**Title :**

**Synthesis of sulfonamides bearing 1,3,5-triarylpyrazoline and 4-thiazolidinone moieties as novel antimicrobial agents**

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**Supplementary Data**

Contents

[**General procedure for synthesis of chalcones (1a-i)** 4](#_Toc536278890)

[**General procedure for synthesis of phenylhydrazones (3a-e)** 6](#_Toc536278891)

[**Fig S1.** 1H NMR Spectrum of compound **2a** (Acetone-d6) 9](#_Toc536278892)

[**Fig S2.** 13C NMR Spectrum of compound **2a** (Acetone-d6) 9](#_Toc536278893)

[Fig S3. MS Spectrum of compound 2a 10](#_Toc536278894)

[**Fig S4.** 1H NMR Spectrum of compound **2b** (Acetone-d6) 10](#_Toc536278895)

[**Fig S5.** 13C NMR Spectrum of compound **2b** (Acetone-d6) 11](#_Toc536278896)

[**Fig S6.** MS Spectrum of compound **2b** 11](#_Toc536278897)

[**Fig S7.** 1H NMR Spectrum of compound **2c** (CDCl3) 12](#_Toc536278898)

[**Fig S8.** 13C NMR Spectrum of compound **2c** (CDCl3) 12](#_Toc536278899)

[**Fig S9.** MS Spectrum of compound **2c** 13](#_Toc536278900)

[**Fig S10.** 1H NMR Spectrum of compound **2d** (CDCl3) 13](#_Toc536278901)

[**Fig S11.** 13C NMR Spectrum of compound **2d** (CDCl3) 14](#_Toc536278902)

[**Fig S12.** MS Spectrum of compound **2d** 14](#_Toc536278903)

[**Fig S13.** 1H NMR Spectrum of compound **2e** (CDCl3) 15](#_Toc536278904)

[**Fig S14.** 13C NMR Spectrum of compound **2e** (CDCl3) 15](#_Toc536278905)

[**Fig S15.** MS Spectrum of compound **2e** 16](#_Toc536278906)

[**Fig S16.** 1H NMR Spectrum of compound **2f** (CDCl3) 16](#_Toc536278907)

[**Fig S17.** 13C NMR Spectrum of compound **2f** (CDCl3) 17](#_Toc536278908)

[**Fig S18.** DEPT Spectra of compound **2f** (CDCl3) 17](#_Toc536278909)

[**Fig S19.** MS Spectrum of compound **2f** 18](#_Toc536278910)

[**Fig S20.** 1H NMR Spectrum of compound **2g** (DMSO) 18](#_Toc536278911)

[**Fig S21.** 13C NMR Spectrum of compound **2g** (DMSO) 19](#_Toc536278912)

[**Fig S22.** MS Spectrum of compound **2g** 19](#_Toc536278913)

[**Fig S23.** 1H Spectrum of compound **2h** (DMSO) 20](#_Toc536278914)

[**Fig S24.** 13C Spectrum of compound **2h** (DMSO) 20](#_Toc536278915)

[**Fig S24.** DEPT Spectra of compound **2h** (DMSO) 21](#_Toc536278916)

[**Fig S25.** MS spectrum of compound **2h** 21](#_Toc536278917)

[**Fig S26.** 1H Spectrum of compound **2i** (DMSO) 22](#_Toc536278918)

[**Fig S27.** 13C Spectrum of compound **2i** (DMSO) 22](#_Toc536278919)

[**Fig S28.** MS spectrum of compound **2i** 23](#_Toc536278920)

[**Fig S29.** 1H Spectrum of compound **4a** (DMSO) 23](#_Toc536278921)

[**Fig S30.** 13C Spectrum of compound **4a** (DMSO) 24](#_Toc536278922)

[**Fig S31.** HR-MS spectrum of compound **4a** 24](#_Toc536278923)

[**Fig S32.** 1H Spectrum of compound **4b** (DMSO) 25](#_Toc536278924)

[**Fig S33.** 13C Spectrum of compound **4b** (DMSO) 25](#_Toc536278925)

[**Fig S34.** MS spectrum of compound **4b** 26](#_Toc536278926)

[**Fig S35.** 1H Spectrum of compound **4c** (DMSO) 26](#_Toc536278927)

[**Fig S36.** 13C Spectrum of compound **4c** (DMSO) 27](#_Toc536278928)

[**Fig S37.** DEPT Spectra of compound **4c** (DMSO) 27](#_Toc536278929)

[**Fig S38.** MS spectrum of compound **4c** 28](#_Toc536278930)

[**Fig S39.** 1H Spectrum of compound **4d** (DMSO) 28](#_Toc536278931)

[**Fig S40.** 13C Spectrum of compound **4d** (DMSO) 29](#_Toc536278932)

[**Fig S41.** DEPT Spectra of compound **4d** (DMSO) 29](#_Toc536278933)

[**Fig S42.** MS spectrum of compound **4d** 30](#_Toc536278934)

[**Fig S43.** 1H Spectrum of compound **4e** (DMSO) 30](#_Toc536278935)

[**Fig S44.** 13C Spectrum of compound **4e** (DMSO) 30](#_Toc536278936)

[**Fig S45.** MS spectrum of compound **4e** (DMSO) 31](#_Toc536278937)

# **General procedure for synthesis of chalcones (1a-i)**

To a stirred solution of acetophenones (0.215 mol) and aldehydes (0.215 mol) in methanol (60 mL) was slowly added 100 mL of aqueous sodium hydroxide solution (2.8 M) and mixed occasionally for 4h at room temperature, monitoring by TLC. After completion of the reaction, the mixture was cooled overnight at 0oC. The solid separated was filtered and washed water (10 mL) and cooled ethanol (10 mL). The solid was dried under the vacuum. It was purified by recrystallization in ethanol to afford the pure chalcones.

*Benzalacetophenone*(**1a**).

Yellow powder. Yield 80.8 %. 1H NMR (500 MHz, acetone-d6, δ, ppm): 8.16-8.14 (*m*, 2H, -CH), 7.89 (*d*, 1H, *J =* 15.5, -CO-CH=CH), 7.86-7.83 (*m*, 2H, -CH), 7.81 (*d*, 1H, *J =* 15.5, -CO-CH=CH), 7.67-7.64 (*m*, 1H, -CH), 7.59-7.55 ( *m*, 2H, -CH), 7.49-7.45 ( *m*, 1H, CH).

*(2E)-3-(2-hydroxyphenyl)-1-phenylprop-2-en-1-one* (**1b**).

Orange powder. Yield 82.3 %. 1H NMR (500 MHz, acetone-d6, δ, ppm): 8.23-8.19 (*d*, 1H, *J* 15.5 Hz, -CO-CH=CH), 8.17-8.14 (*d*,1H, *J* = 15.5, -CO-CH=CH), 8.09-8.06 (*m*, 2H, CH-), 7.57-7.54 (*m*, 1H, CH), 7.52-7.46 (*m*, 3H, -CH), 7.07-7.00 ( *m*, 2H, -CH), 6.48-6.45 ( *m*, 1H, CH).

*(2E)-3-(4-methylphenyl)-1-phenylprop-2-en-1-one* (**1c**).

Orange powder. Yield 81.0 %. 1H NMR (500 MHz, CDCl3, δ, ppm): 7.77 (*d*, 1H, *J* = 15.5, -CO-CH=CH), 8.01-7.97 (*m*, 2H, -CH), 7.86-7.57 (*m*, 2H, -CH), 7.52-7.50 (*m*, 1H, -CH), 7.48-7.44 ( *m*, 2H, -CH), 7.42 (*d*, 1H, *J* = 15.5, -CO-CH=CH), 7.16-7.12 ( *m*, 1H, CH), 2.34 (*s*, 3H, CH3).

*(2E)-3-(4-methoxyphenyl)-1-phenylprop-2-en-1-one* (**1d**).

Orange powder. Yield 81.0 %. 1H NMR (500 MHz, CDCl3, δ, ppm): 8.00-7.98 (*m*, 2H, CH), 7.78 (*d*, 1H, *J* = 15.5, -CO-CH=CH), 7.88-7.55 (*m*, 2H, -CH), 7.54-7.52 (*m*, 1H, -CH), 7.48-7.45 ( *m*, 2H, -CH), 7.41 (*d*, 1H, *J =* 15.5, -CO-CH=CH), 6.92-6.89 ( *m*, 2H, -CH), 3.80 (*s*, 3H, OCH3).

*(2E)-1-(4-fluorophenyl)-3-(4-methylphenyl)prop-2-en-1-one* (**1e**).

Pale yellow powder. Yield 76.0 %. 1H NMR (500 MHz, CDCl3, δ, ppm): 8.05-8.01 (*m*, 2H, CH), 7.79 (*d,* 1H, *J* =15.5, -CO-CH=CH), 7.53 (*d*, 2H, *J =* 8.0, -CH), 7.46 (*d*, 1H, *J* =15.5, -CO-CH=CH), 7.21-7.20 (*m*, 2H, -CH), 7.17-7.12 ( *m*, 2H, -CH), 2.37 (*s*, 3H, -CH3).

*(2E)-1-(4-fluorophenyl)-3-(4-methoxyphenyl)prop-2-en-1-one* (**1f**).

Pale yellow powder. Yield 82.0 %. 1H NMR (500 MHz, CDCl3, δ, ppm): 8.03-8.00 (*m*, 2H, CH), 7.77 (*d*, 1H, *J* = 15.5, -CO-CH=CH), 7.57 (*d*, 2H, *J* = 8.5, -CH), 7.37 (*d*, 1H, *J* =15.5, -CO-CH=CH), 7.15-7.11 (*m*, 2H, -CH), 6.92-6.89 (*m*, 2H, -CH), 3.81 (*s*, 3H, OCH3).

*(2E)-1-(4-methoxyphenyl)-3-phenylprop-2-en-1-one* (**1g**).

Pale yellow powder. Yield 78.0 %. 1H NMR (500 MHz, DMSO-*d*6, δ, ppm): 8.15-8.13 (*m*, 2H, -CH), 7.84-7.82 (*m*, 2H, -CH), 7.80 (*d*, 1H, *J* = 15.5, -CO-CH=CH), 7.69 (*d*, 1H, *J* = 15.5, -CO-CH=CH), 7.08-7.06 (*m*, 2H, -CH), 7.02-7.00 ( *m*, 2H, -CH), 3.81 (*s*, 3H, OCH3).

*(2E)-1-(4-methoxyphenyl)-3-(4-methylphenyl)prop-2-en-1-one* (**1h**).

Pale yellow powder. Yield 70.0 %. 1H NMR (500 MHz, DMSO-d6, δ, ppm): 8.17-8.13 (*m*, 2H, -CH), 7.88 (*d*, 1H, *J* = 15.5, -CO-CH=CH), 7.77-7.75 (*d*, 2H, *J* = 8.0, -CH), 7.69 (*d*, 1H, *J* =15.5, -CO-CH=CH), 7.27 (*d*, 2H, *J* = 8.0, -CH), 7.09-7.06 ( *m*, 2H, -CH), 3.86 (*s*, 3H, OCH3), 2.35 (*s*, 3H, *-*CH3).

*(2E)-1-(4-methoxyphenyl)-3-(4-methoxyphenyl)prop-2-en-1-one* (**1i**).

Yellow powder. Yield 65.0 %. 1H NMR (500 MHz, DMSO-*d*6, δ, ppm): 8.15-8.13 (*m*, 2H, -CH), 7.84-7.82 (*m*, 2H, -CH), 7.80 (*d*, 1H, *J* = 15.5 Hz, -CO-CH=CH), 7.69 (*d*, 1H, *J* =15.5, -CO-CH=CH), 7.08-7.06 (*m*, 2H, -CH), 7.02-7.00 ( *m*, 2H, -CH), 3.86 (*s*, 3H, OCH3), 3.81 (*s*, 3H, OCH3).

# **General procedure for synthesis of phenylhydrazones (3a-e)**

To a stirred solution of 4‑hydrazinylbenzene sulfonamide hydrochloride (2.5 mmol) and benzaldehydes (2.5 mmol) in methanol (30 mL) was added one drop of acetic acid. The mixture was refluxed under stirring at for 4 h with a Dean-Stark equipment. The solvent was evaporated under vacuum and the residue was recrystallized in appropriate solvents to afford pure phenylhydrazones.

*4-(2-Benzylidenehydrazinyl)benzene sulfonamide* **(3a)**.

Recrystallization in EtOAc. Pale yellow powder, m.p. 174-175 oC. Yield 63.0 %. 1H NMR (500 MHz, DMSO-*d*6, *δ*, ppm): 10.77 (*s*, 1H,=N-NH-), 7.95 (*s*, 1H, -CH=N-), 7.70 (*t*, 4H, *J* = 9.0 Hz, -CH), 7.43 (*t*, 2H, *J* = 7.5 Hz, -CH), 7.35 ( *t*, 1H, *J* = 7.5 Hz, -CH), 7.16 ( *d*, 2H, *J* = 8.5 Hz, -CH), 7.06 (*s*, 2H, -SO2NH2).

*4-(2-(4-Methylbenzylidene)hydrazinyl)benzene sulfonamide* **(3b)**.

Recrystallization in EtOH. Yellow powder, m.p. 213-214 oC. Yield 67.0 %. 1H NMR (500 MHz, DMSO-*d*6, *δ*, ppm): 10.68 (*s*, 1H, =N-NH-), 7.91 (*s*, 1H, -CH=N-), 7.66 (*d*, 2H, *J* = 9.0, -CH), 7.59 (*d*, 2H, *J* = 8.0 Hz, -CH), 7.23 ( *d*, 2H, *J* = 8.0, -CH), 7.14 ( *d*, 2H, *J* = 9.0, CH), 7.04 ( *s*, 2H, -SO2NH2), 2.33 (*s*, 3H, CH3).

*4-(2-(4-Methoxybenzylidene)hydrazinyl)benzene sulfonamide* **(3c)**.

Recrystallization in EtOH. Yellow needle, m.p. 225-226 oC. Yield 74.0 %. 1H NMR (500 MHz, DMSO-*d*6, *δ*, ppm): 10.59 (*s*, 1H, =N-NH-), 7.90 (*s*, 1H, -CH=N-), 7.65 (*t*, 4H, *J* = 8.5, -CH), 7.12 (*d*, 2H, *J* = 9.0, -CH), 7.03 (*s*, 2H, *J =* 8.0, SO2NH2), 6.99 (*d*, 2H, *J* = 9.0, CH), 3.79 (*s*, 3H, OCH3).

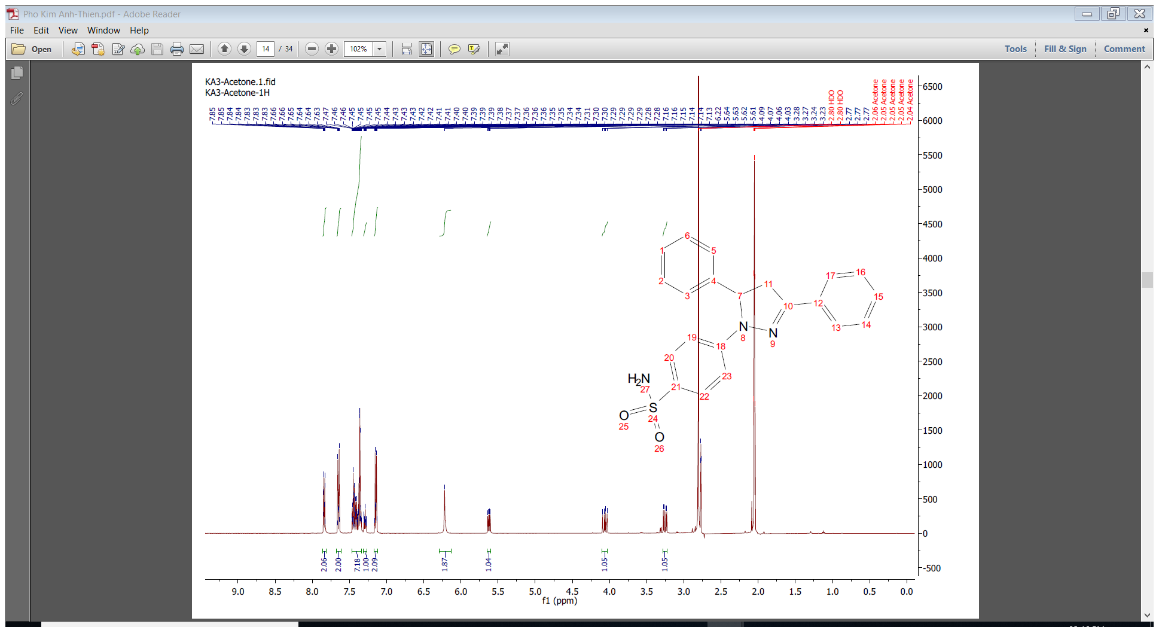
*4-(2-(2-Hydroxybenzylidene)hydrazinyl)benzene sulfonamide* **(3d)**.

Recrystallization in *i*-propanol. Yellow needle, m.p. 254-255 oC. Yield 71.0 %. 1H NMR (500 MHz, DMSO-*d*6, *δ*, ppm): 10.78 (*s*, 1H, OH), 10.23 (*s*, 1H, =N-NH-), 8.24 (*s*, 1H, -CH=N-), 7.68-7.64 (*m*, 3H, -CH), 7.21-7.17 (*m*, 1H, -CH), 7.07-7.05 ( *m*, 4H, -CH and SO2NH2), 6.90-6.86 ( *m*, 2H, CH).

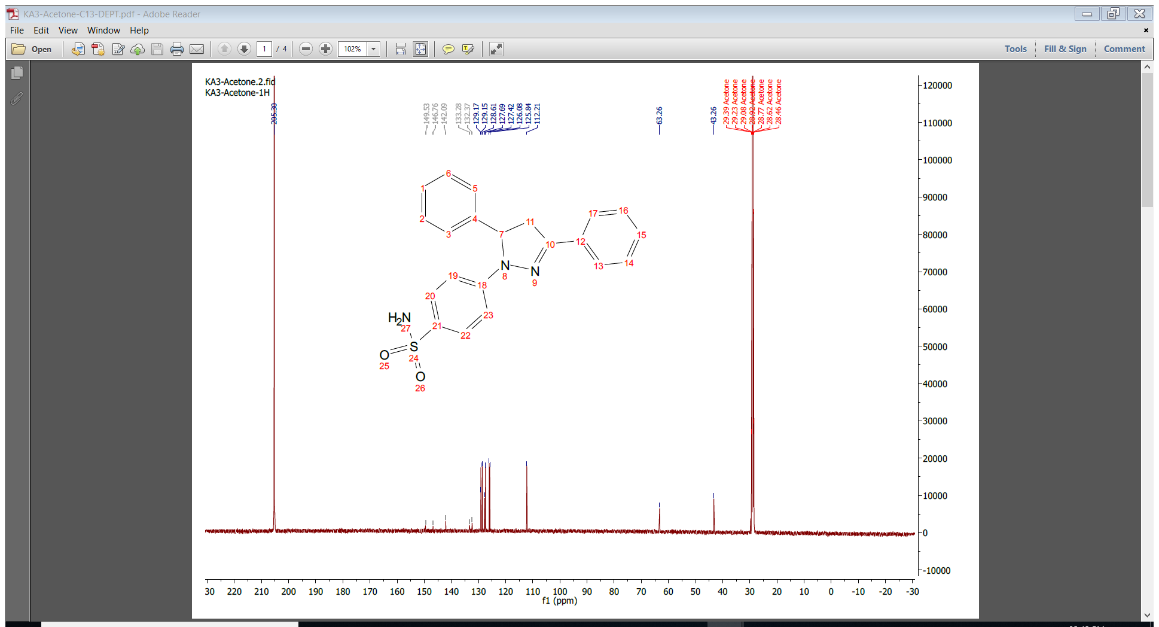
*4-(2-(4-Chlorobenzylidene)hydrazinyl)benzene sulfonamide* **(3e)**.

Recrystallization in dichloromethane. Pale yellow needle, m.p. 210-211 oC. Yield 66.0 %. 1H NMR (500 MHz, DMSO-*d*6, *δ*, ppm): 10.85 (*s*, 1H, =N-NH-), 7.93 (*s*, 1H, -CH=N-), 7.72 (*d*, 2H, *J* = 8.5, -CH), 7.67 (*d*, 2H, *J* = 8.5, -CH), 7.47 ( *d*, 2H, *J* = 9.0, -CH), 7.16 ( *d*, 2H, *J* = 8.5, -CH) 7.07 ( *m*, 2H,CH).

