 Decimation_Rate = 0
 Experiment_Path = C:\Program Files\JEOL
 Initial_Wait = 1[s]
 Phase = {0, 90, 270, 180, 180
 Presat_Time = 5[s]



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 2.0[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1576_13C-1.jdf

```

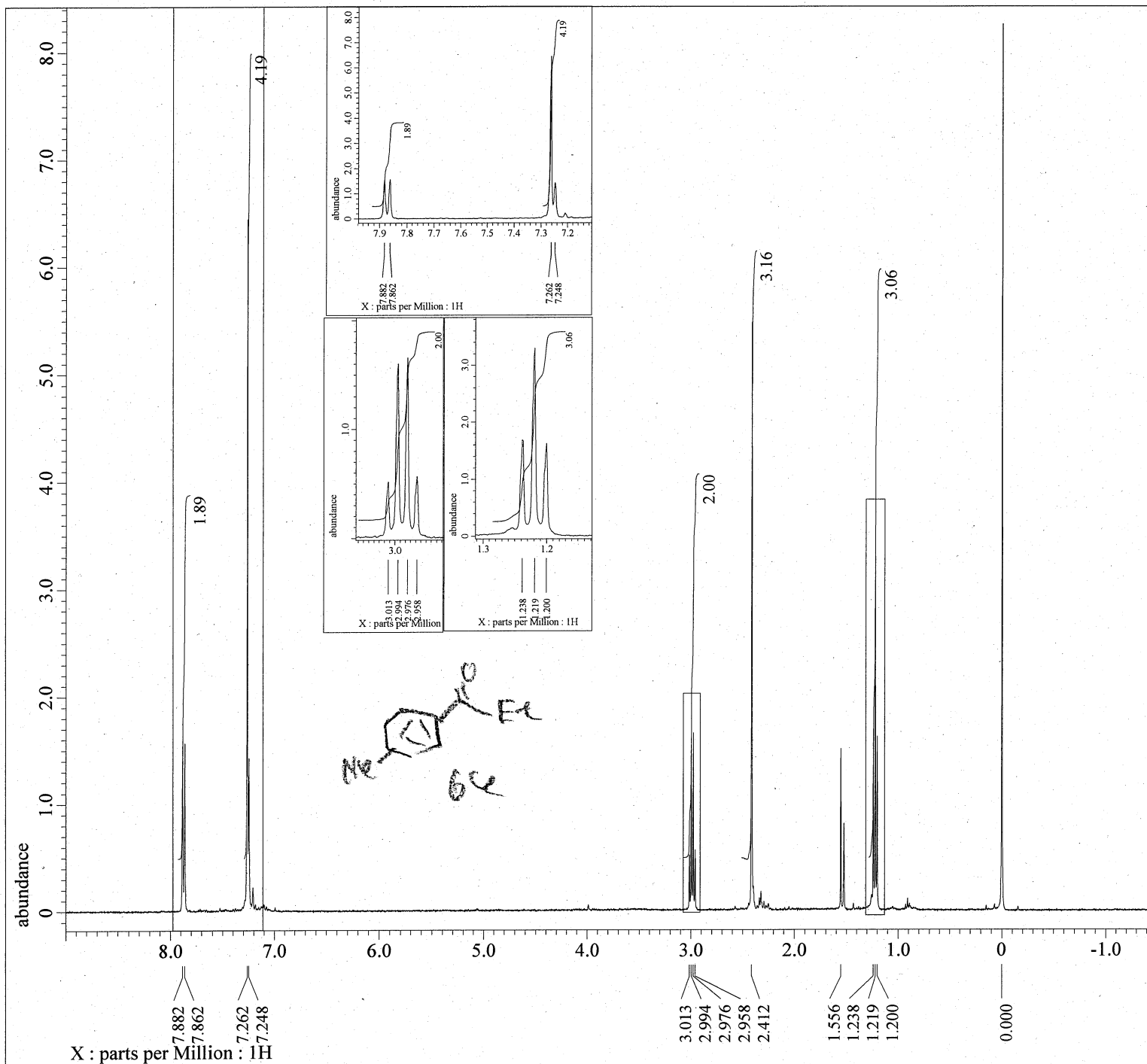
Filename      = KND_1576_13C-2.jdf
Author       = element
Experiment    = single_pulse_dec
Sample_Id    = 1
Solvent      = CHLOROFORM-D
Actual_Start_Time = 24-JAN-2024 05:44:28
Revision_Time = 28-JAN-2024 19:01:30

Comment      = single pulse decoupled ga
Data Format   = 1D COMPLEX
Dim_Size     = 26214
X_Domain     = 13C
Dim_Title    = 13C
Dim_Units    = [ppm]
Dimensions   = X
Site         = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain       = 13C
X_Freq         = 98.51479726[MHz]
X_Offset       = 100[ppm]
X_Points       = 32768
X_Prescans     = 4
X_Resolution   = 0.93958061[Hz]
X_Sweep        = 30.78817734[kHz]
Irr_Domain     = 1H
Irr_Freq       = 391.78655441[MHz]
Irr_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 61
Total_Scans    = 61

Relaxation_Delay = 2[s]
Recvr_Gain       = 60
Temp_Get         = 19.7[dC]
X_90_Width      = 9.46[us]
X_Acq_Time       = 1.06430464[s]
X_Angle          = 30[deg]
X_Atn            = 4.9[dB]
X_Pulse          = 3.15333333[us]
Irr_Atn_Dec      = 22.45[dB]
Irr_Atn_No     = 22.45[dB]
Irr_Noise        = WALTZ
Decoupling       = TRUE
Initial_Wait     = 1[s]
Noe              = TRUE
Noe_Time         = 2[s]
Repetition_Time  = 3.06430464[s]

```



----- PROCESSING PARAMETERS -----
 dc balance(0, FALSE)
 sexp(0.2[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

