Title :

Synthesized 1,3,5-triarylpyrazolines and 4-thiazolidinones bearing sulfonamide moiety as novel antimicrobial agents

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Supplementary Data

Contents

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 %. ^{1}H 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 %. ^{1}H 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 %. ^{1}H NMR (500 MHz, $CDCl_3$, 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, CH_3).

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

Orange powder. Yield 81.0 %. ^{1}H NMR (500 MHz, $CDCl_3$, 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, OCH_3).

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

Pale yellow powder. Yield 76.0 %. ^{1}H NMR (500 MHz, $CDCl_3$, 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, -CH_3).

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

Pale yellow powder. Yield 82.0 %. ^{1}H NMR (500 MHz, $CDCl_3$, 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, OCH_3).

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

Pale yellow powder. Yield 78.0 %. ^{1}H NMR (500 MHz, DMSO-*d6*, 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, OCH_3).

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

Pale yellow powder. Yield 70.0 %. ^{1}H 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, OCH_3), 2.35 (*s*, 3H, $-CH_3$).

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

Yellow powder. Yield 65.0 %. ^{1}H 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, OCH_3), 3.81 (*s*, 3H, OCH_3).

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 ^{o}C. Yield 63.0 %. ^{1}H 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, -SO_2NH_2).

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

Recrystallization in EtOH. Yellow powder, m.p. 213-214 ^{o}C. Yield 67.0 %. ^{1}H 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, -SO_2NH_2), 2.33 (*s*, 3H, CH_3).

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

Recrystallization in EtOH. Yellow needle, m.p. 225-226 ^{o}C. Yield 74.0 %. ^{1}H 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, SO_2NH_2), 6.99 (*d*, 2H, *J* = 9.0, CH), 3.79 (*s*, 3H, OCH_3).

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

Recrystallization in *i*-propanol. Yellow needle, m.p. 254-255 ^{o}C. Yield 71.0 %. ^{1}H 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 SO_2NH_2), 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 ^{o}C. Yield 66.0 %. ^{1}H 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. ^{1}H NMR Spectrum of compound **2f**