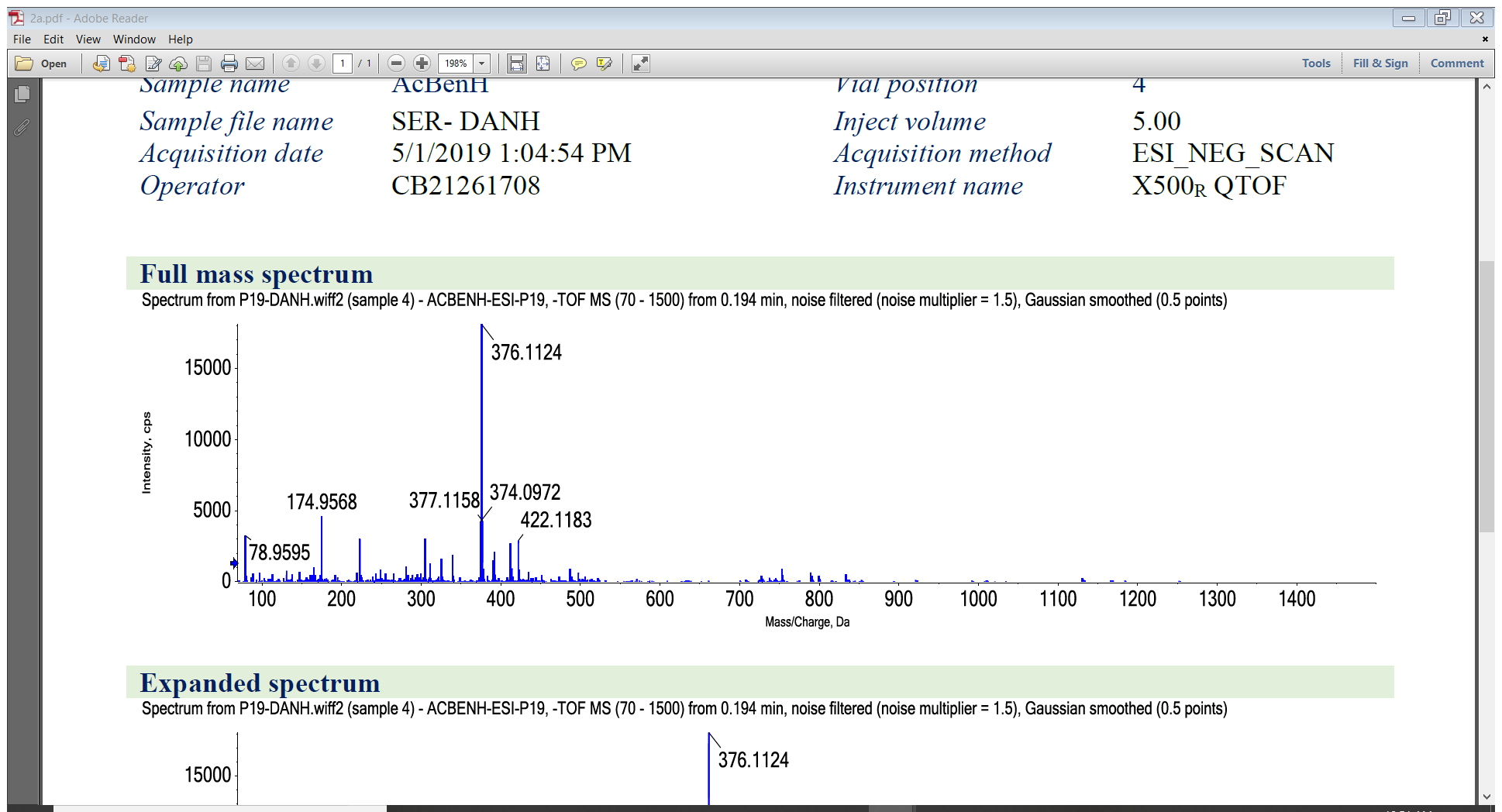
# **Fig S1.** 1H NMR Spectrum of compound **2a** (Acetone-d6)



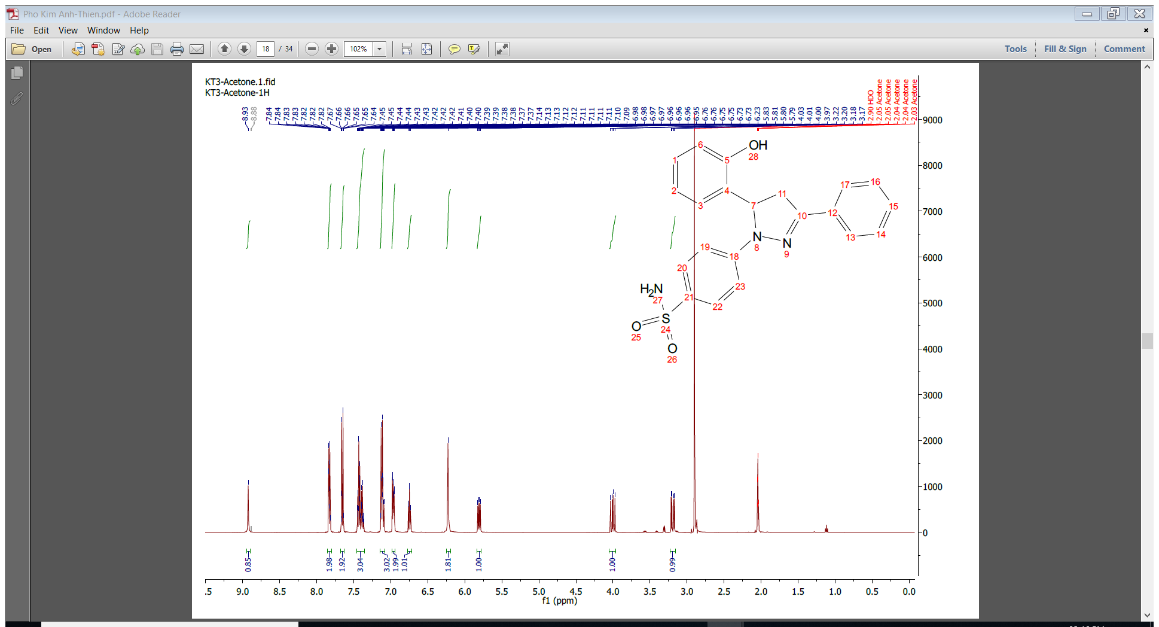
# **Fig S2.** 13C NMR Spectrum of compound **2a** (Acetone-d6)



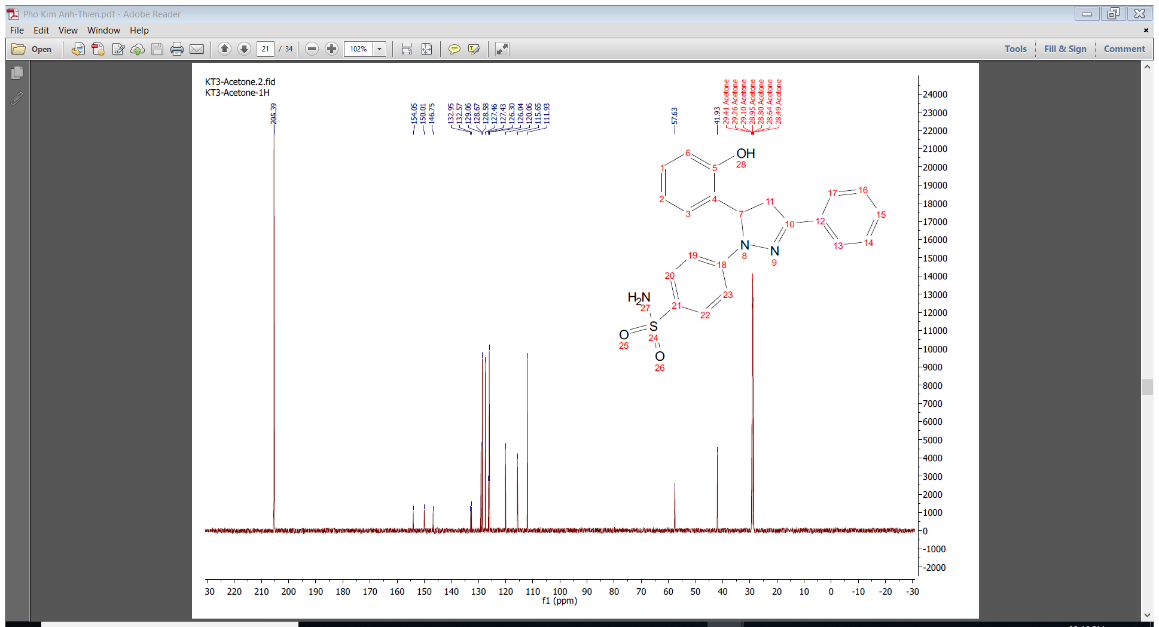
# Fig S3. HR-MS Spectrum of compound 2a



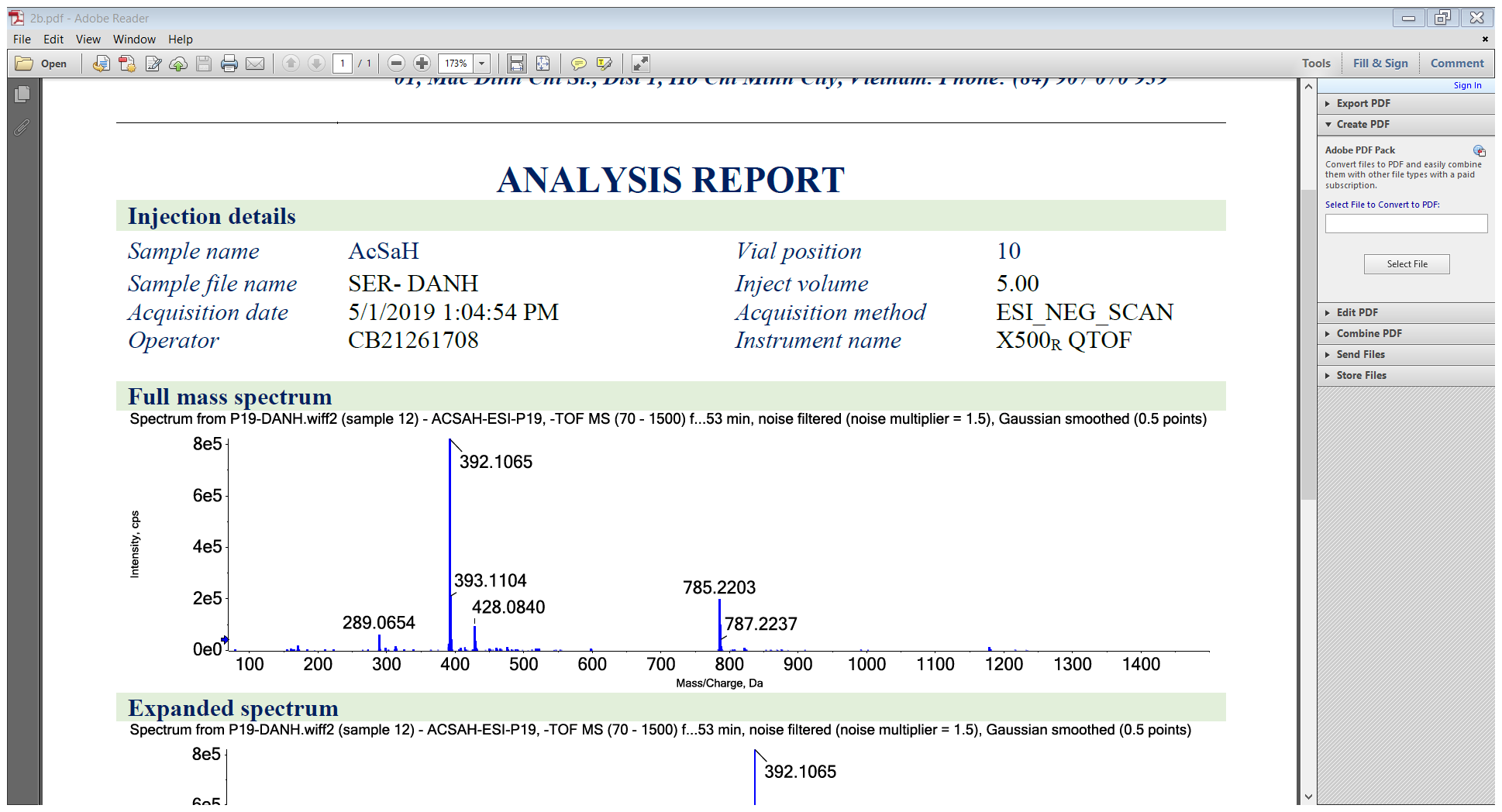
# **Fig S4.** 1H NMR Spectrum of compound **2b** (Acetone-d6)



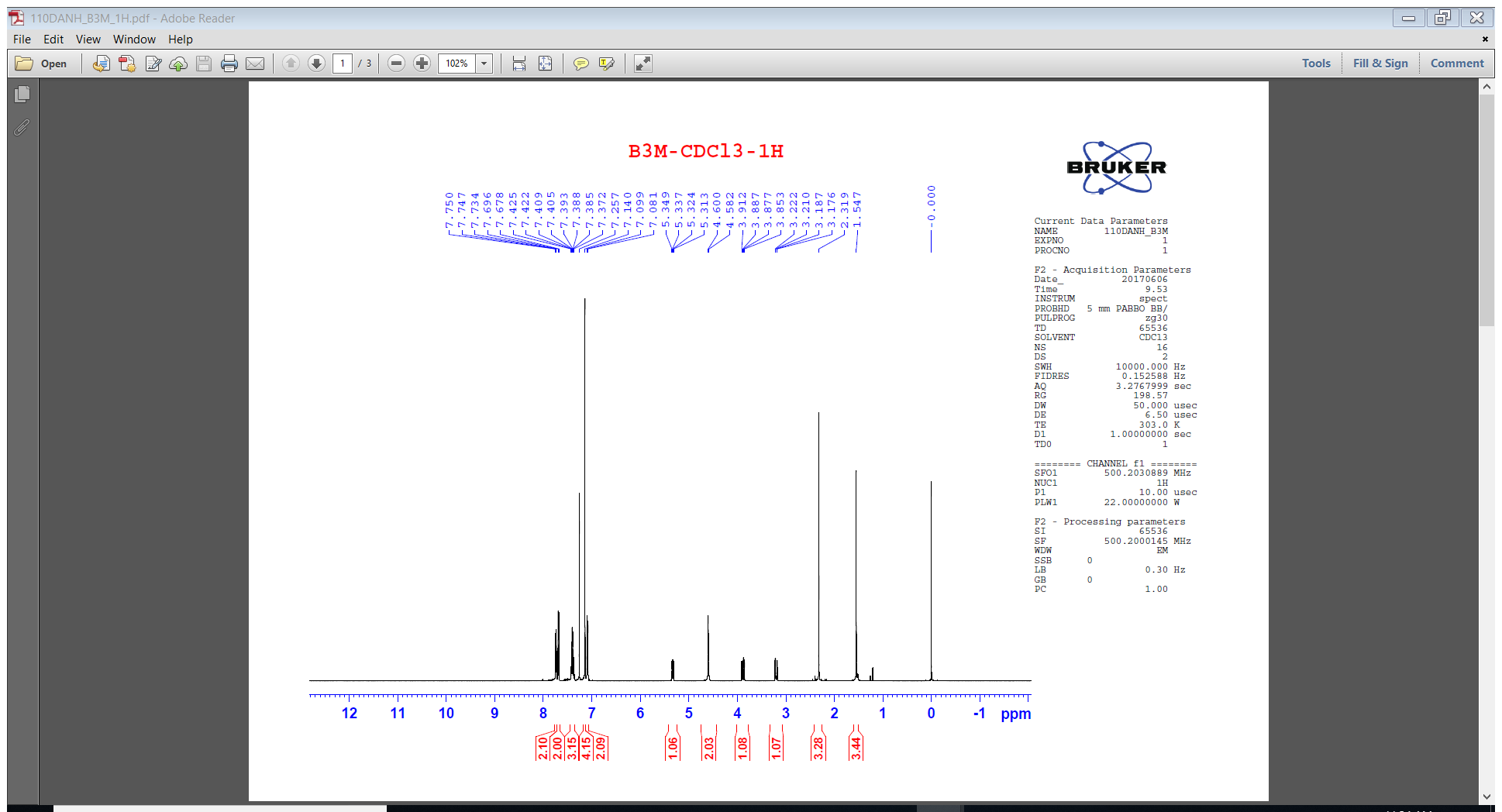
# **Fig S5.** 13C NMR Spectrum of compound **2b** (Acetone-d6)



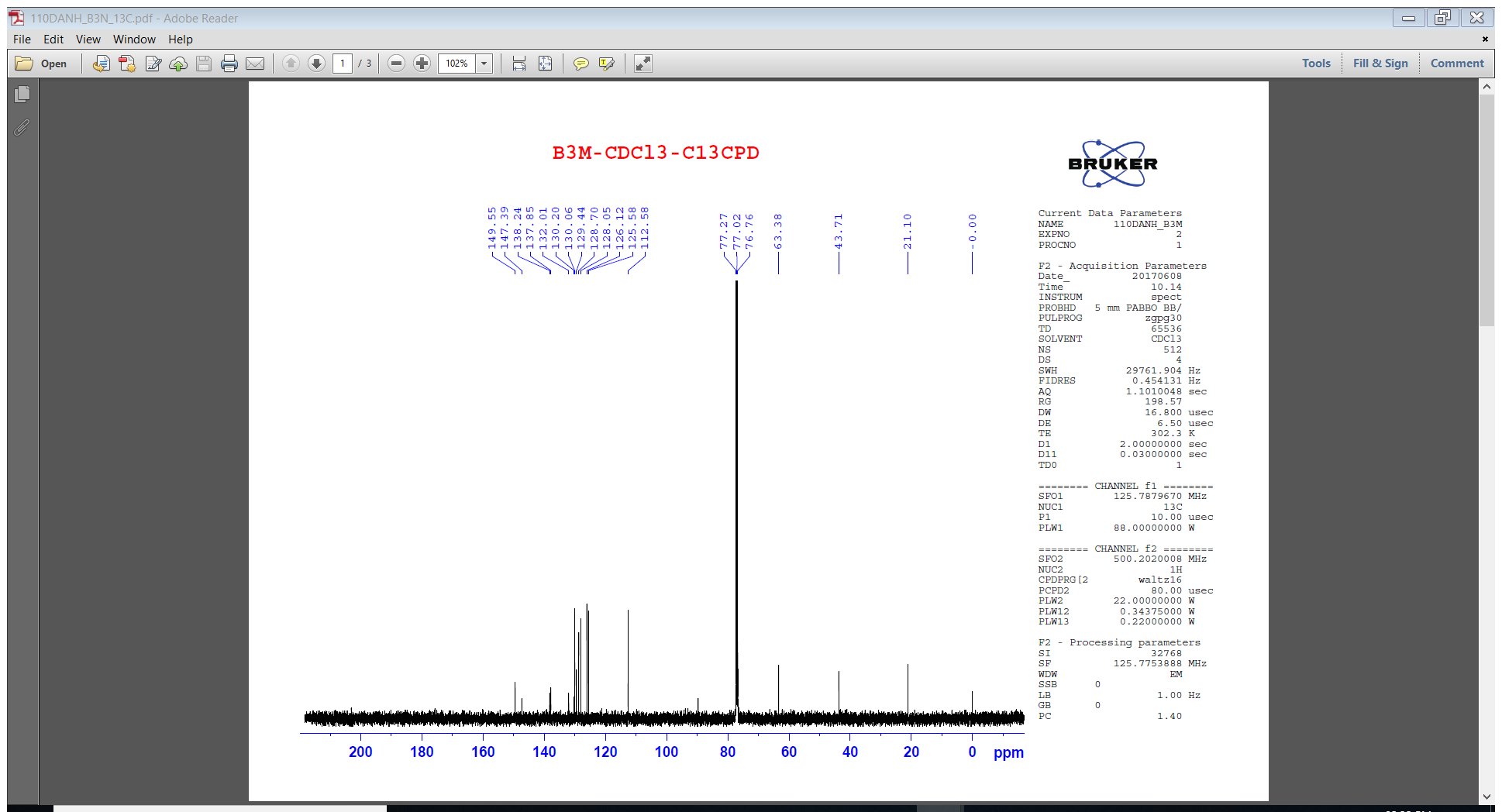
# **Fig S6.** HR-MS Spectrum of compound **2b**



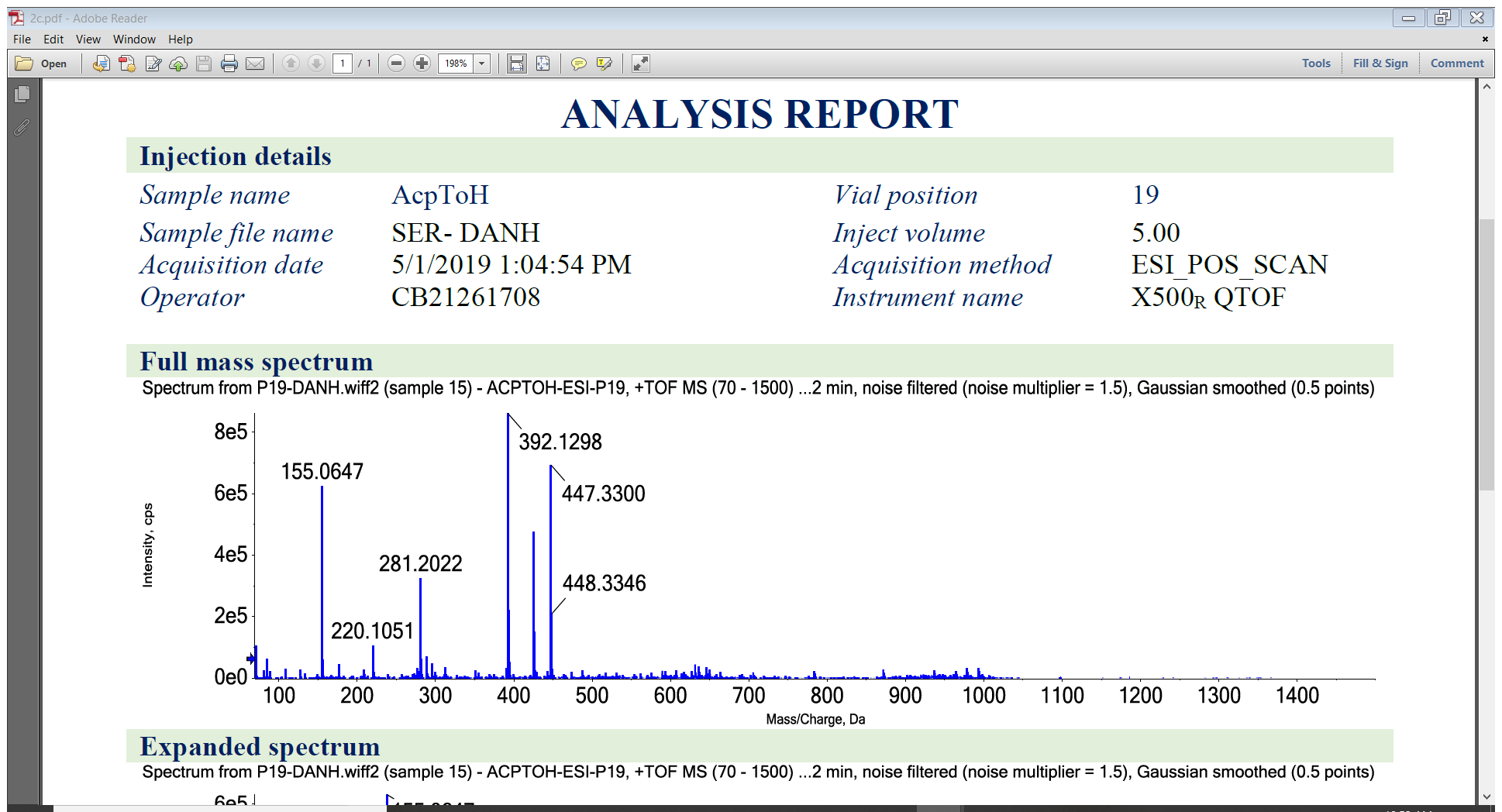
# **Fig S7.** 1H NMR Spectrum of compound **2c** (CDCl3)