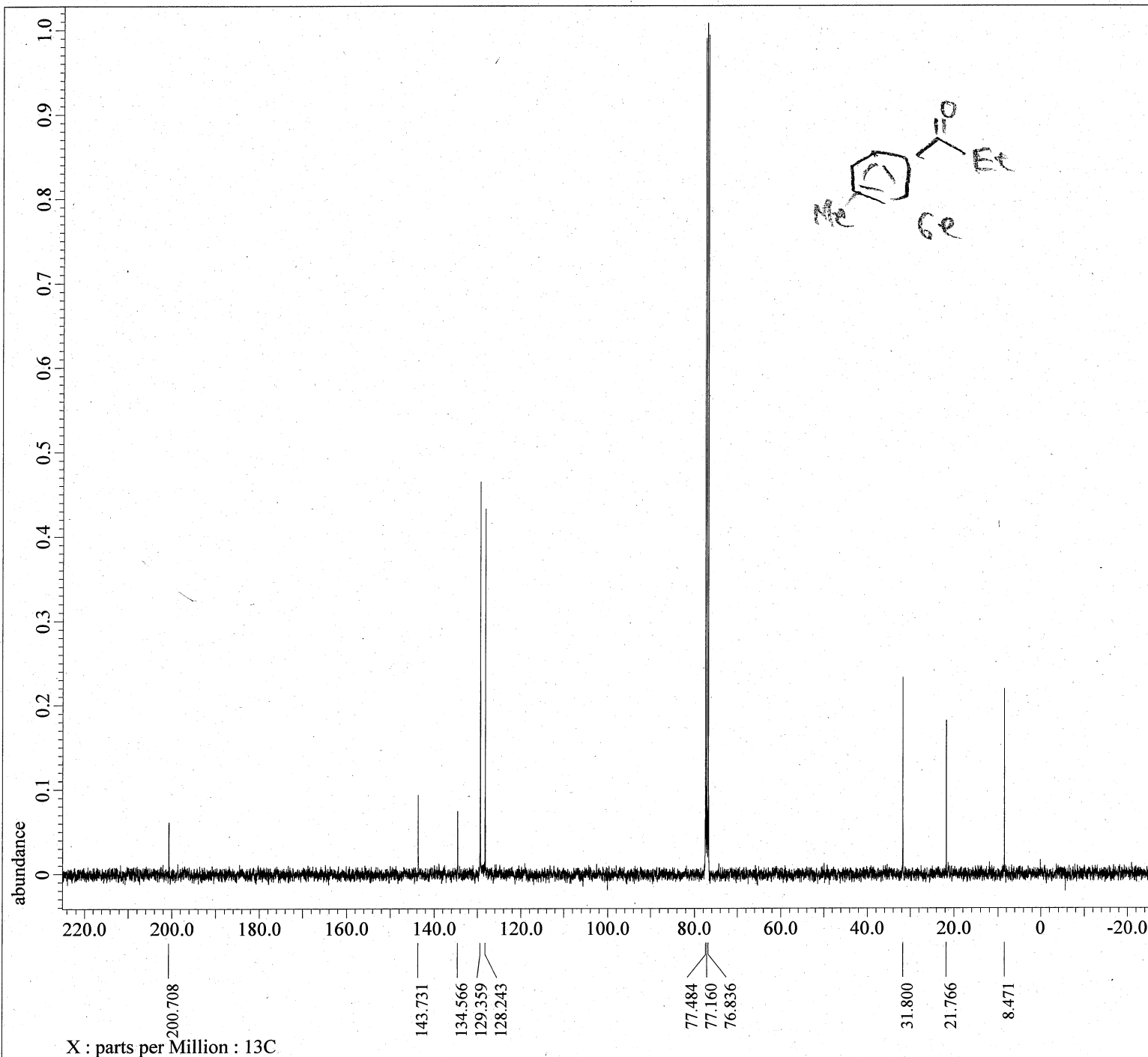
Derived from: KND_1640_pure-1.jdf

Filename = KND_1640_pure-2.jdf
 Author = element
 Experiment = single_pulse.ex2
 Sample_Id = S#492036
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 24-JAN-2024 19:55:02
 Revision_Time = 24-NOV-2024 21:11:48

Comment = single_pulse
 Data_Format = 1D_COMPLEX
 Dim_Size = 13107
 X_Domain = 1H
 Dim_Title = 1H
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 2.228224[s]
 X_Domain = 1H
 X_Freq = 391.78655441[MHz]
 X_Offset = 5[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.44878791[Hz]
 X_Sweep = 7.35294118[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Tri_Domain = 1H
 Tri_Freq = 391.78655441[MHz]
 Tri_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 58
 Temp_Get = 19[dc]
 X_90_Width = 10.79[us]
 X_Acq_Time = 2.228224[s]
 X_Angle = 45[deg]
 X_Atn = 1.9[dB]
 X_Pulse = 5.395[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.228224[s]



----- PROCESSING PARAMETERS -----
 dc balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

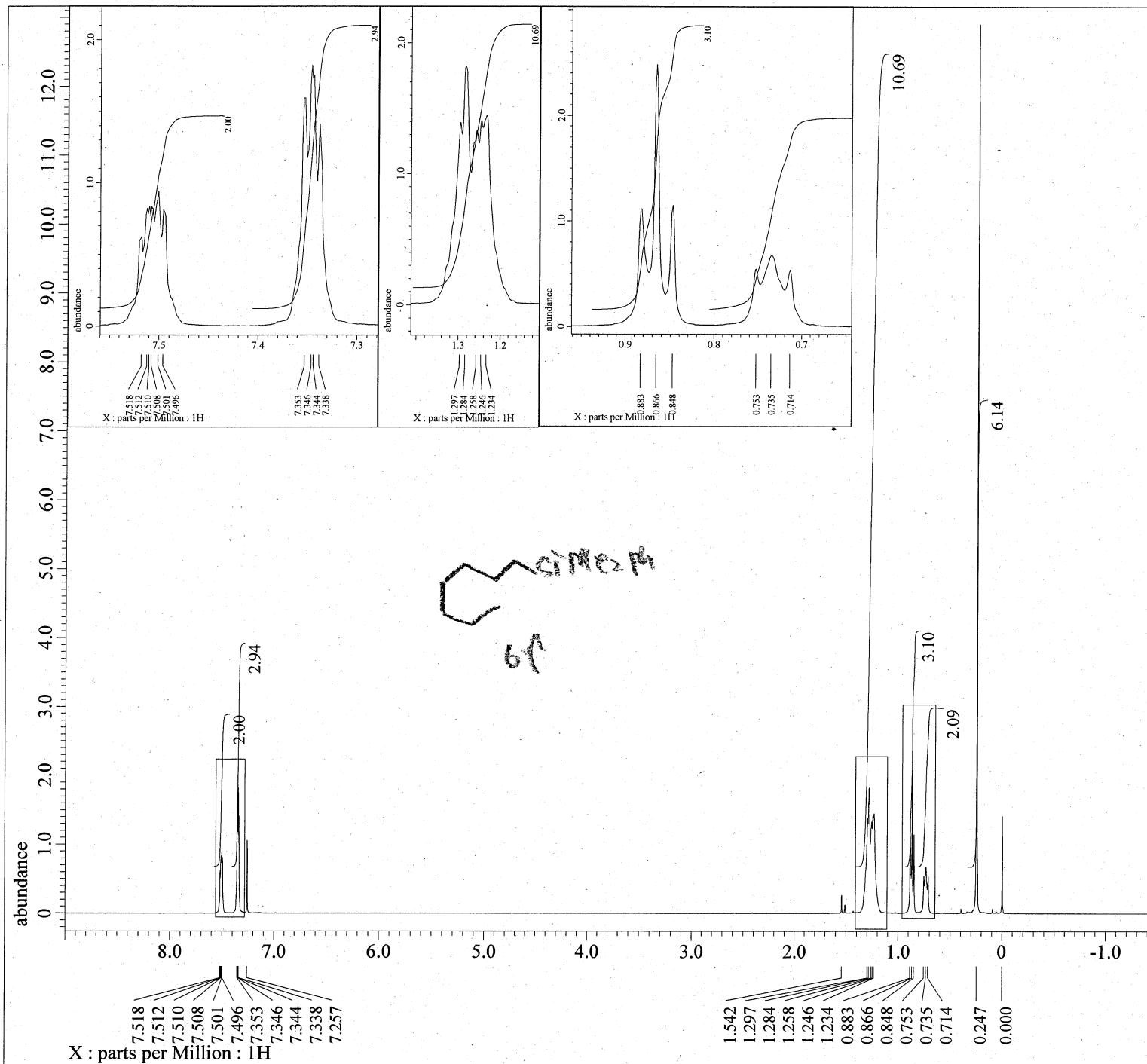
Derived from: KND_1640_13C-1.jdf

Filename = KND_1640_13C-2.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 24-JAN-2024 20:09:01
 Revision_Time = 28-JAN-2024 19:14:53

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim_Size = 26214
 X_Domain = 13C
 Dim Title = 13C
 Dim Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = TRUE
 Scans = 300
 Total_Scans = 300

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 19.5[dC]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_Noe = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



```

----- PROCESSING PARAMETERS -----
dc balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1422_pure-1.jdf

