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Supplementary Information

Synthesis of a new series of dithiocarbamate-linked peptidomimetics and their application in Ugi reaction

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General. Melting points were determined with a Branstead Electrothermal 9200 apparatus and are uncorrected. IR spectra were recorded on a Perkin-Elmer FT RX1 spectrophotometer over the range 400-4000 cm^{-1}. ^{1}H and ^{13}C NMR spectra were determined for the solutions in deuterated solvents with TMS as internal standard on a Brucker AMX 300 MHz instrument. Elemental analyses were conducted with a Perkin-Elmer 2004 (II) CHN analyzer.

General procedure for synthesis of dithiocarbamate containing carboxylic acid (1a-g): In a 50 mL round bottom flask, an amine (10 mmol), dimethylformamide (10 mL) and CS_2 (12 mmol) were added respectively. To this vigorously stirred reaction mixture, chloroacetic acid or 3-chloropropionic acid (10 mmol) was added slowly and stirred at room temperature for 12h. In completion, water was added (25 mL) and the precipitate was collected by filtration. The precipitate was washed with water several times to give the pure product. If needed, further purifications have been done with recrystalization in ethanol.

Typical procedure for synthesis of *bis*dithiocarbamate 3: In a 50 mL round bottom flask, piperazine (10 mmol) and dimethylformamide (15 mL) were added. The mixture was cooled to 0-5 °C and CS_2 (30 mmol) was added. After 1h, to this vigorously stirred reaction mixture, chloroacetic acid (24 mmol) was added slowly and stirred at room temperature for 12h. In completion, water was added (25 mL) and the precipitate was collected by filtration. The precipitate was washed with water several times to give the pure product in 75% isolated yield.

General procedure for synthesis of dithiocarbamates based on aminoacids 5a-e: In a 50 mL round bottom flask, an aminoacid (5 mmol), methanol (8 mL) and NaOH (10 mmol) were added respectively. The mixture was cooled to 0-5 °C and CS_2 (6 mmol) was added. After 1h stirring, the temperature was increased to room temperature. Then, alkyl halide (4.5 mmol) was added and stirred for 15h. In completion, water was added (25 mL) and the pH of the mixture was adjusted to 5 to give the product as precipitate. The precipitate was collected by filtration and washed with water several times to give the pure product **5a-e**.

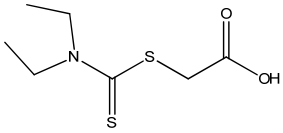
General procedure for synthesis of Ugi adducts 2a-h and 6a-n: In a 25 mL round bottom flask, an aldehyde (1 mmol), methanol (5 mL) and an amine (1 mmol) were added respectively. After 2h stirring at room temperature, an acid containing dithiocarbamate group **1** or an amino acid based dithiocarbamate **5** (1 mmol) was added. The mixture was stirred for 0.5h and then an isocyanide (1 mmol) was added. Progress of reaction was monitored by TLC (petroleum ether: ethylacetate; 70:30). After 24h, water (15 mL) was added to give a precipitate which was collected by filtration. After drying, the precipitate was treated several times with hot petroleum ether to remove unreacted starting materials. Finally, recrystalization in ethanol gave the pure products.

Typical procedure for synthesis of *bis*Ugi adduct 4: In a 25 mL round bottom flask, benzaldehyde (1 mmol), methanol (8 mL) and aniline (1 mmol) were added respectively. After 2h stirring at room temperature, *bis*dithiocaramate based on piperazine **3** (0.5 mmol) and

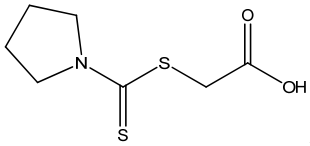
dimethyl sulfoxide (8 mL) were added. The mixture was stirred for 0.5h and then cyclohexyl isocyanide (1 mmol) was added. The temperature was increased to 50 °C and stirred for 24h. Then water (30 mL) was added to give a precipitate which was collected by filtration. After drying, the precipitate was recrystalized in ethanol to give the pure product 4 in 70% isolated yiled.

General procedure for synthesis of amides 7a-g: To a test tube equipped with a magnetic stirrer bar, an aminoacid based dithiocarbamate **5** (1 mmol) and an aniline derivative (1 mmol) were added. The reaction mixture was warmed to 100-110 °C with vigorous stirring. The progress of the reaction was checked by TLC (silicagel; ethylacetate/petroleum ether; 3:7). In completion (10h), the mixture was cooled to room temperature and cold methanol (3 mL) was added to give a precipitate. The precipitate was collected by filtration and washed several times with cold methanol to give pure product **7**.

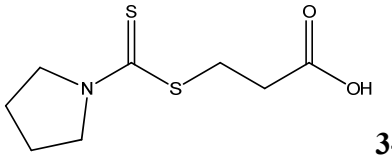
Characterization data for all compounds



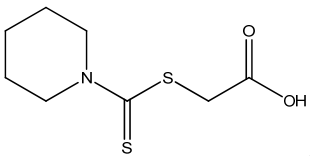
2-((diethylcarbamothioyl)thio)acetic acid (1a) : mp 91-92 °C; ^{1}H NMR (300 MHz, Chloroform-*d*) δ 1.30 (m, 6H), 3.76 (q, 2H, *J* =7.1Hz), 4.01 (q, 2H, *J* = 7.1 Hz), 4.20 (s, 2H), 11.04 (br, 1H); Anal calcd (%) for $C_7H_{13}NO_2S_2$: C, 40.55; H, 6.32; N, 6.76; Found: C, 40.21; H, 6.27; N, 6.83.



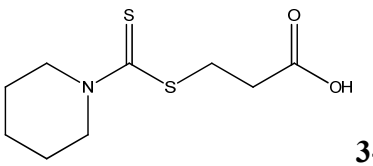
2-((pyrrolidine-1-carbonothioyl)thio)acetic acid (1b) :mp155-158 °C; ^{1}H NMR (300 MHz, Acetone-d_6) δ 1.99 (m, 2H), 2.12 (m, 2H), 3.68 (m, 2H) , 3.81(m, 2H), 4.19 (s, 2H); Anal calcd (%) for $C_7H_{11}NO_2S_2$: C, 40.95; H, 5.40; N, 6.82; Found: C, 41.07; H, 5.26; N, 6.89.



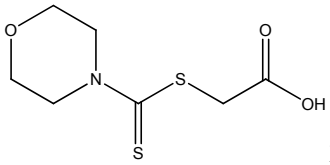
3-((pyrrolidine-1-carbonothioyl)thio)propanoic acid (1c): mp163-165°C; ^{1}H NMR (300 MHz, Chloroform-*d*) δ 2.03 (m, 2H), 2.13 (m, 2H), 2.93 (t, 2H, *J* =6.7 Hz), 3.60 (t, 2H, *J* =6.7 Hz), 3.68 (t, 2H, *J* =6.7 Hz), 3.97 (t, 2H, *J* =6.7 Hz); Anal calcd (%) for $C_8H_{13}NO_2S_2$: C, 43.81; H, 5.97; N, 6.39; Found: C, 43.88; H, 6.03; N, 6.60.



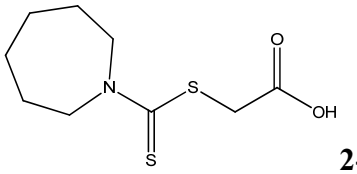
2-((piperidine-1-carbonothioyl)thio)acetic acid (1d): mp149-150 °C; ^{1}H NMR (300 MHz, Chloroform-*d*) δ 1.70 (m, 6H), 3.88 (br, 2H), 4.18 (s, 2H), 4.25 (br, 2H),10.73 (br, 1H); Anal calcd (%) for $C_8H_{13}NO_2S_2$: C, 43.81; H, 5.97; N, 6.39; Found: C, 43.65; H, 6.26; N, 6.52.



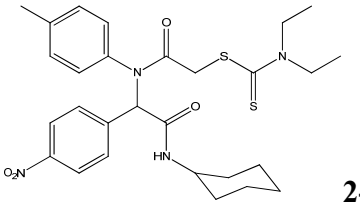
3-((piperidine-1-carbonothioyl)thio)propanoic acid (1e): mp100-102°C; ^{1}H NMR (300 MHz, Chloroform-*d*) δ 1.73 (m, 6H), 2.92 (t, 2H, *J*=6.8Hz), 3.61 (t, 2H, *J*=6.8Hz), 3.90 (s, 2H), 4.32 (s, 2H), 10.32 (br, 1H); Anal calcd (%) for $C_9H_{15}NO_2S_2$: C, 46.32; H, 6.48; N, 6.00; Found: C, 46.47; H, 6.57; N, 6.24.



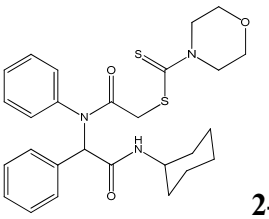
2-((morpholine-4-carbonothioyl)thio)acetic acid (1f) : mp169-171 °C; ^{1}H NMR (300 MHz, Chloroform-*d*) δ 3.84 (m, 4H), 4.01 (br, 2H), 4.26 (s, 2H), 4.36 (br, 2H); Anal calcd (%) for $C_7H_{11}NO_3S_2$: C, 37.99; H, 5.01; N, 6.33; Found: C, 37.99; H, 4.81; N, 6.35.



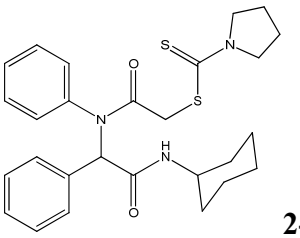
2-((azepane-1-carbonothioyl)thio)acetic acid (1g) :mp 148-149°C; ^{1}H NMR (300 MHz, Acetone-d_6) δ 1.62 – 1.50 (m, 4H), 1.85 (m, 4H), 3.96 (t, 2H, *J* = 6.1 Hz), 4.16 (t, 2H, *J*=6.1 Hz), 4.19 (s, 2H), 11.06 (br, 1H); Anal calcd (%) for $C_9H_{15}NO_2S_2$: C, 46.32; H, 6.48; N, 6.00; Found: C, 46.48; H, 6.51; N, 5.93.



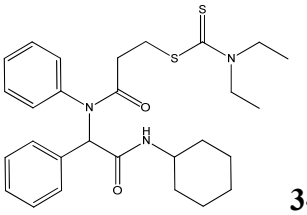
2-((2-(cyclohexylamino)-1-(4-nitrophenyl)-2-oxoethyl)(p-tolyl)amino)-2-oxoethyldiethylcarbamodithioate (2a): mp197-198°C; ^{1}H NMR (300 MHz, $CDCl_3$: δ (ppm) 1.23-1.35 (m, 11H), 1.60-1.74 (m, 3H), 1.91 (m, 1H), 2.00 (m, 1H), 2.31 (s, 3H), 3.65-3.83 (m, 5H), 3.95-4.02 (m, 2H), 6.18 (s, 1H), 6.71 (d, 1H, *J*=8.1Hz), 6.55-7.26 (m, 4H), 7.35 (d, 2H, *J*=8.7 Hz), 8.03 (d, 2H, *J*=8.7 Hz); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 11.5, 12.4, 21.1, 25.07, 25.1, 25.5, 32.8, 33.1, 40.9, 47.3, 49.1, 49.9, 65.1, 123.0, 129.2, 130.3, 131.6, 136.5, 139.3, 142.1, 147.3, 167.1, 168.3, 194.4; Anal calcd (%) for $C_{28}H_{36}N_4O_4S_2$: C, 60.41; H, 6.52; N, 10.06; Found: C, 60.56; H, 6.56; N, 10.09.



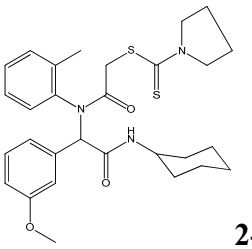
2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-2-oxoethyl morpholine-4-carbodithioate (2b): mp 201-205 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ (ppm) 1.02-1.38 (m, 5H), 1.57-1.72 (m, 3H), 1.84 (m, 2H), 3.74 (t, 4H, *J*=4.8Hz), 3.81-3.89 (m, 3H,), 3.94-4.24 (brs, 4H), 5.90 (d, 1H, *J*=8.1 Hz), 6.04 (s, 1H), 6.30-7.75 (m, 10H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 24.8, 24.9, 25.4, 32.8, 32.97, 41.2, 48.8, 51.2(2C), 65.9, 66.1 (2C), 128.2, 128.3, 128.6, 129.1, 130.3, 130.5, 134.3, 139.3, 167.4, 168.2, 196.6; Anal calcd (%) for $C_{27}H_{33}N_3O_3S_2$:C, 63.37; H, 6.50; N, 8.21; Found: C, 63.70; H, 6.48; N, 8.23.



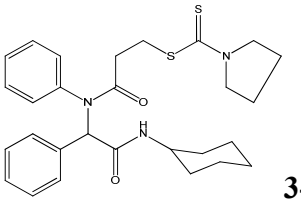
2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-2-oxoethyl pyrrolidine-1-carbodithioate (2c): mp 209-213 °C; IR (KBr): ν_{max} 3300, 2925, 1682, 1667, 1443, 1229, 711, 699 cm^{-1}; ^1H NMR (300 MHz, $CDCl_3$): δ (ppm) 1.08-1.50 (m, 5H), 1.58-1.74 (m, 3H), 1.91-2.10 (m, 6H), 3.69 (t, 2H, *J*=6.8Hz), 3.85-3.91 (m, 5H), 6.09 (s,1H), 6.11 (s, 1H), 6.30-8.05 (m, 10H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 24.3, 24.9, 25.0, 25.4, 26.1, 32.8, 32.9, 40.8, 48.8, 50.7, 55.1, 65.9, 128.1, 128.14, 128.5, 129.0, 130.2, 130.5, 134.4, 139.3, 167.7, 168.2, 191.5; Anal calcd (%) for $C_{27}H_{33}N_3O_2S_2$: C, 65.42; H, 6.71; N, 8.48; Found: C, 65.35; H, 6.80; N, 8.49.



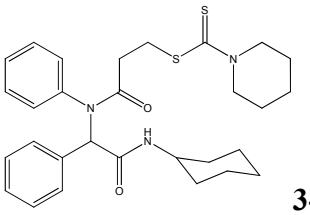
3-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-3-oxopropyl diethylcarbamodithioate (2d): mp 225-227°C; ^1H NMR (300 MHz, $CDCl_3$): δ (ppm) 1.03-1.37(m, 11H),1.59-1.93(m, 5H), 2.52 (t, 2H, *J*=6.7 Hz), 3.56 (t, 2H, *J*=6.7 Hz), 3.69 (q, 2H, *J*=7.2Hz),3.82(m,1H), 3.96(q, 2H, *J*=7.02Hz), 5.63 (d, 1H, *J*=8.3 Hz), 6.01 (s, 1H), 6.60-7.20(m, 10H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 11.6, 12.4, 24.7, 24.8, 25.4, 32.3, 32.77, 32.82, 34.8, 46.5, 48.7, 49.3, 65.3, 128.1, 128.2, 128.3, 128.9, 130.2, 130.4, 134.5, 139.5, 168.6, 172.0, 195.5; Anal calcd (%) for $C_{28}H_{37}N_3O_2S_2$: C, 65.72; H, 7.29; N, 8.21; Found: C, 66.20; H, 7.38; N, 8.37.



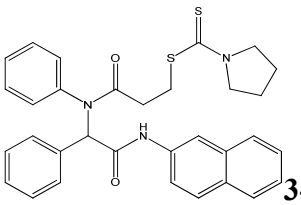
2-((2-(cyclohexylamino)-1-(3-methoxyphenyl)-2-oxoethyl)(o-tolyl)amino)-2-oxoethyl pyrrolidine-1-carbodithioate (2e): mp178.5-179 °C; IR (KBr): ν_{max} 3300, 2930, 2852, 1681, 1666, 1232, 735 cm^{-1}; ^1H NMR (300 MHz, $CDCl_3$): δ (ppm) 1.09-2.12 (m, 17H), 3.56 (s, 3H), 3.67-4.01 (m, 7H), 5.98 (s, 1H), 6.10 (d, 1H, *J*=8.0 Hz),6.57(s, 1H), 6.74(s, 1H), 6.77(s,1H),7.06(m, 2H), 7.21-7.27(m, 2H) 7.69(m, 1H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 17.7, 24.3, 24.9, 25.0, 25.5, 26.1, 32.7, 32.9, 40.8, 48.8, 50.6, 55.1, 55.2, 65.8, 115.1, 115.3, 123.3, 126.9, 128.8, 129.0, 130.4, 131.1, 134.6, 137.9, 137.9, 158.8, 167.9, 168.2, 191.4; Anal calcd (%) for $C_{29}H_{37}N_3O_3S_2$: C, 64.53; H, 6.91; N, 7.79; Found: C, 64.52; H, 6.97; N, 7.88.



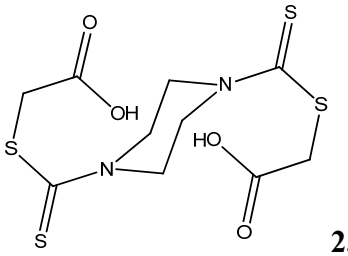
3-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-3-oxopropyl pyrrolidine-1-carbodithioate (2f): mp 282-283 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ (ppm) 0.99-1.18 (m, 3H), 1.33-1.41 (m, 2H), 1.55-1.70 (m, 3H), 1.83-2.20(m, 6H), 2.53 (t, 2H, *J*=6.6 Hz), 3.54-3.62 (m, 4H), 3.81-3.88 (m, 3H), 5.61 (d, 1H, *J*=8.0Hz), 6.03 (s, 1H), 6.55-7.80(m, 10H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 24.2, 24.7, 24.8, 25.4, 26.0, 31.6, 32.78, 32.82, 35.0, 48.7, 50.5, 54.9, 65.2, 128.1, 128.2, 128.3, 128.9, 130.3, 130.4, 134.4, 136.4, 168.6, 172.0, 192.7; Anal calcd (%) for $C_{28}H_{35}N_3O_2S_2$: C, 65.98; H, 6.92; N, 8.24; Found: C, 65.86; H, 6.63; N, 8.47.



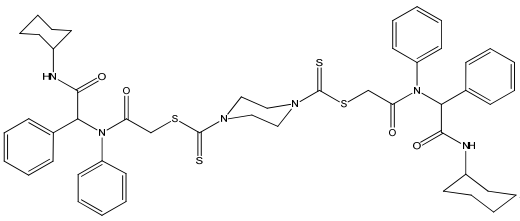
3-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-3-oxopropyl piperidine-1-carbodithioate (2g): mp 243-245.5 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ (ppm) 1.00-1.18 (m, 3H), 1.26-1.42(m, 2H), 1.55-1.66 (m, 9H), 1.83-1.98 (m, 2H), 2.53 (t, 2H, *J*=6.7 Hz), 3.58 (t, 2H, *J*=6.8 Hz), 3.76-3.87 (m, 3H), 4.22 (m, 2H), 5.63 (d, 1H, *J*=8.0 Hz), 6.02 (s, 1H), 6.55-7.98(m, 10H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 24.3, 24.7, 24.8, 25.5, 26.0 (2C), 32.3, 32.78, 32.82, 34.9, 48.7, 51.1, 52.8, 65.2, 128.0, 128.2, 128.3, 128.9, 130.2, 130.4, 134.4, 139.5, 168.6, 172.0, 195.6; Anal calcd (%) for $C_{29}H_{37}N_3O_2S_2$: C, 66.50; H, 7.12; N, 8.02; Found: C, 66.64; H, 7.10; N, 8.24.



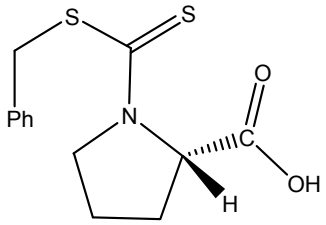
3-((2-(naphthalen-2-ylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-3-oxopropyl pyrrolidine-1-carbodithioate (2h): mp 234-236°C; IR (KBr): ν_{max} 3291, 1668, 1655, 1396, 698cm^{-1}; ^{1}H NMR (300 MHz, $CDCl_3$): δ (ppm) 1.85-1.93 (m, 4H), 2.63 (t, 2H, *J*=6.6 Hz), 3.36-3.65 (m, 4H), 3.81 (t, 2H, *J*=6.4 Hz), 6.40 (s,1H), 6.60-7.90 (m, 16H), 8.20 (s, 1H), 8.48 (s, 1H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 24.1, 25.8, 31.5, 35.0, 50.3, 54.8, 66.0, 116.4, 119.9, 124.7, 126.2 (2C), 127.3, 127.6, 128.3(2C), 128.4, 128.6, 129.1, 130.4, 133.5, 133.6, 135.3, 139.1(2C), 168.4, 172.6, 192.4; Anal calcd (%) for $C_{32}H_{31}N_3O_2S_2$: C, 69.41; H, 5.64; N, 7.59; Found: C, 69.56; H, 5.67; N, 7.59.



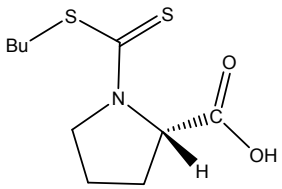
2,2'-((piperazine-1,4-bis(carbonothioyl))bis(sulfanediyl))diacetic acid (3): mp 225-227°C; ^{1}H NMR (300 MHz, Chloroform-*d*) δ 4.14 (s, 8H), 4.31 (s, 4H),12.78 (s, 2H).Anal calcd (%) for $C_{10}H_{14}N_2O_4S_4$: C, 33.88; H, 3.98; N, 7.90; Found: C, 33.64; H, 3.76; N, 7.75.



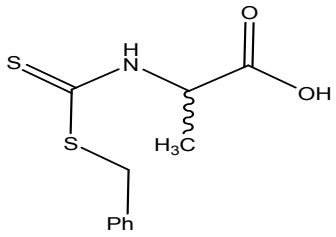
bis(2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-2-oxoethyl) piperazine-1,4-bis(carbodithioate)(4): mp 200-202°C; IR (KBr): ν_{max} 3257, 2927, 1647, 1407, 698 cm^{-1}; ^{1}H NMR (300 MHz, $CDCl_3$): δ (ppm) 1.06-2.01 (m, 20H), 3.80-3.98 (m, 6H),4.17-4.36(brs, 8H),5.92(d, 2H, *J*=8.1 Hz), 6.05 (s, 2H), 6.25-8.10 (m, 20H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 24.8, 24.9, 25.4, 32.8, 32.9, 41.4, 48.8, 48.9 (2C), 65.9, 128.2, 128.3, 128.5, 129.1, 130.2, 130.4, 134.2, 139.2, 167.1, 168.1, 196.8; Anal calcd (%) for $C_{50}H_{58}N_6O_4S_4$: C, 64.21; H, 6.25; N, 8.99; Found: C, 64.67; H, 6.29; N, 8.91.



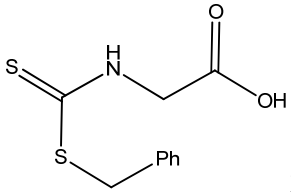
1-((benzylthio)carbonothioyl)pyrrolidine-2-carboxylic acid (5a) :mp125-127 °C; ^{1}H NMR (300 MHz, Acetone-d_6) δ 2.06 – 2.19 (m, 3H), 2.32 – 2.50 (m, 1H), 3.69 – 3.92 (m, 2H), 4.55 (m, 2H), 5.05(m, 1H), 7.25 – 7.43 (m, 5H), 11.26 (brs, 1H); Anal calcd (%) for $C_{13}H_{15}NO_2S_2$: C, 55.49; H, 5.37; N, 4.98; Found: C, 55.77; H, 5.29; N, 5.18.



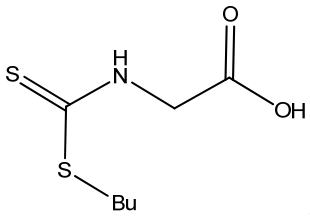
1-((butylthio)carbonothioyl)pyrrolidine-2-carboxylic acid (5b) : mp 98-100°C; ^{1}H NMR (300 MHz, Chloroform-*d*) δ 0.97 (t, 3H, *J*=7.3Hz), 1.48 (m, 2H, *J*=7.3Hz), 1.73 (m, 2H, *J*=7.5Hz), 2.29 (m, 4H),3.32 (m, 2H), 3.77 (m, 1H), 3.88(m, 1H), 5.20 (t, 1H, *J* =5.1Hz),10.73 (brs, 1H). Anal calcd (%) for $C_{10}H_{17}NO_2S_2$: C, 48.55; H, 6.93; N, 5.66; Found: C, 48.69; H, 6.85; N, 5.83.



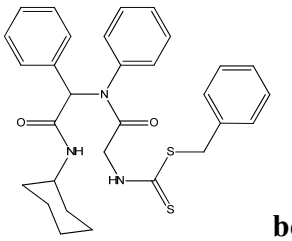
2-(((benzylthio)carbonothioyl)amino)propanoic acid (5c) :mp146-148 °C; ^{1}H NMR (300 MHz, Chloroform-*d*) δ 1.63 (d, 3H, *J* = 7.2 Hz), 4.57 (s, 2H), 5.29 (q, 1H, *J*=7.0 Hz),7.30 – 7.42 (m, 5H) ; Anal calcd (%) for $C_{11}H_{13}NO_2S_2$: C, 51.74; H, 5.13; N, 5.49; Found: C, 51.78; H, 4.95; N, 5.24.



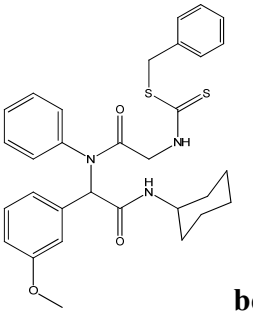
2-(((benzylthio)carbonothioyl)amino)acetic acid (5d):mp165-167 °C;^{1}H NMR (300 MHz, Methanol-d_4) δ 4.39 (s, 2H), 4.52 (s, 2H),7.21 – 7.36 (m, 5H); Anal calcd (%) for $C_{10}H_{11}NO_2S_2$: C, 49.77; H, 4.59; N, 5.80; Found: C, 49.55; H, 4.47; N, 5.65.



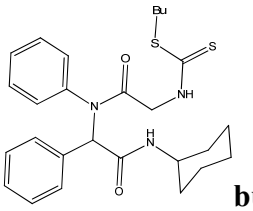
2-(((butylthio)carbonothioyl)amino)acetic acid (5e) : mp86-87 °C; ^{1}H NMR (300 MHz, Chloroform-*d*) δ 0.93 (t, 3H, *J* = 7.3Hz), 1.43 (m, 2H),, 1.67 (m, 2H), 3.27 (t, 2H, *J* = 7.3 Hz), 4.57 (d, 2H, *J*= 4.6Hz), 7.32 (brs, 1H), 8.80 (brs, 1H); Anal calcd (%) for $C_7H_{13}NO_2S_2$: C, 40.55; H, 6.32; N, 6.76; Found: C, 40.50; H, 6.23; N, 6.60.