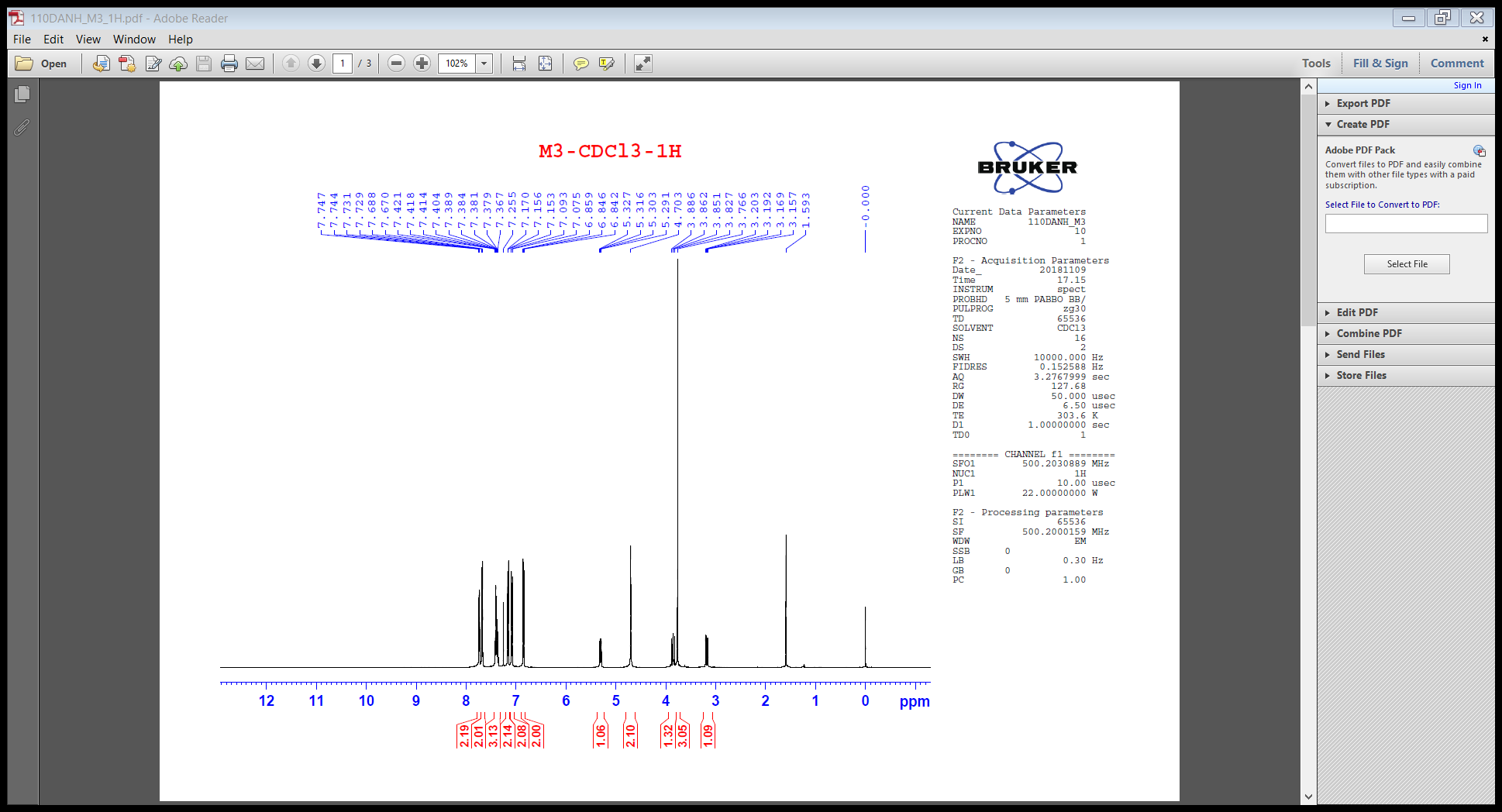
# **Fig S8.** 13C NMR Spectrum of compound **2c** (CDCl3)



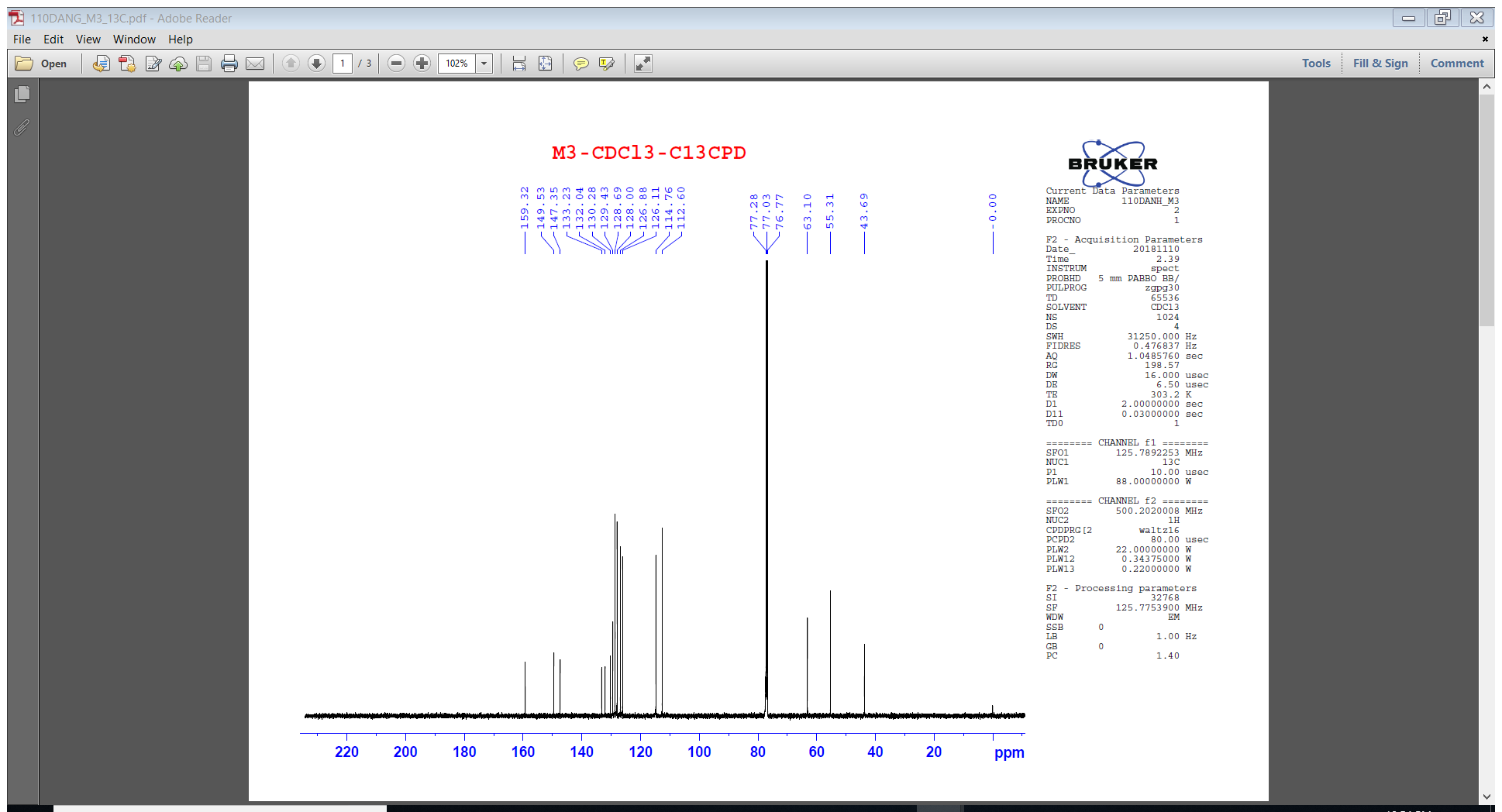
# **Fig S9.** HR-MS Spectrum of compound **2c**



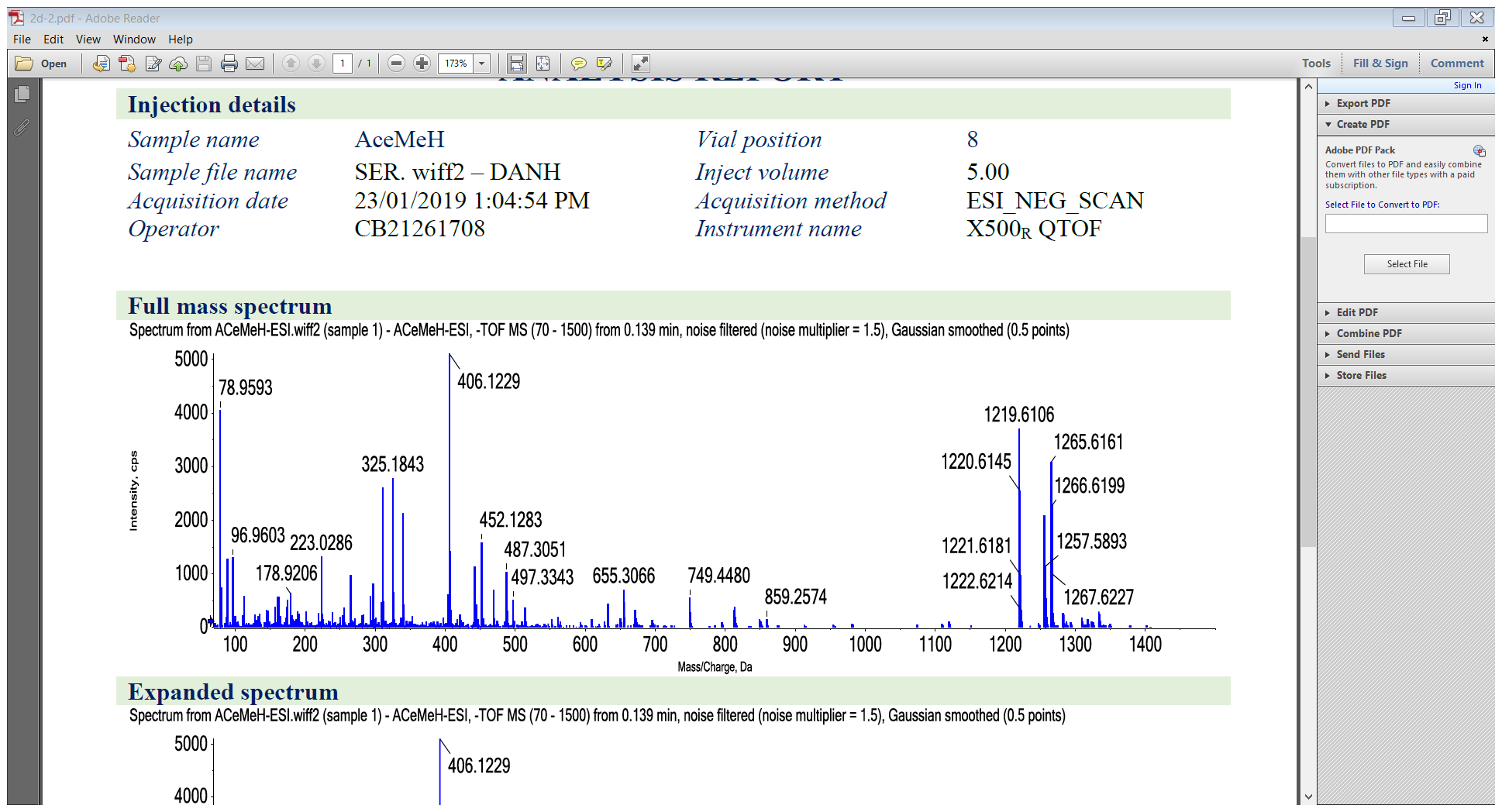
# **Fig S10.** 1H NMR Spectrum of compound **2d** (CDCl3)



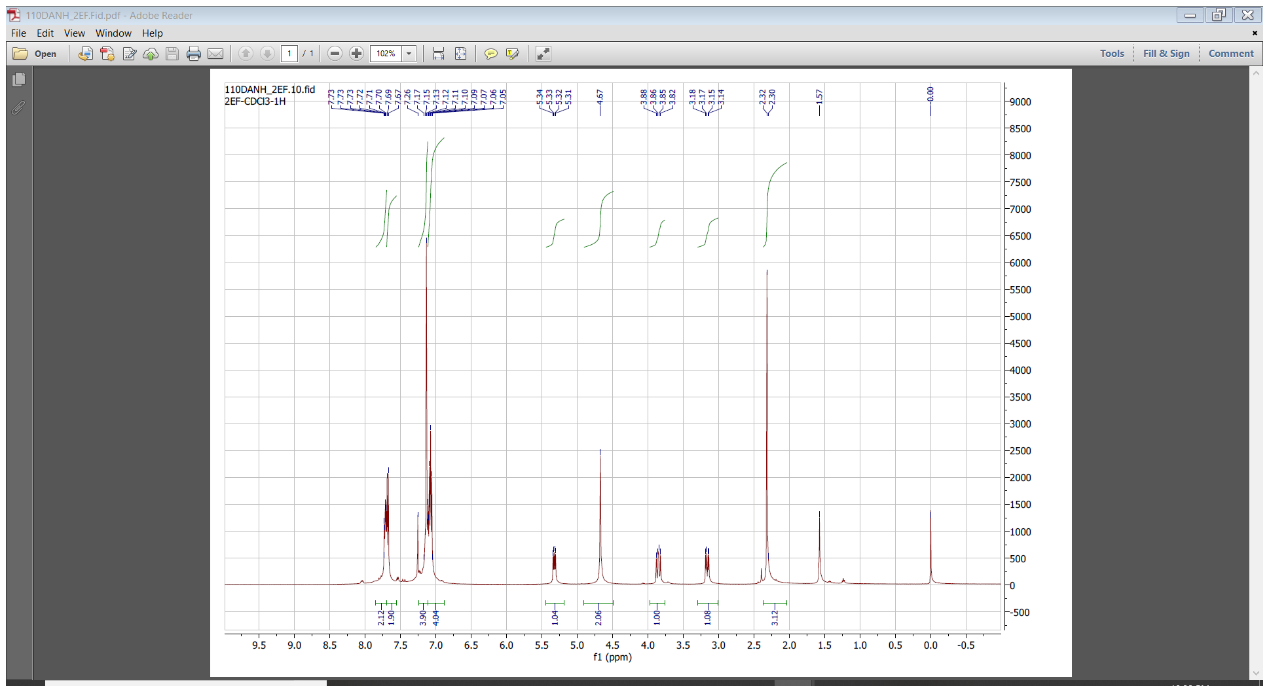
# **Fig S11.** 13C NMR Spectrum of compound **2d** (CDCl3)



# **Fig S12.** HR-MS Spectrum of compound **2d**



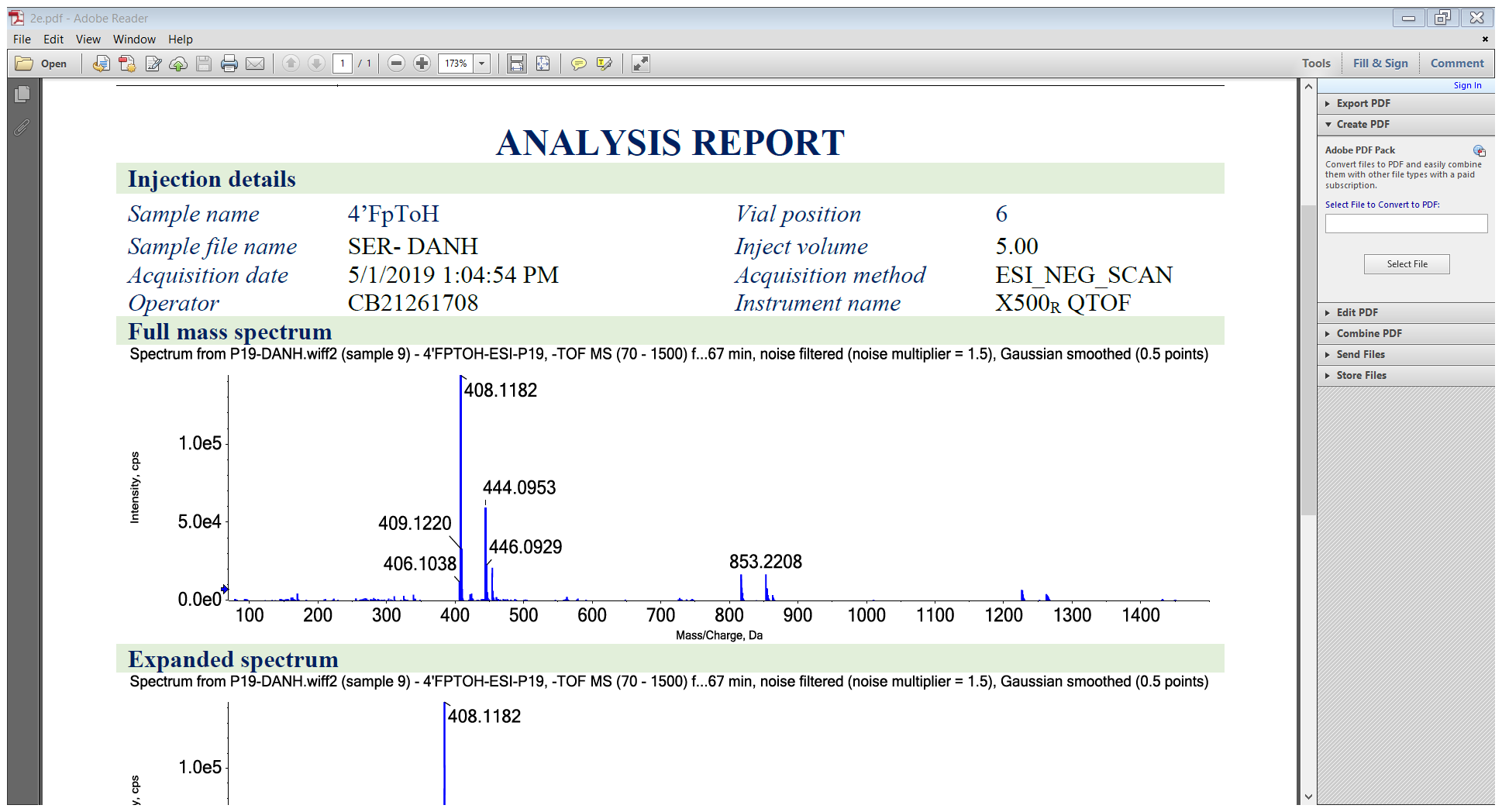
# **Fig S13.** 1H NMR Spectrum of compound **2e** (CDCl3)



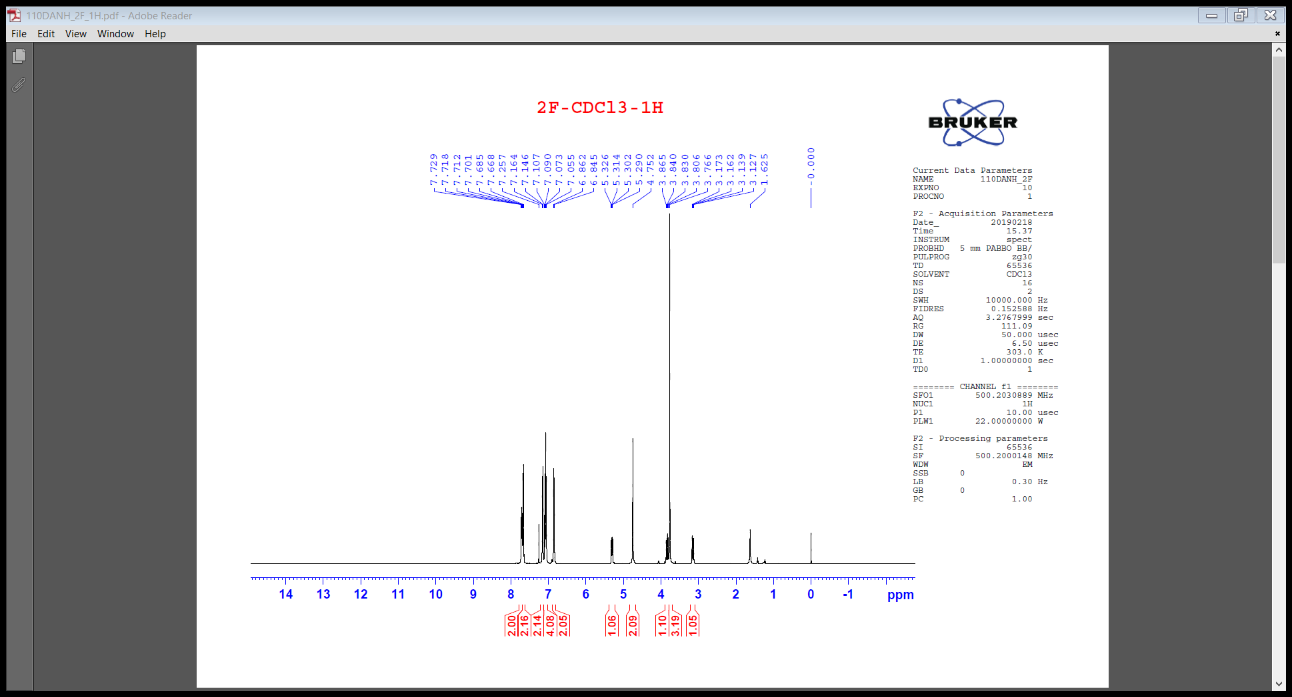
# **Fig S14.** 13C NMR Spectrum of compound **2e** (CDCl3)