```

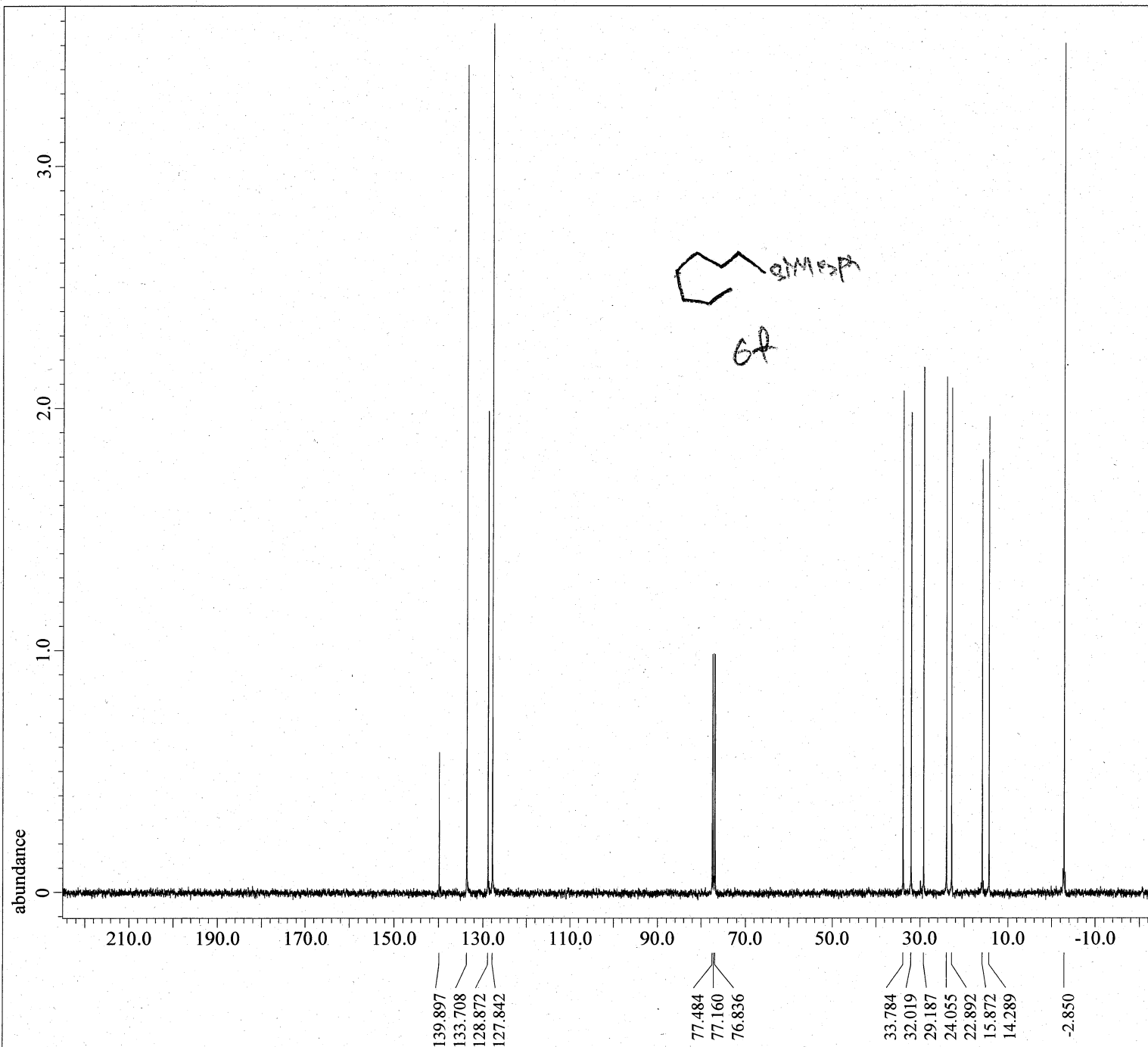
Filename      = KND_1422_pure-2.jdf
Author       = element
Experiment    = single_pulse.ex2
Sample_Id    = S#771308
Solvent      = CHLOROFORM-D
Actual_Start_Time = 25-JAN-2024 03:40:40
Revision_Time = 24-NOV-2024 21:17:46

Comment      = single_pulse
Data Format   = 1D COMPLEX
Dim_Size     = 13107
X_Domain     = 1H
Dim Title    = 1H
Dim Units    = [ppm]
Dimensions   = X
Site         = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 2.228224[s]
X_Domain       = 1H
X_Freq         = 391.78655441[MHz]
X_Offset       = 5[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.44878791[Hz]
X_Sweep        = 7.35294118[kHz]
Irr_Domain     = 1H
Irr_Freq       = 391.78655441[MHz]
Irr_Offset     = 5[ppm]
Tri_Domain     = 1H
Tri_Freq       = 391.78655441[MHz]
Tri_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

Relaxation_Delay = 5[s]
Recvr_Gain       = 42
Temp_Get         = 19.4[dC]
X_90_Width      = 10.79[us]
X_Acq_Time       = 2.228224[s]
X_Angle         = 45[deg]
X_Atn           = 1.9[dB]
X_Pulse         = 5.395[us]
Irr_Mode        = Off
Tri_Mode        = Off
Dante_Presat    = FALSE
Initial_Wait    = 1[s]
Repetition_Time = 7.228224[s]

```



----- PROCESSING PARAMETERS -----
dc balance(0, FALSE)
sexp(2.0[Hz], 0.0[s])
trapezoid3(0[%], 80[%], 100[%])
zerofill(1)
fft(1, TRUE, TRUE)
machinephase
ppm

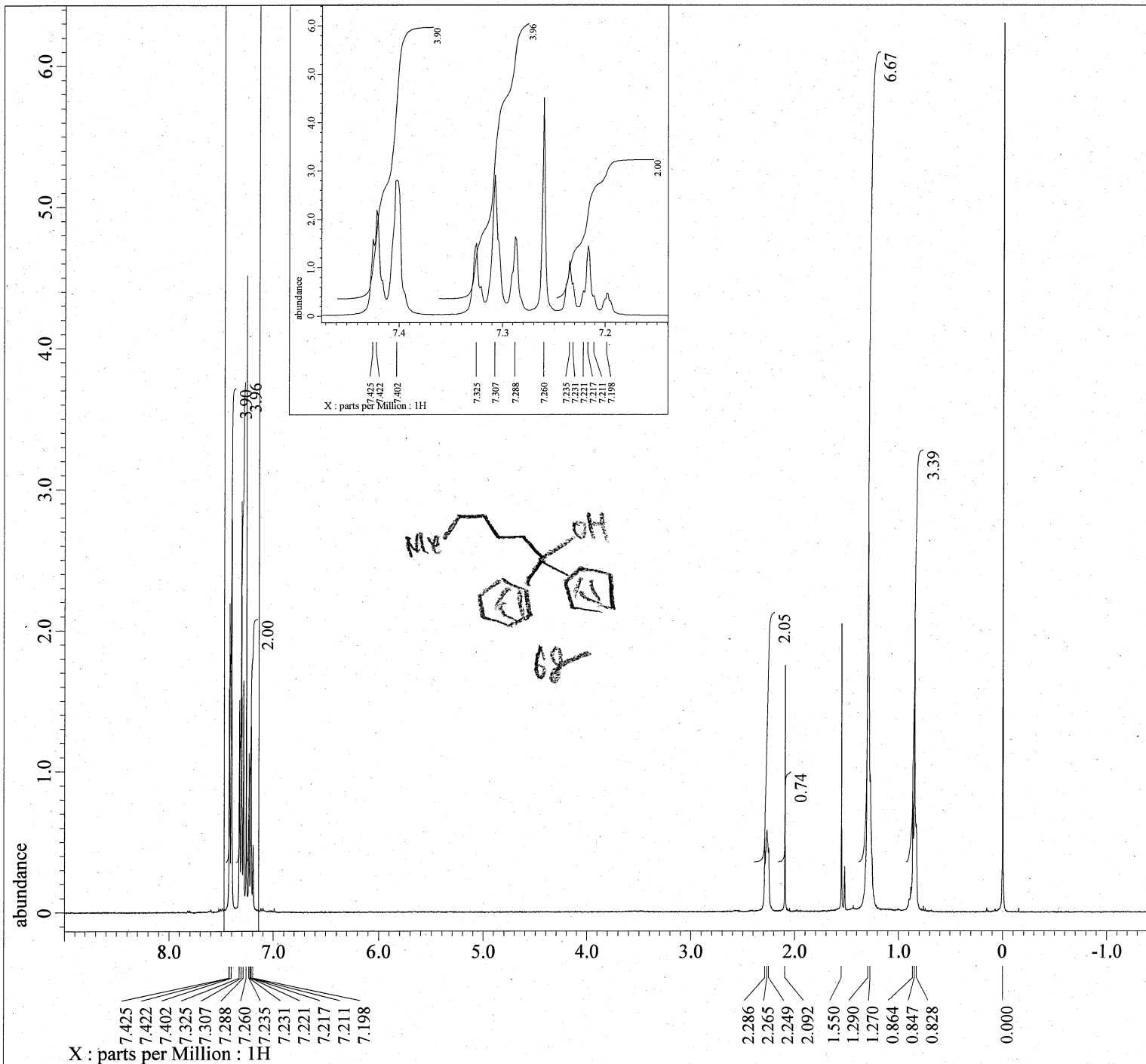
Derived from: KND_1422_13C-1.jdf

Filename = KND_1422_13C-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = 1
Solvent = CHLOROFORM-D
Actual_Start_Time = 25-JAN-2024 03:53:37
Revision_Time = 28-JAN-2024 19:23:32

Comment = single pulse decoupled ga
Data Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain = 13C
X_Freq = 98.51479726[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.93958061[Hz]
X_Sweep = 30.78817734[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 71
Total_Scans = 71

Relaxation_Delay = 2[s]
Recvr_Gain = 60
Temp_Get = 19.9[deg]
X_90_Width = 9.46[us]
X_Acq_Time = 1.06430464[s]
X_Angle = 30[deg]
X_Atn = 4.9[dB]
X_Pulse = 3.15333333[us]
Irr_Atn_Dec = 22.45[dB]
Irr_Atn_Noise = 22.45[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.06430464[s]



----- PROCESSING PARAMETERS -----