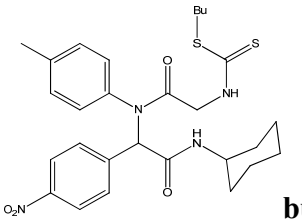
benzyl(2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-2-oxoethyl)carbamodithioate (6a): mp 217-219°C; ^{1}H NMR (300 MHz, $CDCl_3$): δ (ppm) 0.95-1.16 (m, 3H), 1.31-1.37 (m, 2H), 1.56-1.68 (m, 3H), 1.82-1.97 (m, 2H), 3.83 (m, 1H), 4.09 (s, 2H), 4.48 (s, 2H), 5.43 (d, 1H, *J*=8.0 Hz), 5.97(s, 1H), 6.30-7.90 (m, 15H), 8.04 (s, 1H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 24.7, 24.8, 25.3, 32.7, 32.8, 39.8, 48.9, 49.4, 65.9, 127.3, 128.4, 128.5, 128.7, 129.0(2C), 129.3, 130.0, 130.3, 133.6, 136.2, 137.4, 167.8(2C), 196.7; Anal calcd (%) for $C_{30}H_{33}N_3O_2S_2$: C, 67.76; H, 6.26; N, 7.90; Found: C, 67.83; H, 6.23; N, 7.90.



benzyl(2-((2-(cyclohexylamino)-1-(3-methoxyphenyl)-2-oxoethyl)(phenyl)amino)-2-oxoethyl)carbamodithioate (6b): mp177-178 °C; IR(KBr):ν_{max}3275, 2929, 1651, 1492, 699 cm^{-1} ;^{1}H NMR (300 MHz, $CDCl_3$): δ (ppm) 0.98-1.13 (m, 3H), 1.31-1.33 (m, 2H),1.61-1.69 (m,3H), 1.83-1.96 (m,2H), 3.63 (s,3H), 3.82 (m, 1H), 4.11 (s, 2H), 4.48 (s, 2H), 5.51 (d, 1H, *J*=7.9Hz), 5.95 (s, 1H),6.59 (s, 1H), 6.70(d, 1H, *J*=7.5 Hz,),6.77(dd, 1H, *J*=8.2Hz, *J*=2.0Hz) 7.12 (t, 1H, *J*=7.9Hz),7.27-7.90 (m, 10H), 8.09 (s, 1H).^{13}C NMR (75 MHz, $CDCl_3$) 24.7, 24.8, 25.4, 32.7, 32.8, 39.8, 48.9, 49.4, 55.1, 65.8, 114.8, 115.4, 122.6, 127.4, 128.5, 129.0, 129.05, 129.4, 129.5, 130.1, 134.9, 136.3, 137.5, 159.4, 167.7, 167.8, 196.7; Anal calcd (%) for $C_{31}H_{35}N_3O_3S_2$: C, 66.28; H, 6.28; N, 7.48; Found: C, 66.18; H, 6.28; N, 7.51.

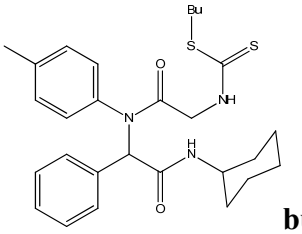


butyl(2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-2-oxoethyl)carbamodithioate (6c): mp 212-213°C; IR (KBr): ν_{max} 3328, 3266, 2927, 2852, 1647, 1405, 699cm^{-1}; ^{1}H NMR (300 MHz, $CDCl_3$): δ (ppm) 0.91 (t, 3H, *J*=7.3Hz), 1.00-1.17 (m, 3H), 1.28-1.47 (m, 4H), 1.58-1.66 (m, 5H), 1.84-1.98 (m, 2H), 3.20 (t, 2H, *J*=7.3 Hz), 3.84 (m, 1H), 4.10 (t, 2H, *J*=3.7Hz), 5.43 (d, 1H, *J*=8.0Hz), 5.99 (s, 1H), 6.20-7.91 (m, 10H), 8 (s, 1H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 13.6, 21.9, 24.7, 24.8, 25.4, 30.9, 32.79, 32.85, 35.1, 48.9, 49.3, 65.9, 128.5, 128.8, 129.0, 129.4, 130.1, 130.3, 133.6, 137.4, 167.8, 167.9, 197.6; Anal calcd (%) for $C_{27}H_{35}N_3O_2S_2$: C, 65.16; H, 7.09; N, 8.44; Found: C, 65.27; H, 7.15; N, 8.58.

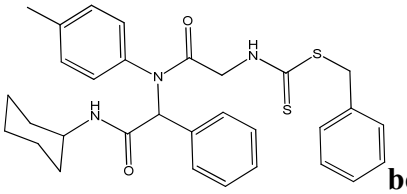


butyl(2-((2-(cyclohexylamino)-1-(4-nitrophenyl)-2-oxoethyl)(p-tolyl)amino)-2-oxoethyl)carbamodithioate (6d): mp 212-214°C; IR (KBr): ν_{max} 3322, 2930, 1652, 1525, 1346, 1107cm^{-1}; ^{1}H NMR (300 MHz, $CDCl_3$): δ (ppm) 0.92 (t, 3H, *J*=7.3Hz), 1.07-1.22 (m, 3H),1.33-1.45 (m, 4H), 1.59-1.71 (m, 5H),1.85-1.89 (m, 2H), 2.31 (s, 3H), 3.21 (t, 2H, *J*=7.3 Hz), 3.84 (m, 1H), 4.11 (t, 2H, *J*=3.5 Hz), 5.77 (d, 1H, *J*=8.0 Hz), 6.05 (s, 1H), 6.25-7.35 (m, 4H), 7.35(d, 2H, *J*=8.7 Hz), 7.87(s, 1H), 8.06(d, 2H, *J*=8.7 Hz); ^{13}C NMR (75 MHz, $CDCl_3$):

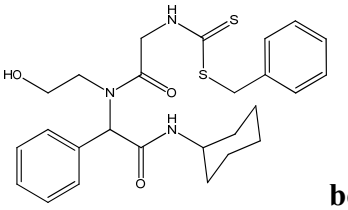
δ (ppm) 13.6, 21.2, 21.9, 24.7, 24.8, 25.3, 30.9, 32.8, 32.9, 35.2, 49.2 (2C), 64.7, 123.4, 129.3, 130.4, 131.3, 134.2, 139.7, 140.8, 147.7, 166.9, 168.5, 198.3; Anal calcd (%) for $C_{28}H_{36}N_4O_4S_2$: C, 60.41; H, 6.52; N, 10.06; Found: C, 60.37; H, 5.86; N, 10.23.



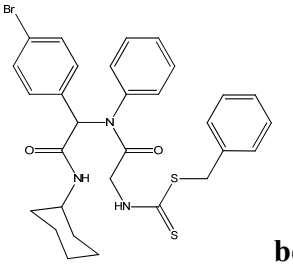
butyl(2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(p-tolyl)amino)-2-oxoethyl)carbamodithioate (6e): mp176-180 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ (ppm) 0.92 (t, 3H, *J*=7.3 Hz), 1.03-1.16 (m, 3H), 1.37-1.45 (m, 5H), 1.54-1.70 (m, 4H), 1.85-1.95 (m, 2H), 2.29 (s, 3H), 3.19 (t, 2H, *J*=7.3 Hz), 3.84 (m, 1H), 4.09 (s, 2H), 5.40 (d, 1H, *J*=8.0 Hz), 5.96 (s, 1H), 6.25-7.75(m, 9H), 8.02(s, 1H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 13.6, 21.2, 21.9, 24.7, 24.8, 25.4, 30.9, 32.8, 32.85, 35.1, 48.9, 49.2, 66.0, 128.5, 128.7, 129.6, 130.0, 130.3, 133.7, 134.8, 139.0, 167.8, 168.1, 197.5; Anal calcd (%) for $C_{28}H_{37}N_3O_2S_2$: C, 65.72; H, 7.29; N, 8.21;Found: C, 65.69; H, 7.46; N, 8.35.



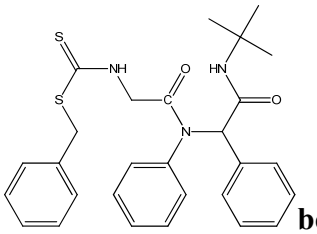
benzyl(2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(p-tolyl)amino)-2-oxoethyl)carbamodithioate (6f): mp 200-202 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ (ppm) 0.94- 1.16 (m, 3H), 1.26-1.41 (m, 2H), 1.56-1.70 (m, 3H), 1.83-1.96 (m, 2H), 2.29 (s, 3H), 3.82 (m, 1H), 4.10 (d, 2H, *J*=3.6 Hz), 4.48 (s, 2H), 5.45 (d, 1H, *J*=7.9 Hz), 5.96 (s, 1H), 6.50-7.95 (m, 14H), 8.09(s, 1H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 21.1, 24.7, 24.8, 25.4, 32.77, 32.82, 39.9, 48.9, 49.4, 66.0, 127.3, 128.50, 128.53, 128.7, 129.0, 129.65, 130.0, 130.34, 133.7, 134.7, 136.2, 139.0, 167.8, 167.9, 196.6; Anal calcd (%) for $C_{31}H_{35}N_3O_2S_2$: C, 68.22; H, 6.46; N, 7.70; Found: C, 68.69; H, 6.59; N, 7.87.



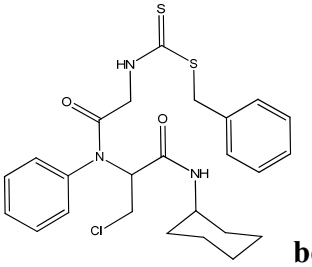
benzyl (2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(2-hydroxyethyl)amino)-2-oxoethyl)carbamodithioate (6g): mp103-105°C; IR(KBr): ν_{max} 3316, 2929, 1649, 1452, 701cm^{-1}; ^{1}H NMR (300 MHz, $CDCl_3$): δ (ppm) 0.84-1.95(m, 10H), 3.01(d, 1H, *J*=15.4 Hz), 3.25-4.54(m, 6H), 4.54(s, 2H), 4.70(s, 1H), 5.62(m, 2H), 6.85-7.45(m, 10H), 8.17 (s,1H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 24.6, 24.7, 25.3, 32.6 (2C), 39.9, 47.1, 49.2, 49.2, 59.4, 64.6, 127.4, 128.5, 129.0, 129.33, 129.4, 129.8, 133.1, 136.3, 169.0, 169.7, 196.7 .Anal calcd (%) for $C_{26}H_{33}N_3O_3S_2$: C, 62.49; H, 6.66; N, 8.41; Found: C, 62.22; H, 6.90; N, 7.99.



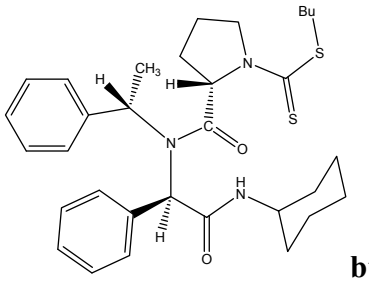
benzyl(2-((1-(4-bromophenyl)-2-(cyclohexylamino)-2-oxoethyl)(phenyl)amino)-2-oxoethyl)carbamodithioate (6h): mp199-200 °C; IR(KBr): ν_{max} 3263, 2930, 1653, 1491, 1402, 700 cm^{-1}; ^1H NMR (300 MHz, $CDCl_3$): δ (ppm) 0.95-1.18 (m, 3H), 1.25-1.41(m, 2H), 1.57-1.72(m, 3H), 1.82-1.96(m, 2H), 3.81 (m, 1H), 4.09(s, 2H), 4.48 (s, 2H), 5.48 (d, 1H, *J*=8.0 Hz), 5.91 (s, 1H), 6.50-7.80 (m, 14H), 7.98 (s, 1H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 24.7, 24.8, 25.4, 32.8, 32.9, 39.9, 49.0, 49.4, 65.1, 123.2, 127.4, 128.5, 129.0, 129.3, 129.6, 130.0, 131.7, 131.9, 132.6, 136.3, 137.2, 167.4, 167.9, 196.9; Anal calcd (%) for $C_{30}H_{32}BrN_3O_2S_2$: C, 59.01; H, 5.28; N, 6.88; Found: C, 58.93; H, 5.31; N, 6.93.



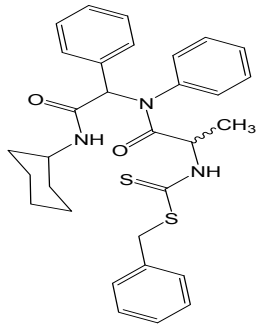
benzyl(2-((2-(tert-butylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-2-oxoethyl)carbamodithioate (6i): mp190-191°C; IR (KBr): ν_{max} 3298, 1654, 1594, 1555, 1408, 699, 694 cm^{-1}; ^1H NMR (300 MHz, $CDCl_3$): δ (ppm) 1.34 (s, 9H), 4.10 (m, 2H), 4.48 (s, 2H), 5.39 (s, 1H), 5.90 (s, 1H), 6.10-7.85 (m, 15H), 8.05 (s, 1H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 28.6, 39.9, 49.5, 51.8, 66.3, 127.4, 128.5, 128.7, 129.0, 129.3, 130.1(2C), 130.3,132.6, 133.7, 136.3, 137.3, 167.6, 167.9, 196.6; Anal calcd (%) for $C_{28}H_{31}N_3O_2S_2$: C, 66.50; H, 6.18; N, 8.31; Found: C, 66.60; H, 6.19; N, 8.37.



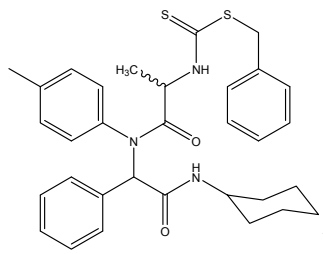
benzyl(2-((3-chloro-1-(cyclohexylamino)-1-oxopropan-2-yl)(phenyl)amino)-2-oxoethyl)carbamodithioate (6j): mp170-175 °C; ^1H NMR (300 MHz, $CDCl_3$):δ(ppm) 1.17-1.44 (m, 5H), 1.60-1.75(m, 3H), 1.87-1.97(m, 2H), 3.40 (t, 1H, *J*=11.3Hz), 3.77 (m, 1H), 3.86 (dd, 1H, *J*=12.2 and 4.4 Hz) 4.10 (m, 2H), 4.50 (s, 2H), 5.36 (dd, 1H, *J*=10.3 and 4.4 Hz), 6.41 (d, 1H, , *J*=8.0 Hz), 7.24-7.47 (m, 10H), 8.07 (s, 1H); ^{13}C NMR (75 MHz, $CDCl_3$): δ(ppm) 24.8, 24.83, 25.4, 32.8, 32.9, 40.0, 40.5, 48.7, 49.3, 60.9, 127.5, 128.5, 129.0(2C), 130.1, 130.1, 135.5, 136.2, 166.8, 169.3, 198.0; Anal calcd (%) for $C_{25}H_{30}ClN_3O_2S_2$: C, 59.56; H, 6.00; N, 8.34; Found: C, 59.34; H, 5.97; N, 8.14.



butyl 2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)((S)-1-phenylethyl)carbamoyl) pyrrolidine-1-carbodithioate (6k): mp 193-195 °C; IR (KBr): ν_{max} 3414, 2927, 2849, 1669, 1656, 1433, 1148, 956, 708 cm^{-1}; ^1H NMR (300 MHz, $CDCl_3$): δ (ppm) 0.94 (t, 3H, *J*=7.3Hz), 1.12-1.32(m, 5H), 1.38-1.78(m,12H),1.93-2.31(m, 4H), 3.20(m, 1H), 3.39 (m, 1H), 3.48(m, 1H), 3.75(m, 1H), 3.85(m, 1H), 4.69 (s, 1H), 5.72 (m, 2H), 6.91(d, 1H, *J*=7.8Hz), 7.20-7.40 (m, 8H),7.73-7.76 (m,2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 13.6, 18.3, 22.0, 24.4, 24.6, 24.8, 25.6, 28.8, 30.9, 32.1, 32.5, 36.4, 48.2, 51.1, 56.2, 64.3, 65.0, 126.9, 127.1, 128.0, 128.63, 128.68, 128.7, 137.3, 137.9, 167.8, 170.3, 195.0; Anal calcd (%) for $C_{32}H_{43}N_3O_2S_2$: C, 67.93; H, 7.66; N, 7.43; Found: C, 68.10; H, 7.98; N, 7.44.

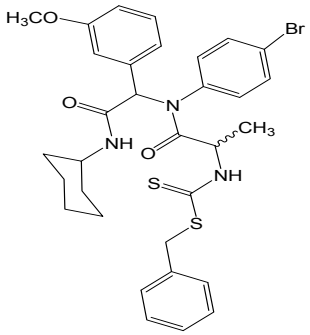


benzyl (1-((2-(cyclohexylamino)-1-phenyl-2-thioxoethyl)(phenyl)amino)-1-oxopropan-2-yl)carbamodithioate (6l): mp186-187.8°C; IR (KBr): ν_{max} 3326, 3242, 2930, 1680, 1622, 698 cm^{-1} ; ^1H NMR (300 MHz, $CDCl_3$): δ (ppm) 0.96-1.95 (m, 13H), 3.84 (m, 1H), 4.47 (s, 2H), 5.02 (t, 1H, *J*= 6.8 Hz), 5.50 (d, 1H, *J*=7.7 Hz), 6.13 (s, 1H), 6.40-7.35 (m, 15H), 7.77 (d, 1H, *J*= 6.8 Hz); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 17.6, 24.7, 24.8, 25.4, 32.8 (2C), 39.8, 48.9, 53.7, 65.0, 127.4, 128.3, 128.4, 128.5, 128.6, 128.7, 128.9, 129.1, 130.4, 133.6, 136.2, 137.7, 168.2, 172.0, 196.4; Anal calcd (%) for $C_{31}H_{35}N_3OS_2$: C, 68.22; H, 6.46; N, 7.70; Found: C, 68.26; H, 6.73; N, 7.70.

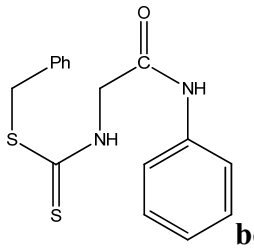


benzyl(1-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(p-tolyl)amino)-1-oxopropan-2-yl)carbamodithioate (6m): mp190-193 °C; ^1H NMR (300 MHz, $CDCl_3$): δ (ppm) 1.01-1.16 (m, 3H), 1.27-1.42(m, 5H), 1.54-1.97 (m, 5H), 2.27 (s, 3H), 3.85 (m,

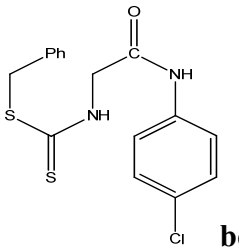
1H), 4.48 (s, 2H), 5.03 (m, 1H), 5.48 (d, 1H, *J*=8.0 Hz), 6.11 (s, 1H), 6.25-7.70 (m, 14H), 7.75 (d, 1H, *J*=7.14 Hz); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 17.7, 21.1, 24.7, 24.8, 25.4, 32.9 (2C), 39.9, 48.8, 53.6, 65.1, 127.4, 128.3, 128.5, 128.58, 129.0, 129.6, 130.1, 130.4, 133.7, 135.0, 136.2, 138.6, 168.2, 172.2, 196.3; Anal calcd (%) for $C_{32}H_{37}N_3O_2S_2$: C, 68.66; H, 6.66; N, 7.51; Found: C, 68.41; H, 6.57; N, 7.45.



benzyl(1-((4-bromophenyl)(2-(cyclohexylamino)-1-(3-methoxyphenyl)-2-oxoethyl)amino)-1-oxopropan-2-yl)carbamodithioate (6n): mp184-187 °C; ^{1}H NMR (300 MHz, $CDCl_3$): δ (ppm) 0.99-1.15 (m, 3H), 1.30-1.32(m, 5H), 1.55-1.70 (m, 3H), 1.85-1.94 (m, 2H), 3.64 (s, 3H), 3.80 (m, 1H), 4.47 (s, 2H), 4.96 (m, 1H), 5.40 (d, 1H, *J*=7.9 Hz), 6.11 (s, 1H), 6.40-7.60 (m, 14H); ^{13}C NMR (75 MHz, $CDCl_3$): δ (ppm) 17.6, 24.7, 24.8, 25.4, 32.8 (2C), 39.9, 49.0, 53.6, 55.2, 64.5, 109.9, 114.7, 115.6, 122.7, 122.9, 127.4, 128.6, 129.0, 129.5, 132.0, 132.4, 134.6, 136.7, 159.4, 168.0, 171.8, 196.8; Anal calcd (%) for $C_{32}H_{36}BrN_3O_3S_2$: C, 58.71; H, 5.54; N, 6.42; Found: C,58.31; H,5.45; N,6.27.

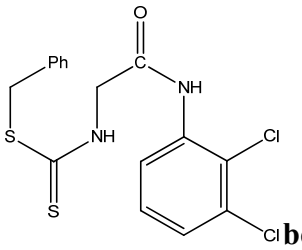


benzyl (2-oxo-2-(phenylamino)ethyl)carbamodithioate (7a): mp190-191°C; ^{1}H NMR (300 MHz, Acetone-d_6): δ (ppm) 4.43 (d, 2H, *J* = 4.2 Hz), 4.50 (s, 2H), 7.04 (t, 1H, *J* = 7.2 Hz), 7.15 – 7.45 (m, 7H), 7.58 (d, 2H, *J* = 8.0Hz), 10.16 (s, 1H), 10.25 (s, 1H); ^{13}C NMR (75 MHz, Acetone-d_6): δ (ppm) 38.5, 49.6, 119.0, 123.3, 127.2, 128.4, 128.8, 128.9, 137.04, 138.8, 165.8, 197.5; Anal calcd (%) for $C_{16}H_{16}N_2OS_2$: C, 60.73; H, 5.10; N, 8.85; Found: 60.89; H, 5.14; N, 8.89.

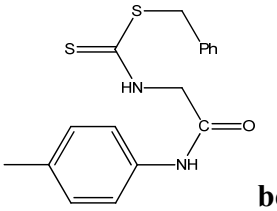


benzyl (2-((4-chlorophenyl)amino)-2-oxoethyl)carbamodithioate (7b): mp 208-209 °C; ^{1}H NMR (300 MHz, DMSO-d_6): δ (ppm) 4.42 (d, 2H, *J* = 5.5 Hz), 4.49 (s, 2H),

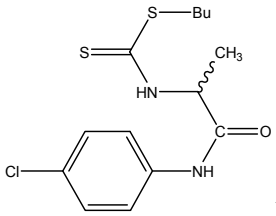
7.21 – 7.37 (m, 7H),7.60 (d, *J* =8.8 Hz, 2H), 10.27 (t, 1H, *J* = 6.0 Hz), 10.30 (s, 1H); ^{13}C NMR (75 MHz, DMSO-d_6) δ (ppm) 38.9, 50.0, 120.9, 127.2, 127.6, 128.9, 129.1, 129.4, 137.4, 138.2, 166.4, 198.1; Anal calcd (%) for $C_{16}H_{15}ClN_2OS_2$: C, 54.77; H, 4.31; N, 7.98; Found: C, 54.72; H, 4.16; N, 7.98.



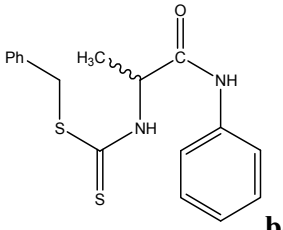
benzyl(2-((2,3-dichlorophenyl)amino)-2-oxoethyl)carbamodithioate (7c): mp166-167 °C; ^{1}H NMR (300 MHz, DMSO -d_6) δ (ppm) 4.43 (d, 2H, *J* = 4.8 Hz), 4.49 (s, 2H), 7.21-7.37 (m, 5H), 7.46 (dd,1H, *J* = 8.8 and 2.3 Hz), 7.57 (d, 1H, *J* =8.8 Hz), 7.96 (d, 1H, *J* =2.2 Hz), 10.47 (s, 1H), 10.30 (s, 1H); ^{13}C NMR (75 MHz, DMSO-d_6) δ (ppm) 38.5, 49.6, 119.0, 120.1, 124.7, 127.2, 128.4, 128.9, 130.7, 131.0, 136.9, 138.8, 166.4, 197.8; Anal calcd (%) for $C_{16}H_{14}Cl_2N_2OS_2$: C, 49.87; H, 3.66; N, 7.27; Found: C, 50.05; H, 3.48; N, 7.27.



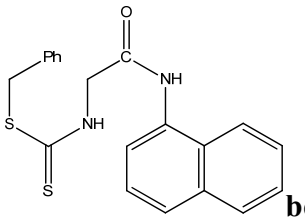
benzyl(2-oxo-2-(p-tolylamino)ethyl)carbamodithioate (7d): mp194-195°C; ^{1}H NMR (300 MHz, DMSO-d_6) δ (ppm) 2.23 (s, 3H), 4.42 (d, 2H, *J*= 5.2 Hz), 4.50 (s, 2H), 7.10 (d, *J*= 8.3 Hz, 2H), 7.21 – 7.38 (m, 5H), 7.46 (d, 2H, *J*= 8.5 Hz), 10.07 (s, 1H),10.24 (m, 1H); ^{13}C NMR (75 MHz, DMSO-d_6) δ (ppm) 20.4, 38.4, 49.6, 119.0, 127.2, 128.4, 128.9, 129.1, 132.2, 136.3, 137.0, 165.5, 197.4; Anal calcd (%) for $C_{17}H_{18}N_2OS_2$: C, 61.79; H, 5.49; N, 8.48; Found: C, 61.30; H, 5.29; N, 8.55.



butyl(1-((4-chlorophenyl)amino)-1-oxopropan-2-yl)carbamodithioate (7e): mp188-189 °C; ^{1}H NMR (300 MHz, DMSO-d_6) δ (ppm) 0.86 (t, 3H, *J*=7.3 Hz),1.27–1.45 (m, 5H), 1.55 (m, 2H), 3.15 (t, 2H, *J* =7.3 Hz), 4.99 (m, 1H, *J*=7.5 Hz), 7.34 (d, 2H, *J*= 8.5 Hz), 7.61 (d, 2H, *J*=8.5 Hz), 10.14 (d, 1H, *J*= 6.3 Hz), 10.28 (s, 1H); ^{13}C NMR (75 MHz, DMSO-d_6) δ (ppm) 13.5, 17.5, 21.5, 30.9, 33.9, 56.3, 120.6, 126.8, 128.6, 137.9, 170.1, 197.4; Anal calcd (%) for $C_{14}H_{19}ClN_2OS_2$: C, 50.82; H, 5.79; N, 8.47; Found: C, 50.74; H, 5.57; N, 8.60.

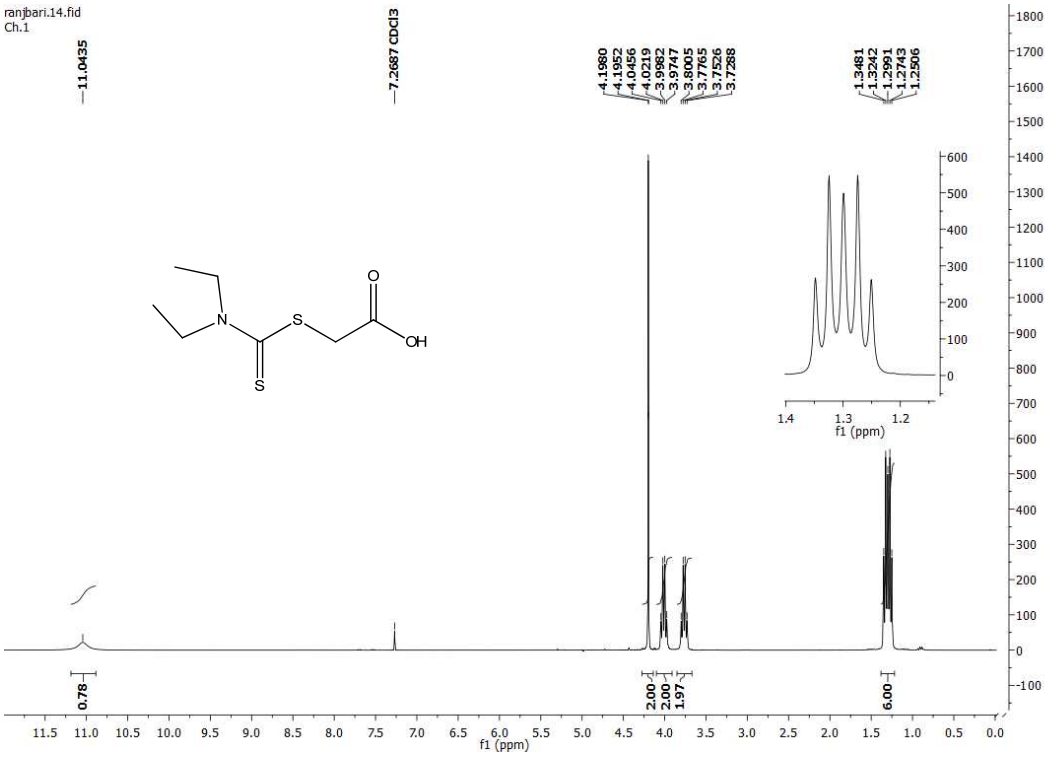


benzyl (1-oxo-1-(phenylamino)propan-2-yl)carbamodithioate (7f): mp173-174°C; ^{1}H NMR (300 MHz, Acetone-d_6) δ (ppm) 1.53 (d, 3H, *J* =7.0 Hz), 4.54 (s, 2H), 5.22 (m, 1H), 7.06 (t, 1H, *J* = 7.4 Hz), 7.23 – 7.32 (m, 5H), 7.40 (d, 2H, *J* =7.3 Hz), 7.64 (d, 2H, *J* = 8.1 Hz), 9.07 (s, 1H), 9.40 (s, 1H); ^{13}C NMR (75 MHz, Acetone-d_6) δ (ppm) 17.8, 39.8, 57.4, 120.2, 124.4, 128.0, 129.2, 129.5, 129.8, 137.9, 139.7, 170.2, 198.3; Anal calcd (%) for $C_{17}H_{18}N_2OS_2$: C, 61.79; H, 5.49; N, 8.48; Found: C, 61.56; H, 5.58; N, 8.62.