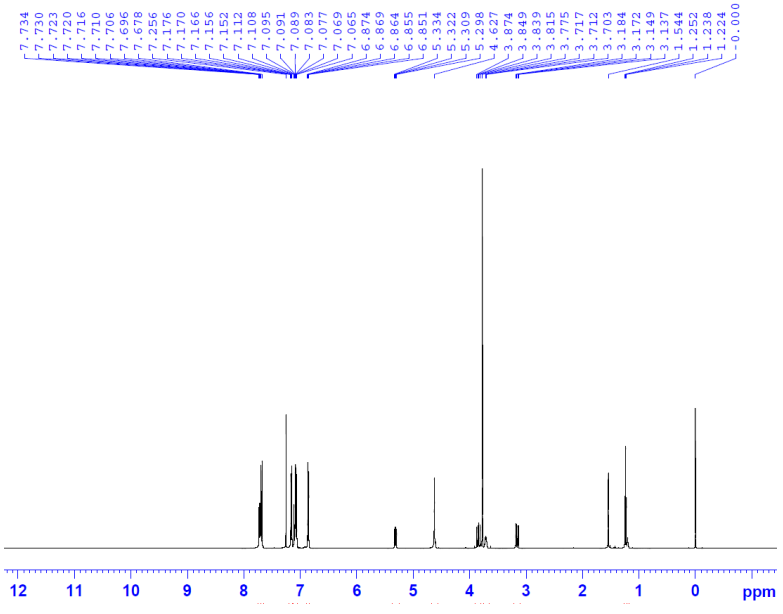

Fig S2. ^{13}C NMR Spectrum of compound **2f**

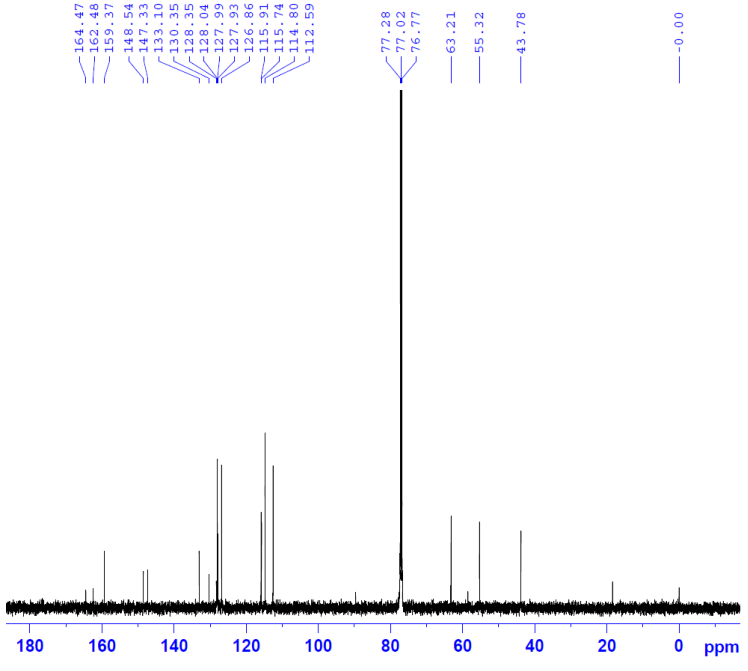

Fig S3. DEPT Spectra of compound 2f

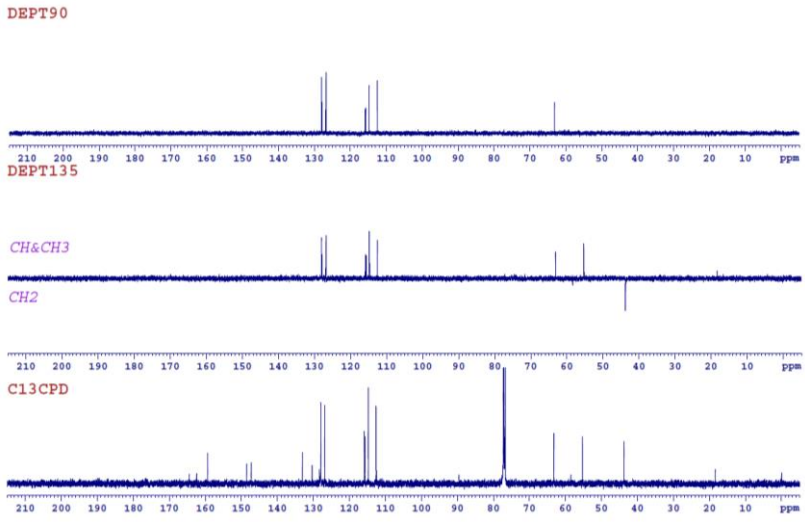

Fig S4. MS Spectrum of compound 2f