```

dc_balance( 0, FALSE )
sexf( 0.2[Hz], 0.0[s] )
trapezoid3( 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1648_pure-1.jdf

Filename = KND_1648_pure-2.jdf

Author = element

Experiment = single_pulse.ex2

Sample_Id = S#795434

Solvent = CHLOROFORM-D

Actual_Start_Time = 25-JAN-2024 04:20:38

Revision_Time = 24-NOV-2024 21:22:40

Comment = single_pulse

Data_Format = 1D_COMPLEX

Dim_Size = 13107

X_Domain = 1H

Dim_Title = 1H

Dim_Units = [ppm]

Dimensions = X

Site = ECS 400

Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])

X_Acq_Duration = 2.228224[s]

X_Domain = 1H

X_Freq = 391.78655441[MHz]

X_Offset = 5[ppm]

X_Points = 16384

X_Prescans = 1

X_Resolution = 0.44878791[Hz]

X_Sweep = 7.35294118[kHz]

Irr_Domain = 1H

Irr_Freq = 391.78655441[MHz]

Irr_Offset = 5[ppm]

Tri_Domain = 1H

Tri_Freq = 391.78655441[MHz]

Tri_Offset = 5[ppm]

Clipped = FALSE

Scans = 8

Total_Scans = 8

Relaxation_Delay = 5[s]

Recvr_Gain = 52

Temp_Get = 19.2[dC]

X_90_Width = 10.79[us]

X_Acq_Time = 2.228224[s]

X_Angle = 45[deg]

X_Atn = 1.9[dB]

X_Pulse = 5.395[us]

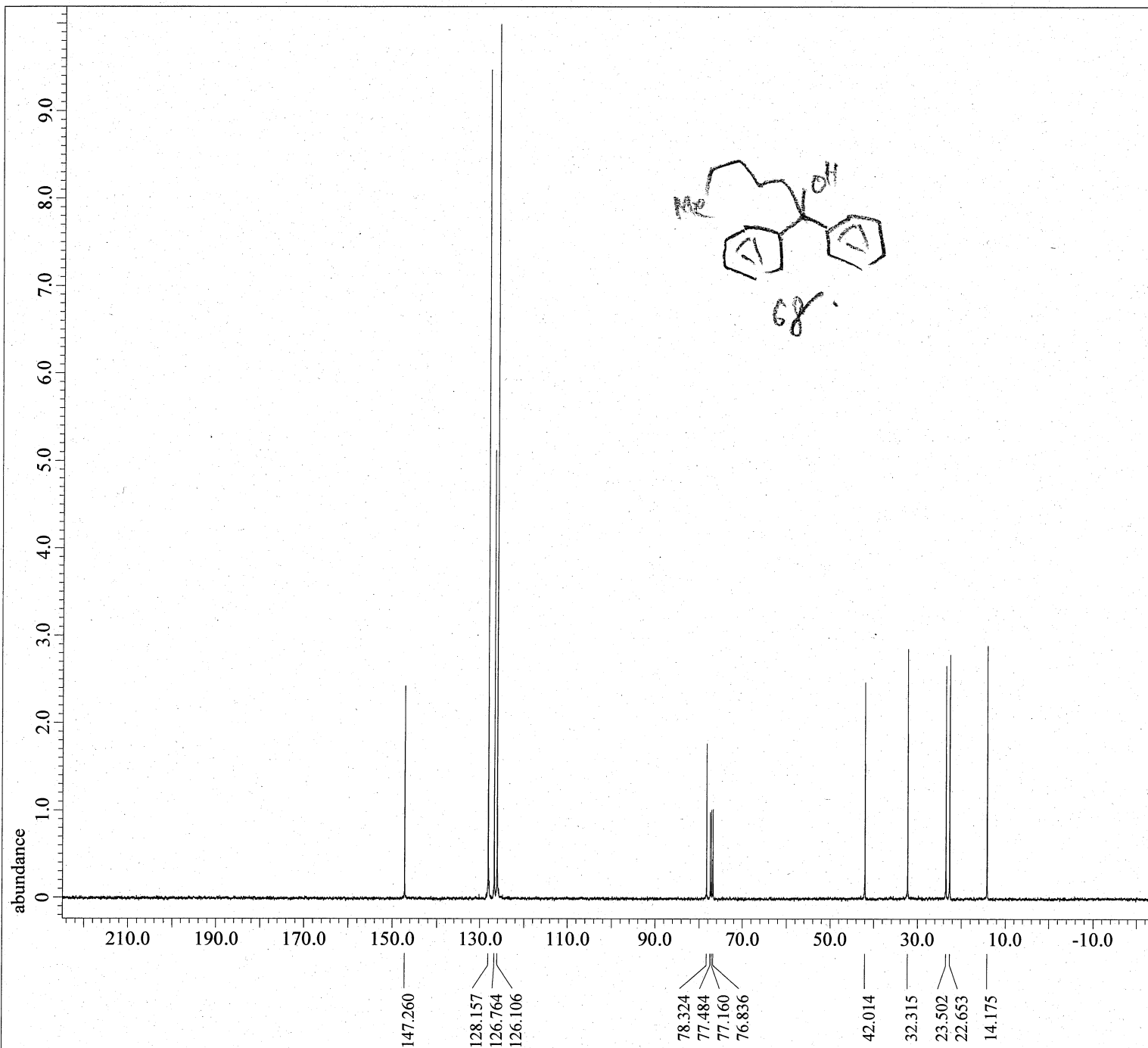
Irr_Mode = Off

Tri_Mode = Off

Dante_Presat = FALSE

Initial_Wait = 1[s]

Repetition_Time = 7.228224[s]



----- PROCESSING PARAMETERS -----
 dc_balance(0, FALSE)
 sexp(2.0[Hz], 0.0[s])
 trapezoid3(0[%], 80[%], 100[%])
 zerofill(1)
 fft(1, TRUE, TRUE)
 machinephase
 ppm