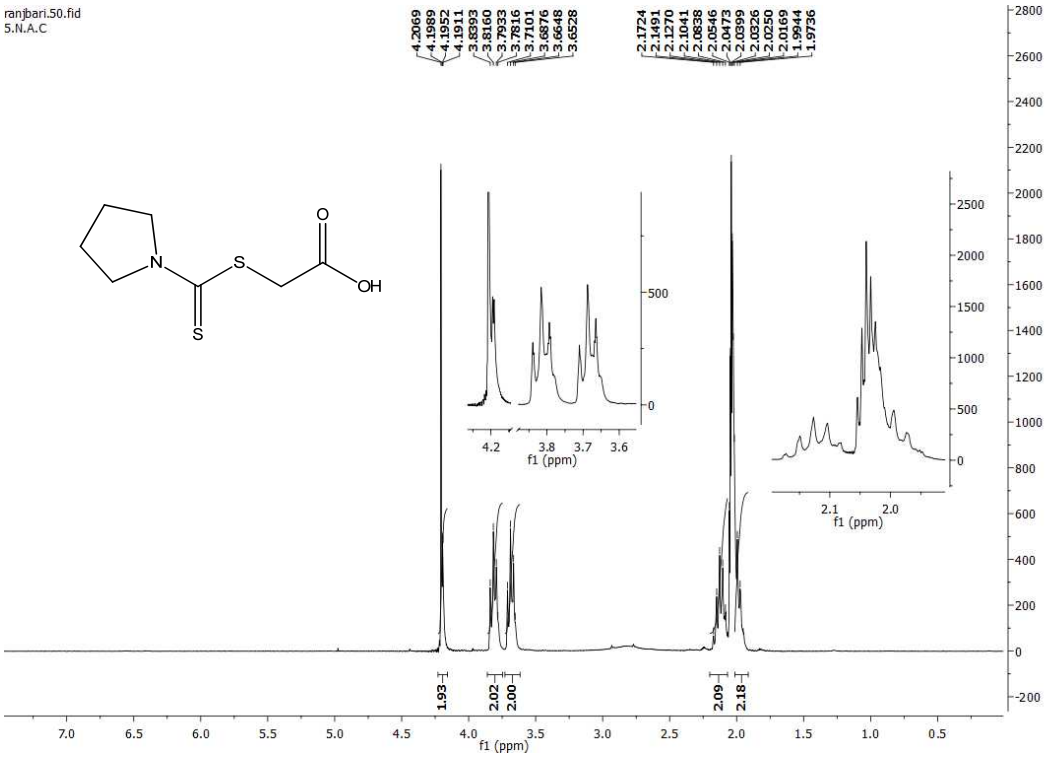


benzyl (2-(naphthalen-1-ylamino)-2-oxoethyl)carbamodithioate (7g): mp151-152 °C; ^{1}H NMR (300 MHz, DMSO-d_6) δ (ppm) 4.52 (s, 2H), 4.59 (s, 2H), 7.24 – 7.39 (m, 5H), 7.44 – 7.55 (m, 3H), 7.64 (d, 1H, *J* = 7.3 Hz), 7.78 (d, 1H, *J* = 8.0 Hz), 7.93 (m, 1H), 8.12 (m, 1H), 10.12 (s, 1H),10.30 (s, 1H); ^{13}C NMR (75 MHz, DMSO-d_6) δ (ppm) 38.5, 49.5, 121.7, 122.9, 125.4, 125.5, 125.8, 126.0, 127.2, 127.8, 128.0, 128.4, 128.9, 133.2, 133.6, 137.0, 166.7, 197.5; Anal calcd (%) for $C_{20}H_{18}N_2OS_2$: C, 65.54; H, 4.95; N, 7.64; Found: C, 65.16; H, 4.78; N, 7.54.

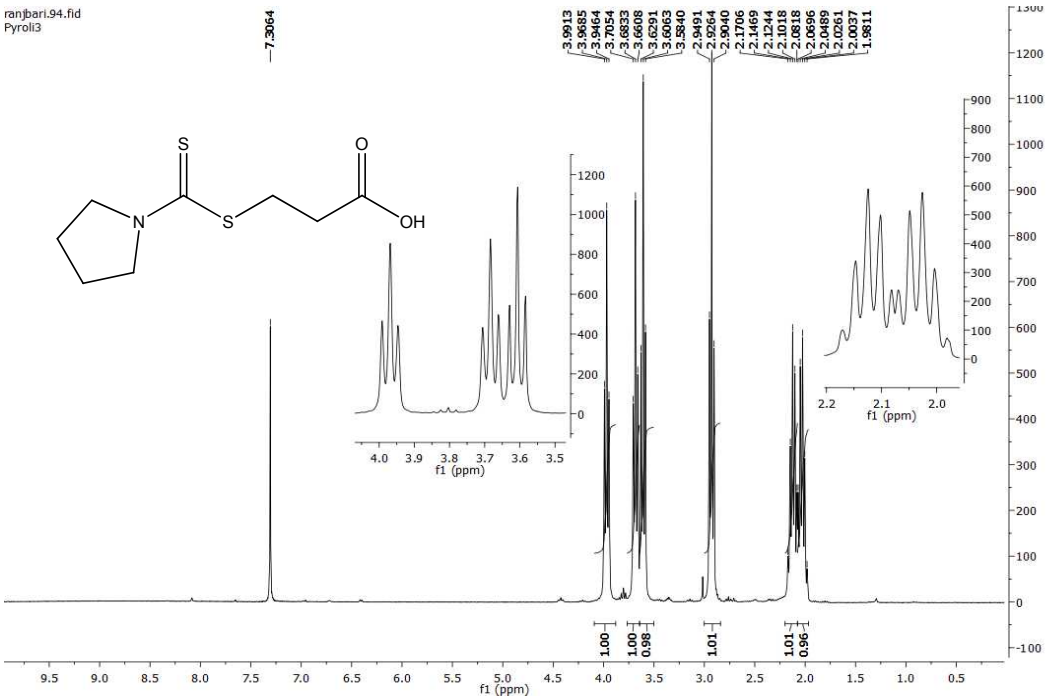
2-((diethylcarbamothioyl)thio)acetic acid **(1a)**



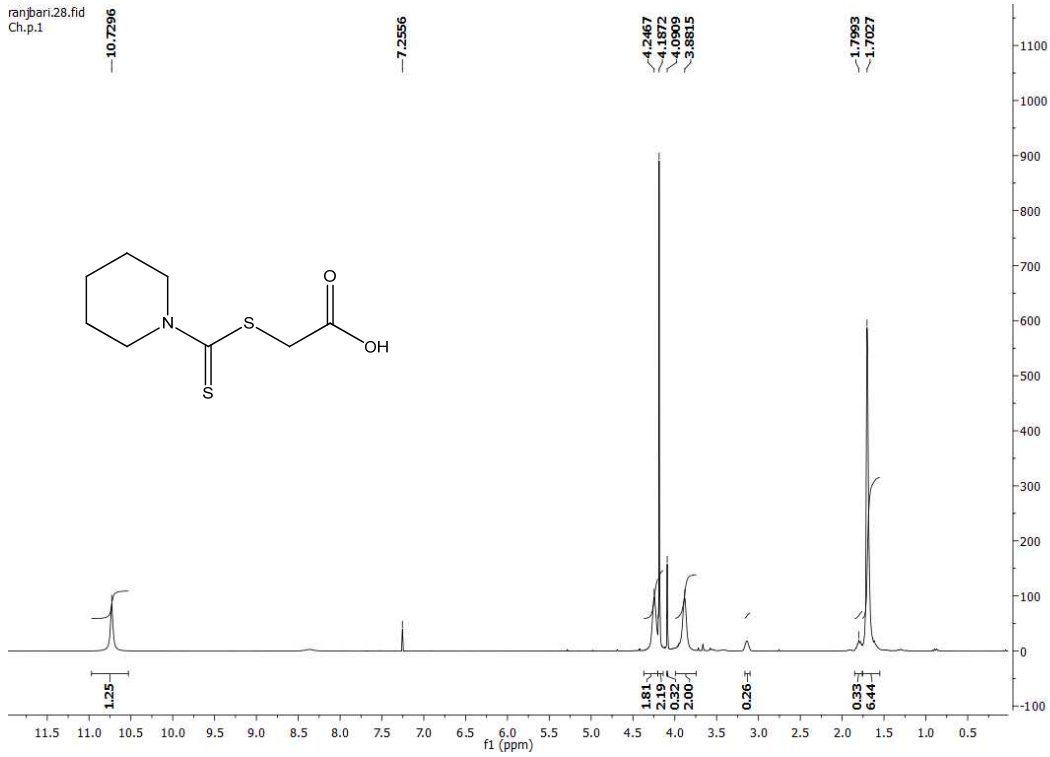
2-((pyrrolidine-1-carbonothioyl)thio)acetic acid **(1b)**



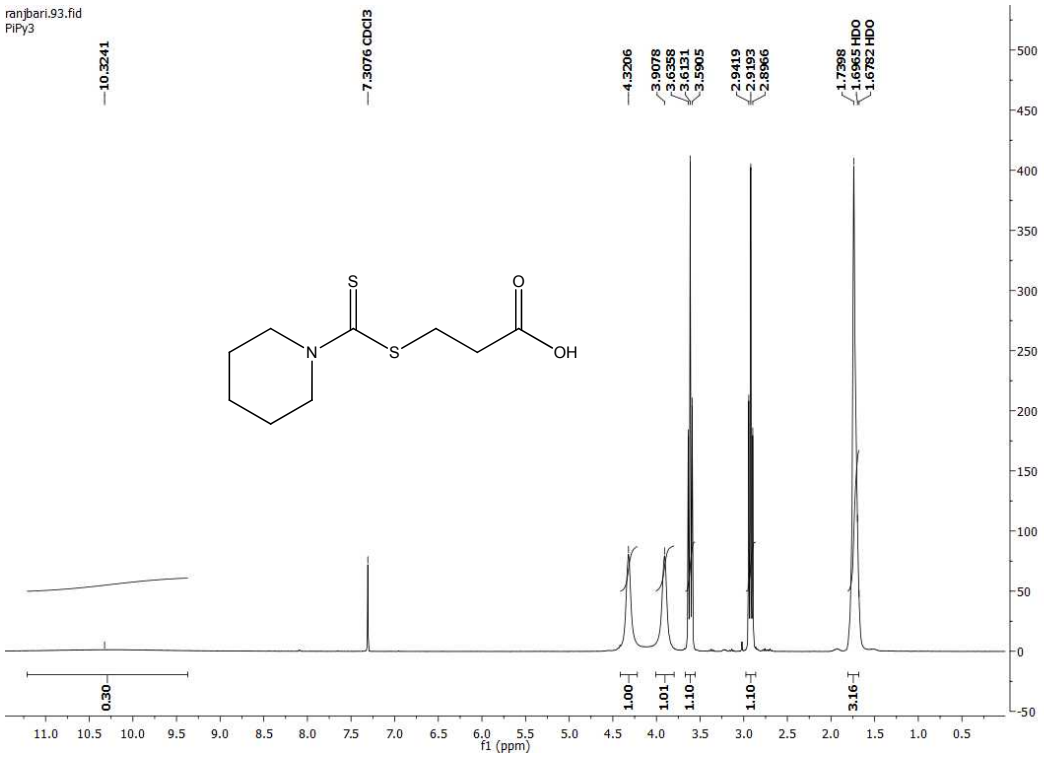
3-((pyrrolidine-1-carbonothioyl)thio)propanoic acid **(1c)**



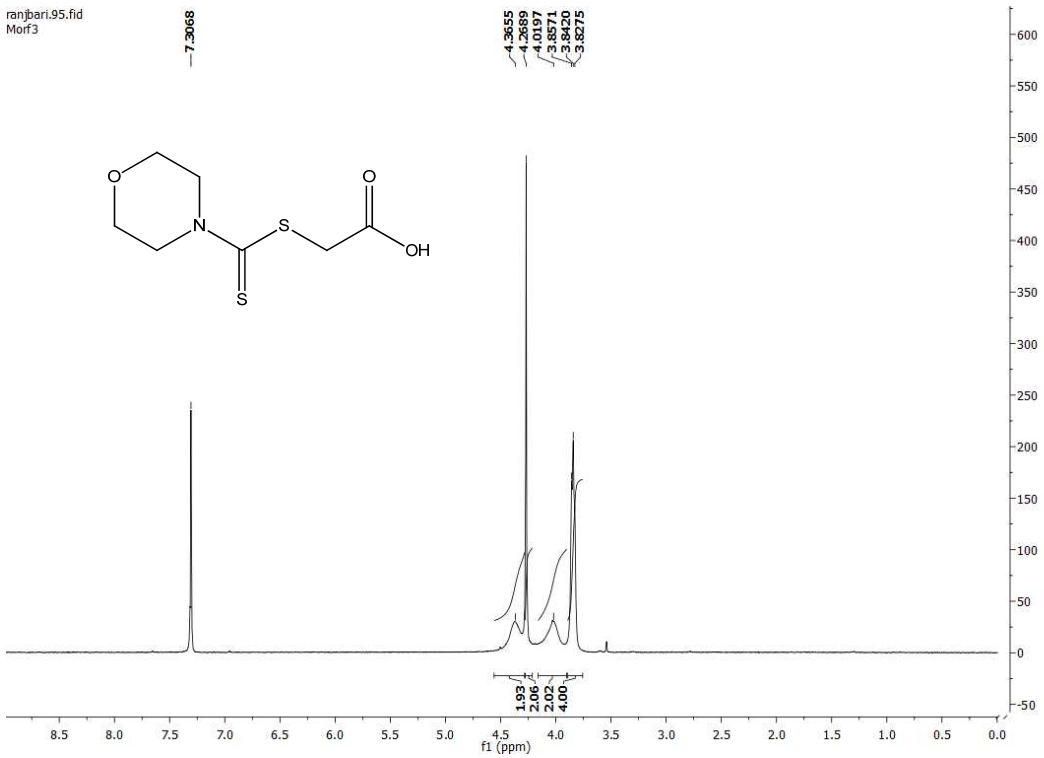
2-((piperidine-1-carbonothioyl)thio)acetic acid **(1d)**



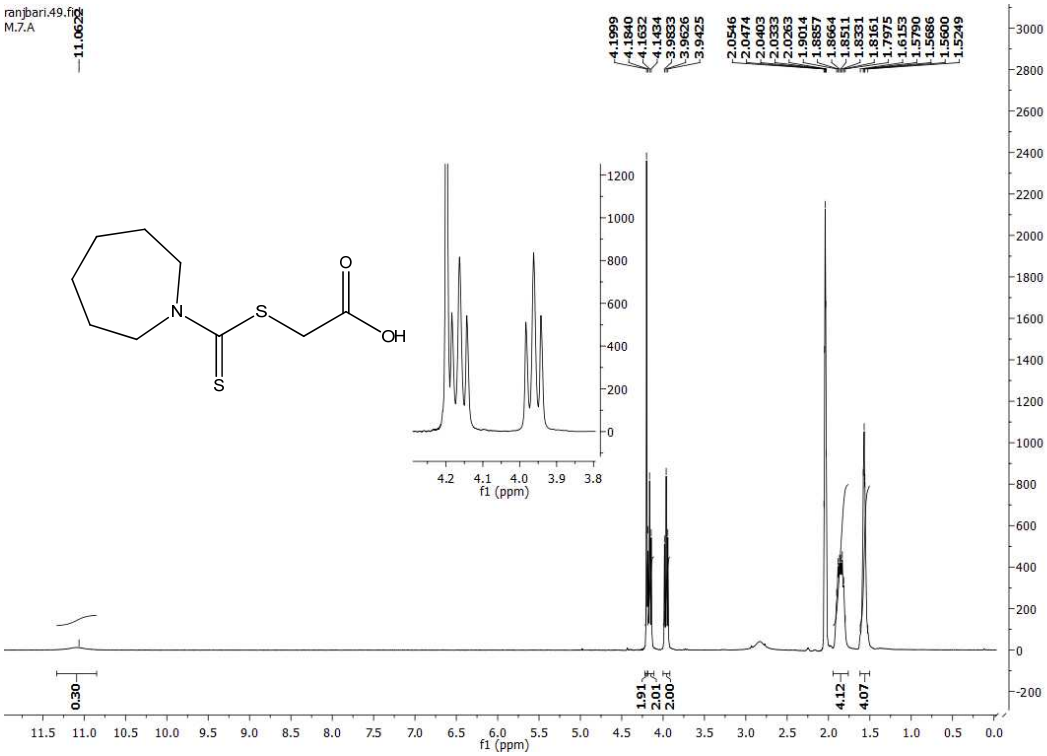
3-((piperidine-1-carbonothioyl)thio)propanoic acid **(1e)**



2-((morpholine-4-carbonothioyl)thio)acetic acid **(1f)**

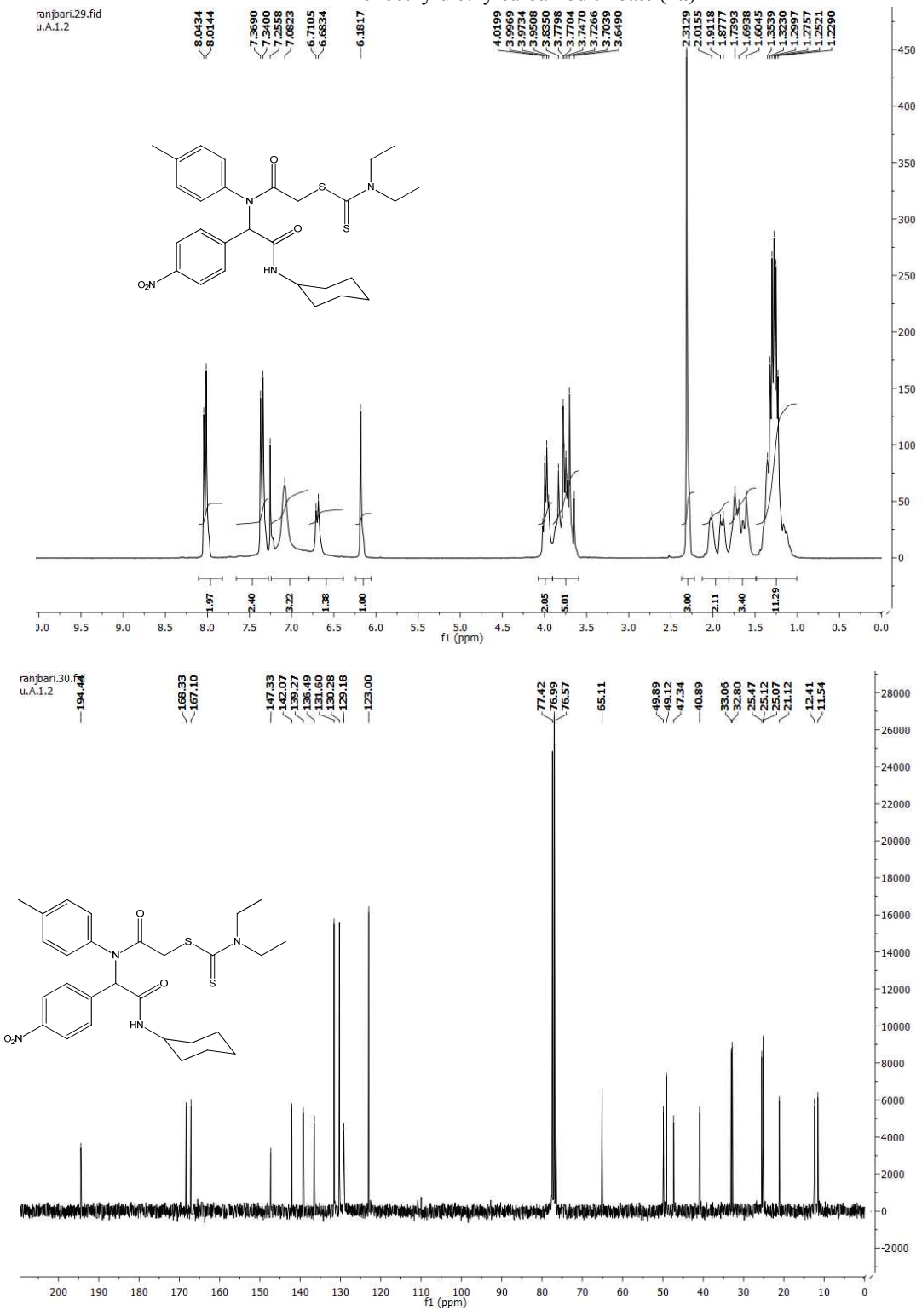


2-((azepane-1-carbonothioyl)thio)acetic acid **(1g)**

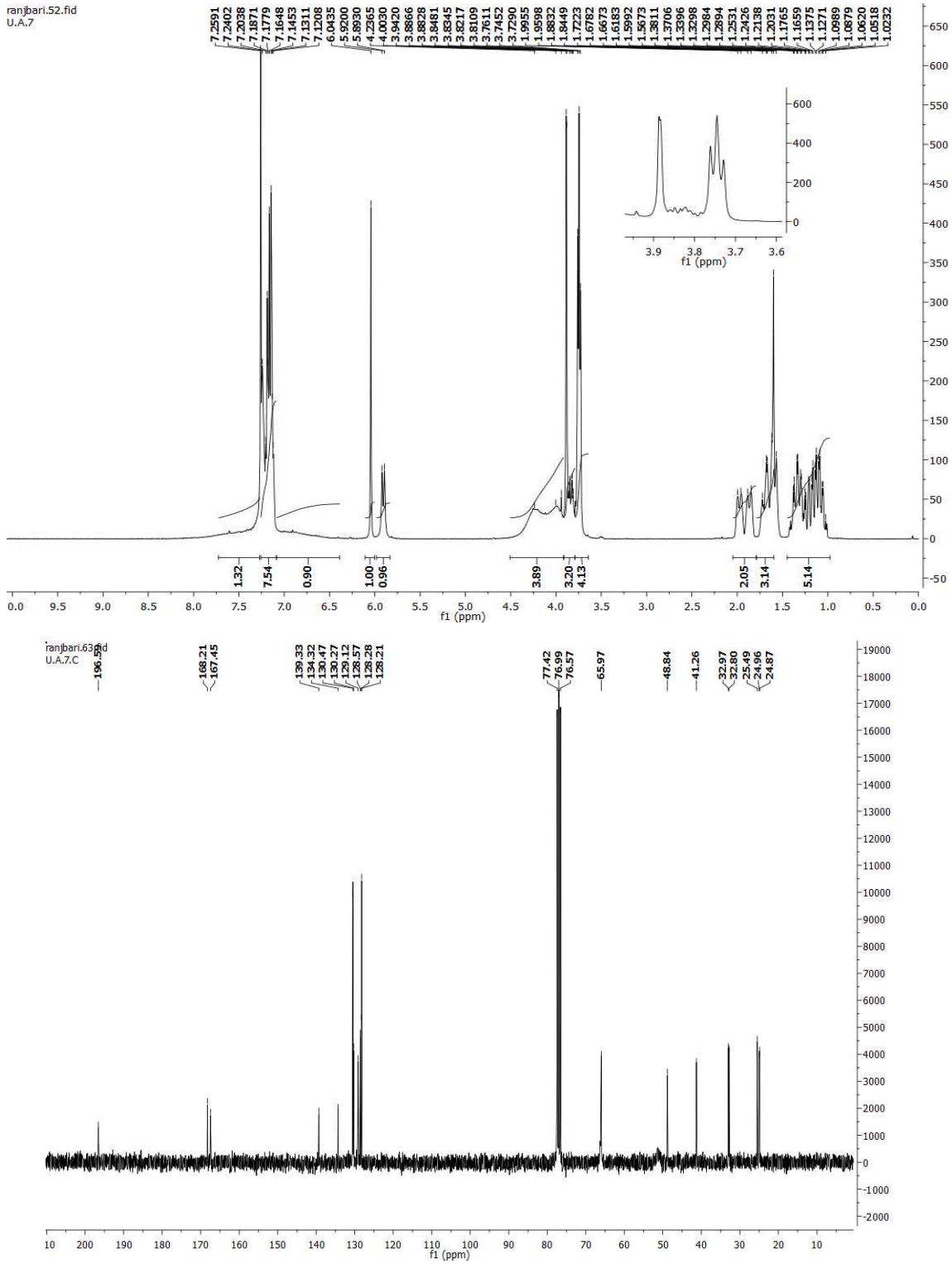


2-((2-(cyclohexylamino)-1-(4-nitrophenyl)-2-oxoethyl)(p-tolyl) amino)-

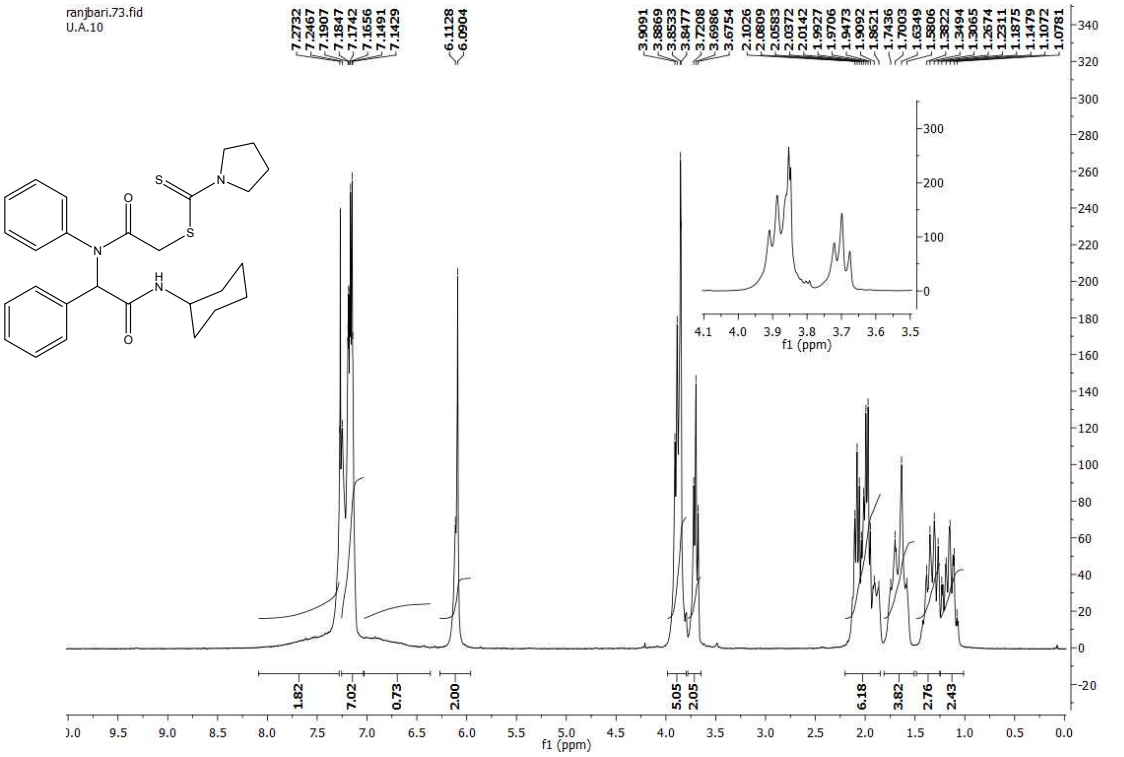
2-oxoethyldiethylcarbamodithioate (**2a**)