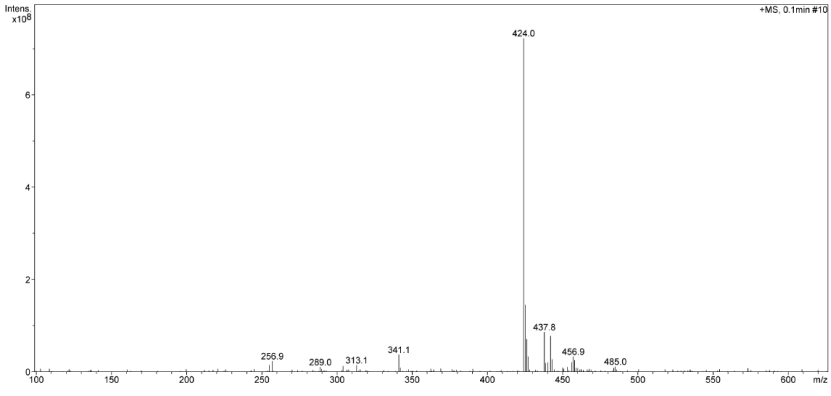

Fig S5. ^{1}H Spectrum of compound **2h**

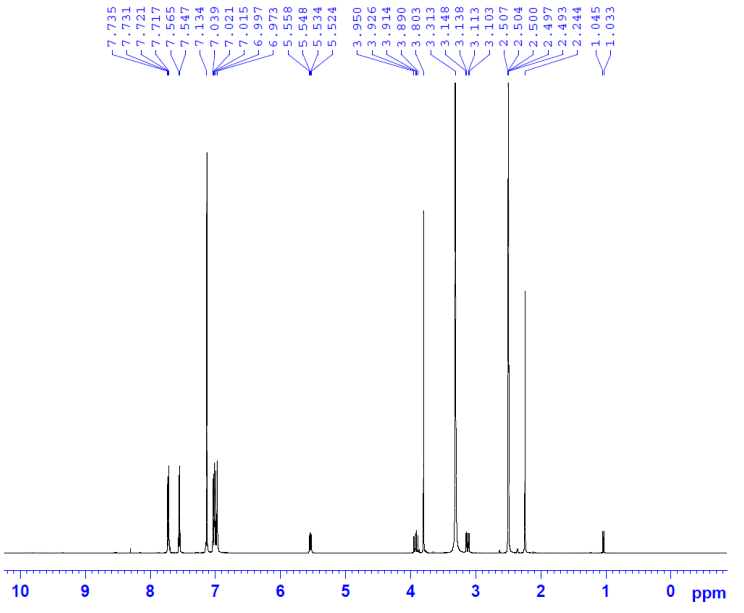

Fig S6. ^{13}C Spectrum of compound **2h**

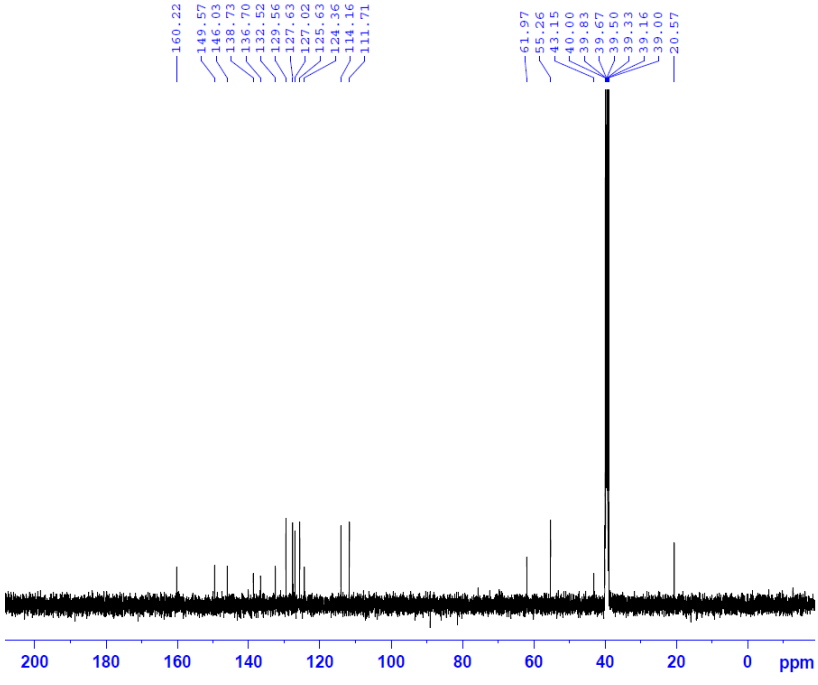

Fig S7. DEPT Spectra of compound 2h