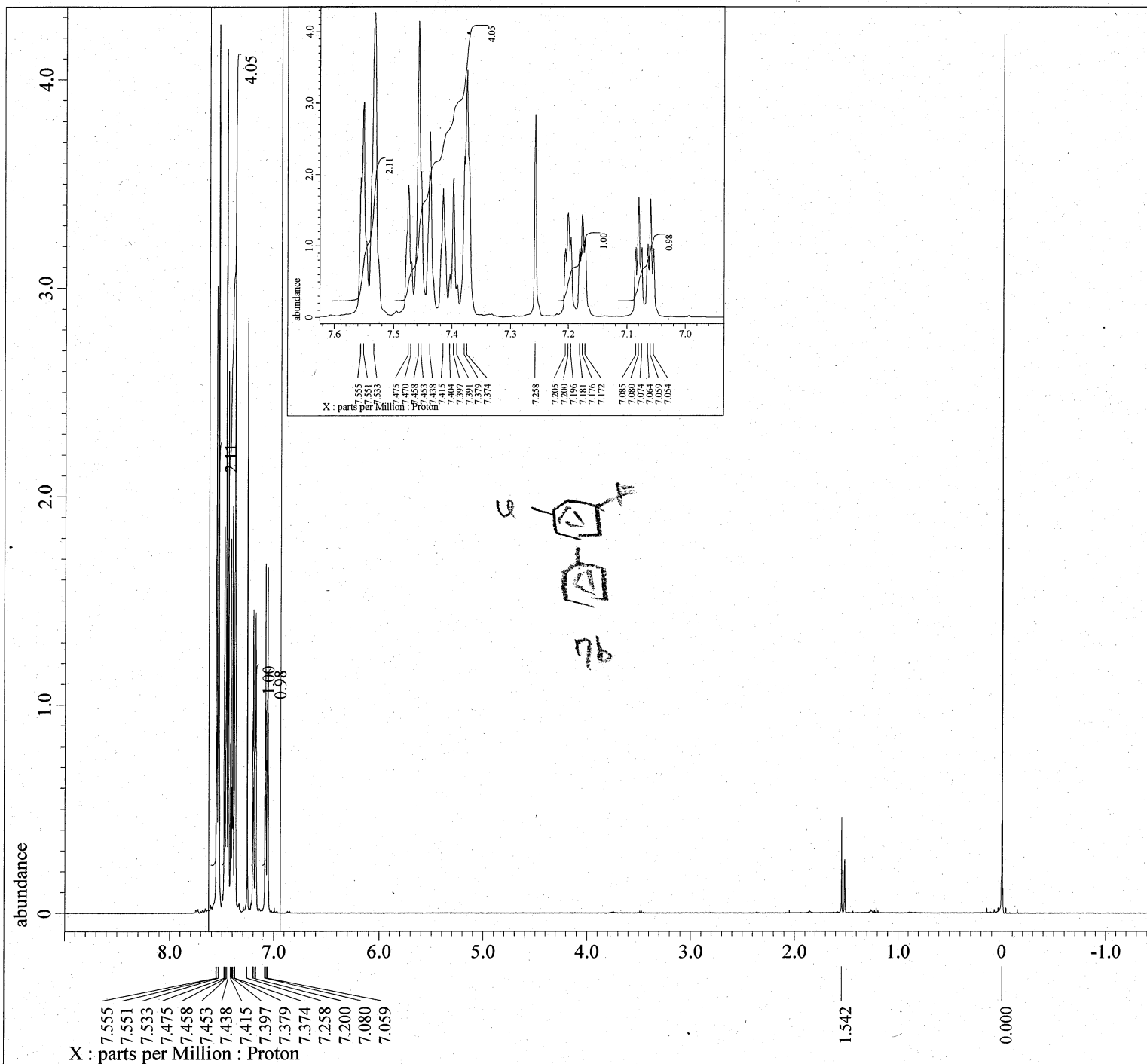
Derived from: KND_1648_13C-2.jdf

Filename = KND_1648_13C-3.jdf
 Author = element
 Experiment = single_pulse_dec
 Sample_Id = 1
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 25-JAN-2024 04:45:30
 Revision_Time = 28-JAN-2024 19:33:50

Comment = single pulse decoupled ga
 Data Format = 1D COMPLEX
 Dim_Size = 26214
 X_Domain = 13C
 Dim_Title = 13C
 Dim_Units = [ppm]
 Dimensions = X
 Site = ECS 400
 Spectrometer = JNM-ECS400

Field_Strength = 9.20197068[T] (390[MHz])
 X_Acq_Duration = 1.06430464[s]
 X_Domain = 13C
 X_Freq = 98.51479726[MHz]
 X_Offset = 100[ppm]
 X_Points = 32768
 X_Prescans = 4
 X_Resolution = 0.93958061[Hz]
 X_Sweep = 30.78817734[kHz]
 Irr_Domain = 1H
 Irr_Freq = 391.78655441[MHz]
 Irr_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 59
 Total_Scans = 59

Relaxation_Delay = 2[s]
 Recvr_Gain = 60
 Temp_Get = 19.7[dC]
 X_90_Width = 9.46[us]
 X_Acq_Time = 1.06430464[s]
 X_Angle = 30[deg]
 X_Atn = 4.9[dB]
 X_Pulse = 3.15333333[us]
 Irr_Atn_Dec = 22.45[dB]
 Irr_Atn_Noe = 22.45[dB]
 Irr_Noise = WALTZ
 Decoupling = TRUE
 Initial_Wait = 1[s]
 Noe = TRUE
 Noe_Time = 2[s]
 Repetition_Time = 3.06430464[s]



```

---- PROCESSING PARAMETERS ----
dc balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

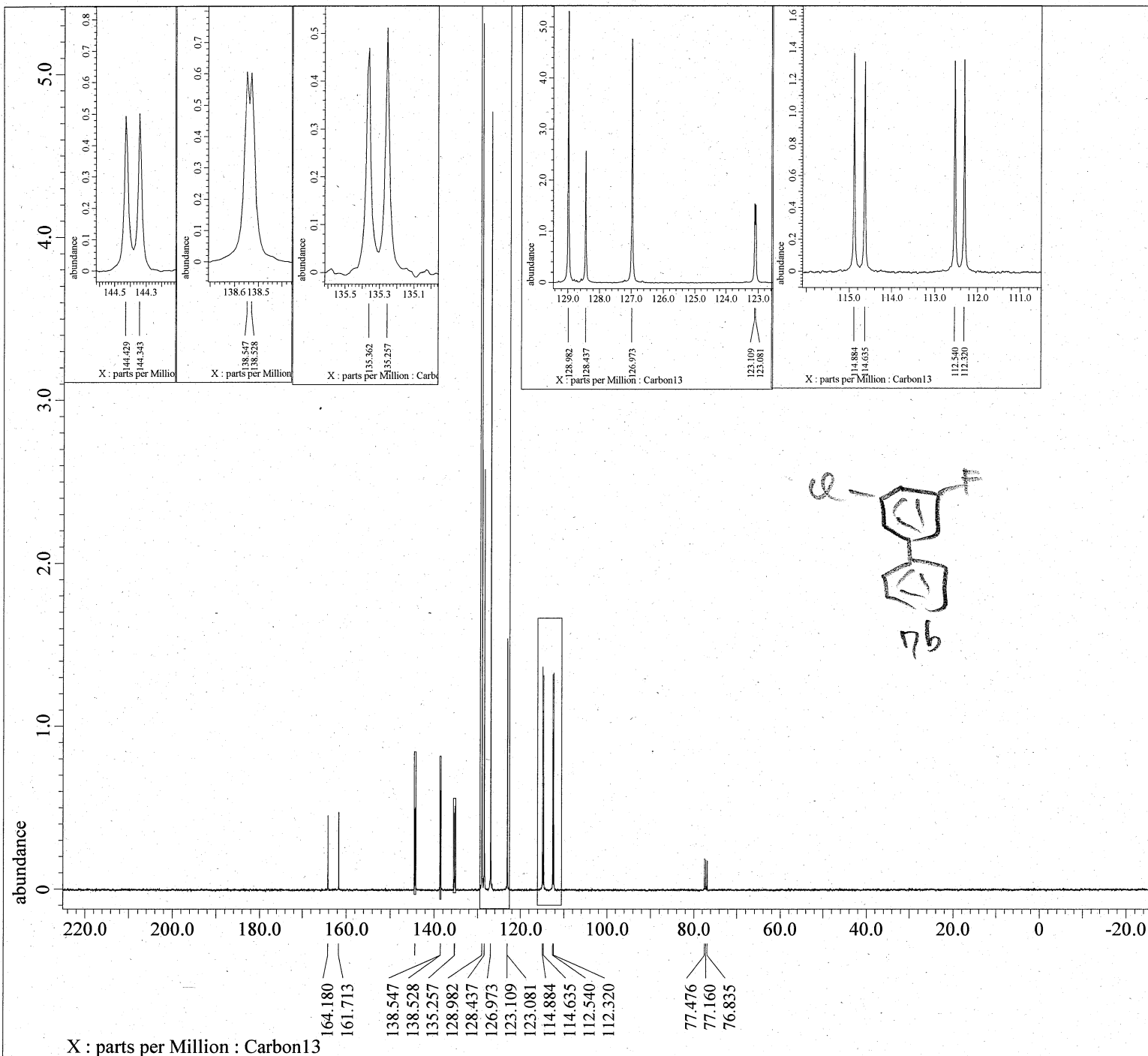
Derived from: KND_1801_pure_Proton-1-1.jdf

Filename      = KND_1801_pure_Proton-1-2.
Author        = element
Experiment     = proton.jxp
Sample_Id     = KND_1801_pure
Solvent       = CHLOROFORM-D
Actual_Start_Time = 16-MAR-2024 23:21:58
Revision_Time  = 24-NOV-2024 21:28:57

Comment       = single_pulse
Data Format    = 1D COMPLEX
Dim_Size      = 13107
X_Domain      = Proton
Dim Title     = Proton
Dim Units     = [ppm]
Dimensions    = X
Spectrometer  = DELTA2_NMR

Field_Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 2.18103808[s]
X_Domain       = 1H
X_Freq         = 400.53219825[MHz]
X_Offset       = 5[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.45849727[Hz]
X_Sweep        = 7.51201923[kHz]
X_Sweep_Clippped = 6.00961538[kHz]
Irr_Domain     = Proton
Irr_Freq       = 400.53219825[MHz]
Irr_Offset     = 5[ppm]
Tri_Domain     = Proton
Tri_Freq       = 400.53219825[MHz]
Tri_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

Relaxation_Delay = 5[s]
Recvr_Gain       = 44
Temp_Get        = 20.1[dC]
X_90_Width      = 6.7[us]
X_Acq_Time      = 2.18103808[s]
X_Angle         = 45[deg]
X_Atn           = 0.8[dB]
X_Pulse         = 3.35[us]
Irr_Mode        = Off
Tri_Mode        = Off
Dante_Presat    = FALSE
Initial_Wait    = 1[s]
Repetition_Time = 7.18103808[s]
  