# **110DANH_2EF_13C.pdf - Adobe Reader**

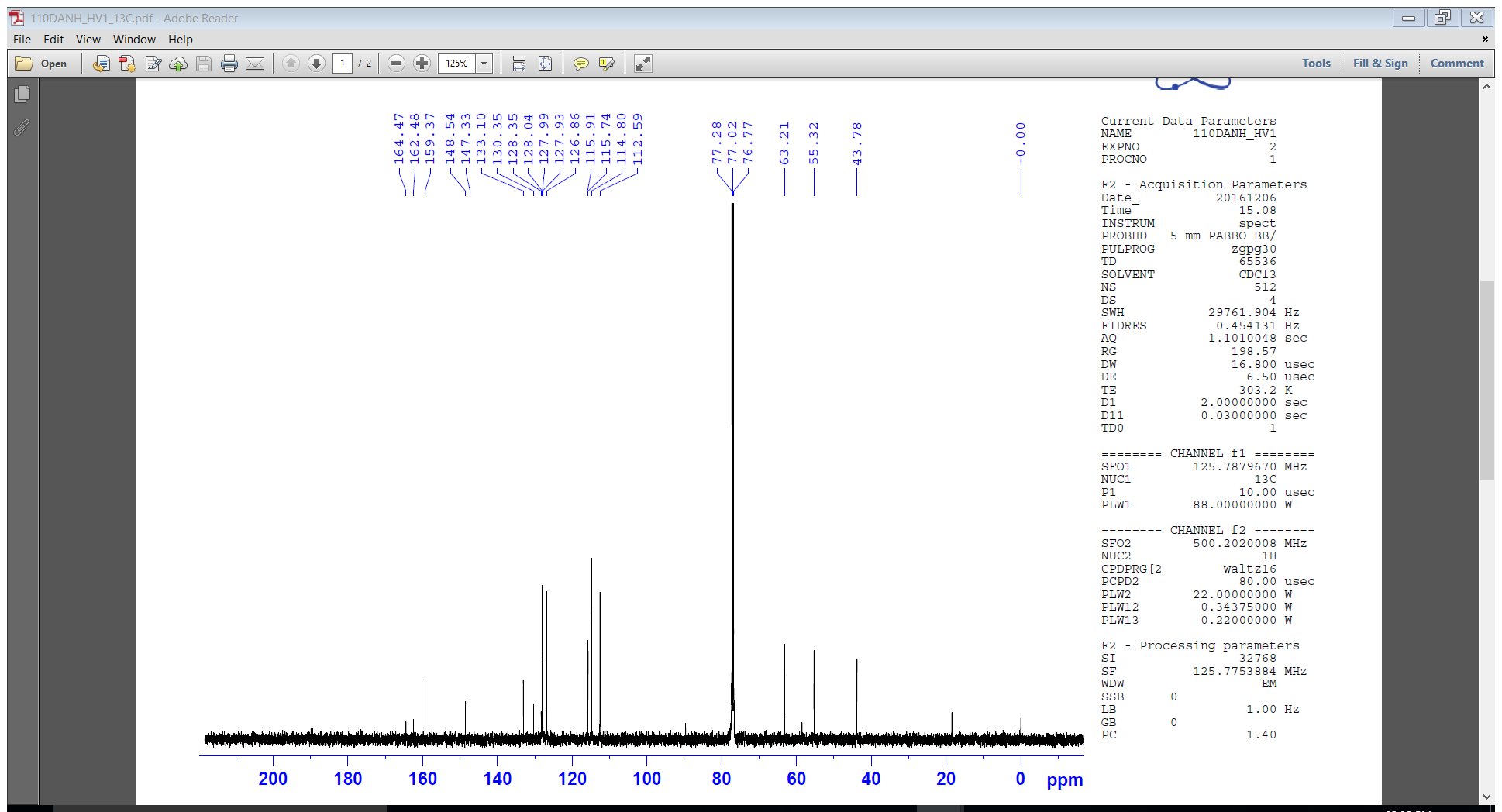
# **Fig S15.** HR-MS Spectrum of compound **2e**



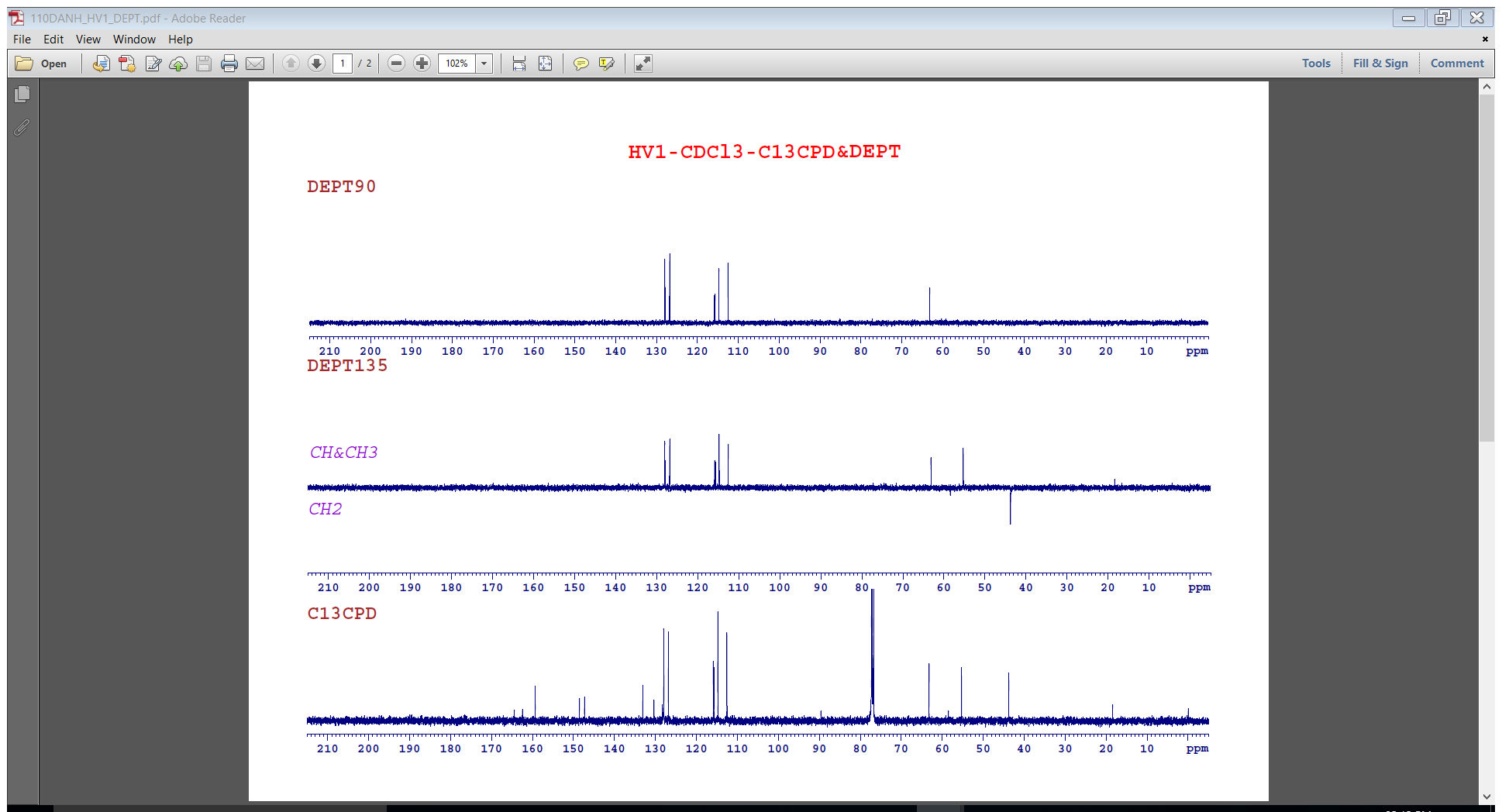
# **Fig S16.** 1H NMR Spectrum of compound **2f** (CDCl3)



# **Fig S17.** 13C NMR Spectrum of compound **2f** (CDCl3)

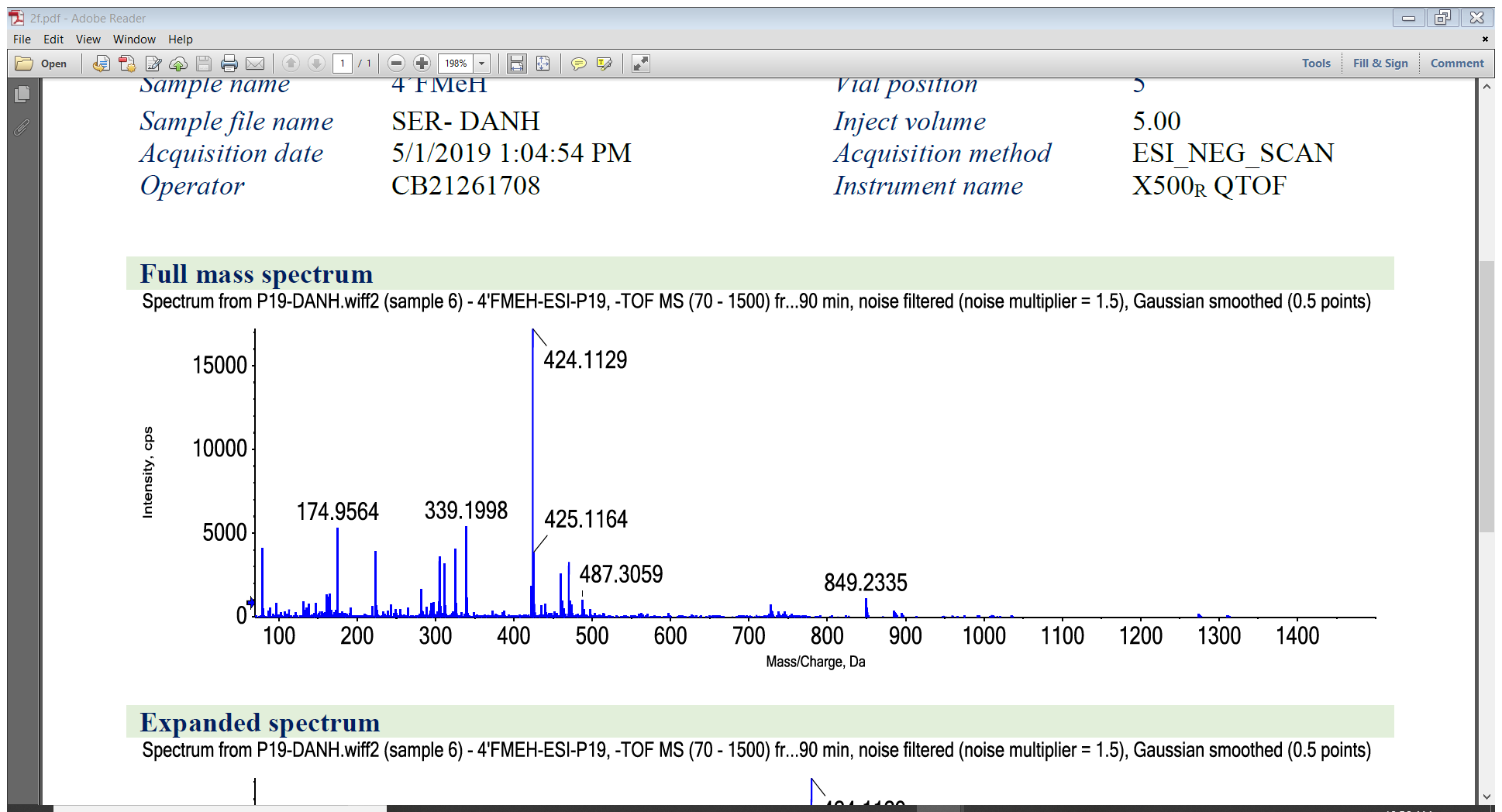


# **Fig S18.** DEPT Spectra of compound **2f** (CDCl3)

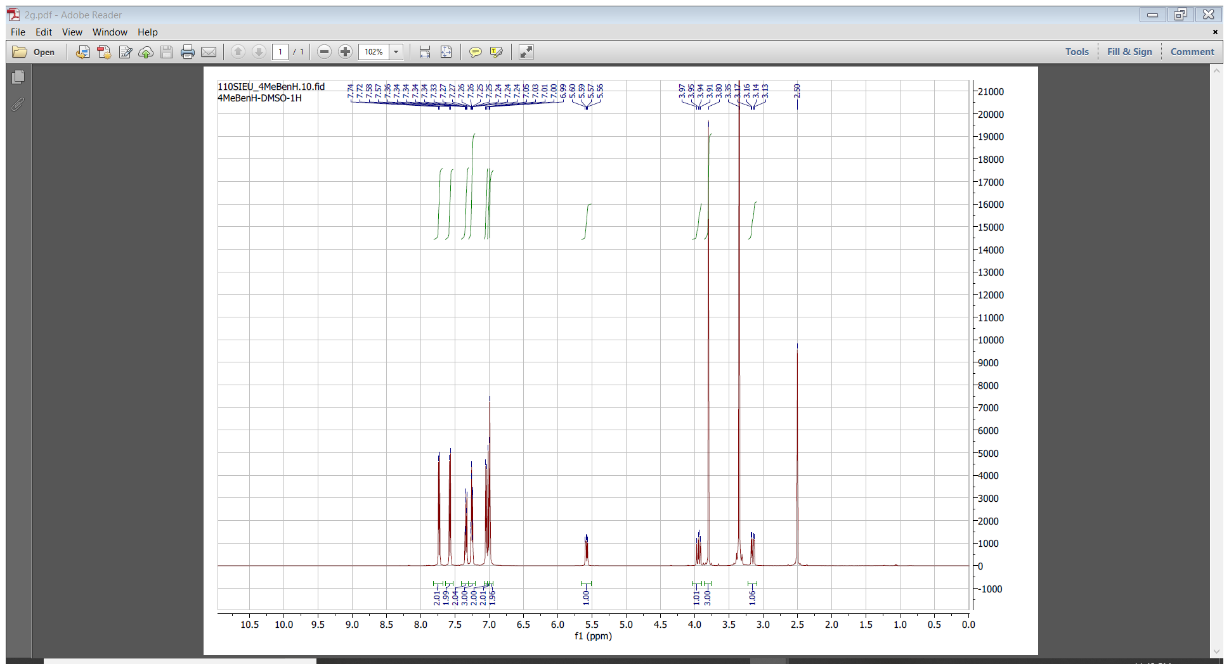


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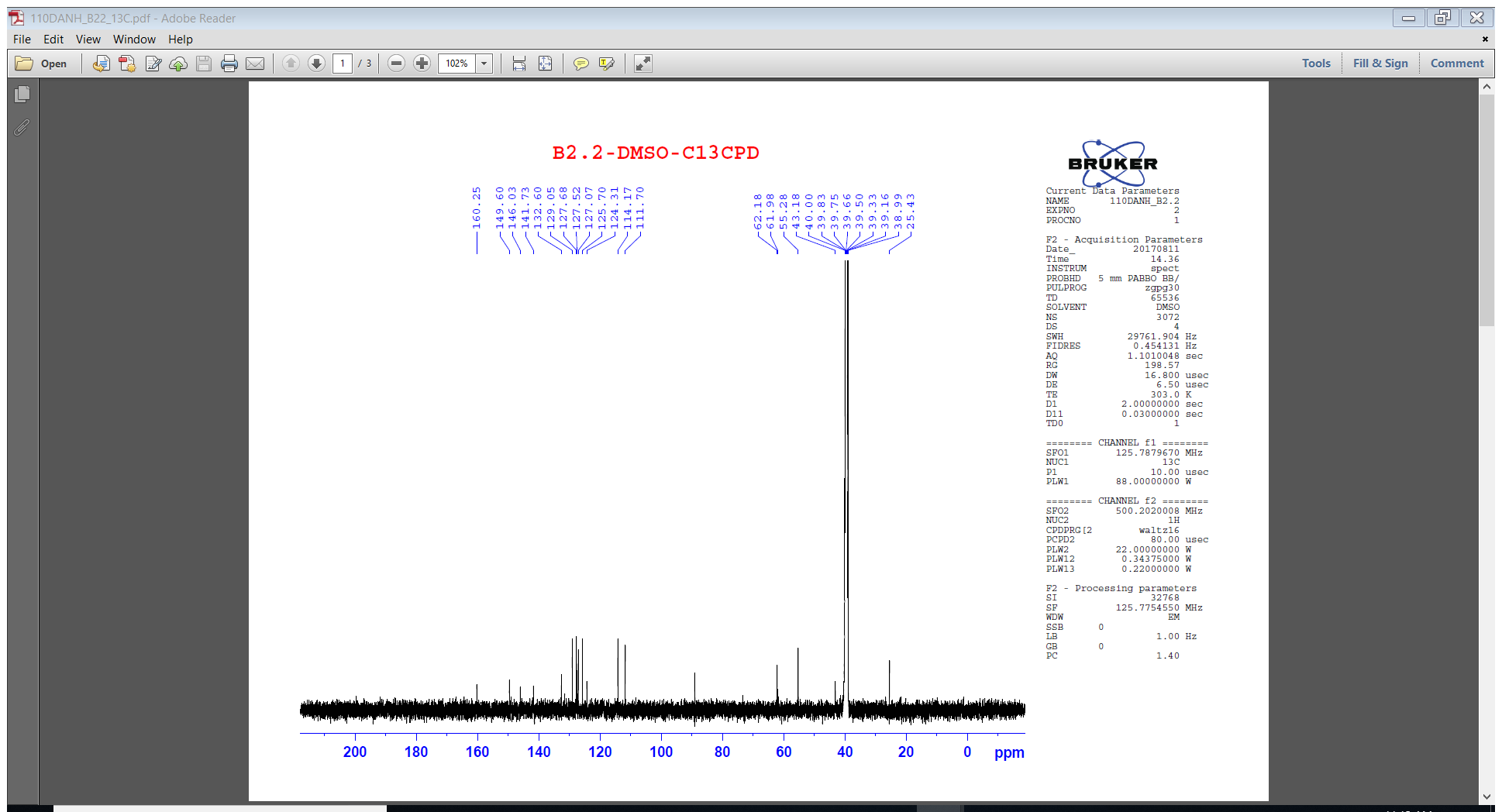
# **Fig S19.** HR-MS Spectrum of compound **2f**



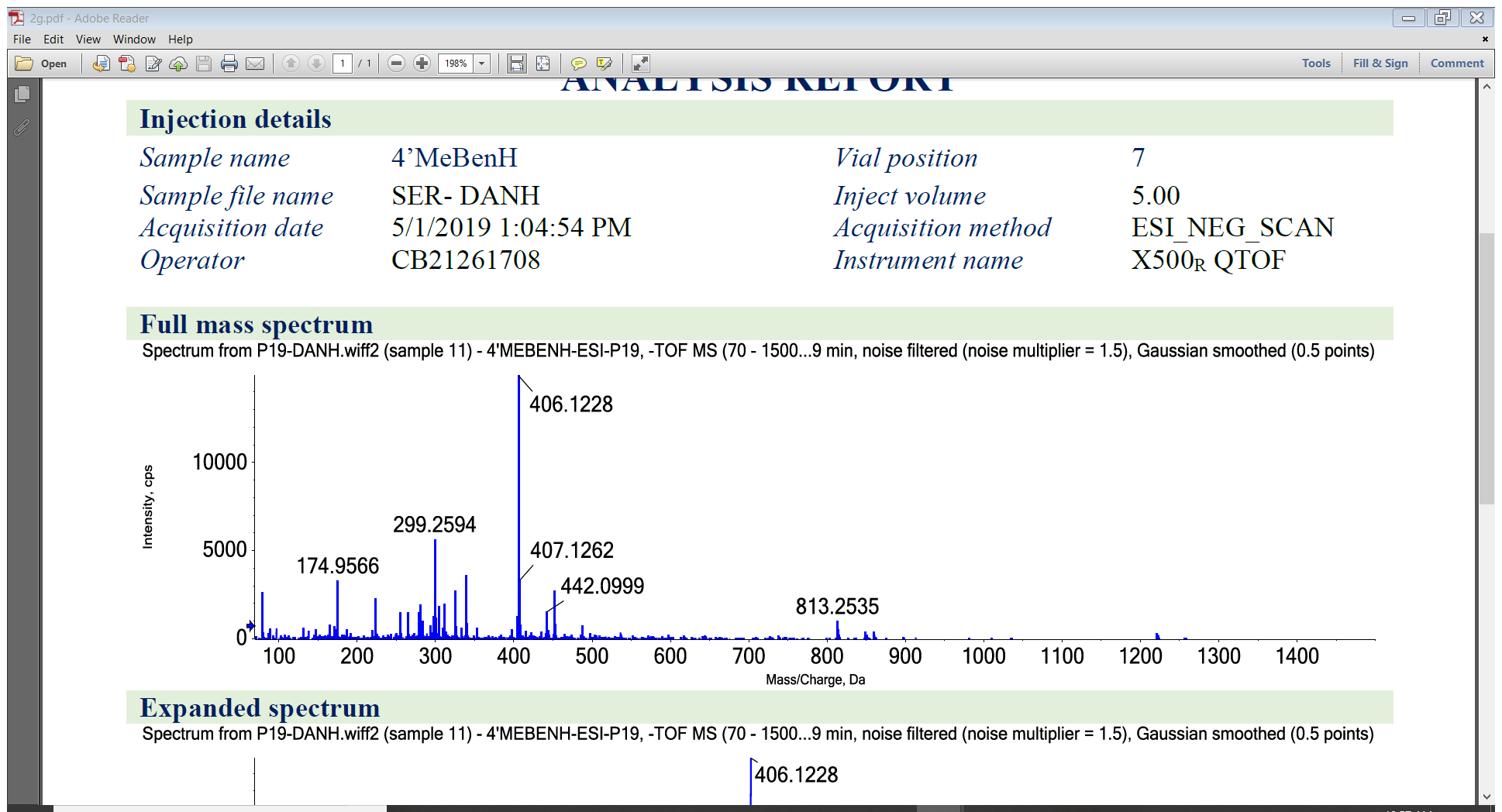
# **Fig S20.** 1H NMR Spectrum of compound **2g** (DMSO)