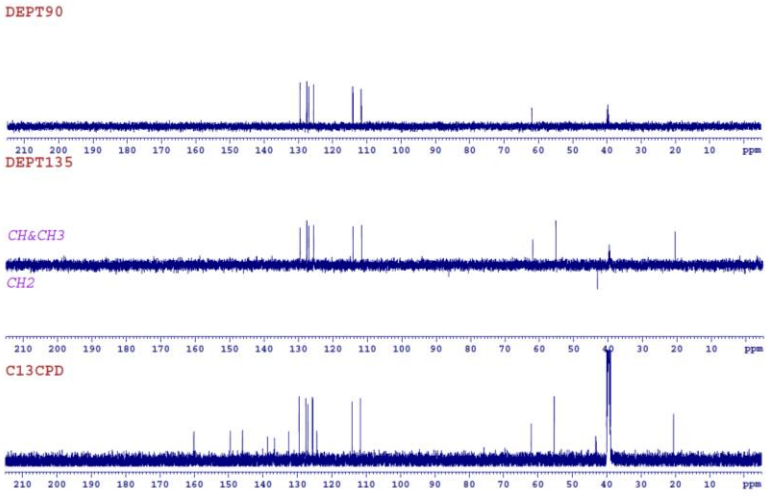

Fig S8. MS spectrum of compound 2h

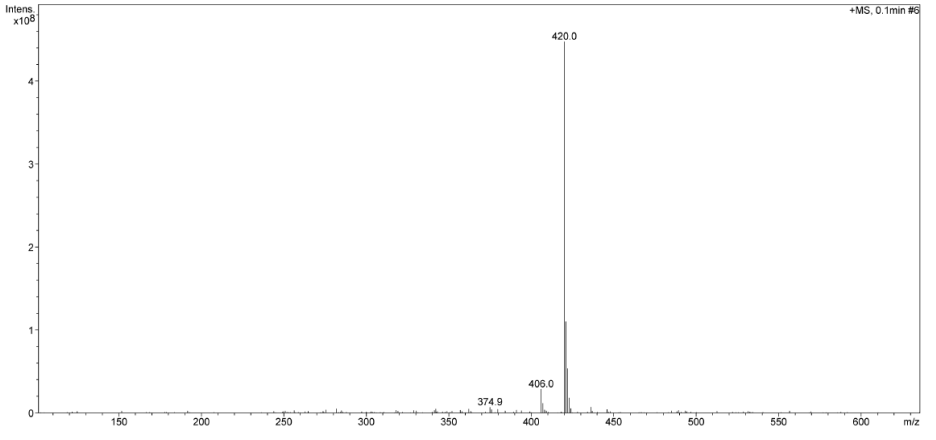

Fig S9. ^{1}H Spectrum of compound **4c**

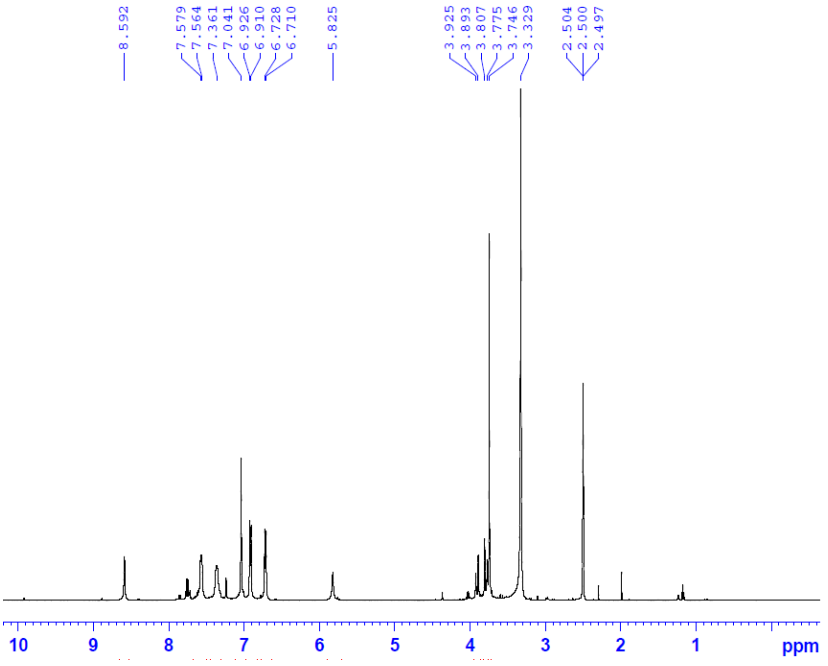

Fig S10. ^{13}C Spectrum of compound **4c**