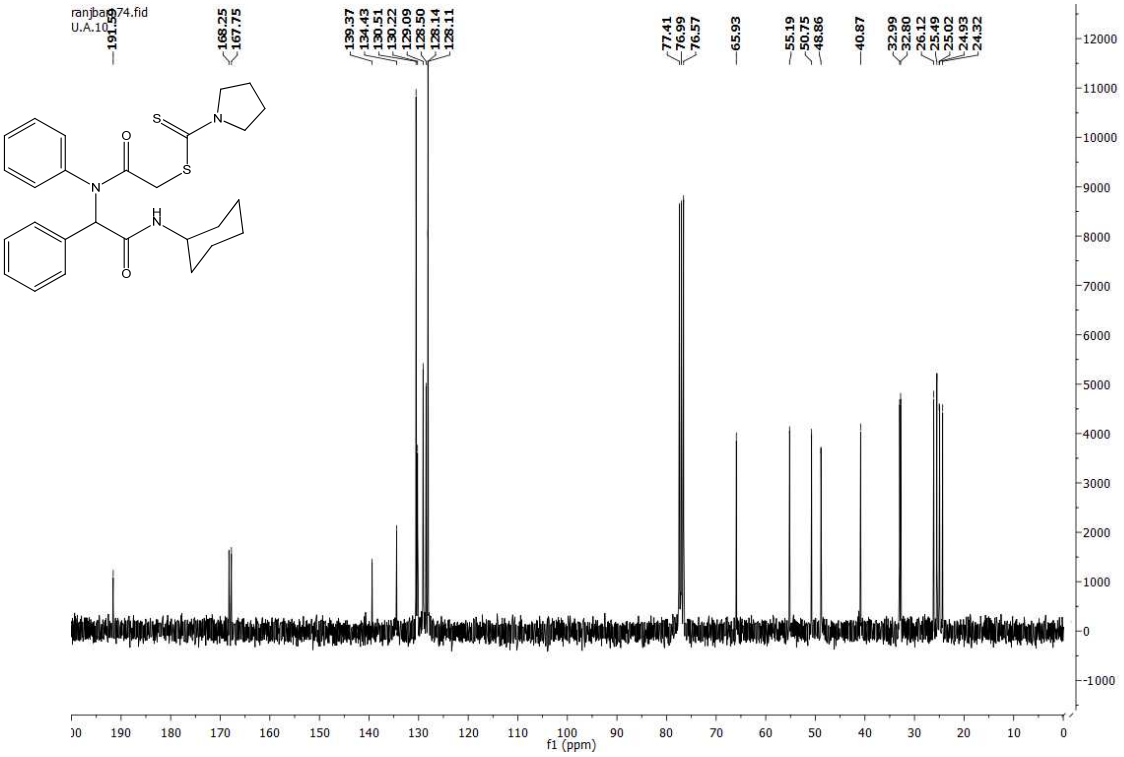


2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-2-oxoethyl morpholine-4-carbodithioate(**2b**)

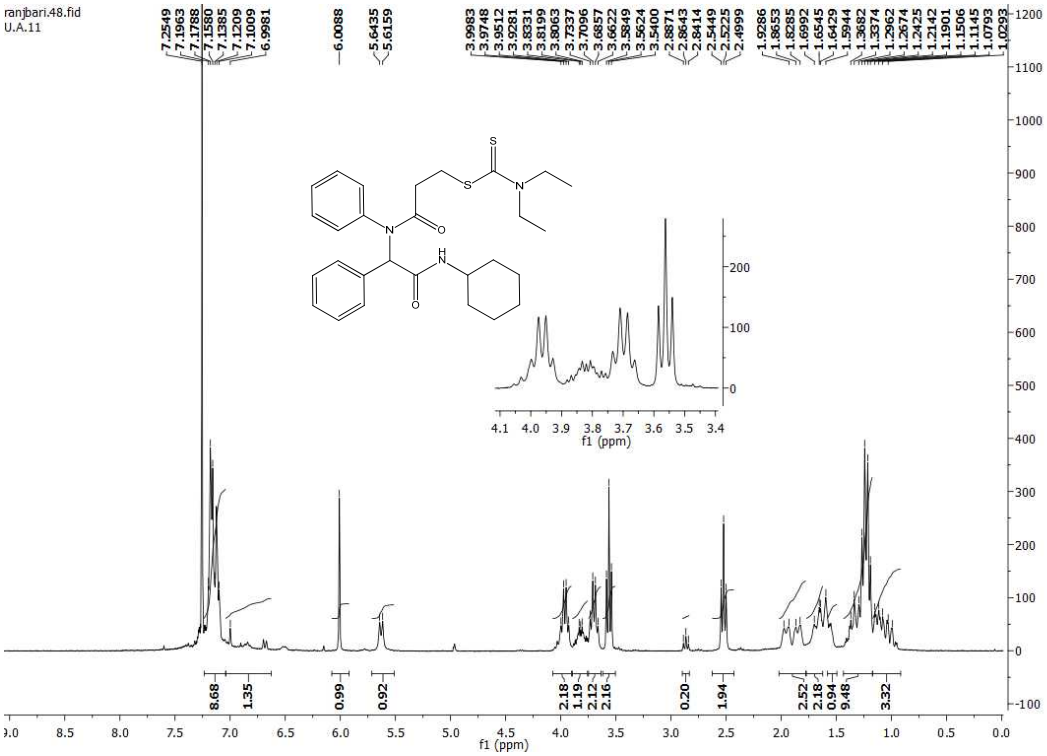


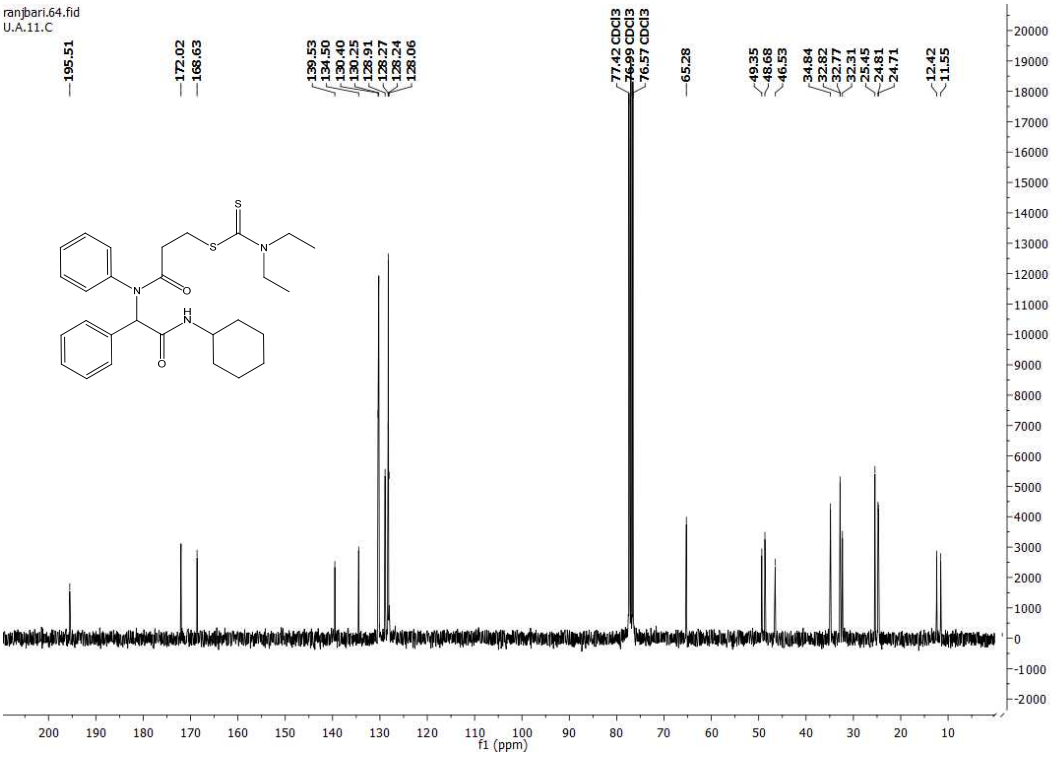
2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-2-oxoethyl pyrrolidine-1-carbodithioate **(2c)**





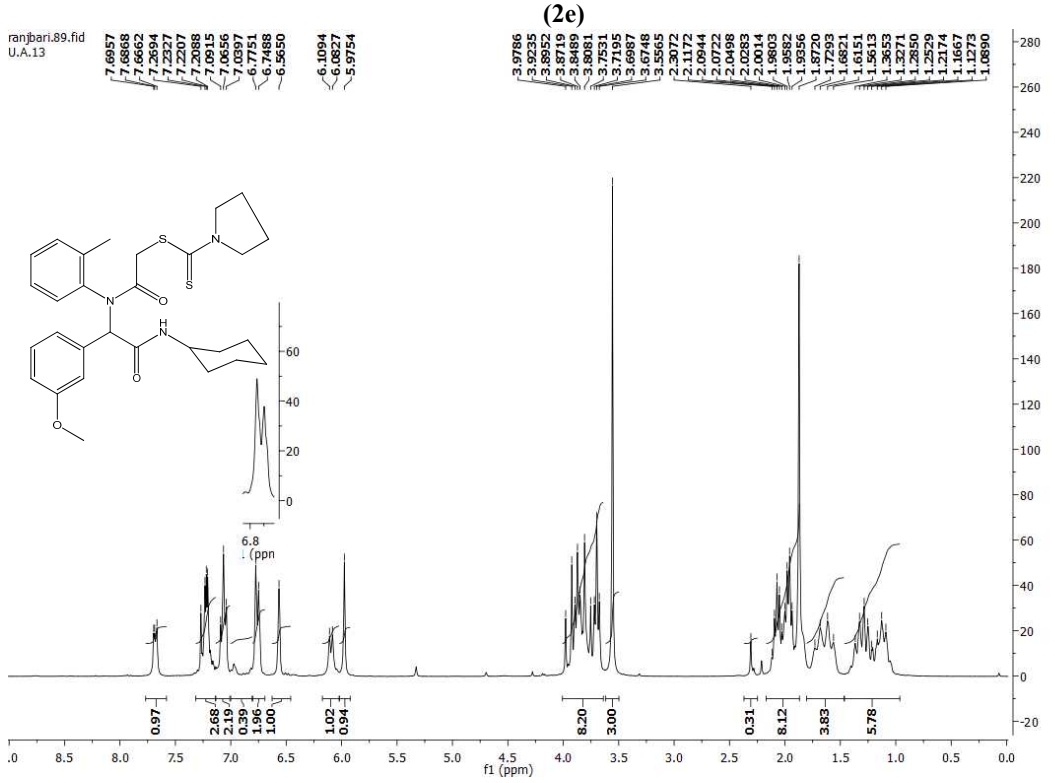
3-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-3-oxopropyl diethylcarbamodithioate **(2d)**

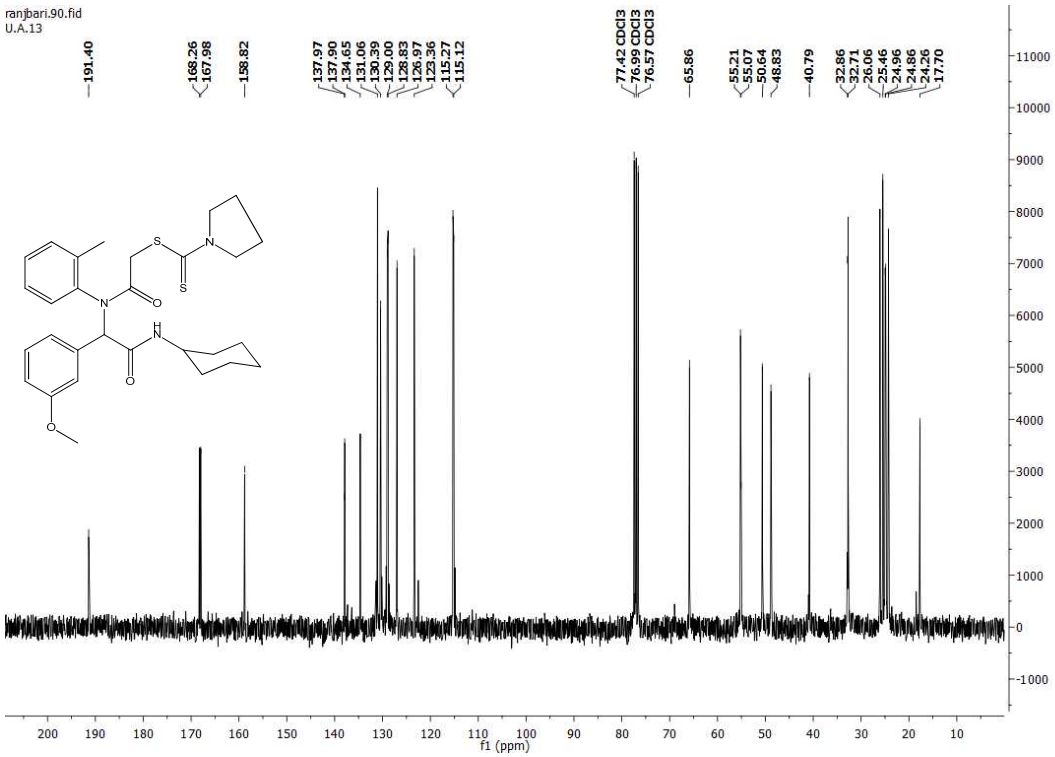




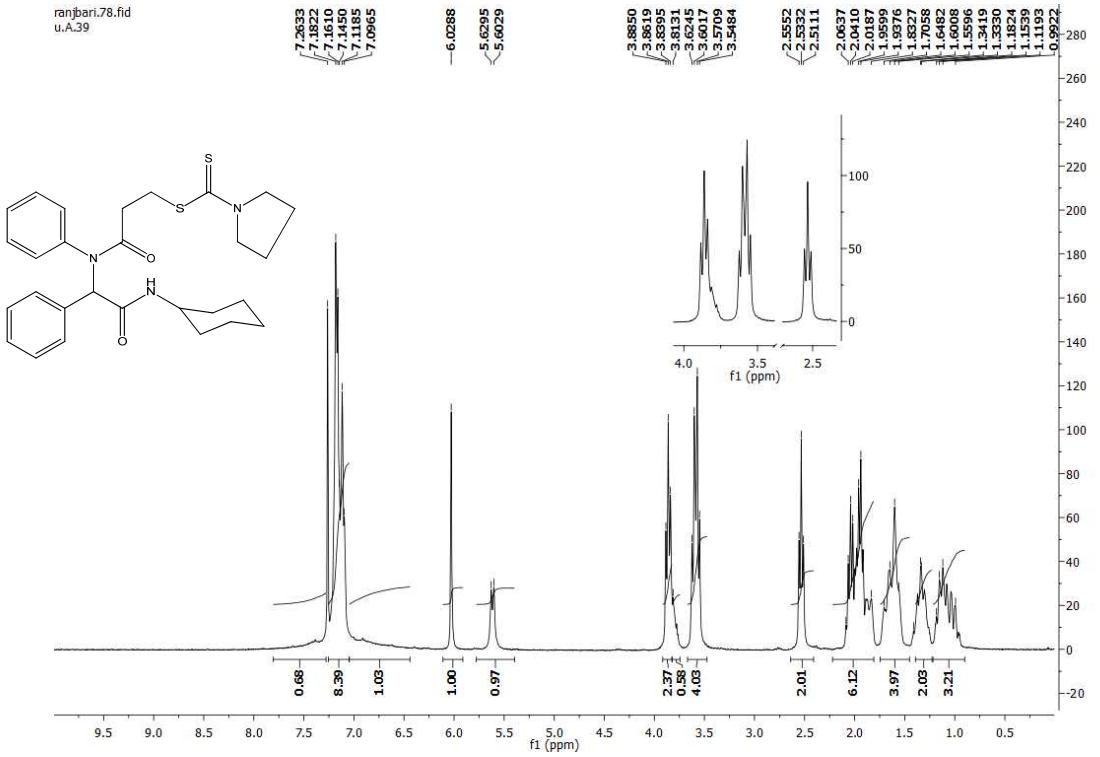
2-((2-(cyclohexylamino)-1-(3-methoxyphenyl)-2-oxoethyl)(o-tolyl)amino)-2-oxoethyl pyrrolidine-1-carbodithioate

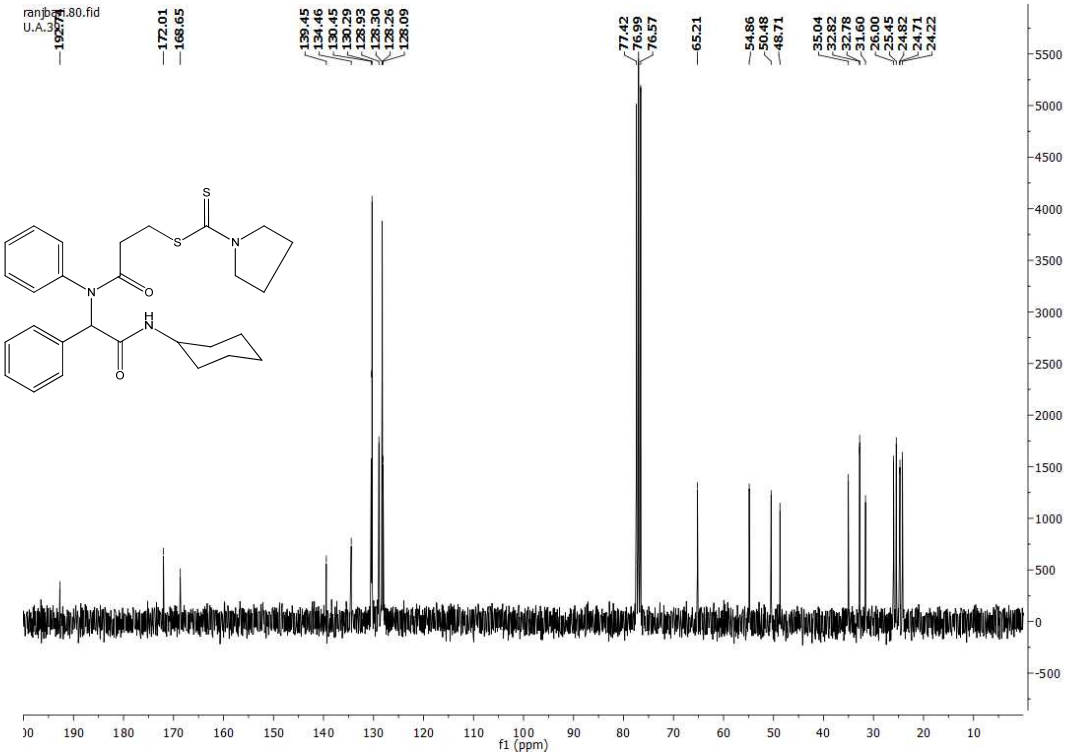
(2e)



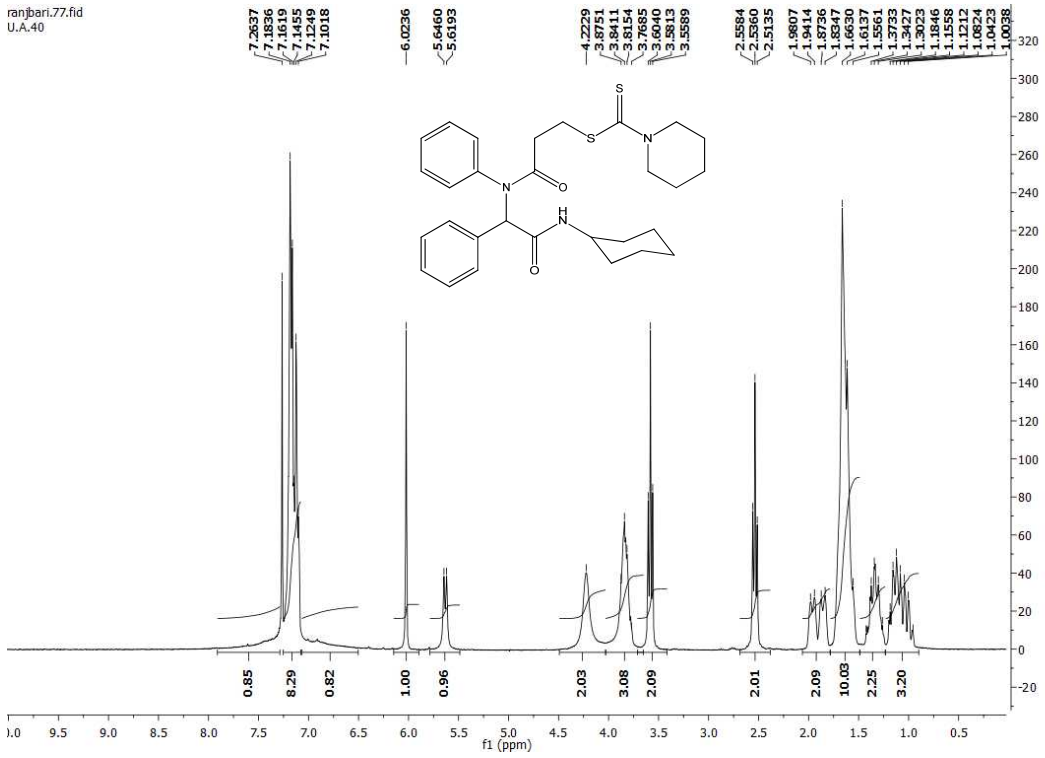


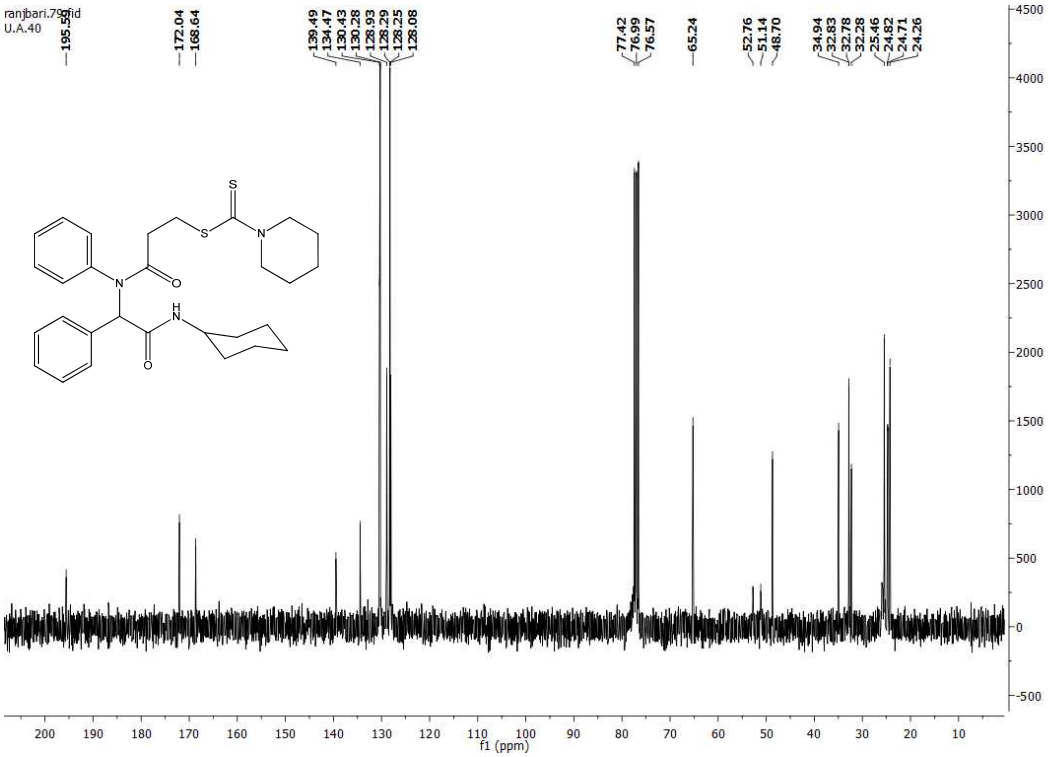
3-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-3-oxopropyl pyrrolidine-1-carbodithioate **(2f)**