```



```

---- PROCESSING PARAMETERS ----
dc balance( 0, FALSE )
sexp( 2.0[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

Derived from: KND_1801_13C_Carbon-1-1.jdf

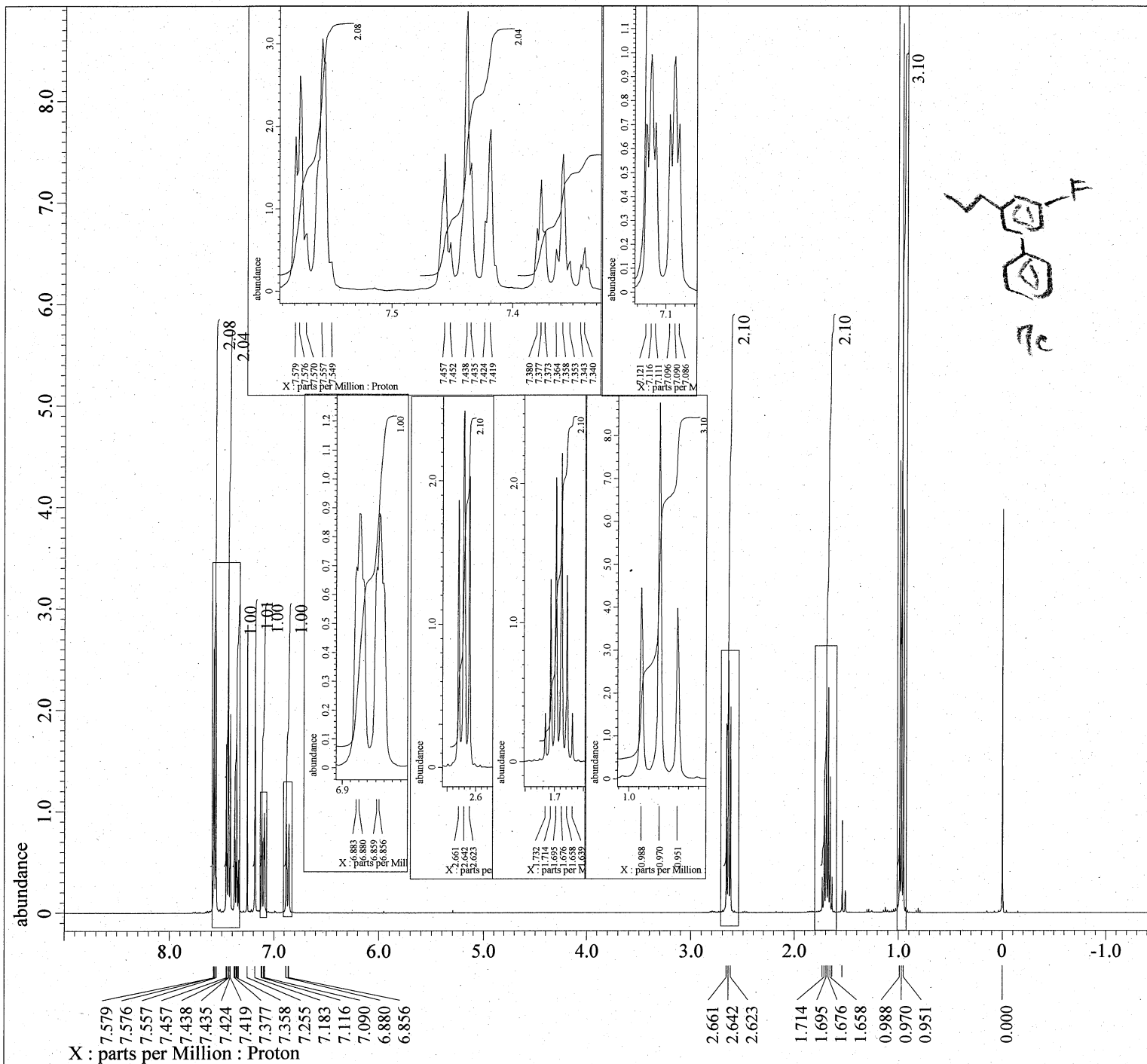
Filename      = KND_1801_13C_Carbon-1-2.j
Author        = element
Experiment     = carbon.jxp
Sample_Id     = KND_1801_13C
Solvent       = CHLOROFORM-D
Actual_Start_Time = 16-MAR-2024 23:36:48
Revision_Time  = 14-JUL-2024 17:41:23

Comment       = single pulse decoupled ga
Data Format    = 1D COMPLEX
Dim_Size      = 26214
X_Domain      = Carbon
Dim_Title     = Carbon13
Dim_Units     = [ppm]
Dimensions    = X
Spectrometer  = DELTA2_NMR

Field_Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 1.03809024[s]
X_Domain       = 13C
X_Freq         = 100.71389092[MHz]
X_Offset       = 100[ppm]
X_Points       = 32768
X_Prescans     = 4
X_Resolution   = 0.96330739[Hz]
X_Sweep        = 31.56565657[kHz]
X_Sweep_Clippped = 25.25252525[kHz]
Irr_Domain     = Proton
Irr_Freq       = 400.53219825[MHz]
Irr_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 42
Total_Scans    = 42

Relaxation_Delay = 2[s]
Recvr_Gain       = 50
Temp_Get         = 20[dc]
X_90_Width       = 12.68[us]
X_Acq_Time       = 1.03809024[s]
X_Angle          = 30[deg]
X_Atn            = 4[dB]
X_Pulse          = 4.22666667[us]
Irr_Atn_Dec      = 26.45[dB]
Irr_Atn_Noise    = 26.45[dB]
Irr_Noise        = WALTZ
Irr_Pwidth       = 0.115[ms]
Decoupling       = TRUE
Initial_Wait     = 1[s]
Noe              = TRUE
Noe_Time         = 2[s]
Repetition_Time  = 3.03809024[s]