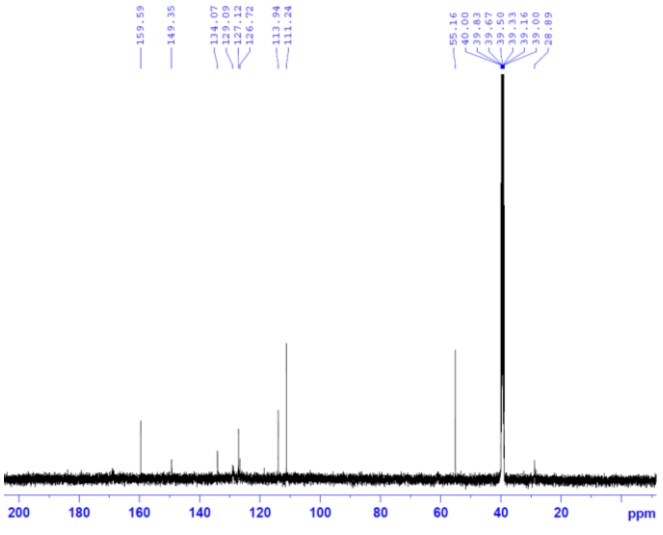

Fig S11. DEPT Spectra of compound **4c**

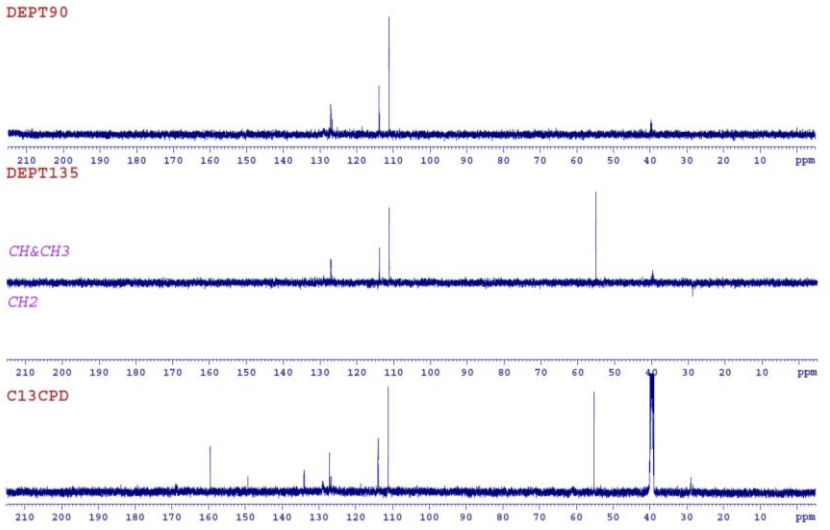

Fig S12. MS spectrum of compound **4c**

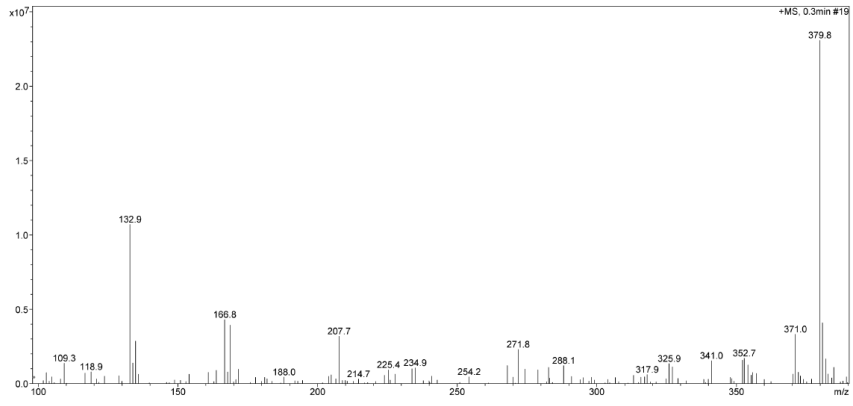

Fig S13. ^{1}H Spectrum of compound **4d**