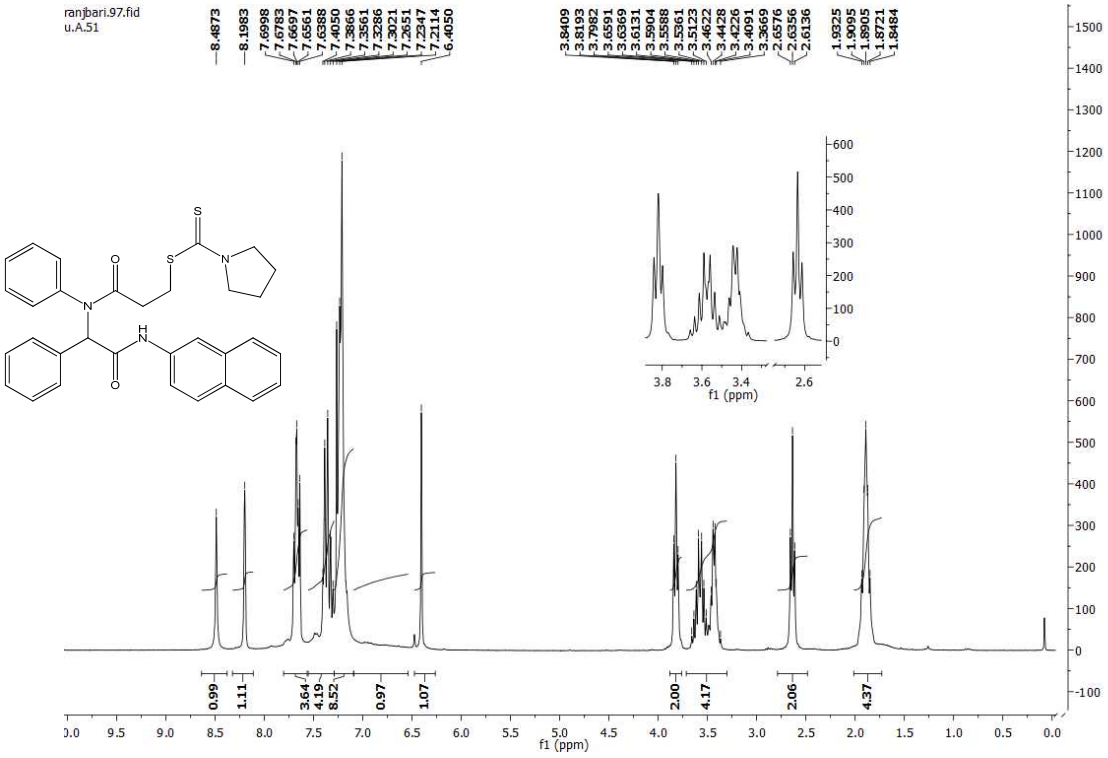


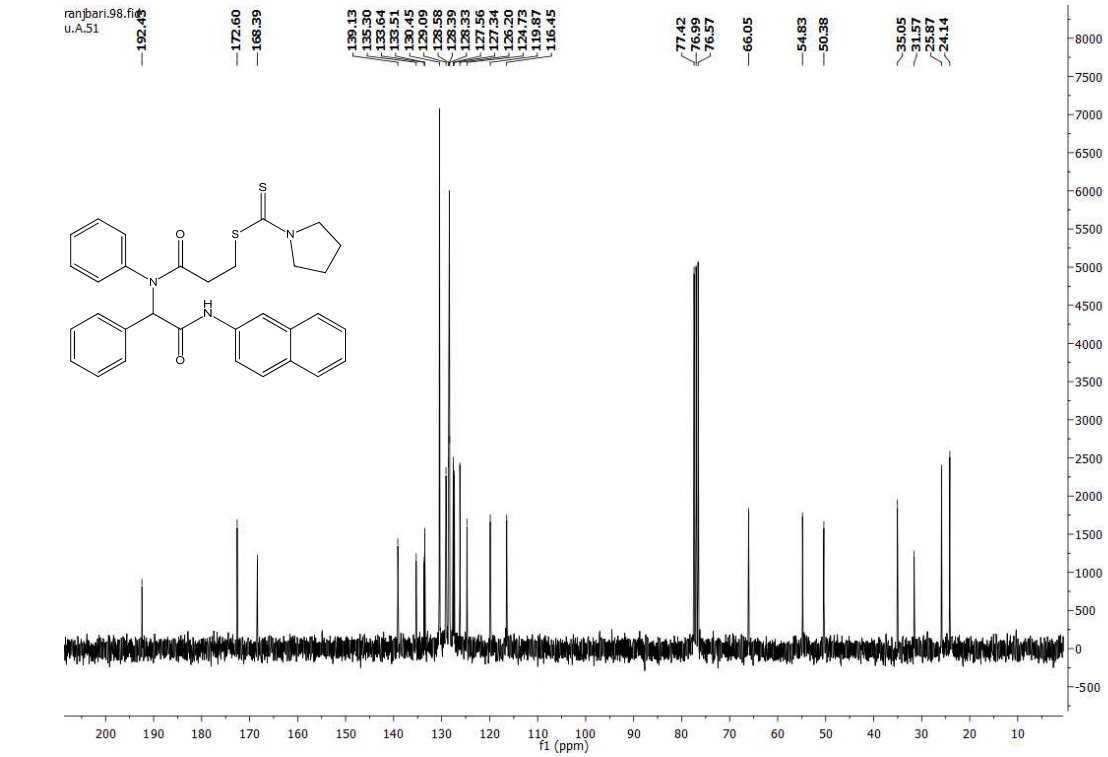
3-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-3-oxopropyl piperidine-1-carbodithioate **(2g)**



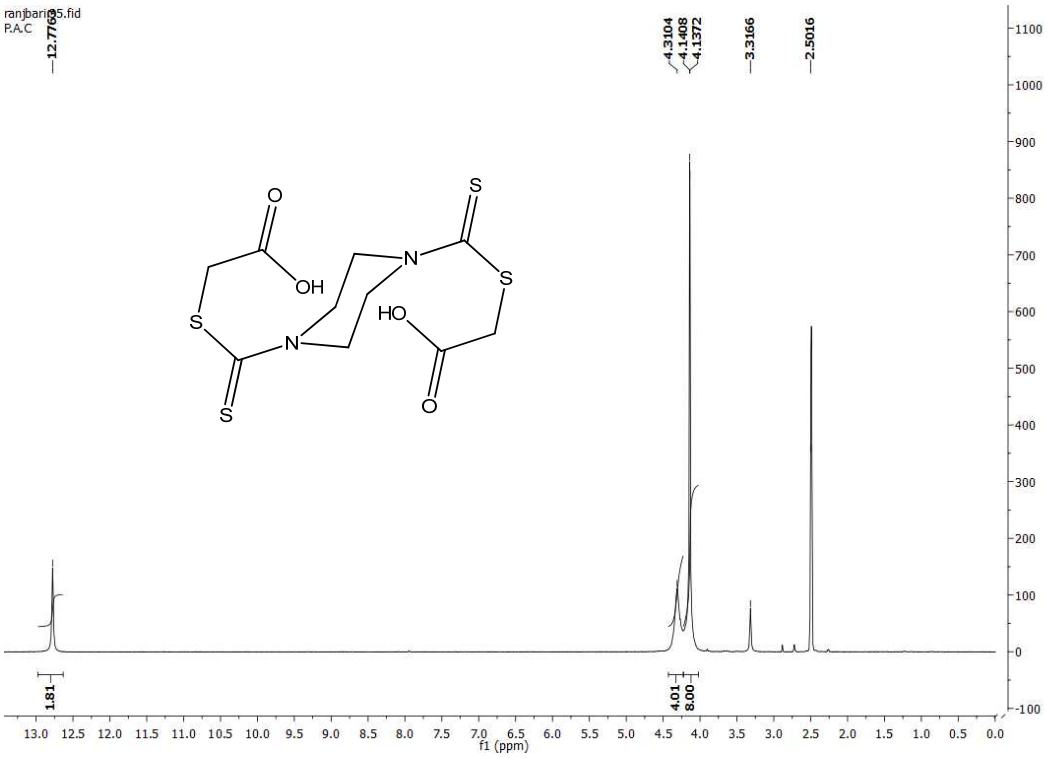


3-((2-(naphthalen-2-ylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-3-oxopropyl pyrrolidine-1-carbodithioate **(2h)**

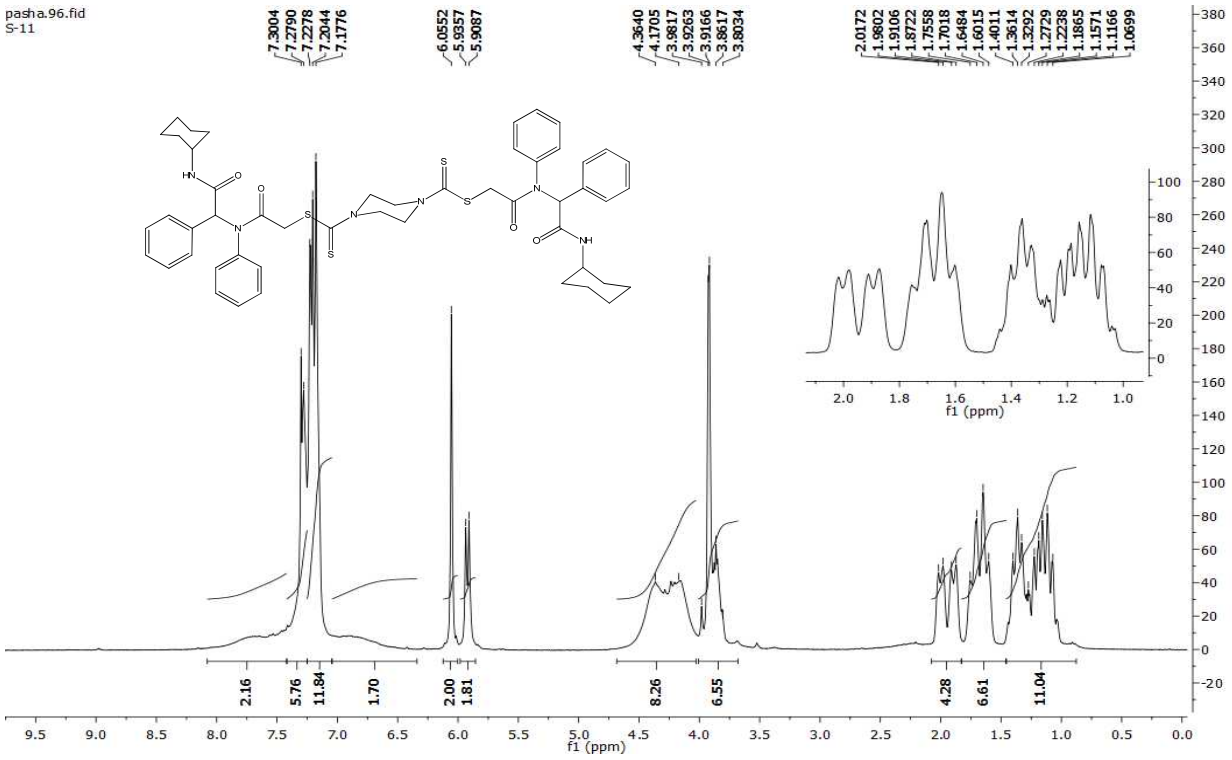


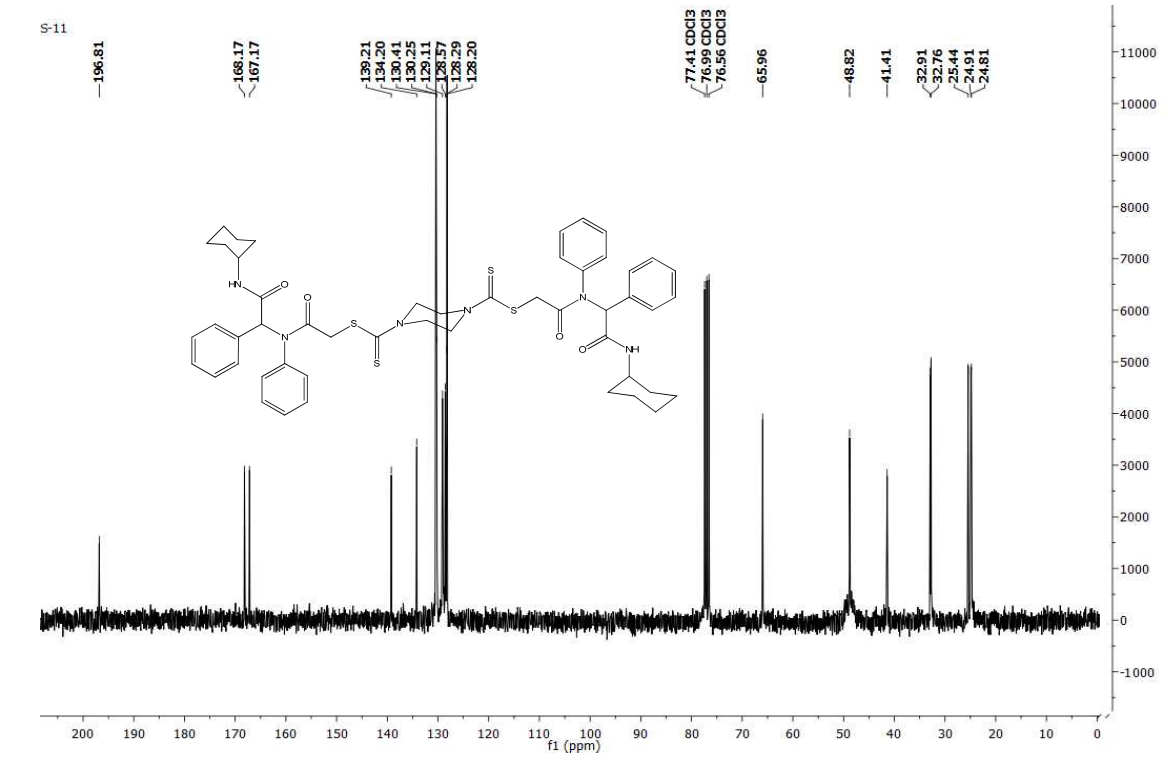


2,2'-((piperazine-1,4-bis(carbonothioyl))bis(sulfanediyl))diacetic acid **3**

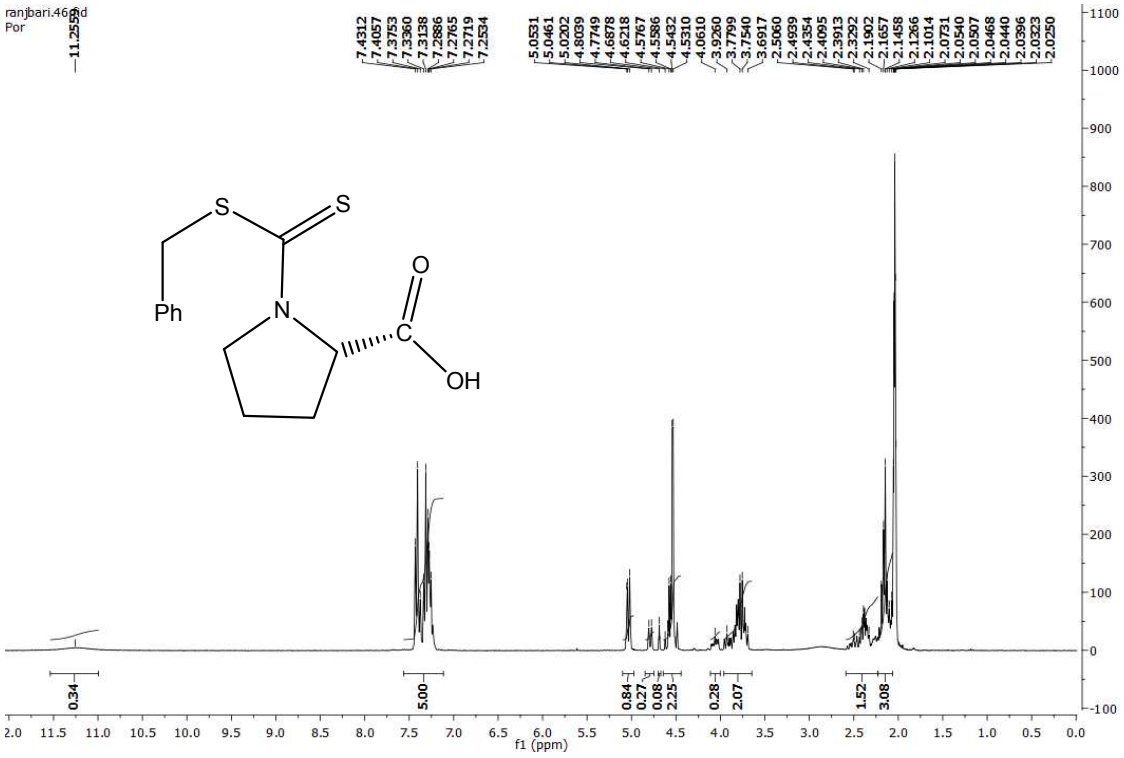


bis(2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-2-oxoethyl) piperazine-1,4-bis(carbodithioate) (**4**)

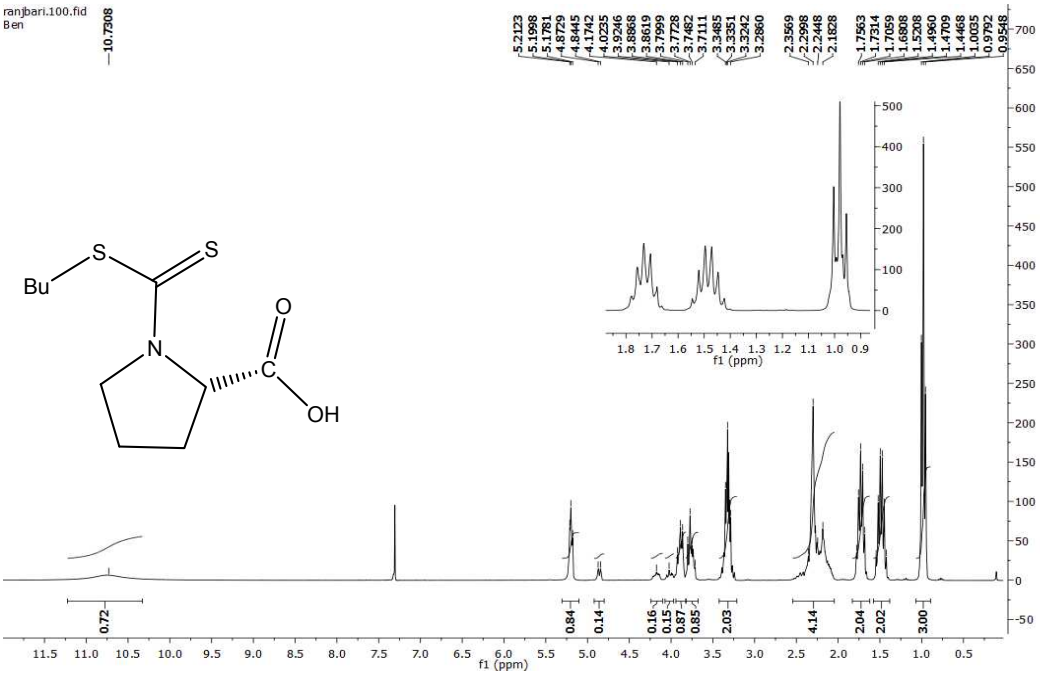




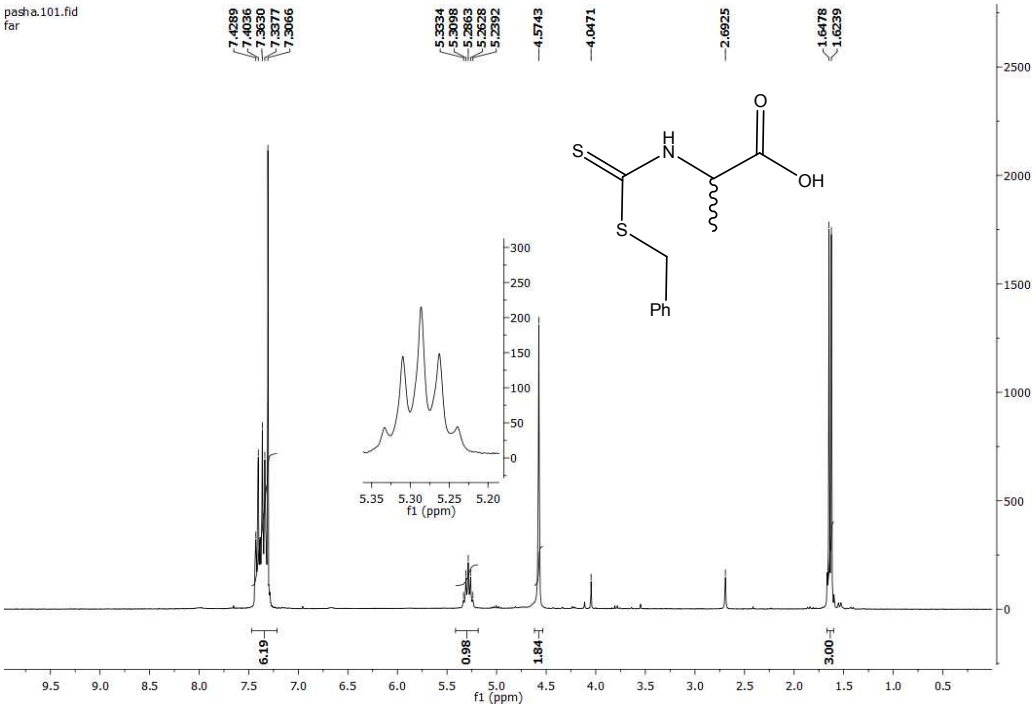
1-((benzylthio)carbonothioyl)pyrrolidine-2-carboxylic acid**(5a)**



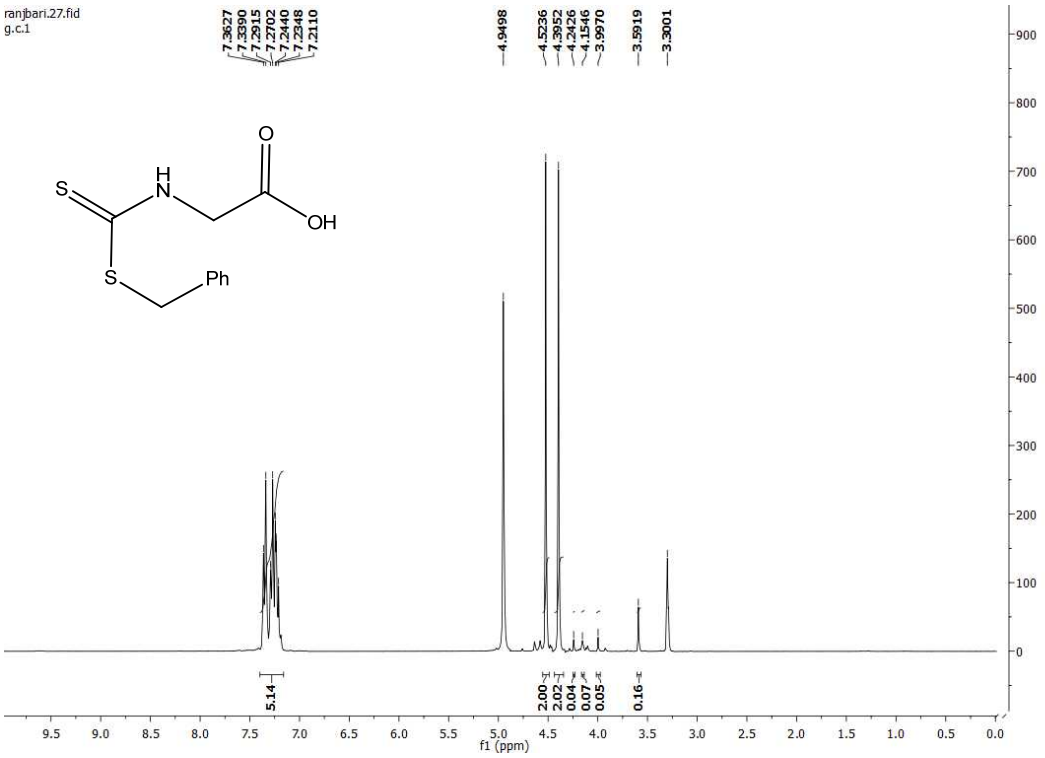
1-((butylthio)carbonothioyl)pyrrolidine-2-carboxylic acid **(5b)**



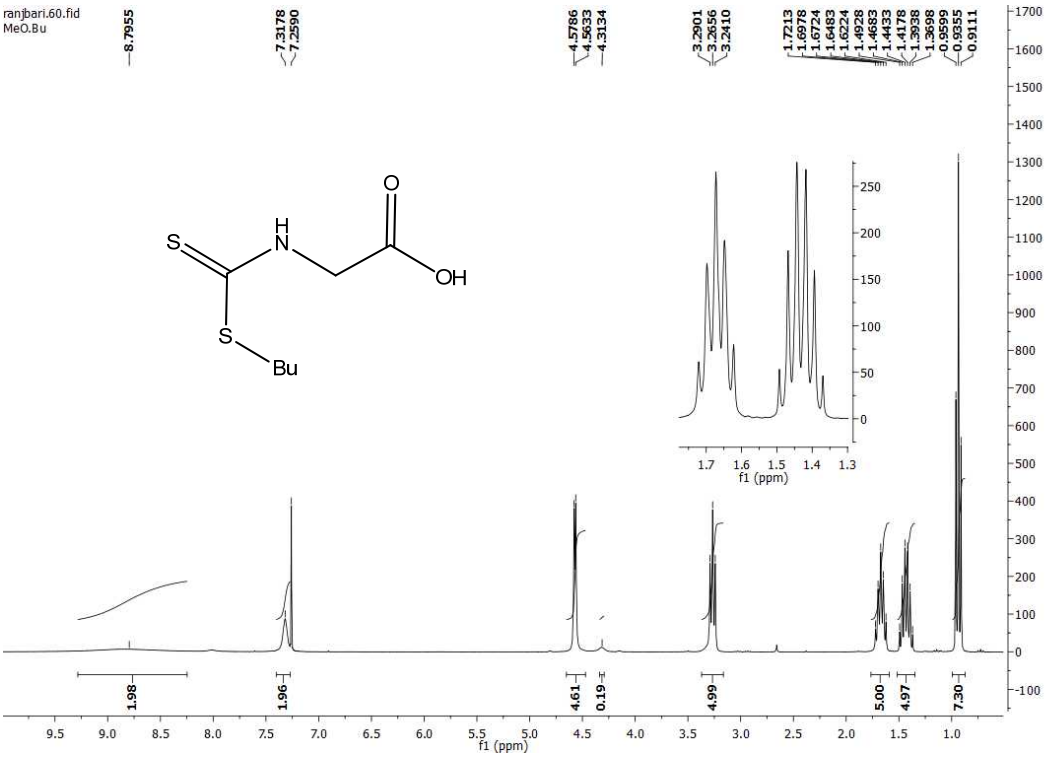
2-(((benzylthio)carbonothioyl)amino)propanoic acid **(5c)**



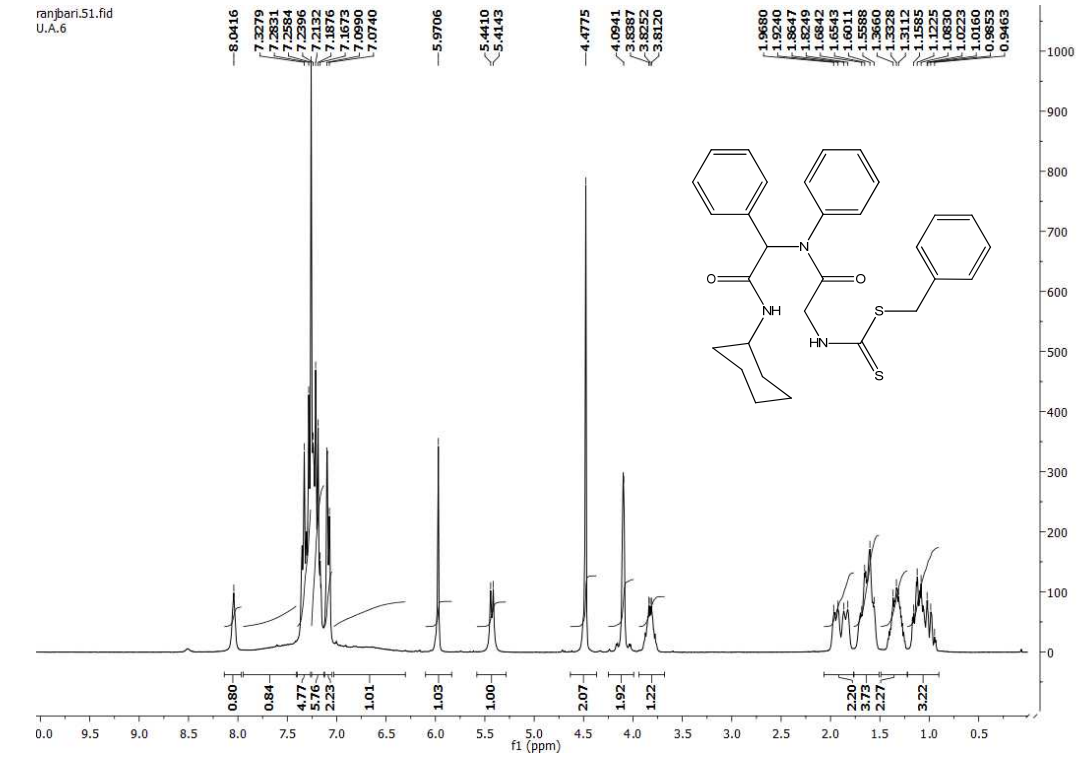
2-(((benzylthio)carbonothioyl)amino)acetic acid **(5d)**