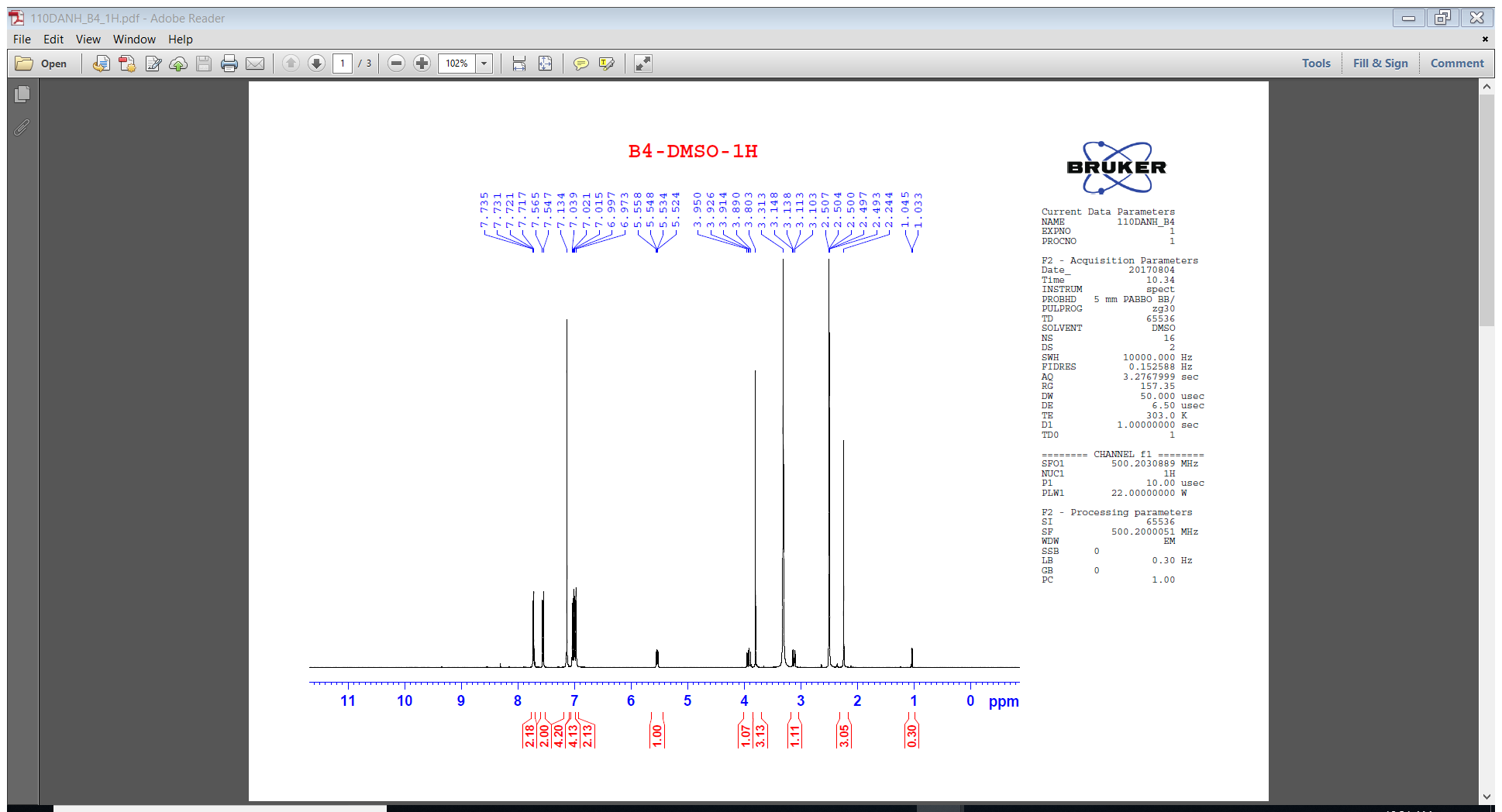
# **Fig S21.** 13C NMR Spectrum of compound **2g** (DMSO)



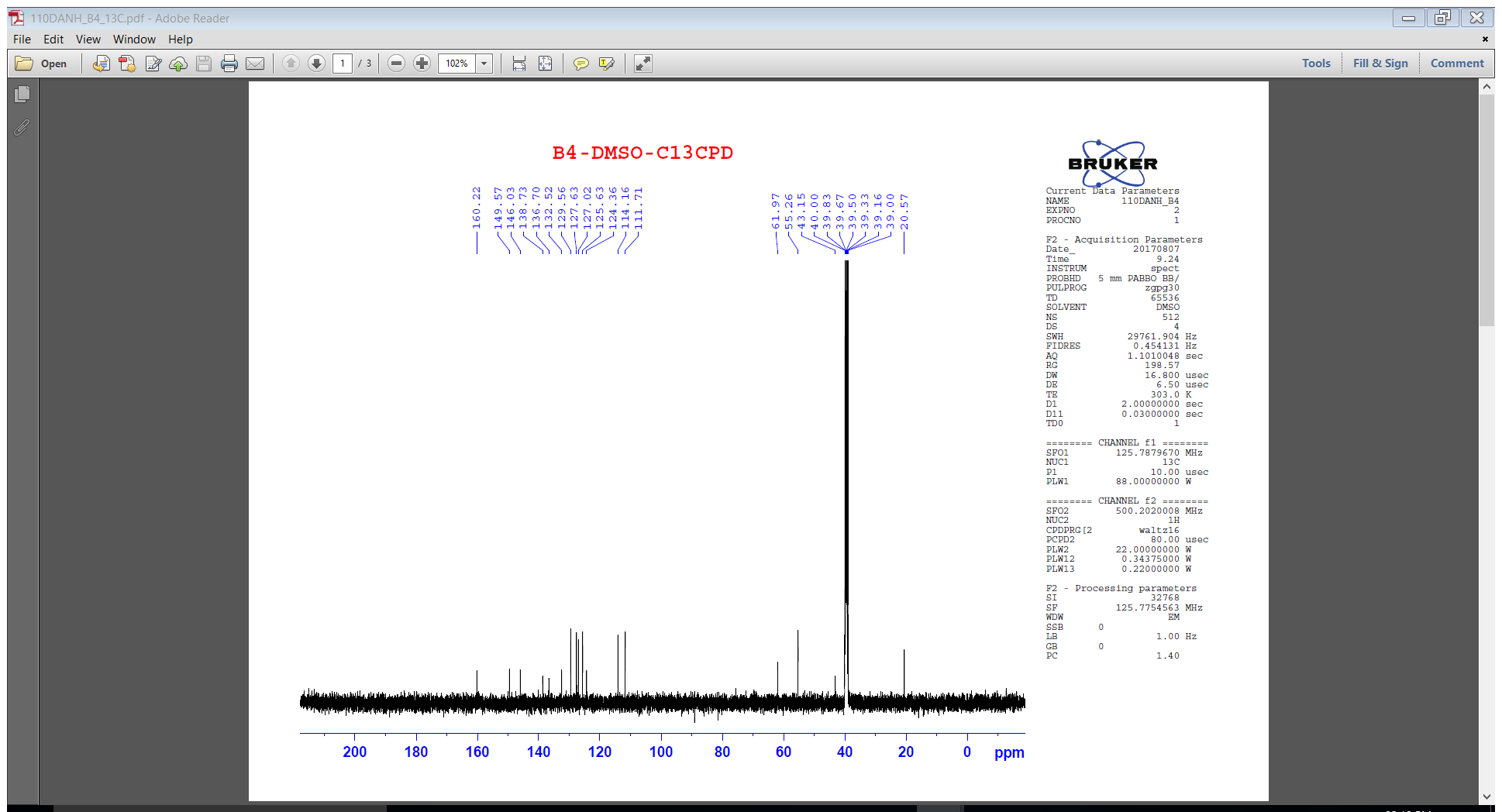
# **Fig S22.** HR-MS Spectrum of compound **2g**



# **Fig S23.** 1H Spectrum of compound **2h** (DMSO)

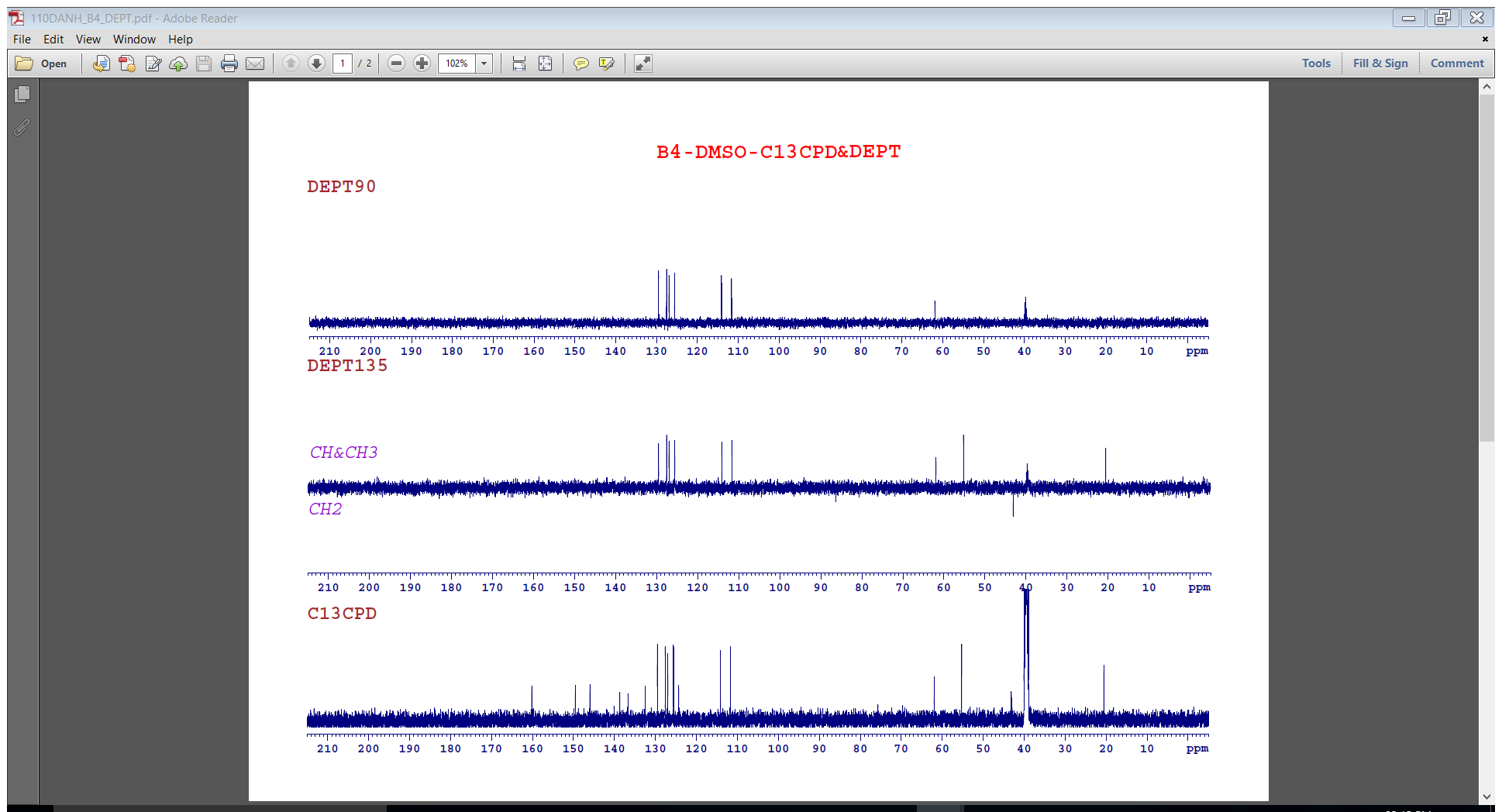


# **Fig S24.** 13C Spectrum of compound **2h** (DMSO)

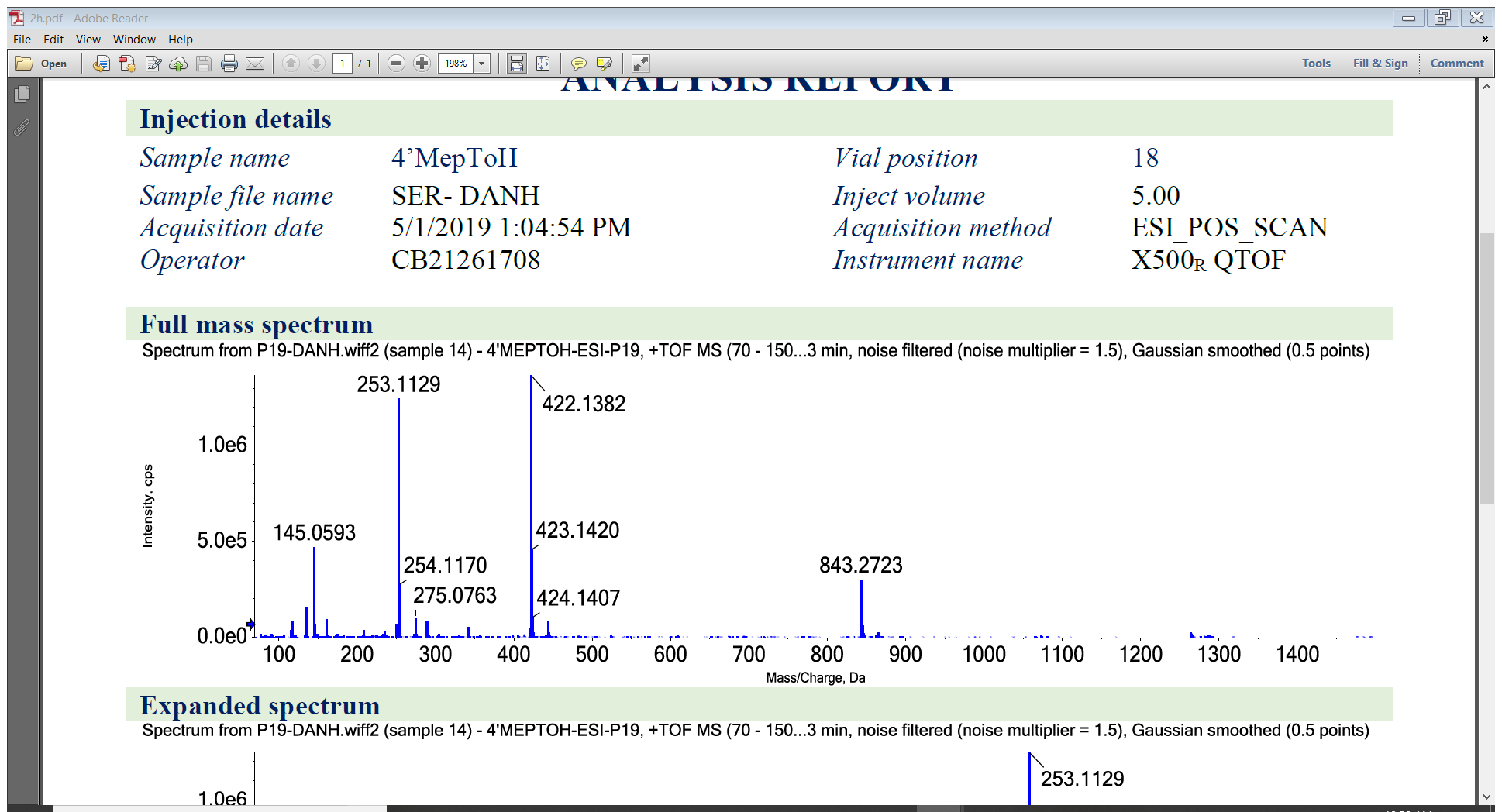


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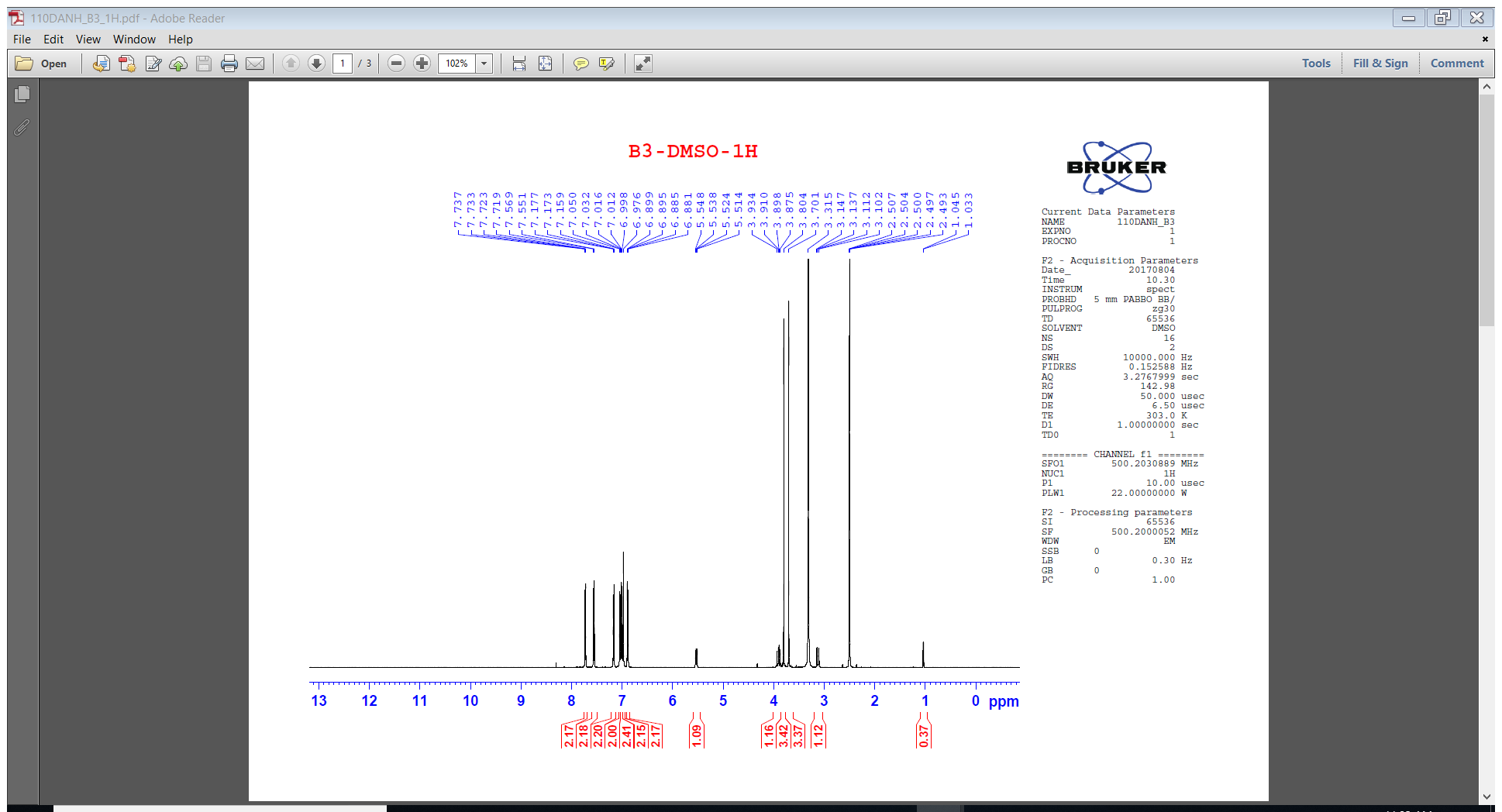
# **Fig S24.** DEPT Spectra of compound **2h** (DMSO)



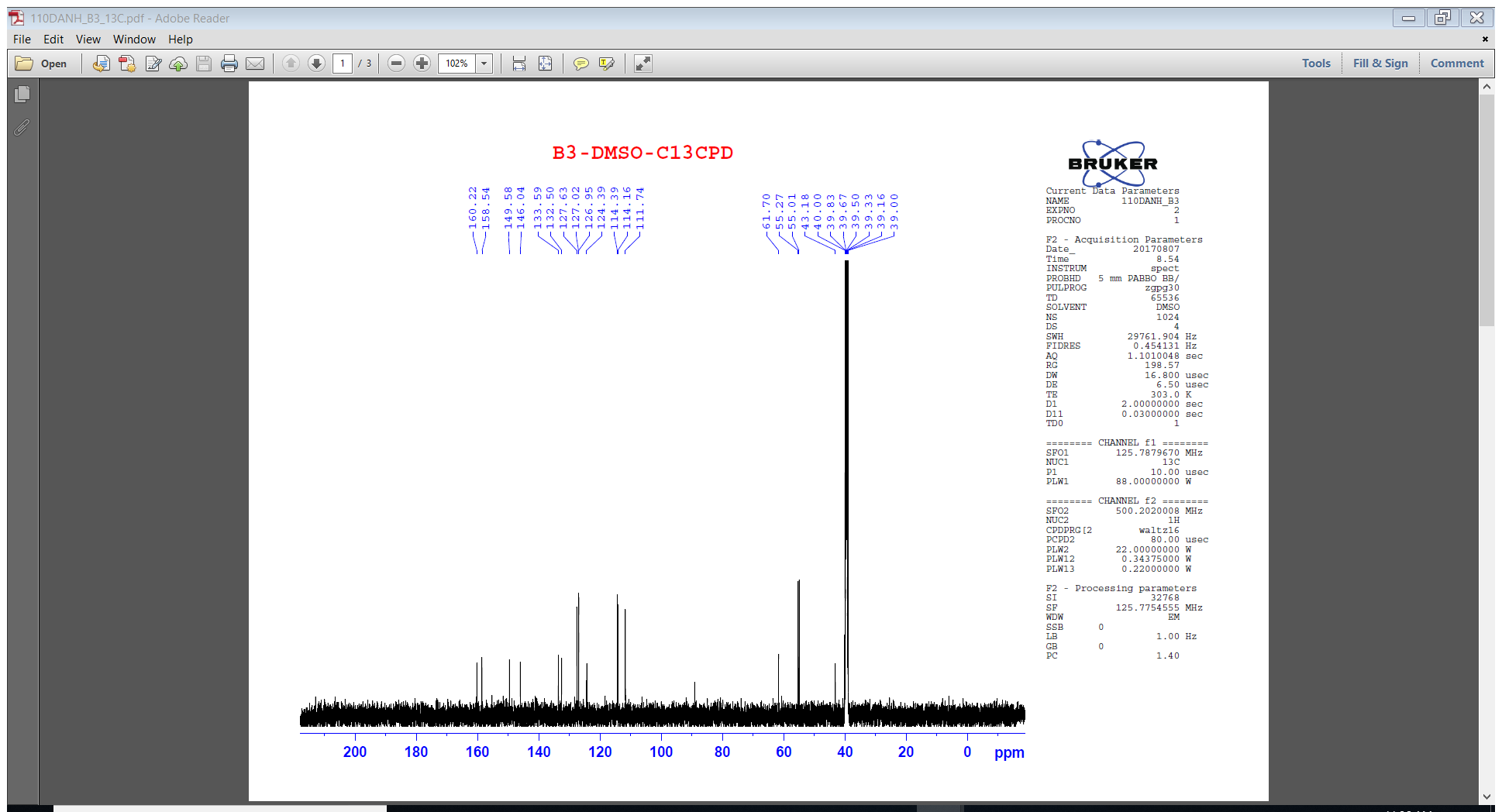
# **Fig S25.** HR-MS spectrum of compound **2h**