```



```

---- PROCESSING PARAMETERS ----
dc balance( 0, FALSE )
sexp( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

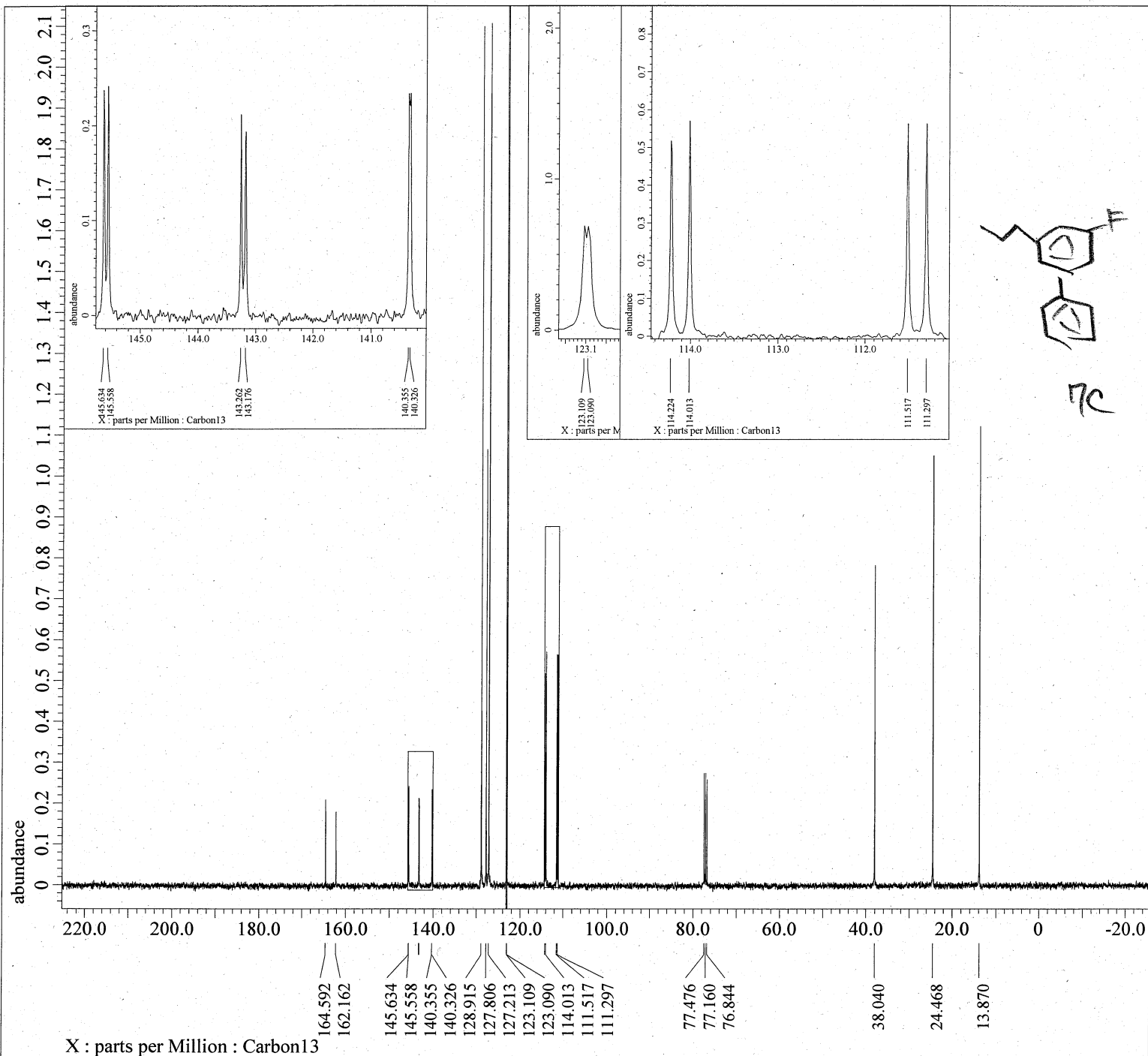
Derived from: KND_1816_pure_Proton-1-1.jdf

Filename      = KND_1816_pure_Proton-1-2.
Author        = element
Experiment     = proton.jxp
Sample_Id     = KND_1816_pure
Solvent       = CHLOROFORM-D
Actual_Start_Time = 22-MAR-2024 22:15:19
Revision_Time  = 24-NOV-2024 21:41:41

Comment       = single_pulse
Data Format    = 1D COMPLEX
Dim Size      = 13107
X_Domain      = Proton
Dim Title     = Proton
Dim Units     = [ppm]
Dimensions    = X
Spectrometer  = DELTA2_NMR

Field_Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 2.18103808[s]
X_Domain       = 1H
X_Freq         = 400.53219825[MHz]
X_Offset       = 5[ppm]
X_Points       = 16384
X_Prescans     = 1
X_Resolution   = 0.45849727[Hz]
X_Sweep        = 7.51201923[kHz]
X_Sweep_Clippped = 6.00961538[kHz]
Irr_Domain     = Proton
Irr_Freq       = 400.53219825[MHz]
Irr_Offset     = 5[ppm]
Tri_Domain     = Proton
Tri_Freq       = 400.53219825[MHz]
Tri_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 8
Total_Scans    = 8

Relaxation_Delay = 5[s]
Recvr_Gain       = 42
Temp_Get         = 19.9[dC]
X_90_Width       = 6.7[us]
X_Acq_Time       = 2.18103808[s]
X_Angle          = 45[deg]
X_Atn            = 0.8[dB]
X_Pulse          = 3.35[us]
Irr_Mode         = Off
Tri_Mode         = Off
Dante_Presat     = FALSE
Initial_Wait     = 1[s]
Repetition_Time  = 7.18103808[s]
  
```



----- PROCESSING PARAMETERS -----

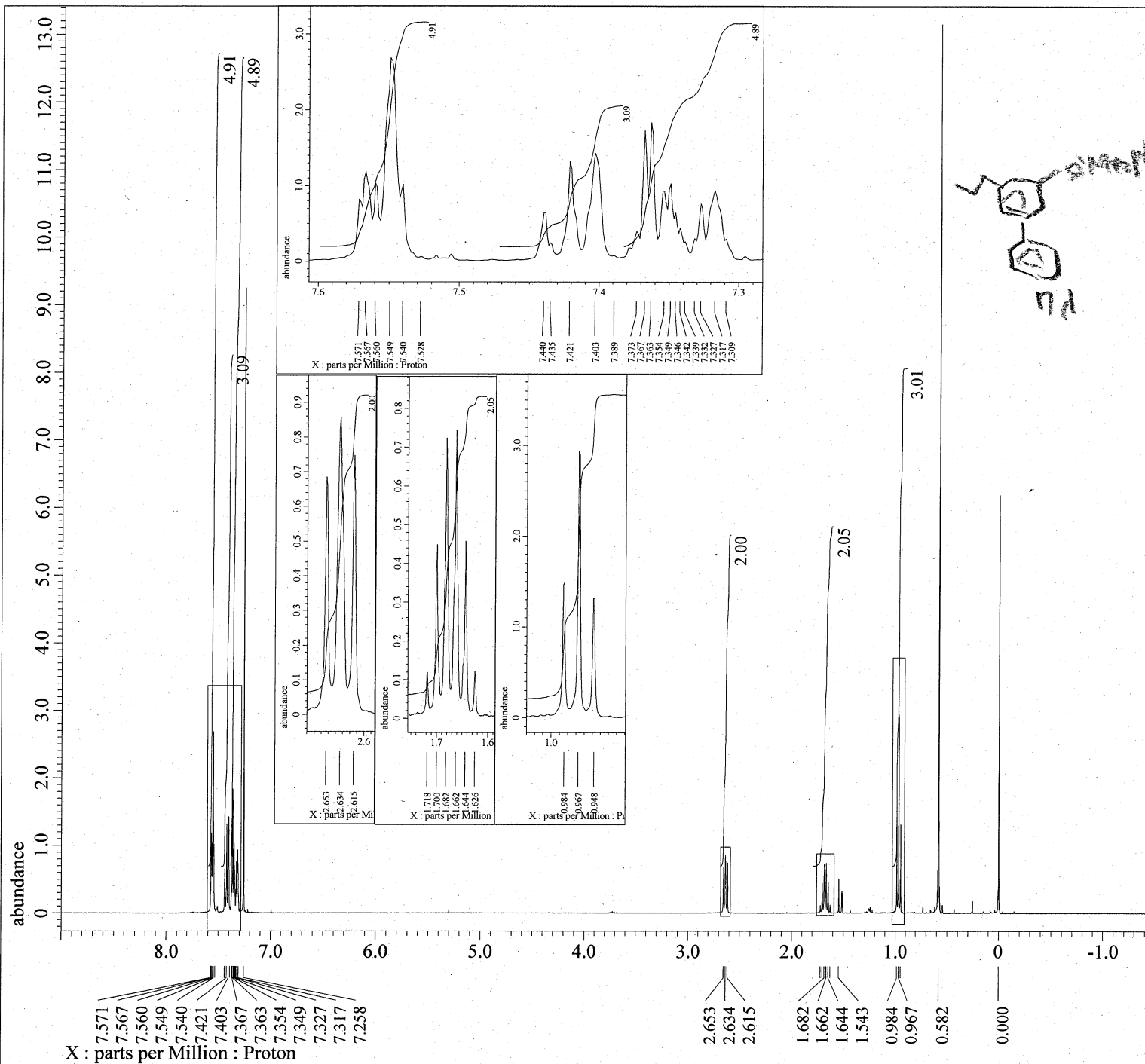
```

dc_balance( 0, FALSE )
sexp( 2.0[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

Derived from: KND_1816_13C_Carbon-1-1.jdf

Filename	= KND_1816_13C_Carbon-1-2.j
Author	= element
Experiment	= carbon.jxp
Sample Id	= KND_1816_13C
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 22-MAR-2024 22:25:15
Revision_Time	= 14-JUL-2024 18:12:27
Comment	= single pulse decoupled ga
Data Format	= 1D COMPLEX
Dim Size	= 26214
X_Domain	= Carbon
Dim Title	= Carbon13
Dim Units	= [ppm]
Dimensions	= X
Spectrometer	= DELTA2_NMR
Field Strength	= 9.4073814[T] (400[MHz])
X_Acq_Duration	= 1.03809024[s]
X_Domain	= 13C
X_Freq	= 100.71389092[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.96330739[Hz]
X_Sweep	= 31.56565657[kHz]
X_Sweep_Clippped	= 25.25252525[kHz]
Irr_Domain	= Proton
Irr_Freq	= 400.53219825[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 31
Total_Scans	= 31
Relaxation_Delay	= 2[s]
Recvr_Gain	= 50
Temp_Get	= 19.9[dC]
X_90_Width	= 12.68[us]
X_Acq_Time	= 1.03809024[s]
X_Angle	= 30[deg]
X_Atn	= 4[dB]
X_Pulse	= 4.22666667[us]
Irr_Atn_Dec	= 26.45[dB]
Irr_Atn_No	= 26.45[dB]
Irr_Noise	= WALTZ
Irr_Pwidth	= 0.115[ms]
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.03809024[s]



----- PROCESSING PARAMETERS -----