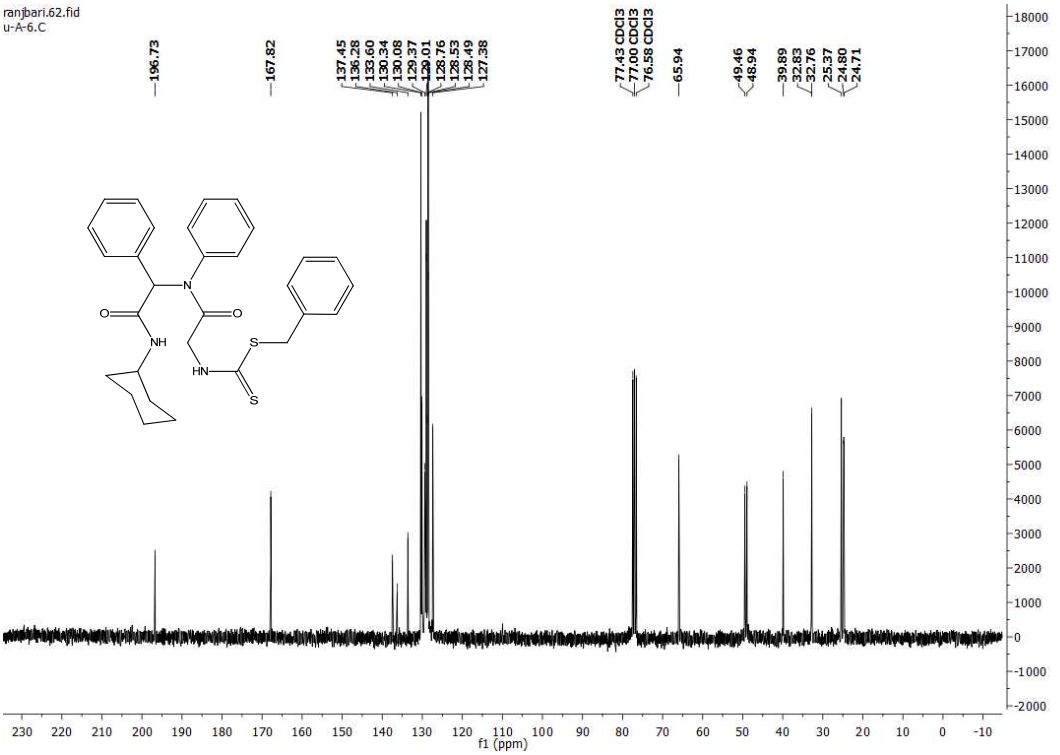


2-(((butylthio)carbonothioyl)amino)acetic acid **(5e)**



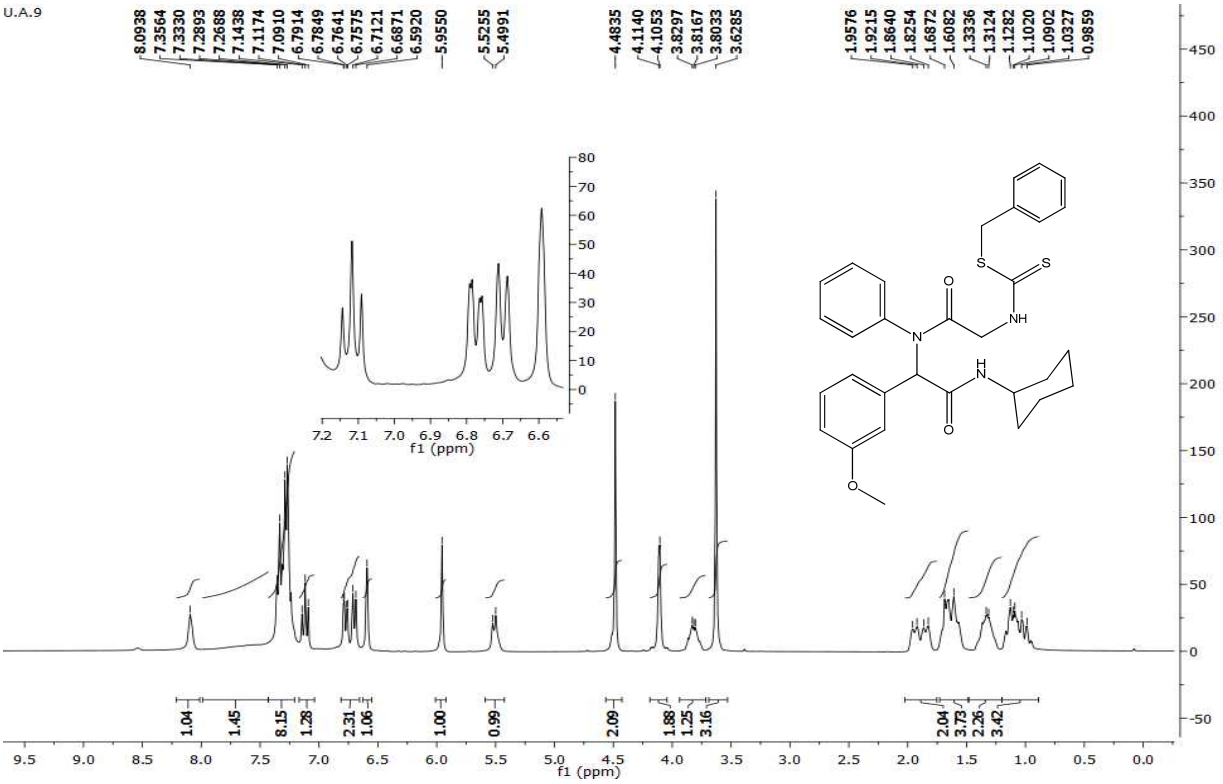
benzyl(2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-2-oxoethyl)carbamodithioate (**6a**)

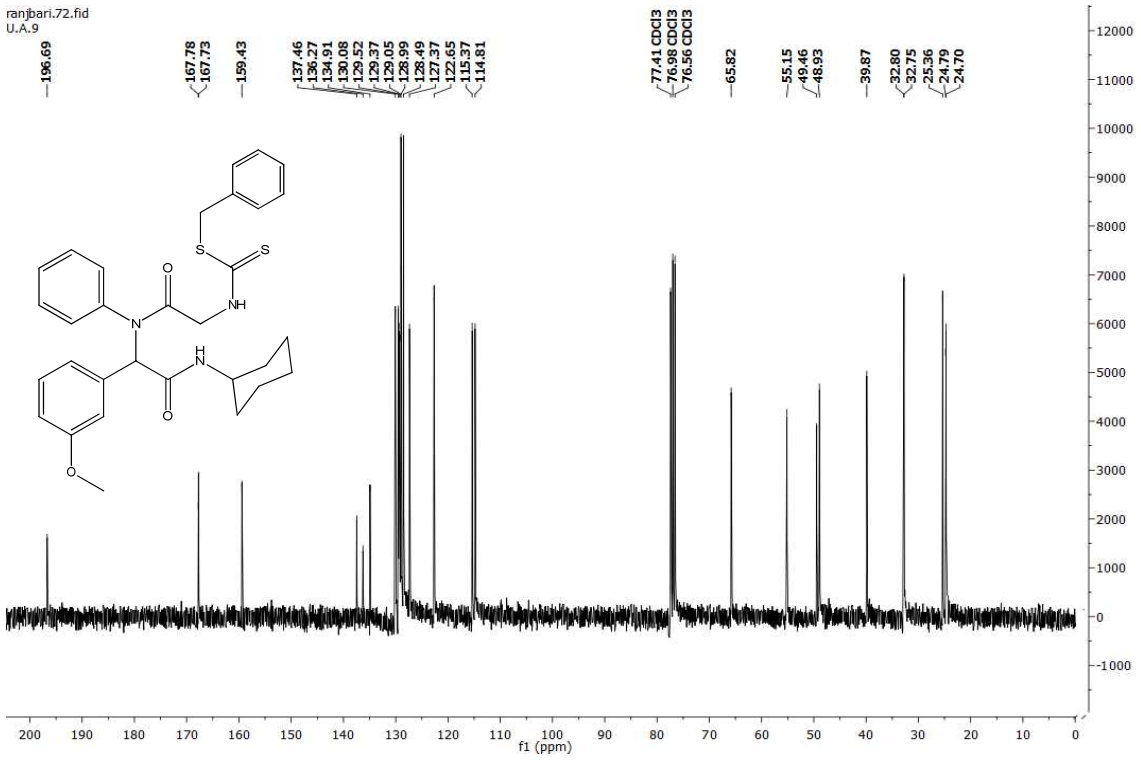




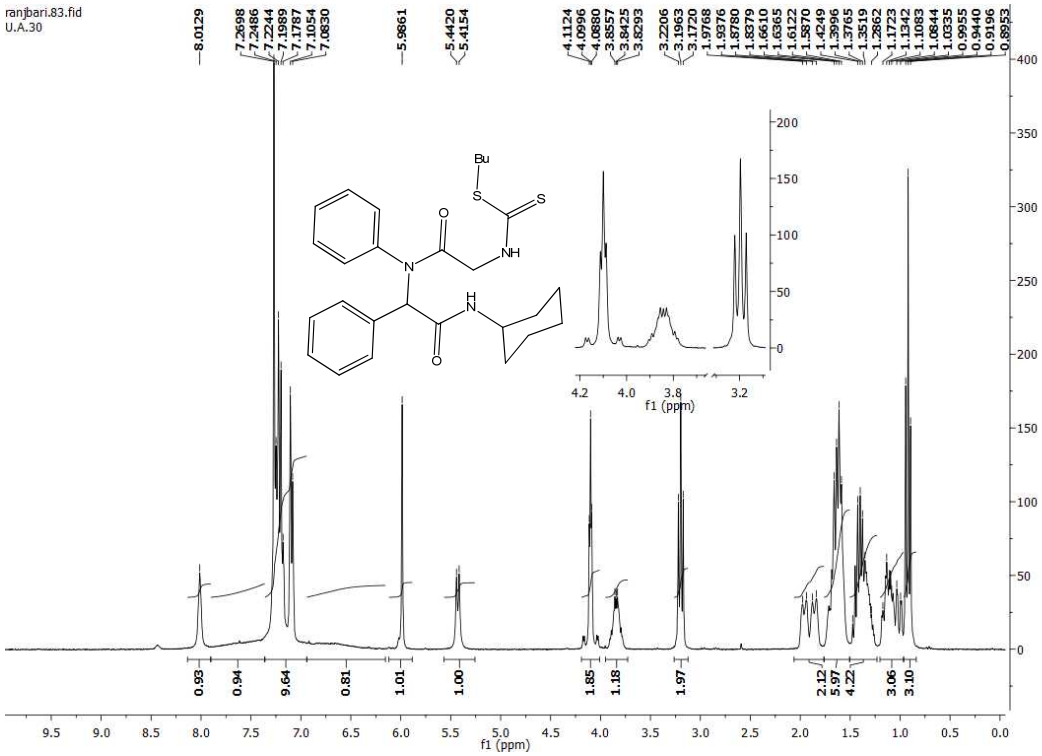
benzyl(2-((2-(cyclohexylamino)-1-(3-methoxyphenyl)-2-oxoethyl)(phenyl)amino)-2-oxoethyl)carbamodithioate

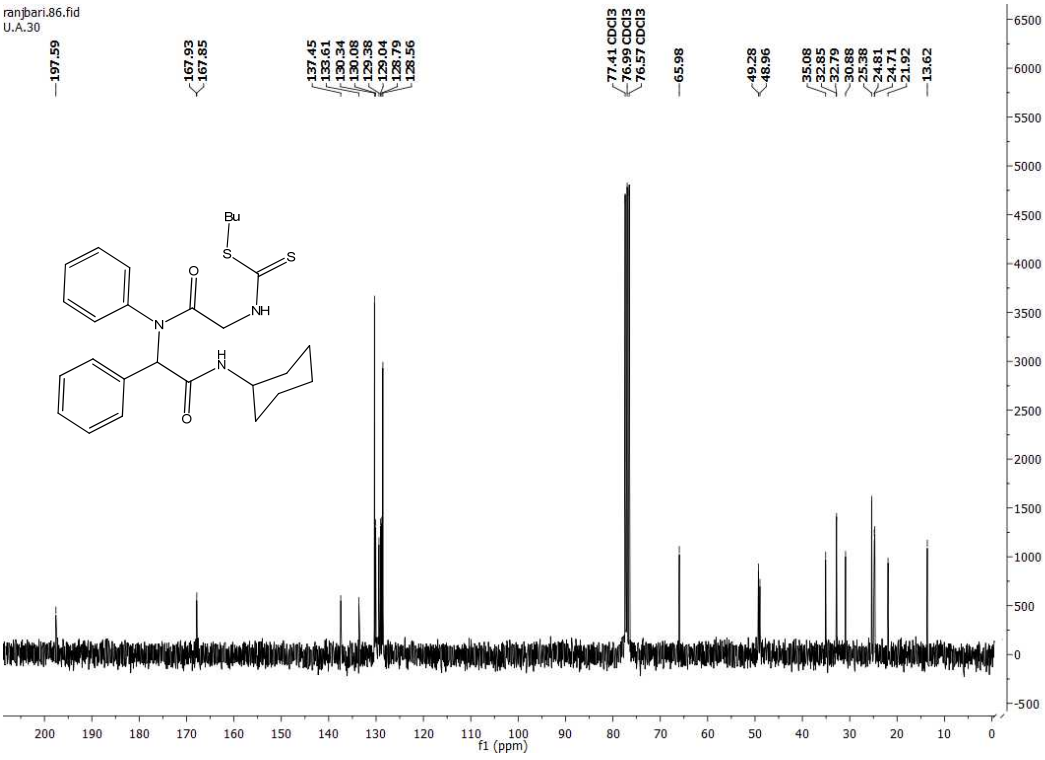
(6b)



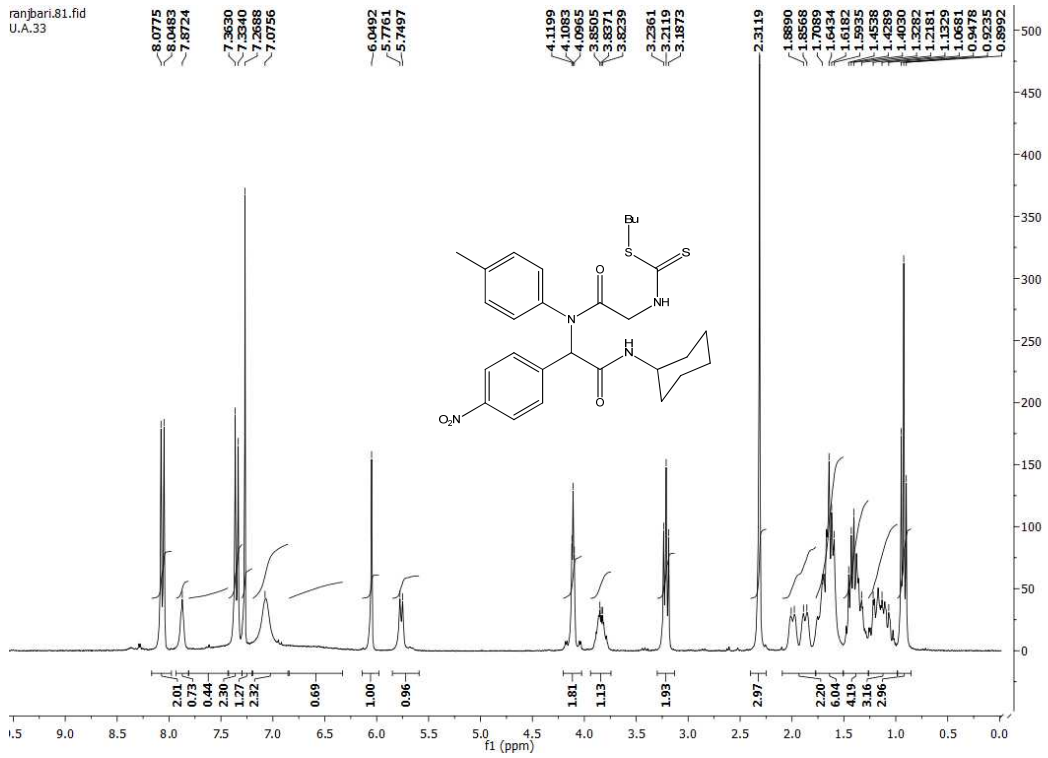


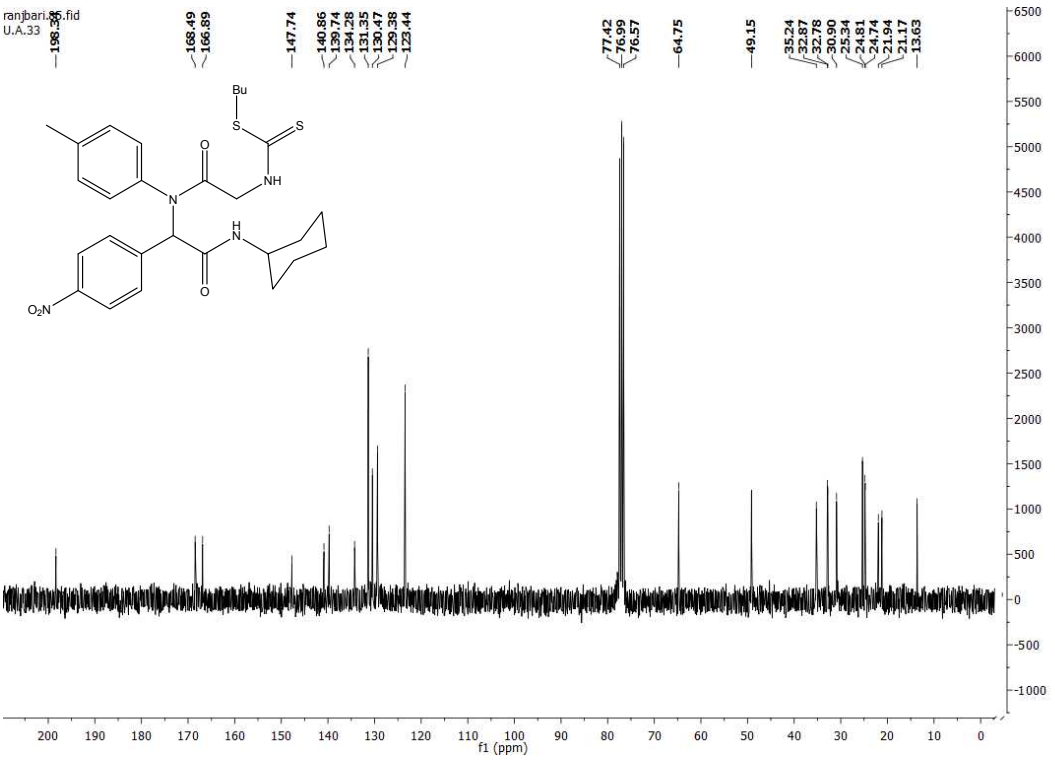
butyl(2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(phenyl) amino)-2-oxoethyl) carbamodithioate **(6c)**



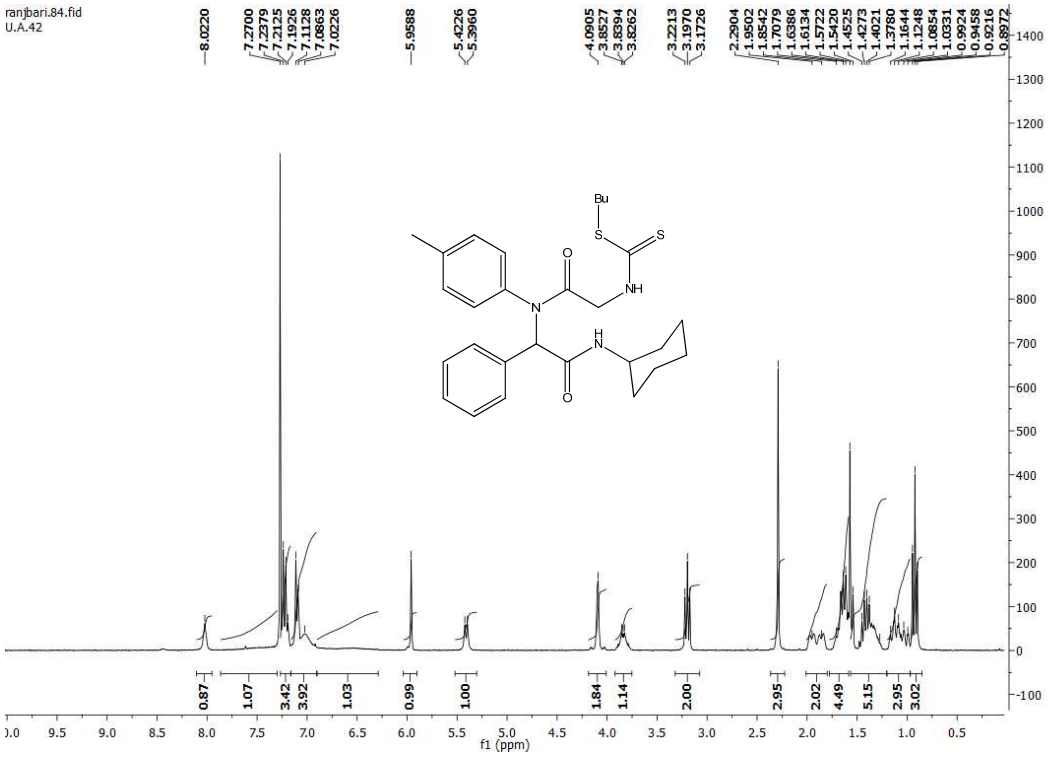


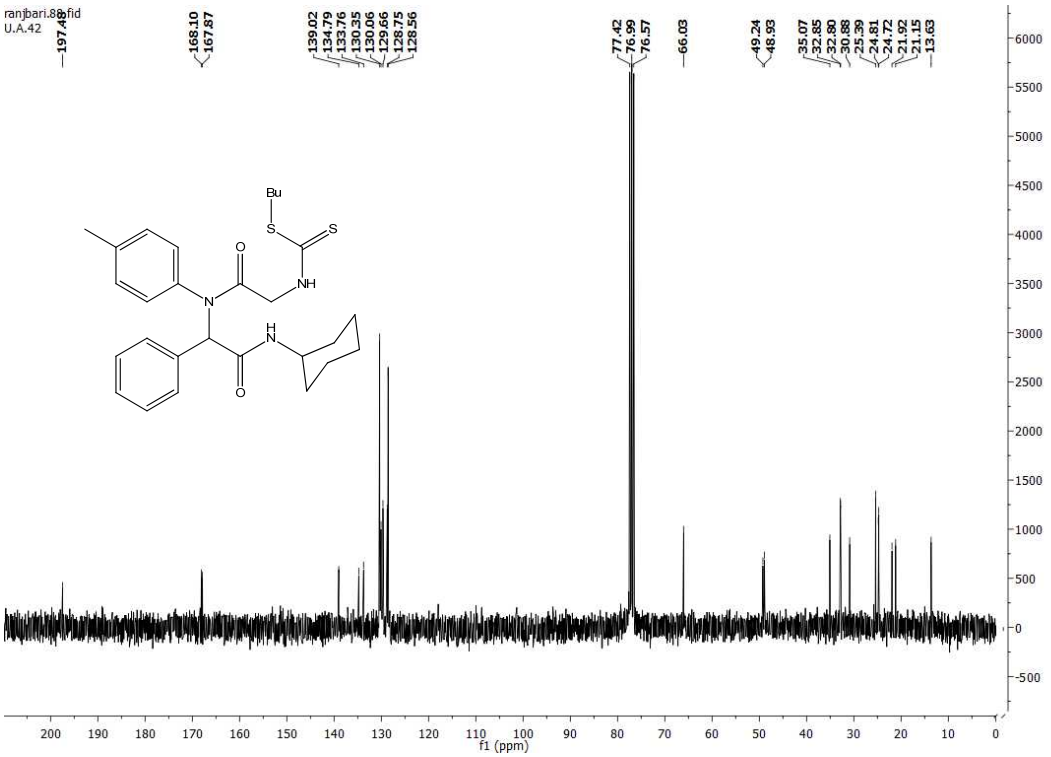
butyl(2-((2-(cyclohexylamino)-1-(4-nitrophenyl)-2-oxoethyl)(p-tolyl)amino)-2-oxoethyl) carbamodithioate **(6d)**



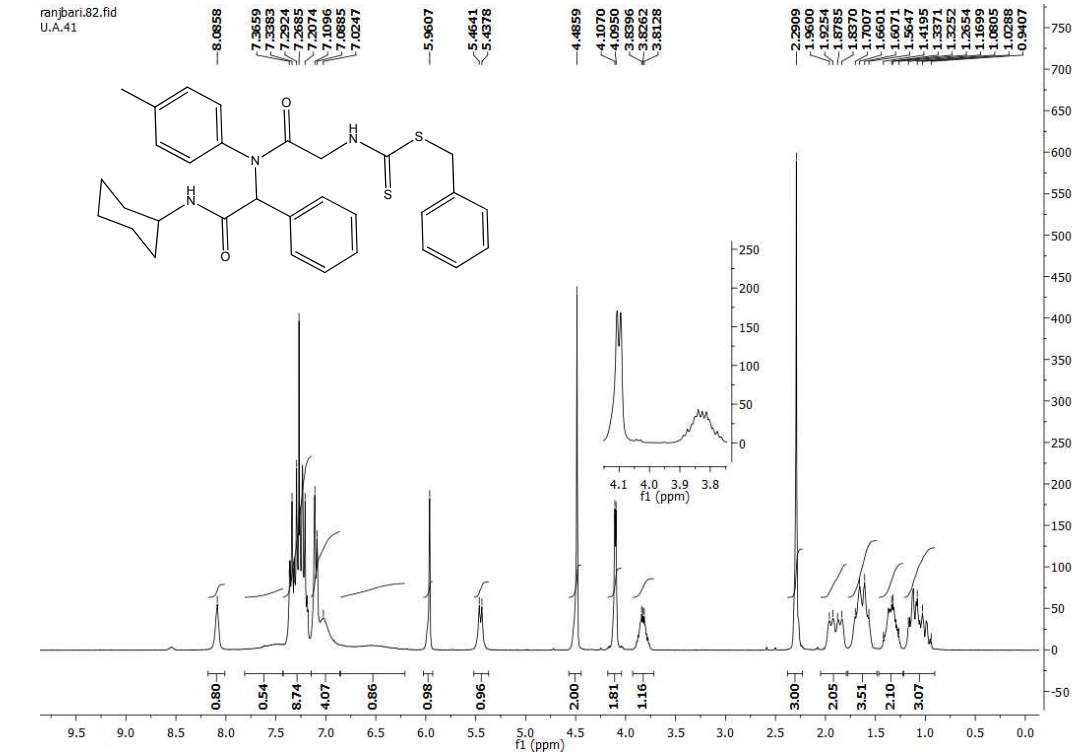


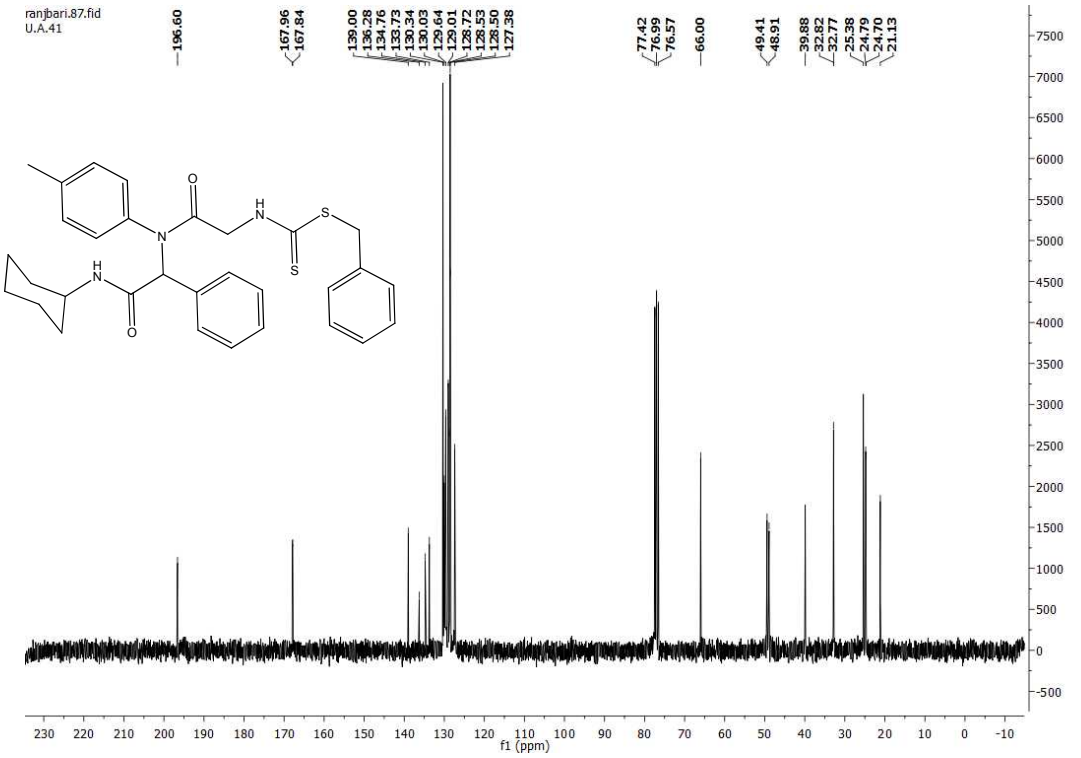
butyl(2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(p-tolyl)amino)-2-oxoethyl) carbamodithioate **(6e)**