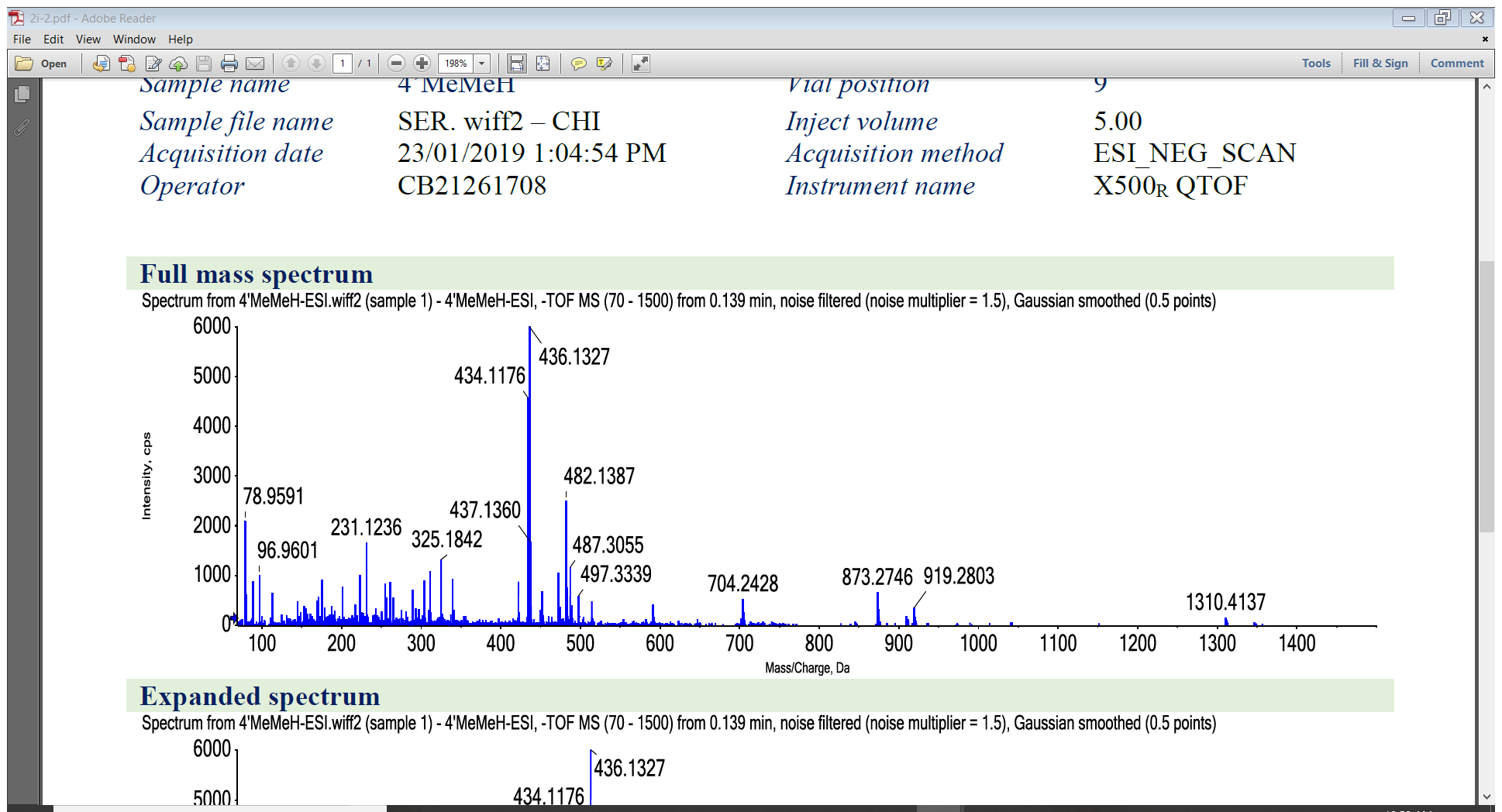
# **Fig S26.** 1H Spectrum of compound **2i** (DMSO)



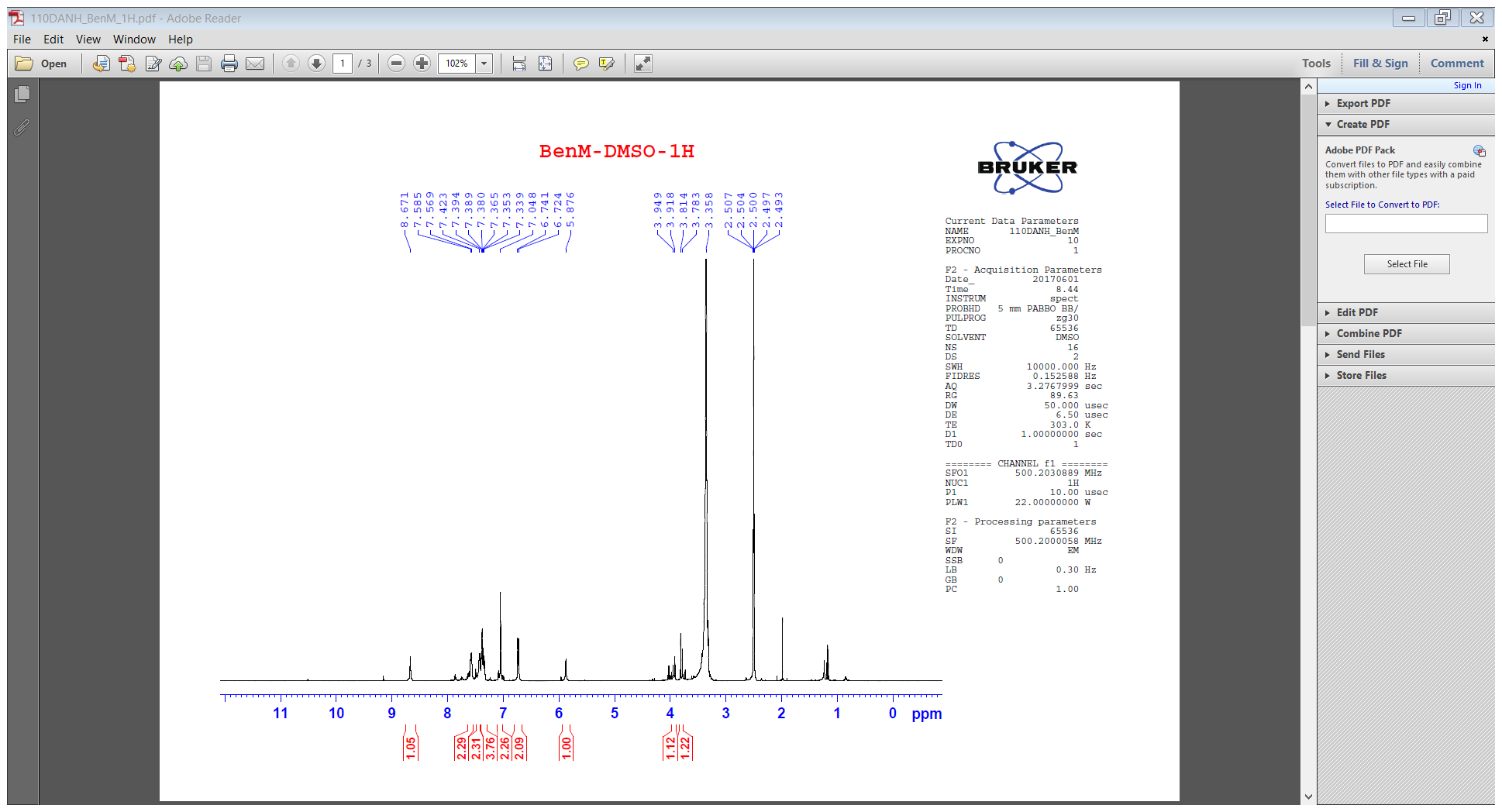
# **Fig S27.** 13C Spectrum of compound **2i** (DMSO)



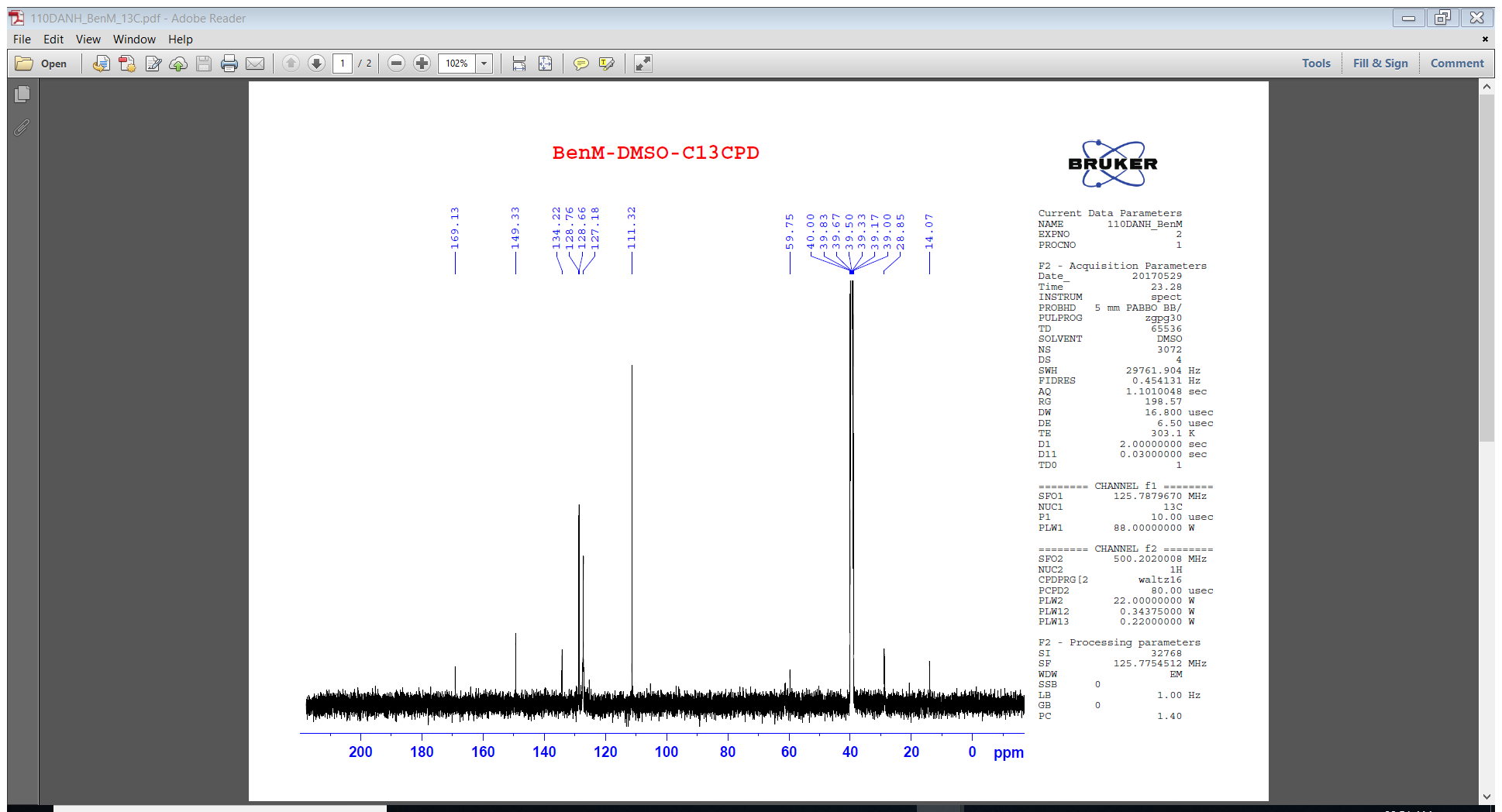
# **Fig S28.** HR-MS spectrum of compound **2i**



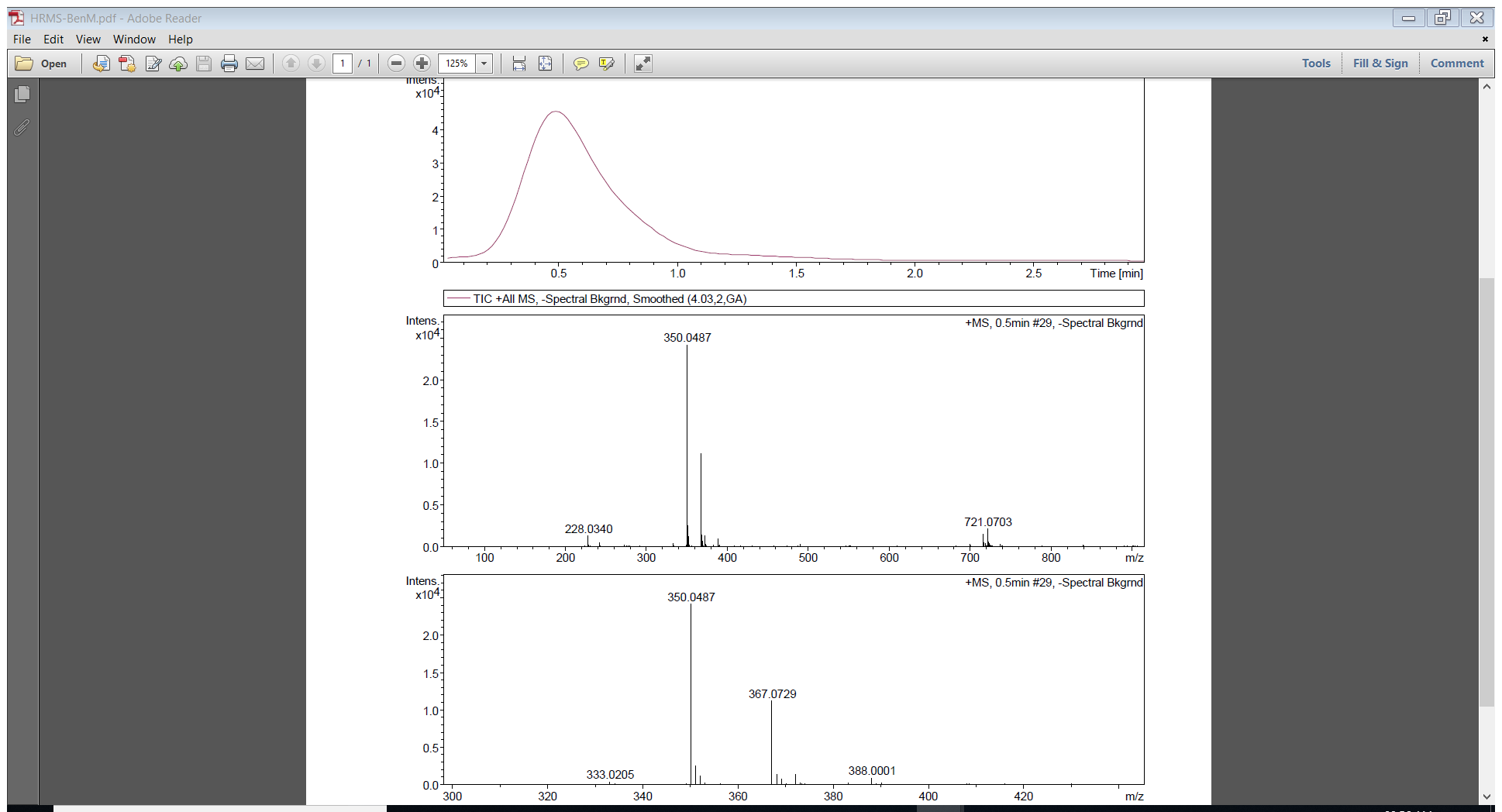
# **Fig S29.** 1H Spectrum of compound **4a** (DMSO)



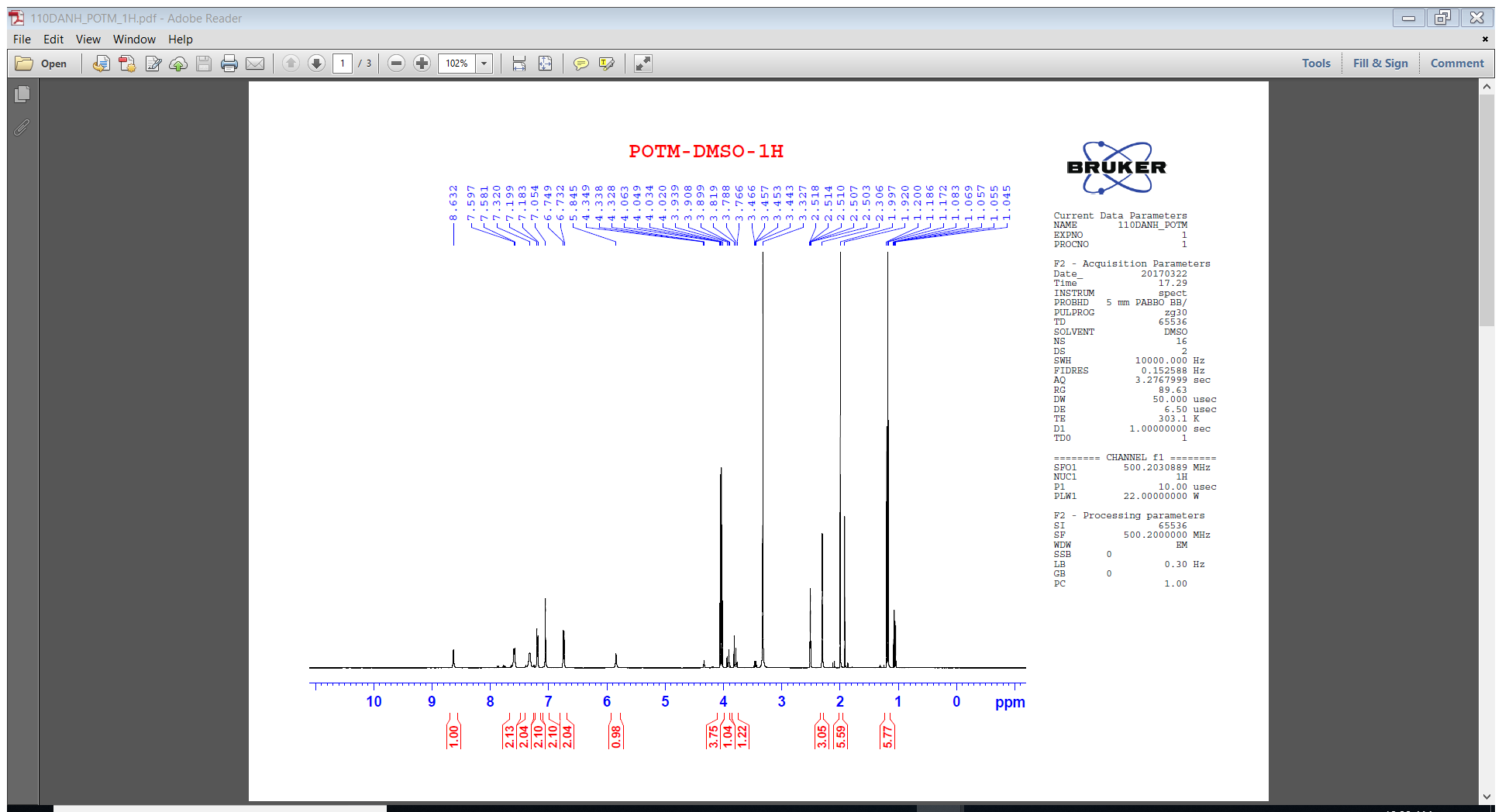
# **Fig S30.** 13C Spectrum of compound **4a** (DMSO)



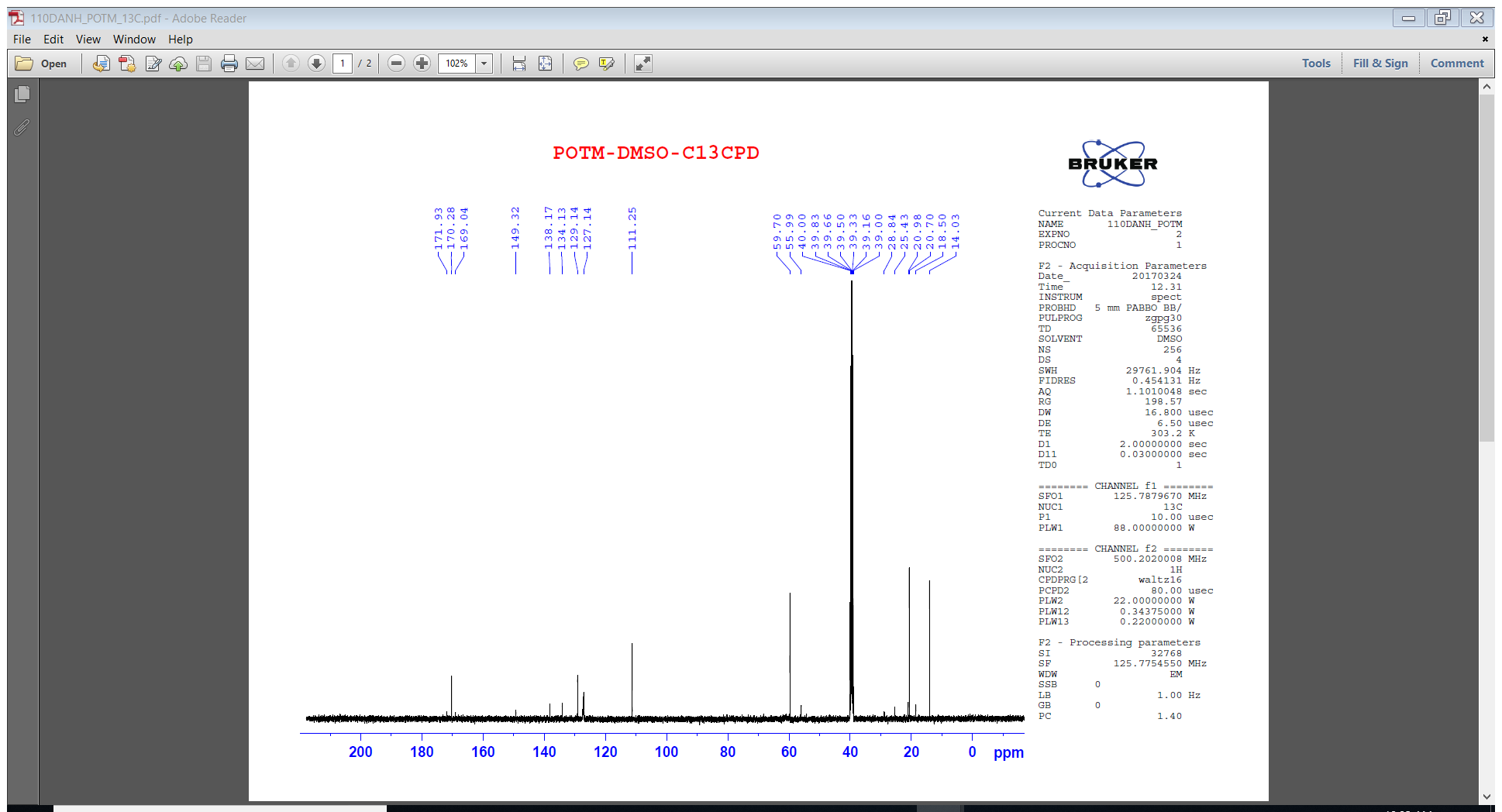
# **Fig S31.** HR-MS spectrum of compound **4a**