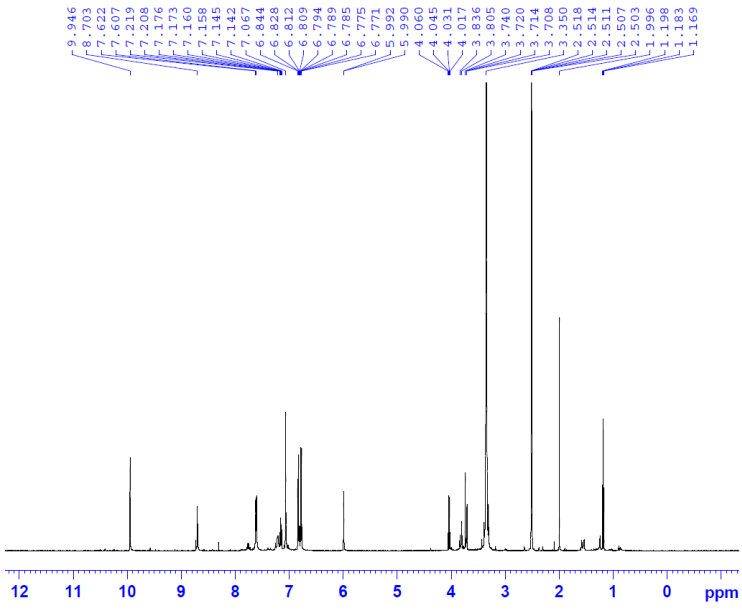

Fig S14. ^{13}C Spectrum of compound **4d**

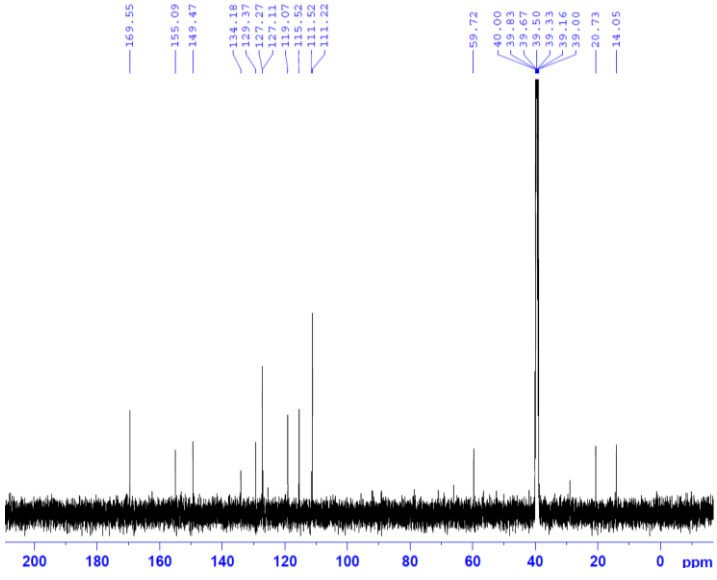

Fig S15. DEPT Spectra of compound **4d**

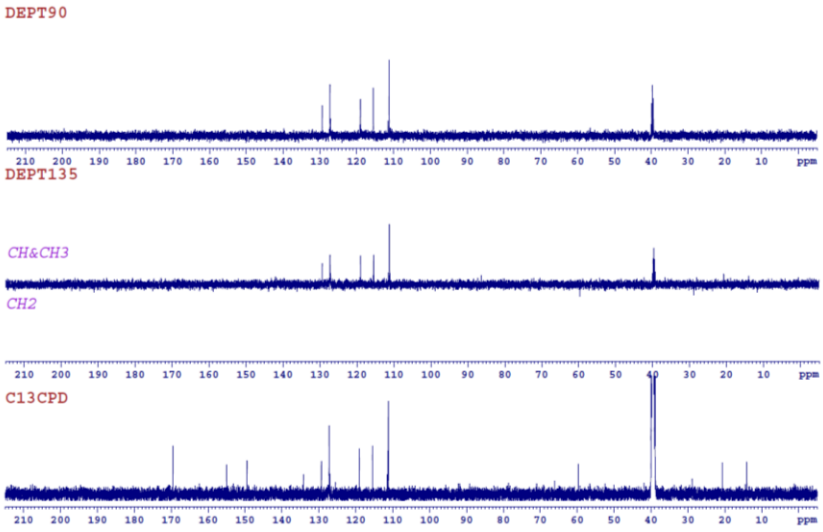

Fig S16. MS spectrum of compound **4d**