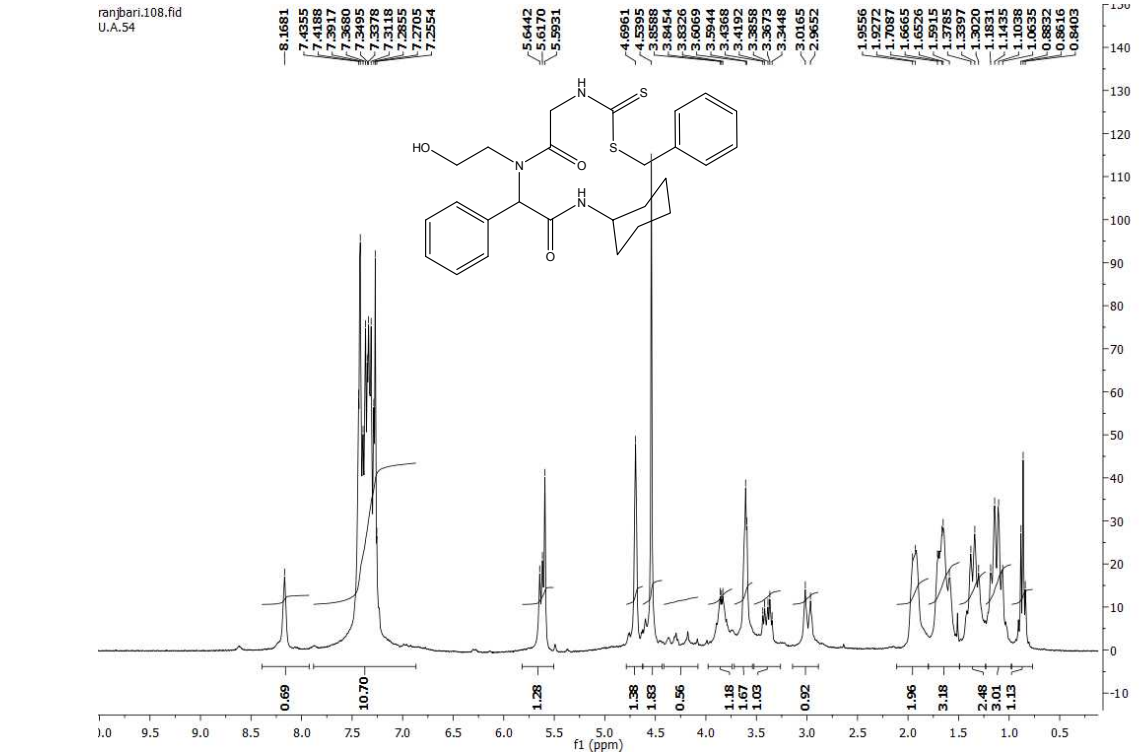


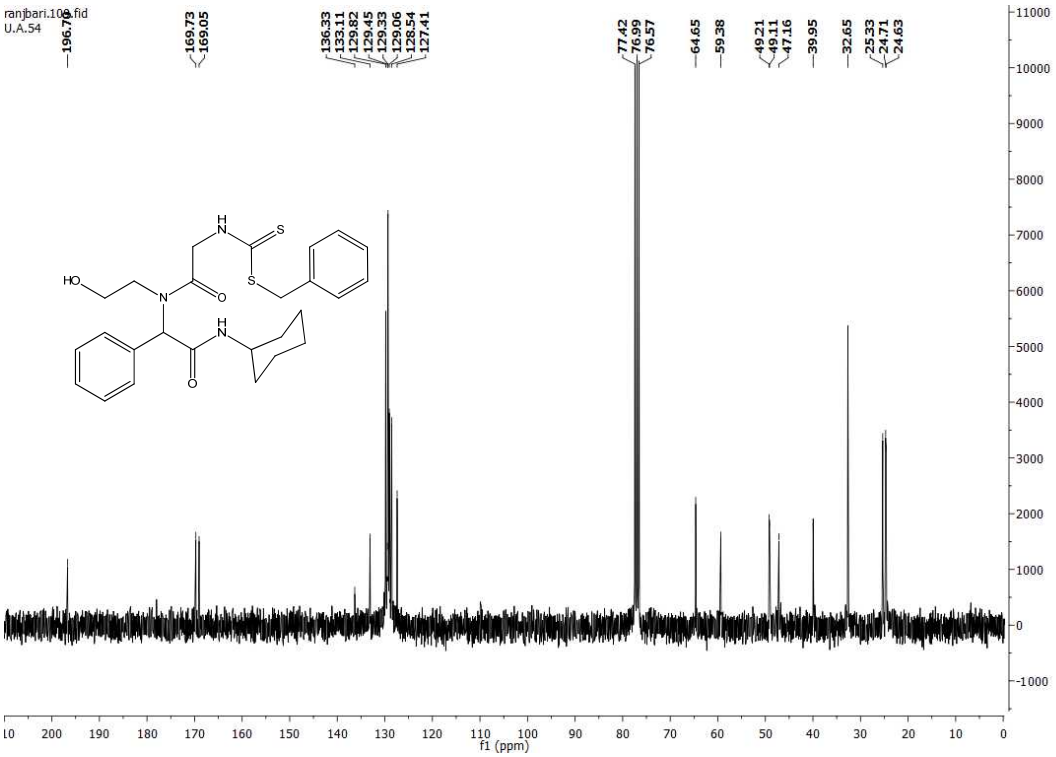
benzyl(2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(p-tolyl)amino)-2-oxoethyl) carbamodithioate **(6f)**



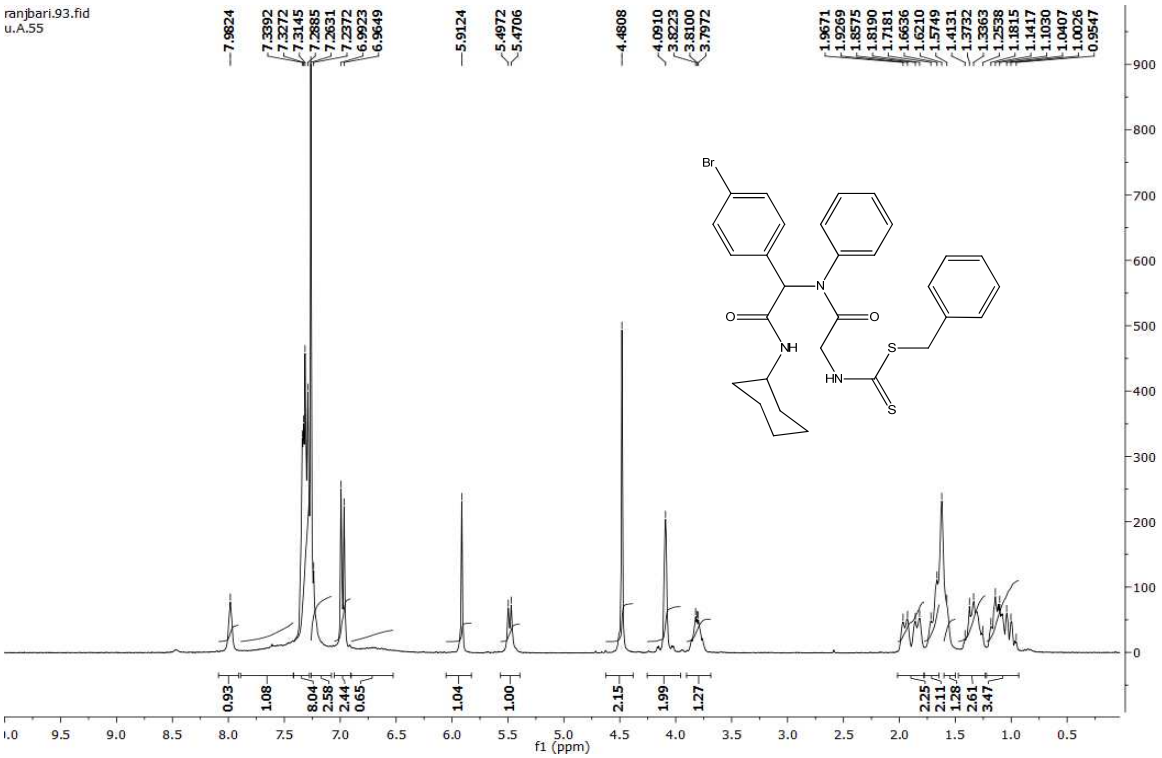


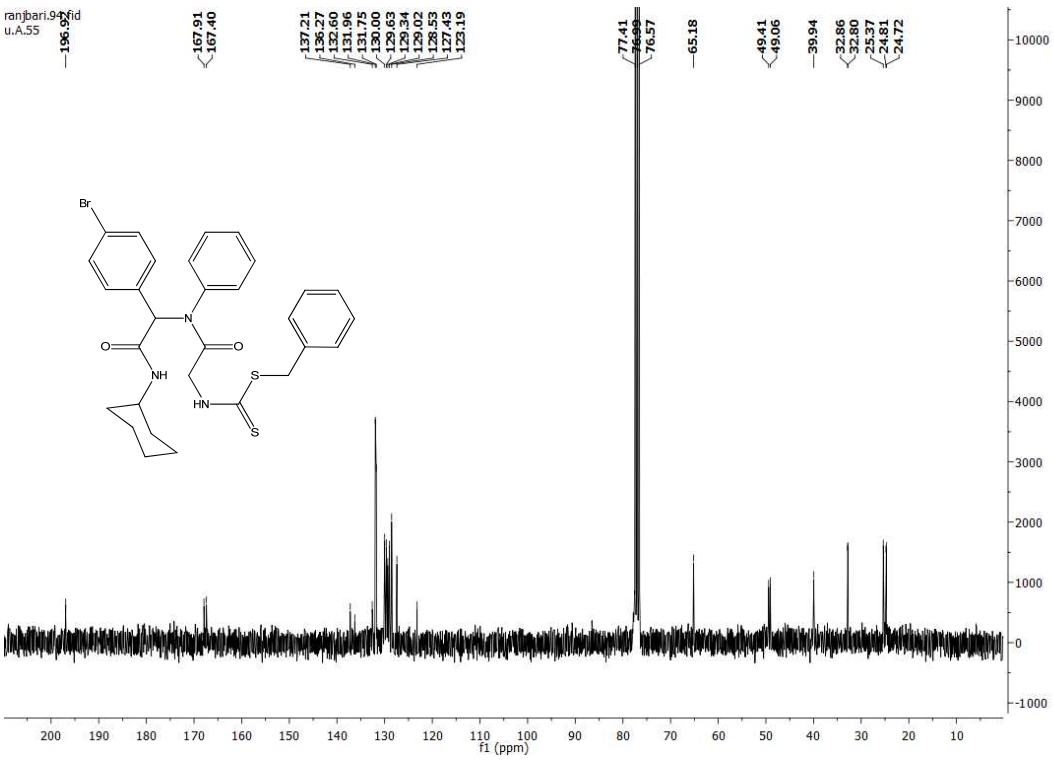
benzyl (2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(2-hydroxyethyl)amino)-2-oxoethyl) carbamodithioate **(6g)**



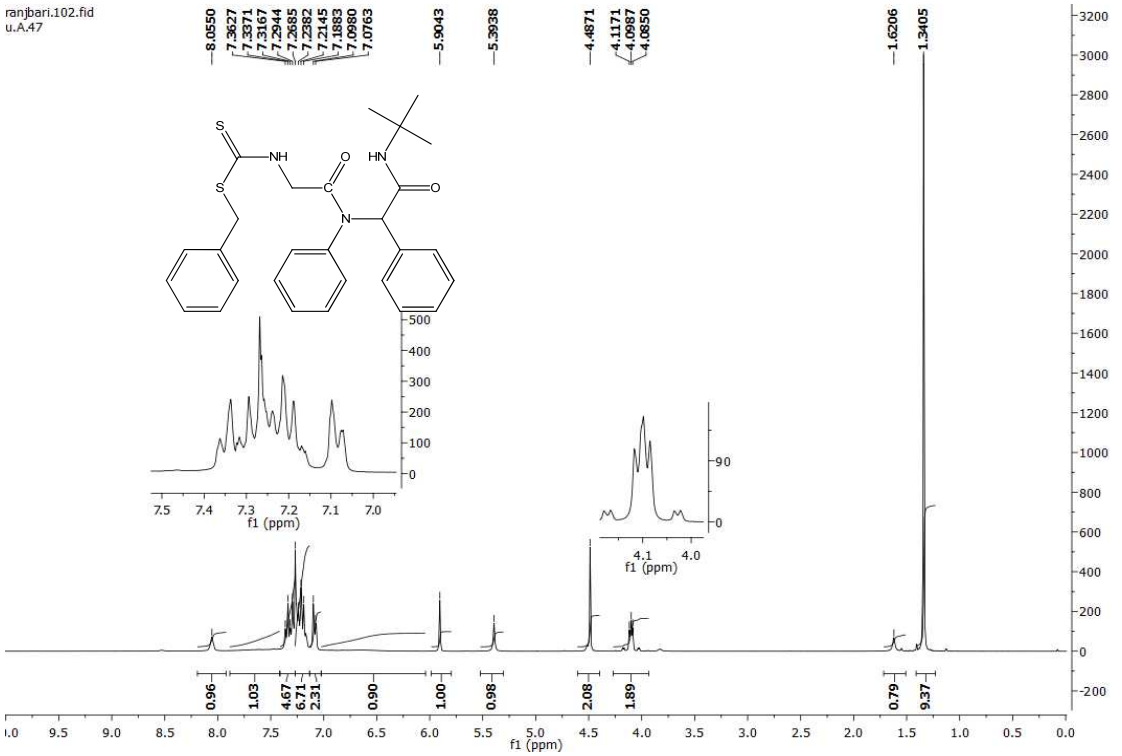


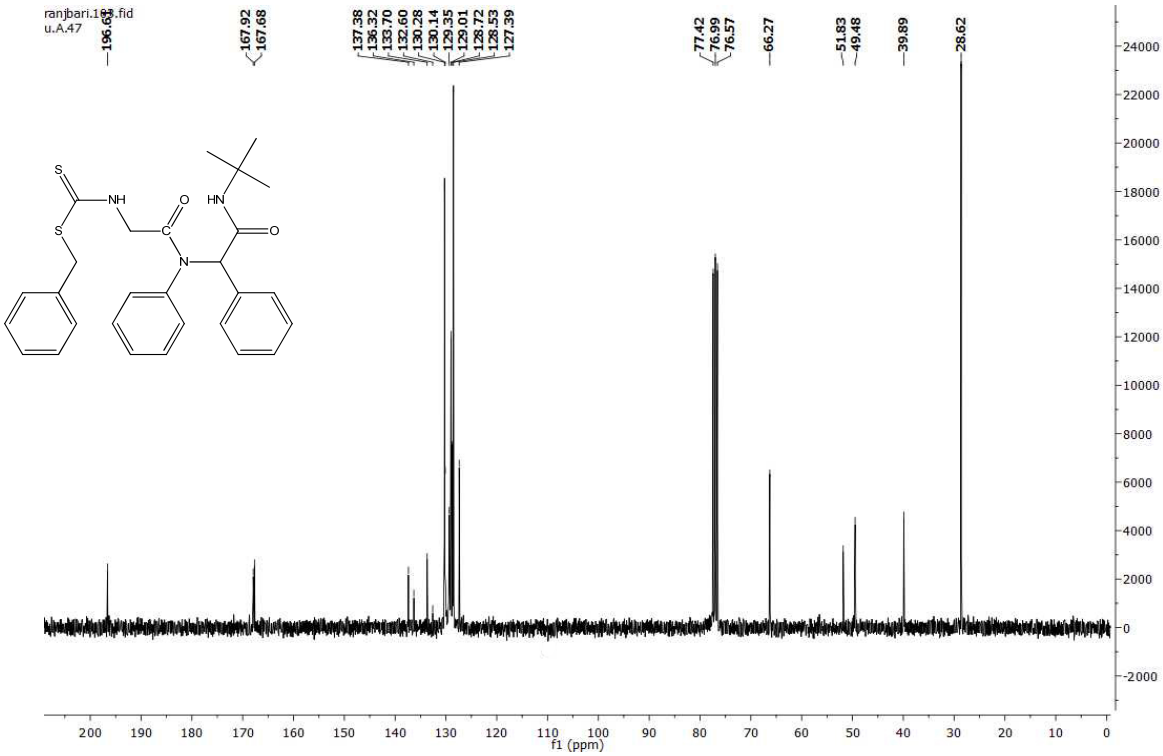
benzyl(2-((1-(4-bromophenyl)-2-(cyclohexylamino)-2-oxoethyl)(phenyl)amino)-2-oxoethyl)carbamodithioate **(6h)**



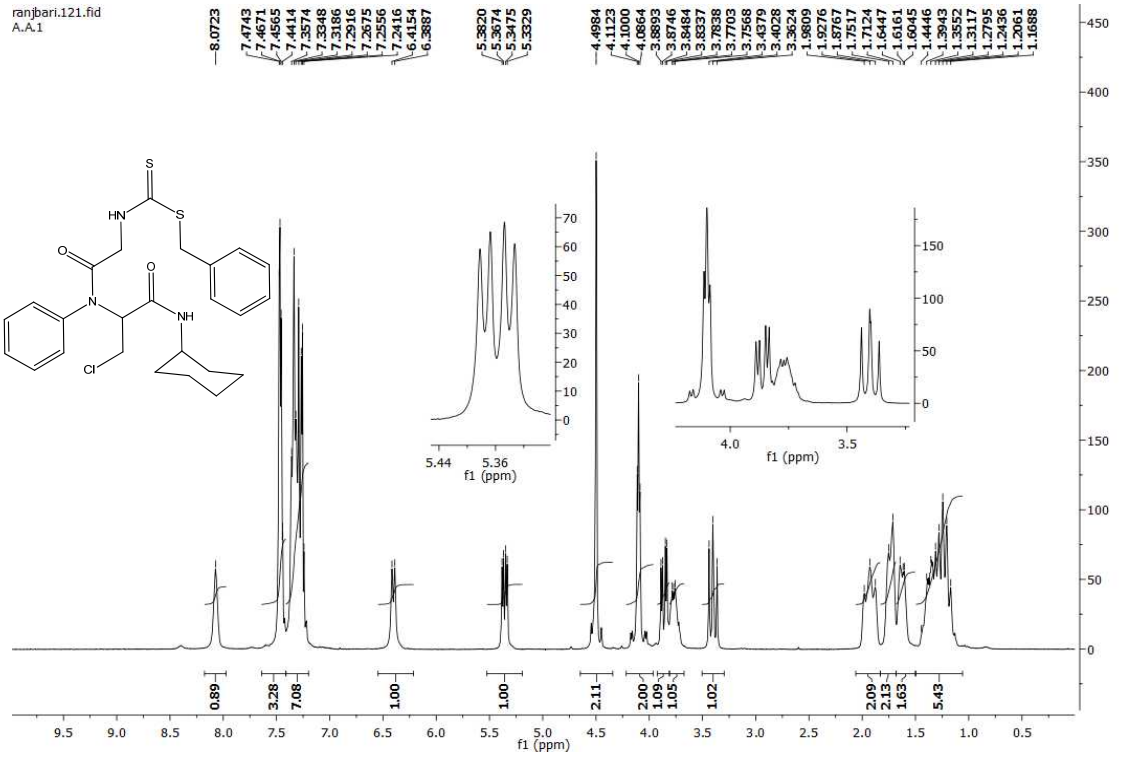


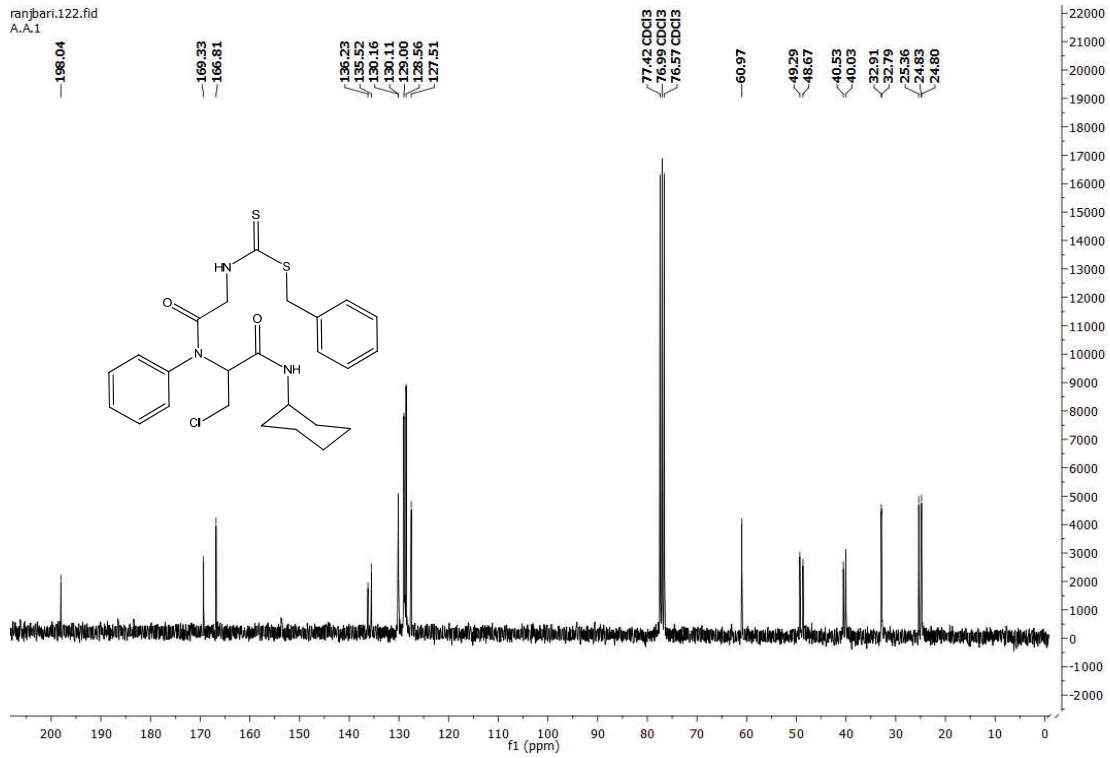
benzyl(2-((2-(tert-butylamino)-2-oxo-1-phenylethyl)(phenyl)amino)-2-oxoethyl) carbamodithioate **(6i)**



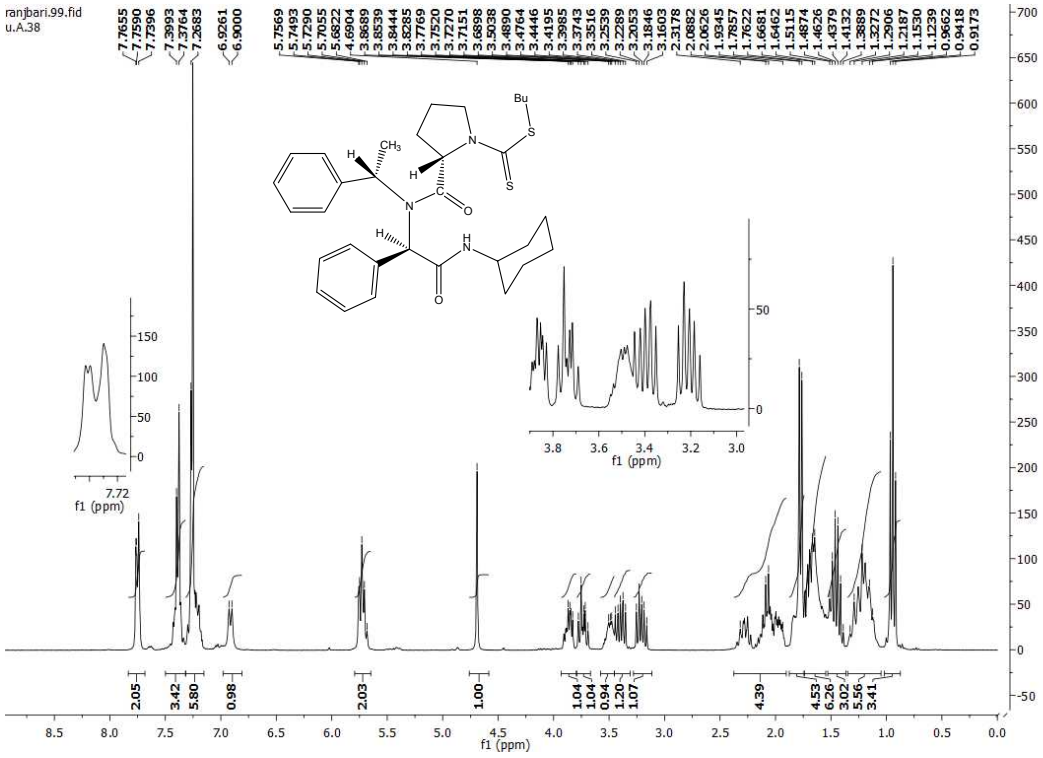


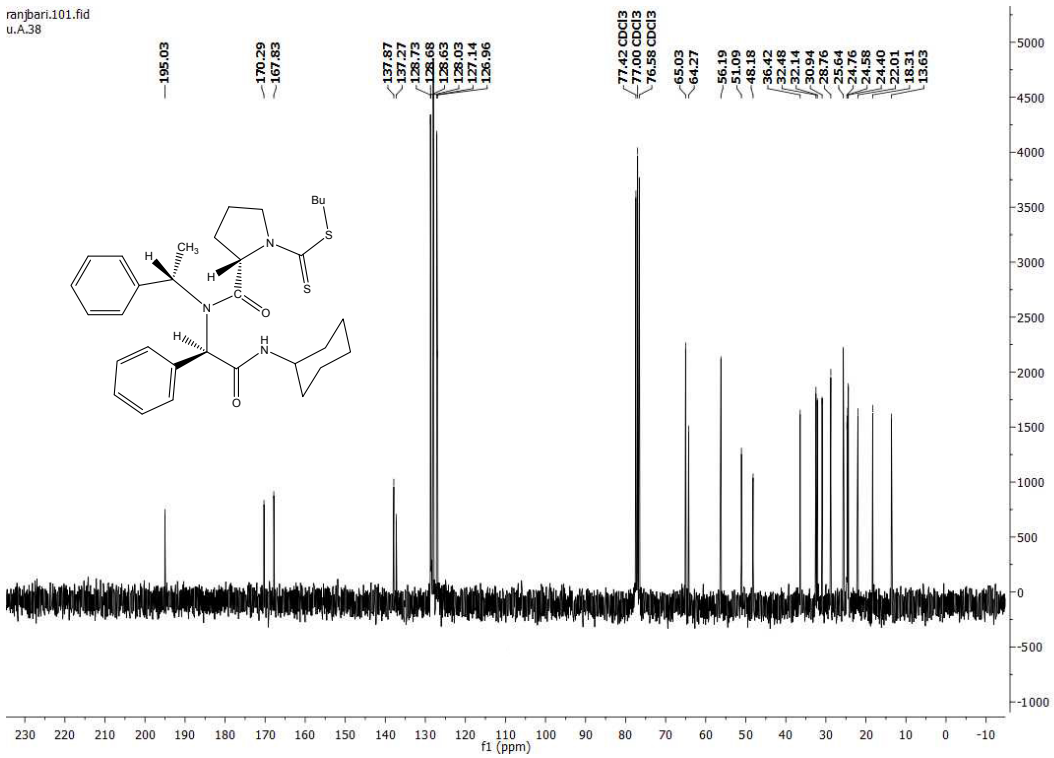
benzyl(2-((3-chloro-1-(cyclohexylamino)-1-oxopropan-2-yl)(phenyl)amino)-2-oxoethyl)carbamodithioate **(6j)**