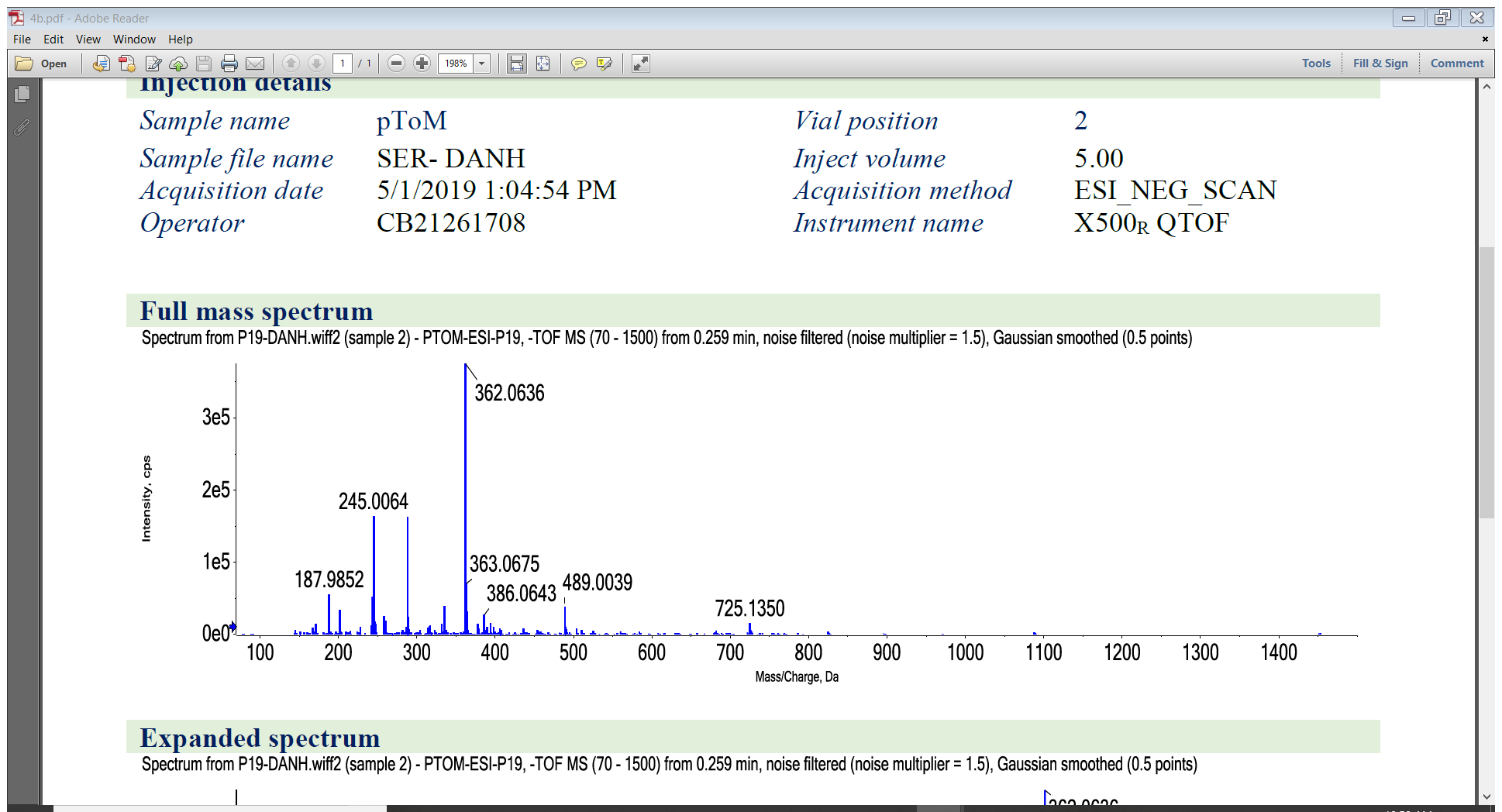
# **Fig S32.** 1H Spectrum of compound **4b** (DMSO)



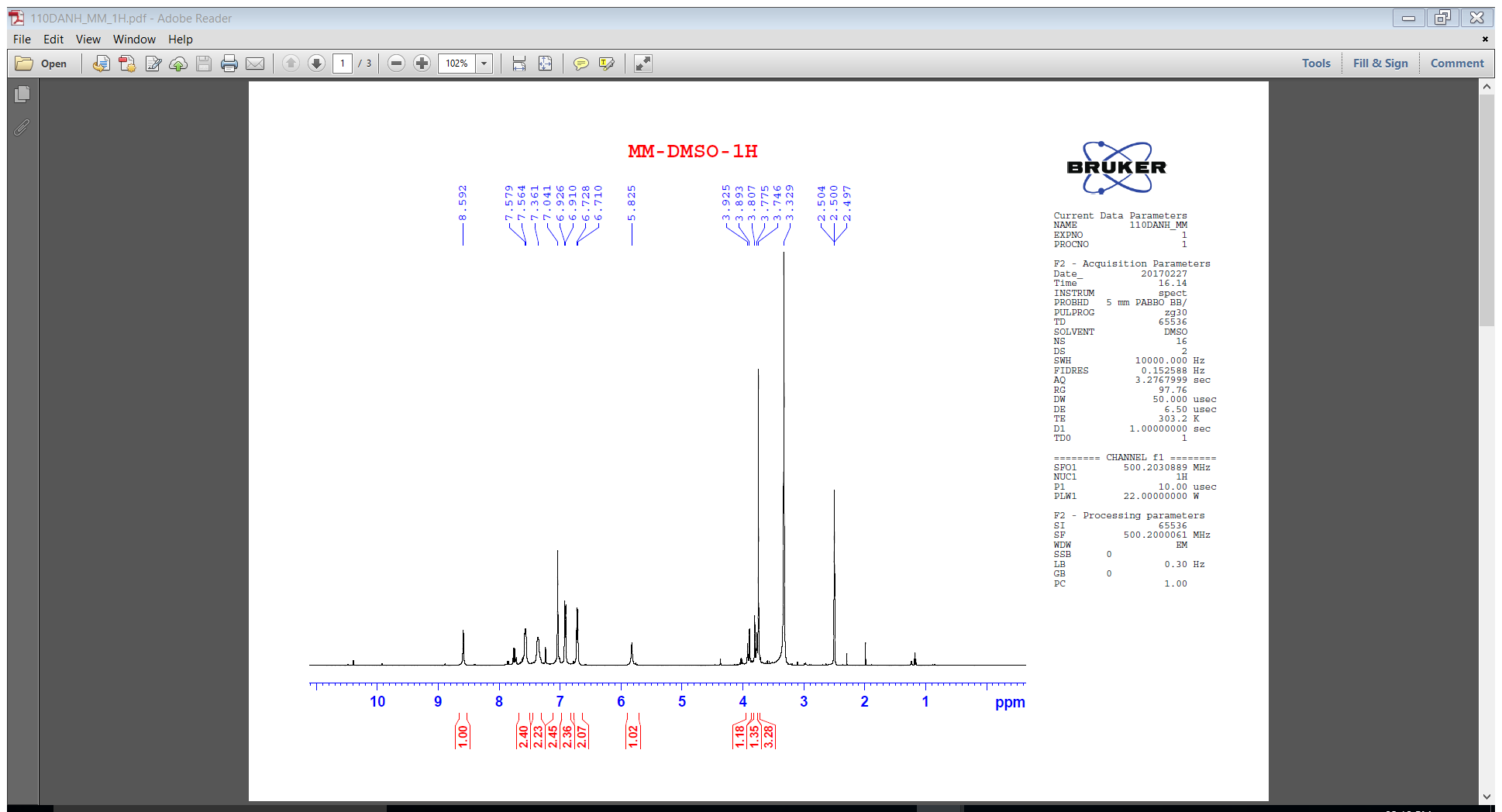
# **Fig S33.** 13C Spectrum of compound **4b** (DMSO)



# **Fig S34.** HR-MS spectrum of compound **4b**

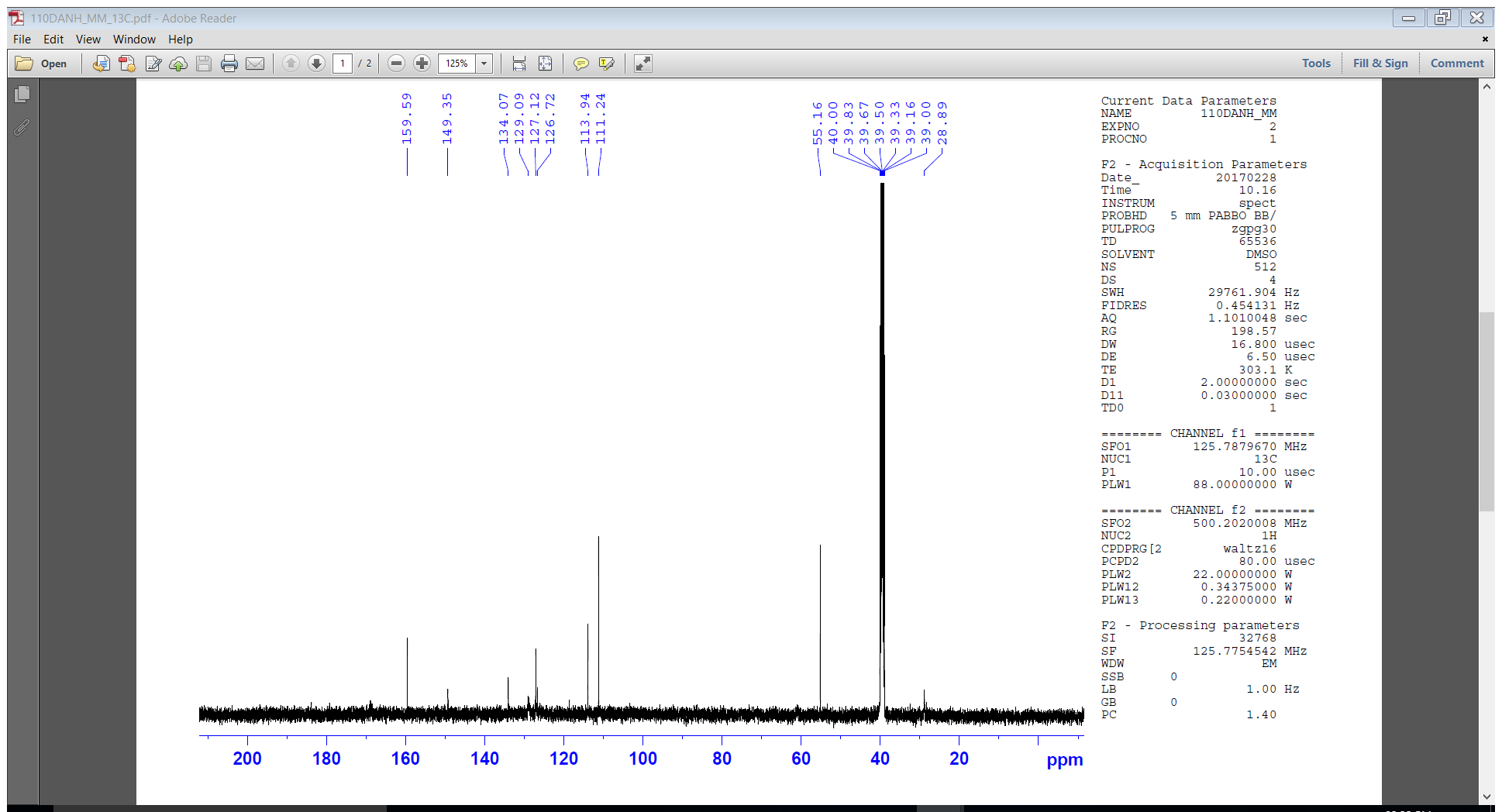


# **Fig S35.** 1H Spectrum of compound **4c** (DMSO)

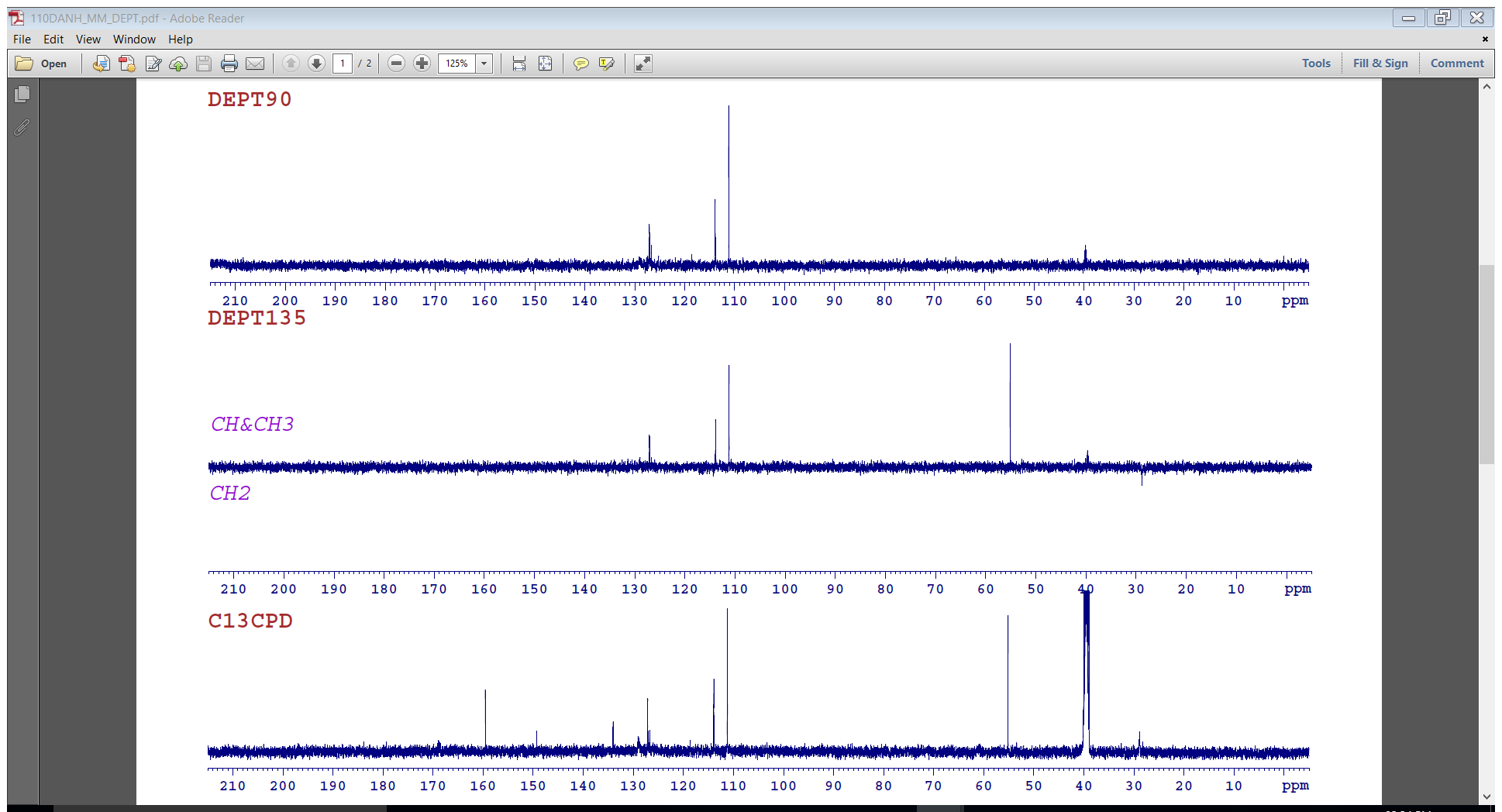


# 

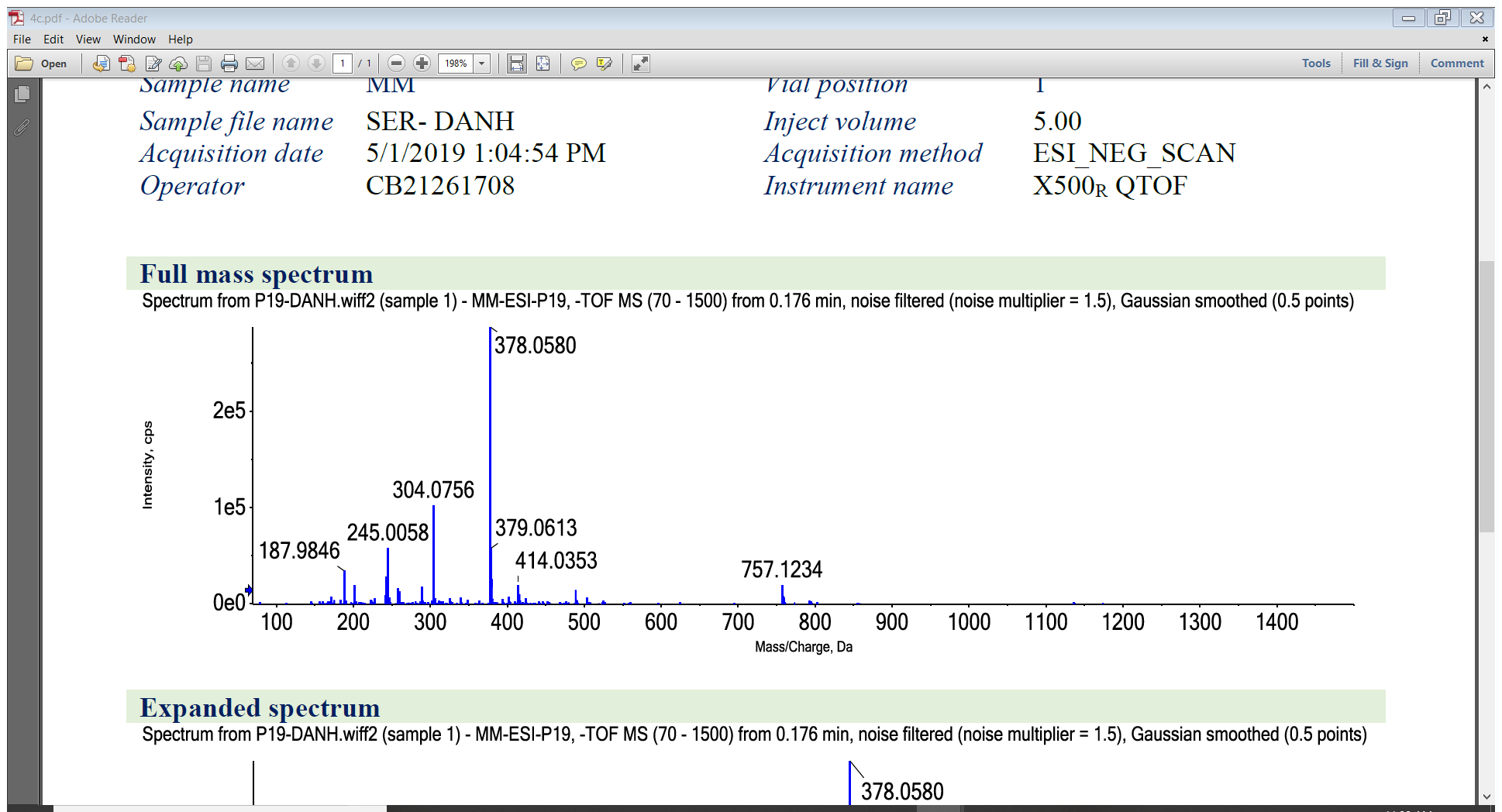
# **Fig S36.** 13C Spectrum of compound **4c** (DMSO)