```

dc balance( 0, FALSE )
sexf( 0.2[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

```

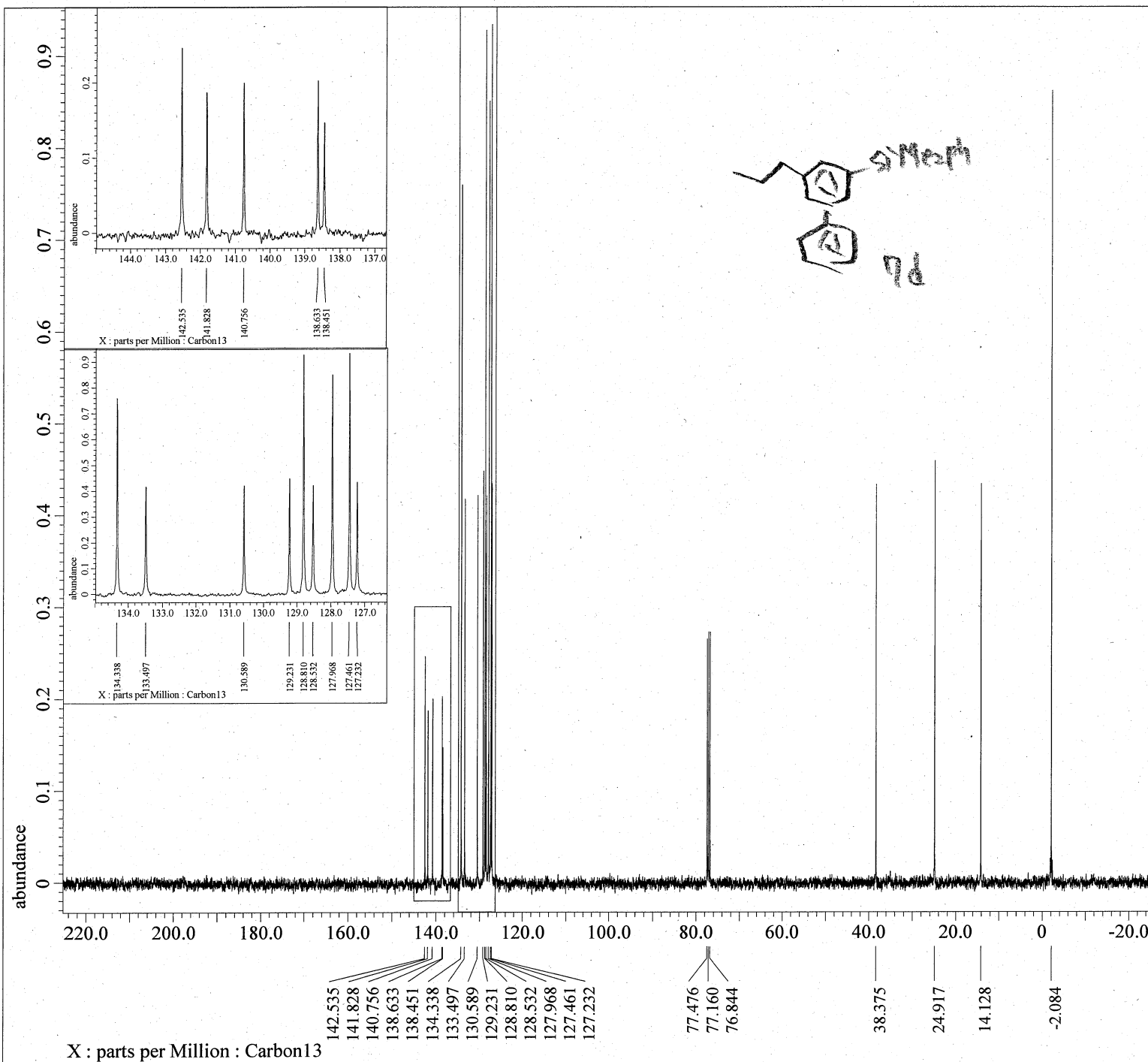
Derived from: KND_1812_pure_Proton-1-1.jdf

Filename = KND_1812_pure_Proton-1-2.
 Author = element
 Experiment = proton.jxp
 Sample_Id = 1812
 Solvent = CHLOROFORM-D
 Actual_Start_Time = 16-MAR-2024 21:38:24
 Revision_Time = 24-NOV-2024 21:47:59

Comment = single_pulse
 Data Format = 1D COMPLEX
 Dim Size = 13107
 X Domain = Proton
 Dim Title = Proton
 Dim Units = [ppm]
 Dimensions = X
 Spectrometer = DELTA2_NMR

Field_Strength = 9.4073814[T] (400[MHz])
 X_Acq_Duration = 2.18103808[s]
 X_Domain = 1H
 X_Freq = 400.53219825[MHz]
 X_Offset = 5[ppm]
 X_Points = 16384
 X_Prescans = 1
 X_Resolution = 0.45849727[Hz]
 X_Sweep = 7.51201923[kHz]
 X_Sweep_Clippped = 6.00961538[kHz]
 Irr_Domain = Proton
 Irr_Freq = 400.53219825[MHz]
 Irr_Offset = 5[ppm]
 Tri_Domain = Proton
 Tri_Freq = 400.53219825[MHz]
 Tri_Offset = 5[ppm]
 Clipped = FALSE
 Scans = 8
 Total_Scans = 8

Relaxation_Delay = 5[s]
 Recvr_Gain = 46
 Temp_Get = 19.9[dC]
 X_90_Width = 6.7[us]
 X_Acq_Time = 2.18103808[s]
 X_Angle = 45[deg]
 X_Atn = 0.8[dB]
 X_Pulse = 3.35[us]
 Irr_Mode = Off
 Tri_Mode = Off
 Dante_Presat = FALSE
 Initial_Wait = 1[s]
 Repetition_Time = 7.18103808[s]



```

---- PROCESSING PARAMETERS ----
dc_balance( 0, FALSE )
sexp( 2.0[Hz], 0.0[s] )
trapezoid( 0[%], 0[%], 80[%], 100[%] )
zerofill( 1 )
fft( 1, TRUE, TRUE )
machinephase
ppm

Derived from: KND_1812_13C_Carbon-1-1.jdf

Filename      = KND_1812_13C_Carbon-1-2.j
Author        = element
Experiment     = carbon.jpg
Sample_Id     = KND_1812_13C
Solvent       = CHLOROFORM-D
Actual_Start_Time = 16-MAR-2024 21:50:46
Revision_Time  = 24-NOV-2024 21:50:58

Comment       = single pulse decoupled ga
Data Format    = 1D COMPLEX
Dim_Size      = 26214
X_Domain      = Carbon
Dim_Title     = Carbon13
Dim_Units     = [ppm]
Dimensions    = X
Spectrometer  = DELTA2_NMR

Field Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 1.03809024[s]
X_Domain       = 13C
X_Freq         = 100.71389092[MHz]
X_Offset       = 100[ppm]
X_Points       = 32768
X_Prescans     = 4
X_Resolution   = 0.96330739[Hz]
X_Sweep        = 31.56565657[kHz]
X_Sweep_Clipped = 25.25252525[kHz]
Irr_Domain     = Proton
Irr_Freq       = 400.53219825[MHz]
Irr_Offset     = 5[ppm]
Clipped        = FALSE
Scans          = 40
Total_Scans    = 40

Relaxation_Delay = 2[s]
Recvr_Gain       = 50
Temp_Get         = 20[degC]
X_90_Width      = 12.68[us]
X_Acq_Time       = 1.03809024[s]
X_Angle         = 30[deg]
X_Atn           = 4[dB]
X_Pulse         = 4.22666667[us]
Irr_Atn_Dec     = 26.45[dB]
Irr_Atn_Noe     = 26.45[dB]
Irr_Noise       = WALTZ
Irr_Pwidth      = 0.115[ms]
Decoupling      = TRUE
Initial_Wait    = 1[s]
Noe              = TRUE
Noe_Time        = 2[s]
Repetition_Time = 3.03809024[s]
  
```