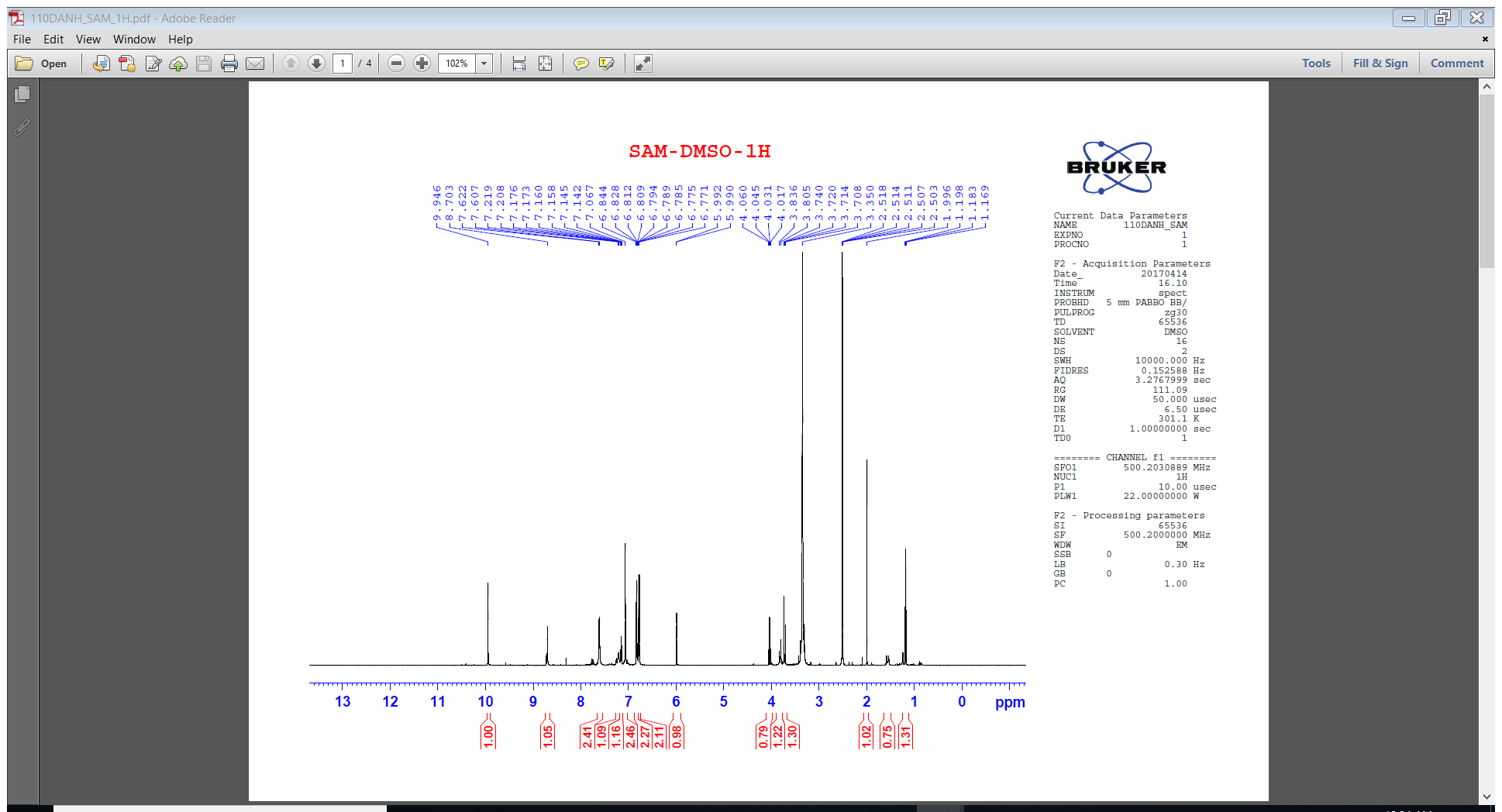
# **Fig S37.** DEPT Spectra of compound **4c** (DMSO)



# **Fig S38.** HR-MS spectrum of compound **4c**

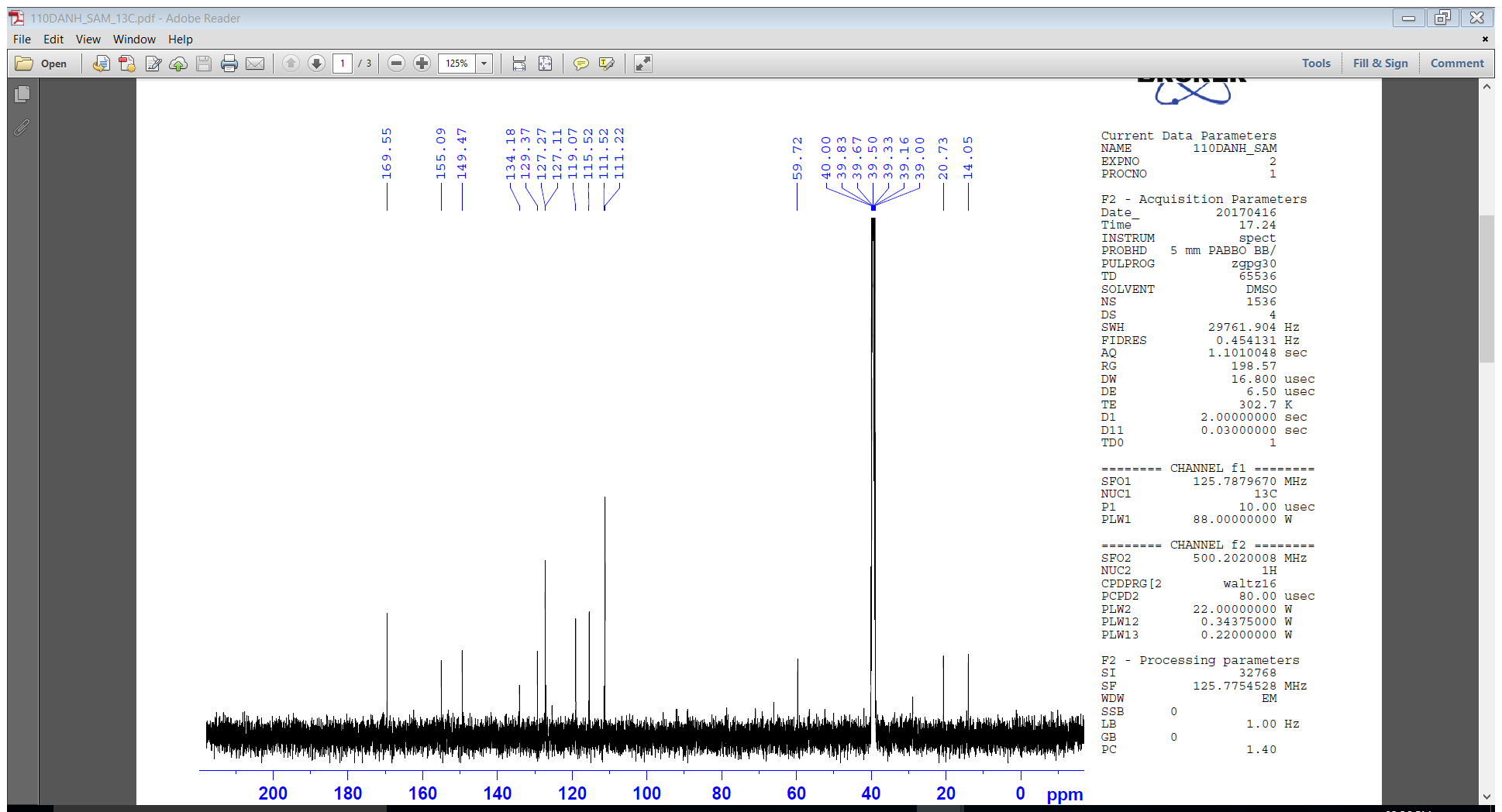


# **Fig S39.** 1H Spectrum of compound **4d** (DMSO)

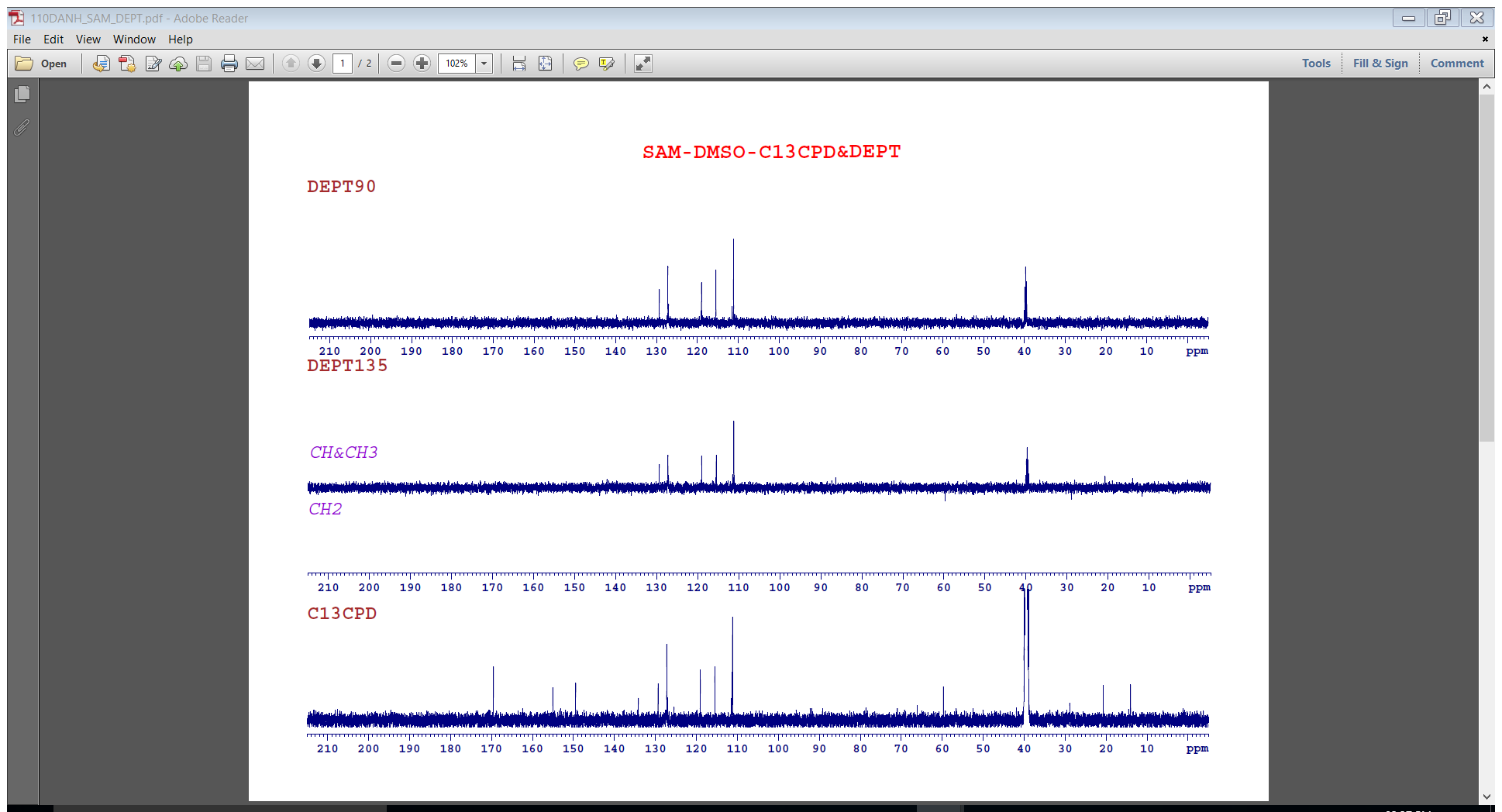


# 

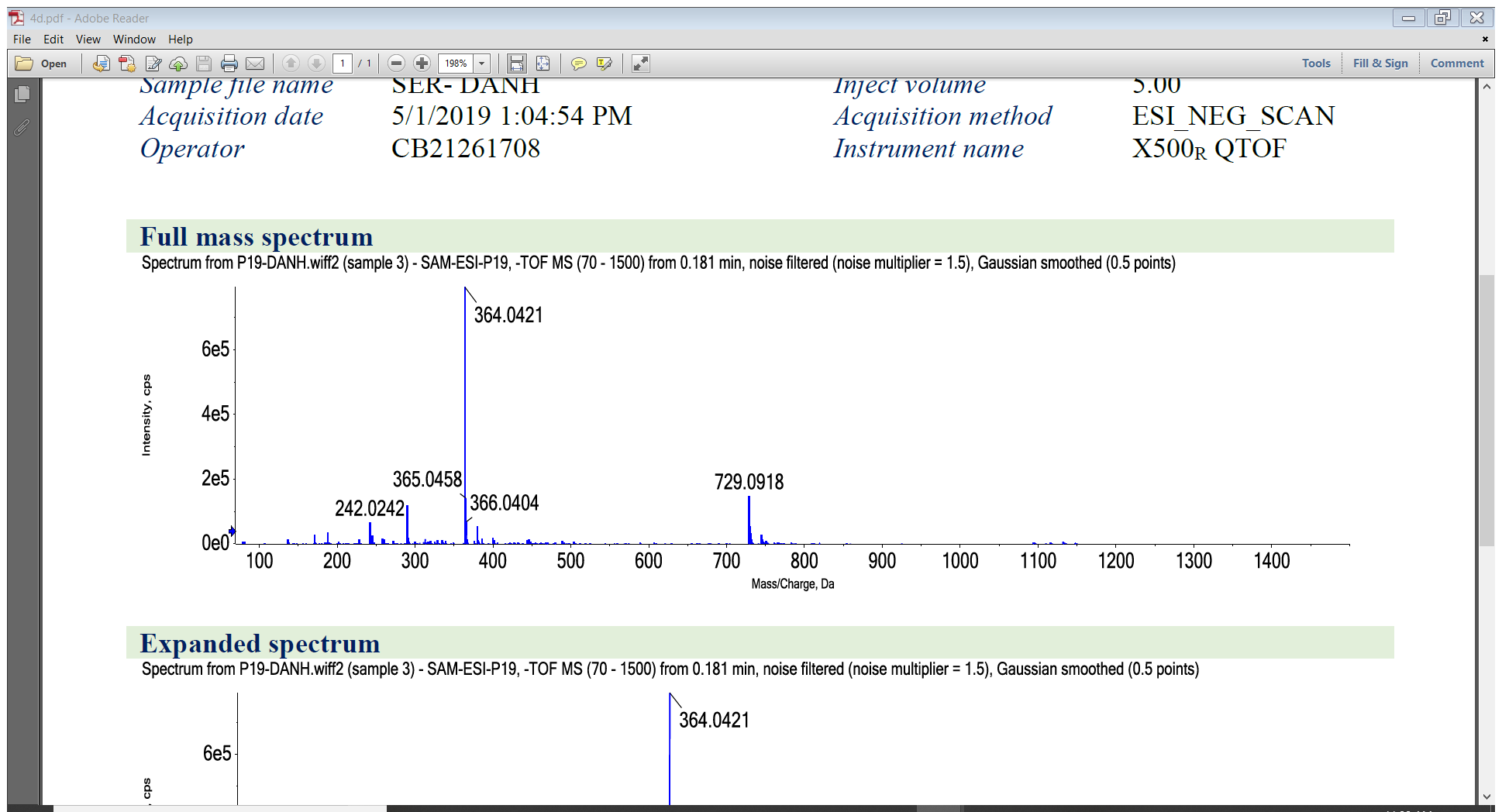
# **Fig S40.** 13C Spectrum of compound **4d** (DMSO)



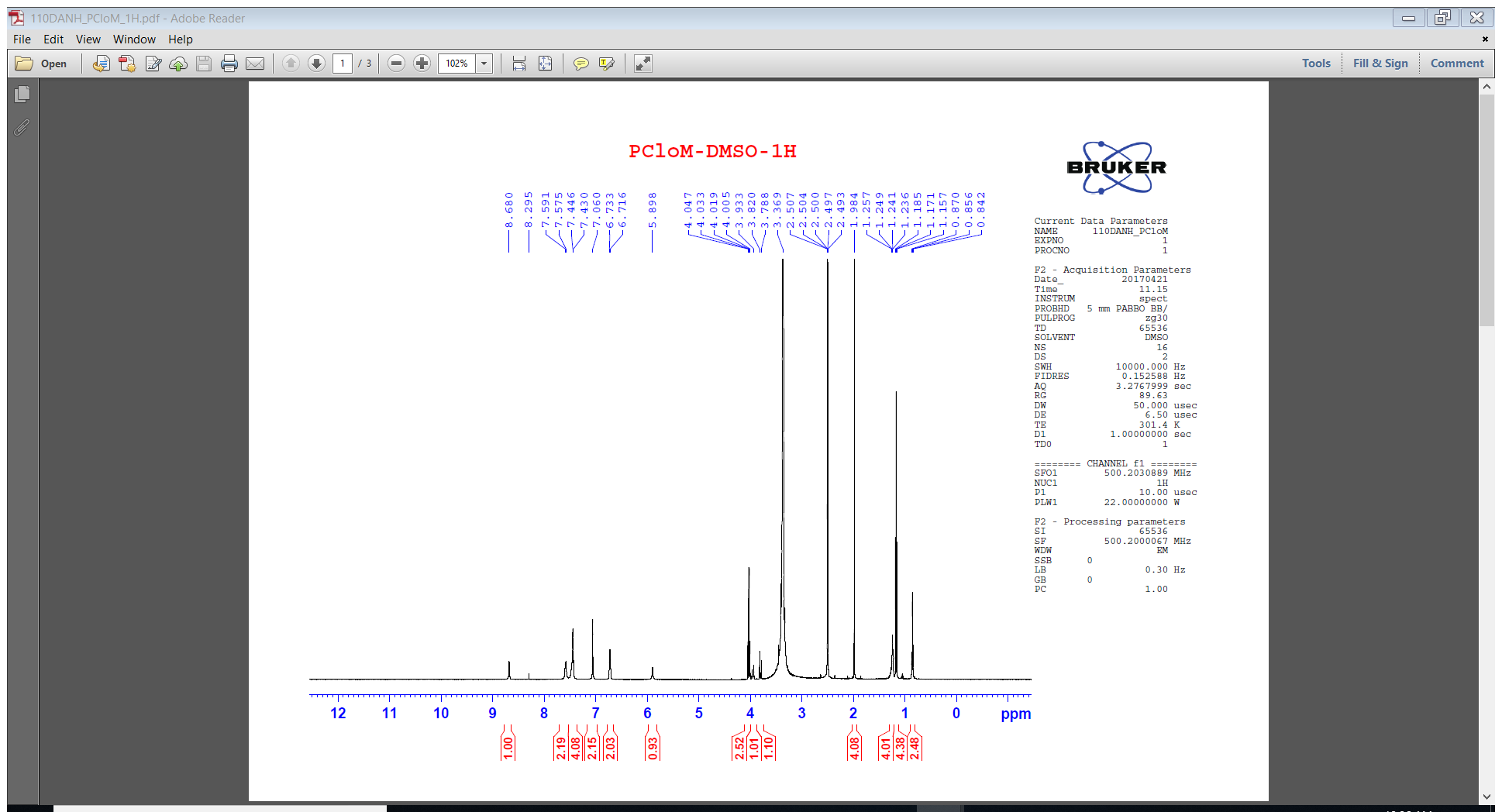
# **Fig S41.** DEPT Spectra of compound **4d** (DMSO)



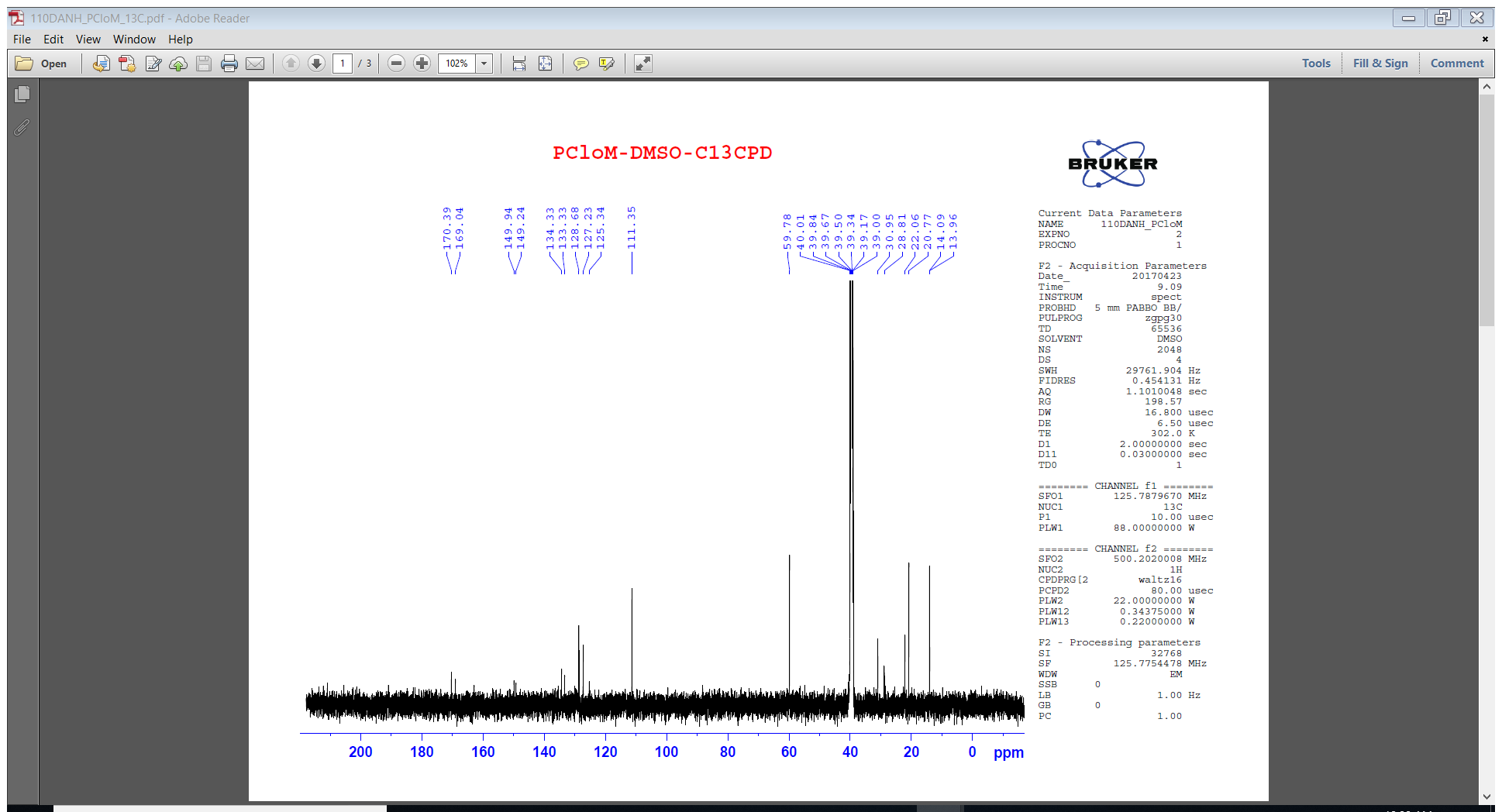
# **Fig S42.** HR-MS spectrum of compound **4d**



# **Fig S43.** 1H Spectrum of compound **4e** (DMSO)



# **Fig S44.** 13C Spectrum of compound **4e** (DMSO)



# **Fig S45.** HR-MS spectrum of compound **4e** (DMSO)