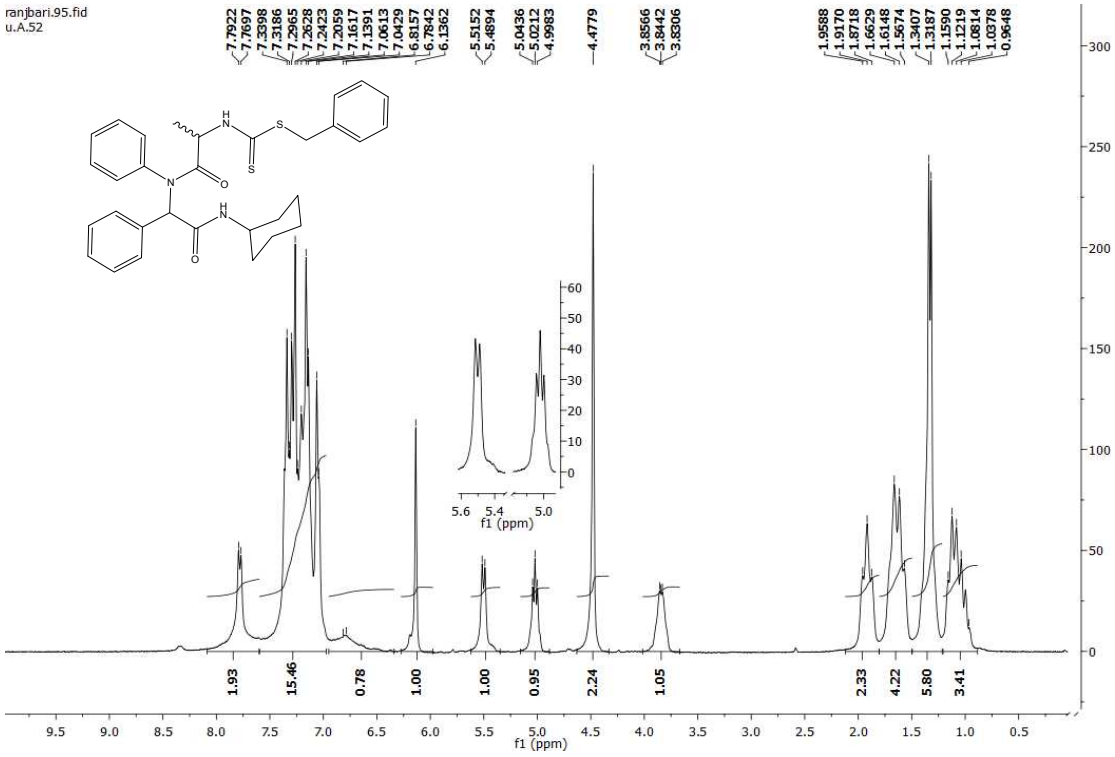


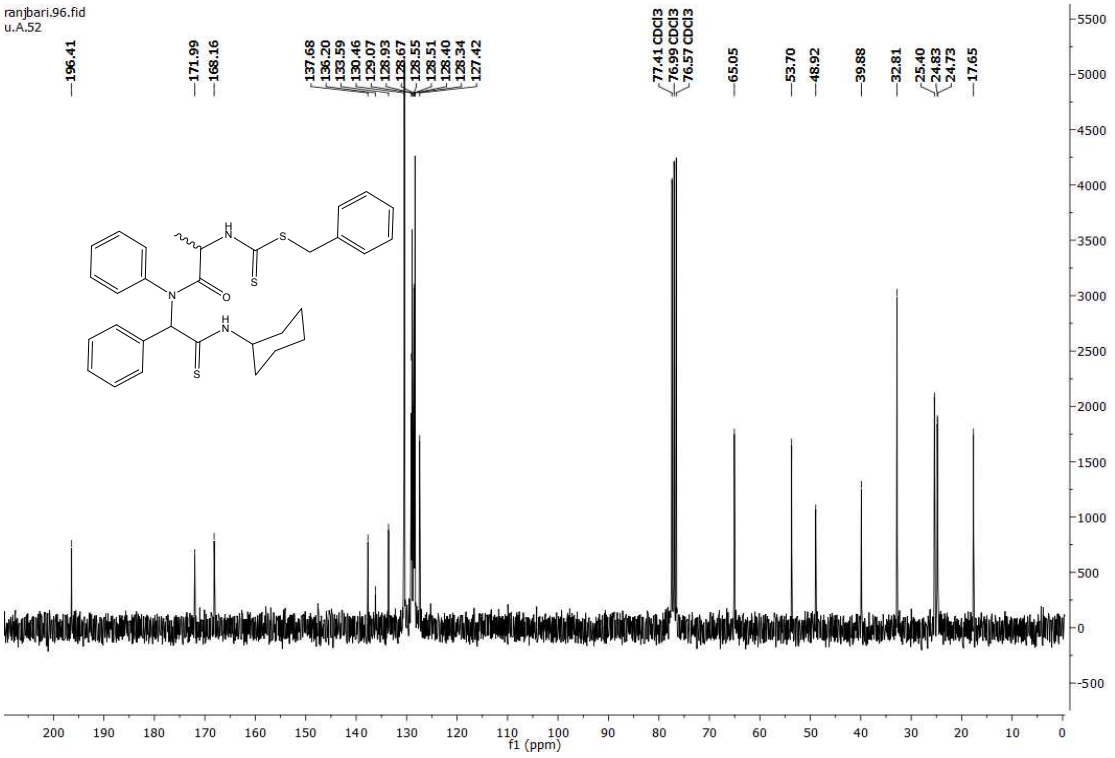
butyl2-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)((*S*)-1-phenylethyl)carbamoyl) pyrrolidine-1-carbodithioate (**6k**)



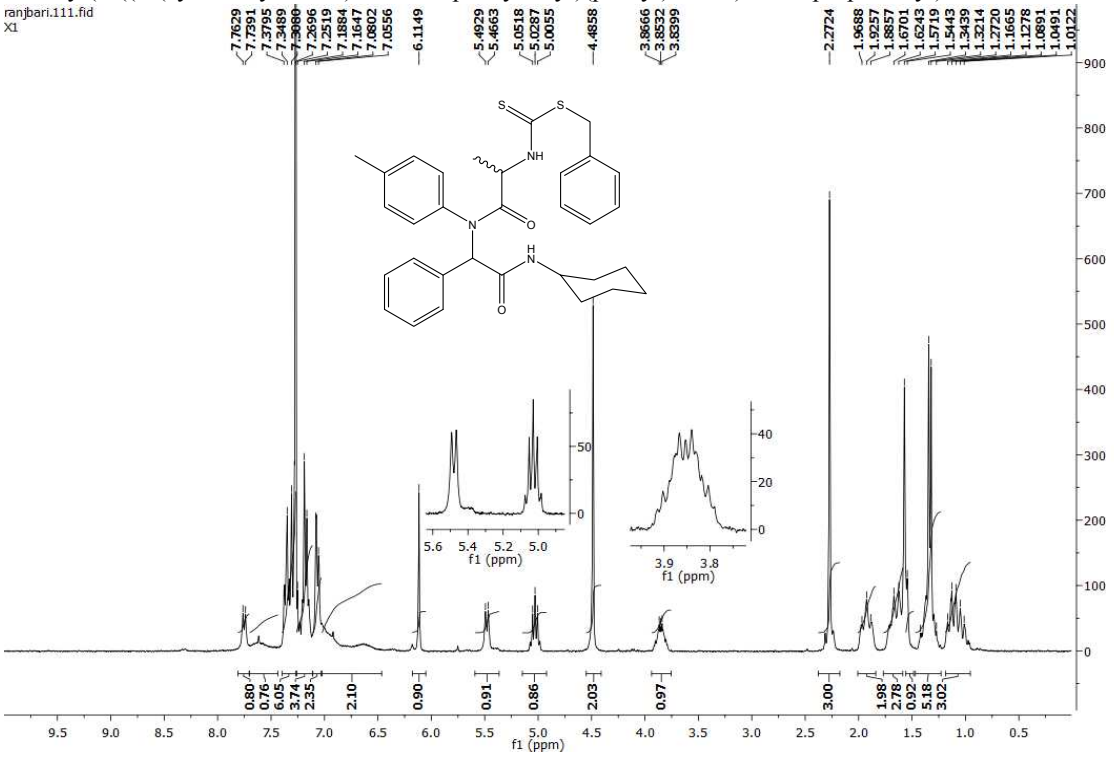


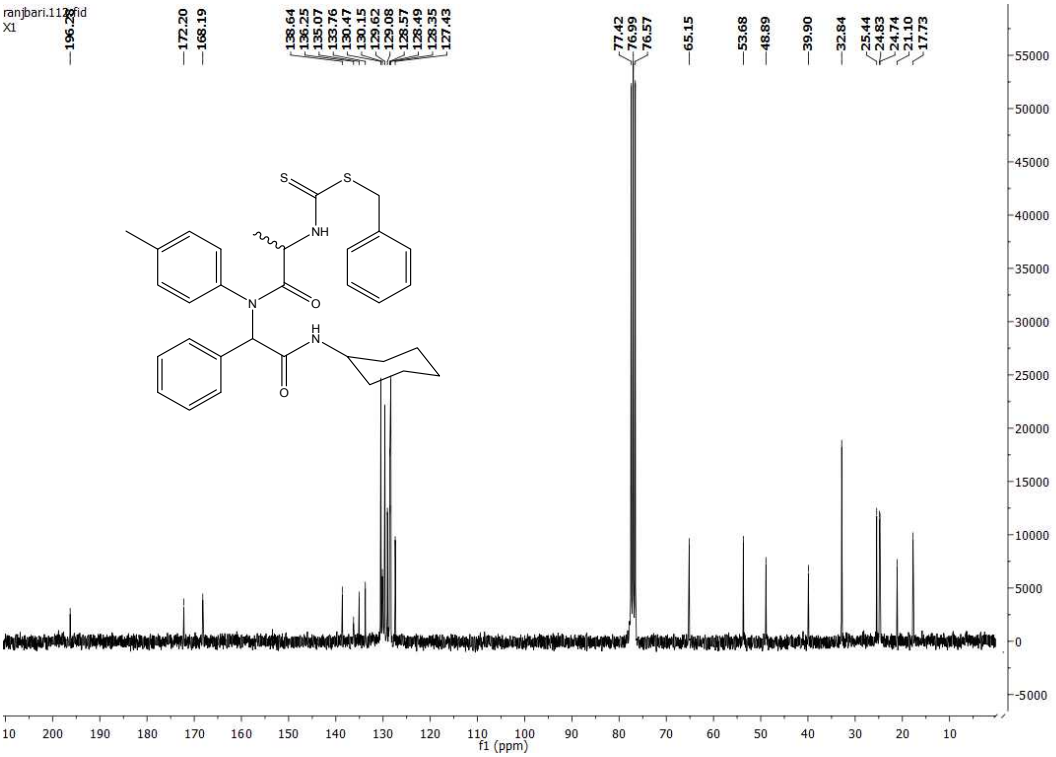
benzyl (1-((2-(cyclohexylamino)-1-phenyl-2-thioxoethyl) (phenyl)amino)-1-oxopropan-2-yl)carbamodithioate **(6l)**



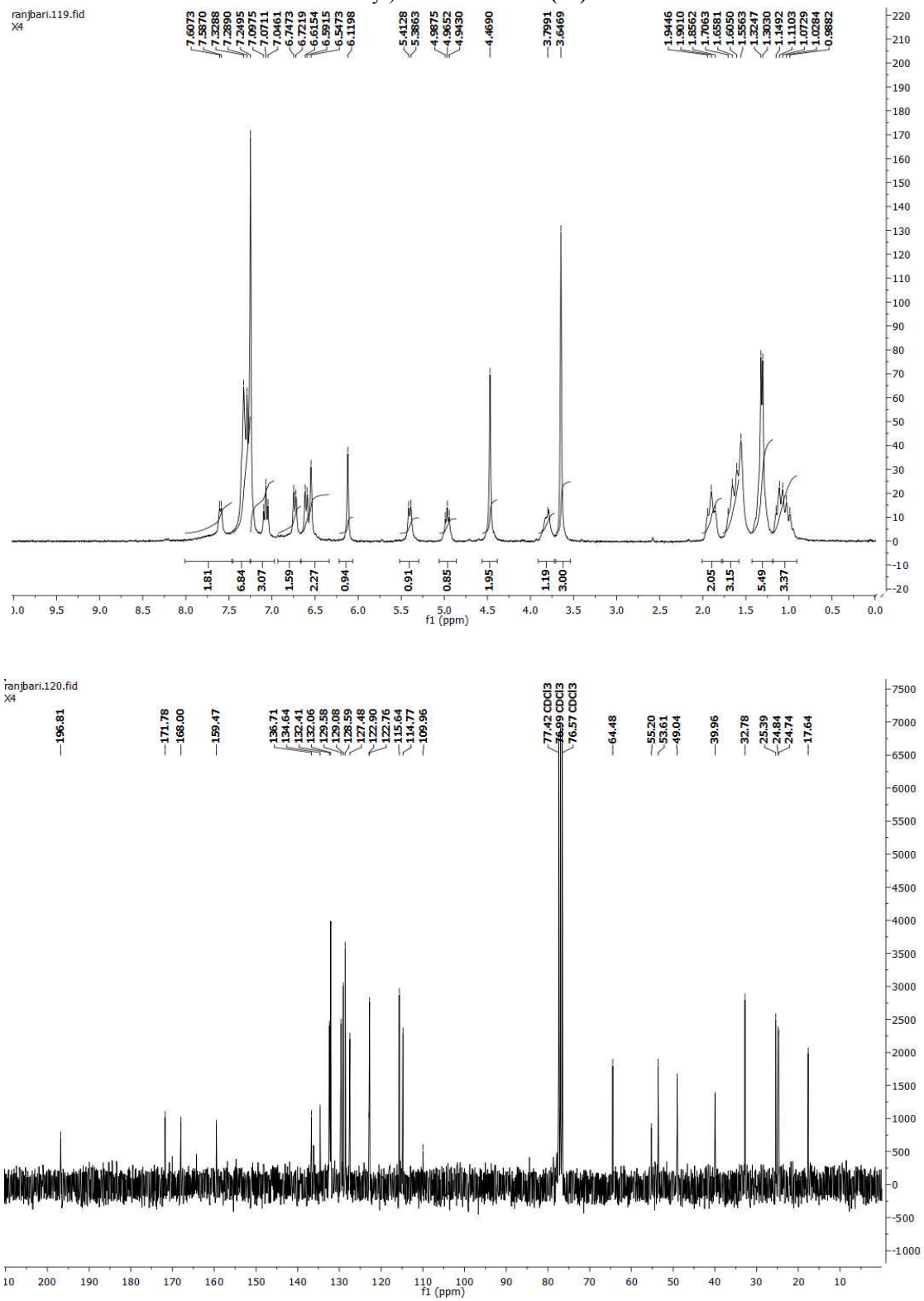


benzyl(1-((2-(cyclohexylamino)-2-oxo-1-phenylethyl)(p-tolyl)amino)-1-oxopropan-2-yl) carbamodithioate **(6m)**

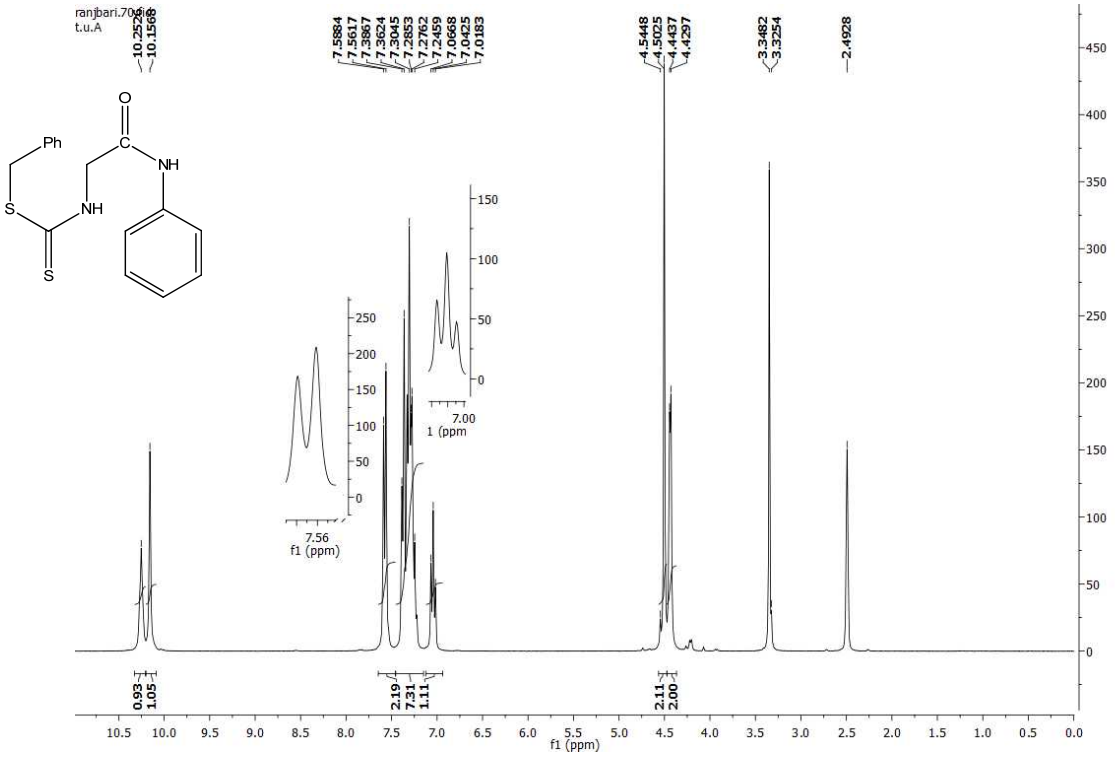


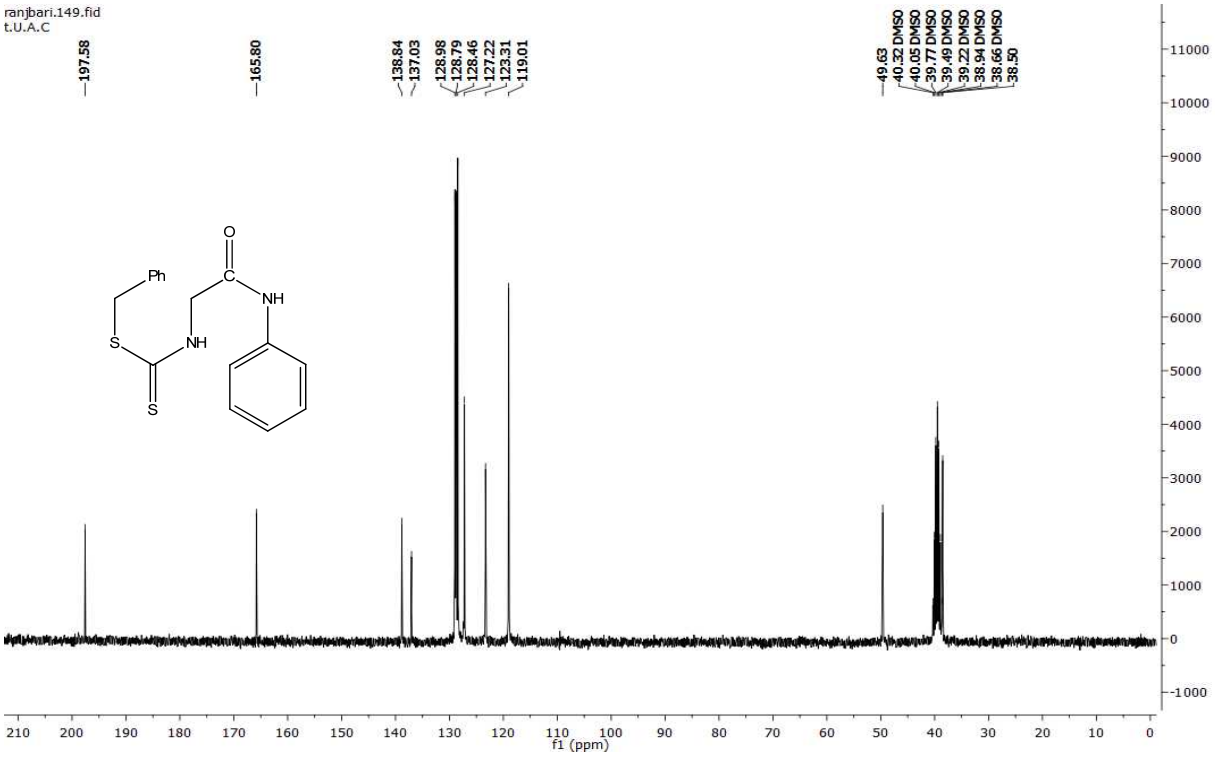


benzyl(1-((4-bromophenyl)(2-(cyclohexylamino)-1-(3-methoxyphenyl)-2-oxoethyl)amino) -1-oxopropan-2-yl)carbamodithioate **(6n)**

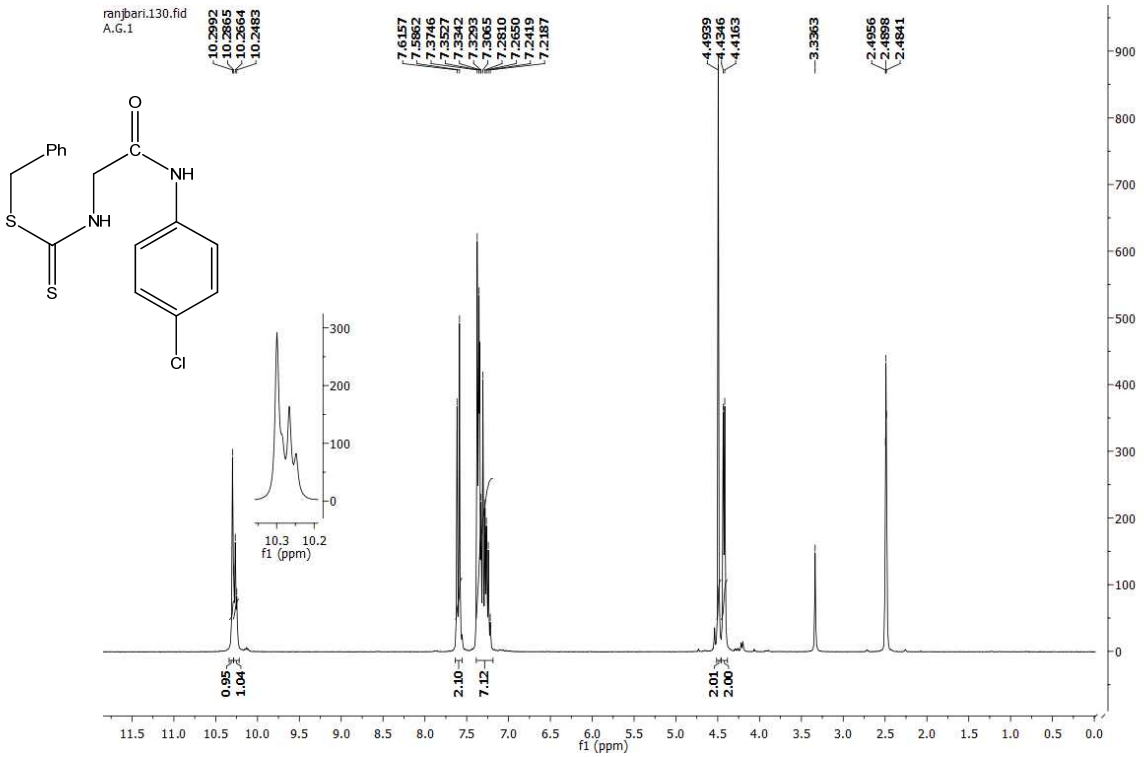


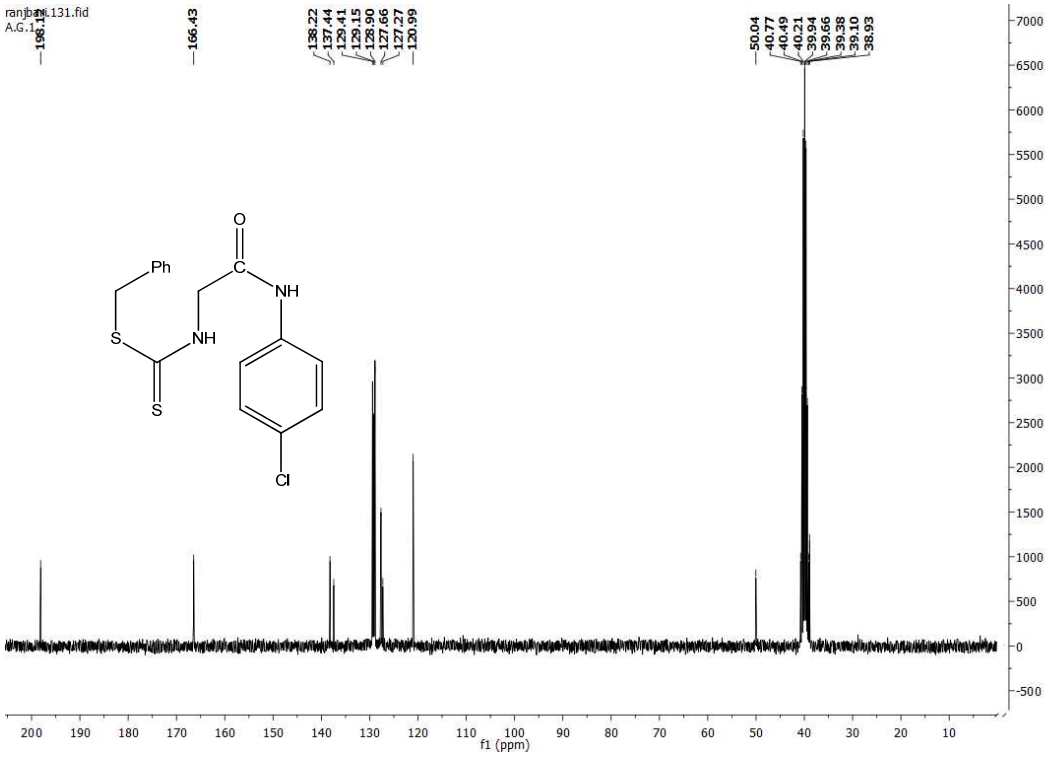
benzyl (2-oxo-2-(phenylamino)ethyl)carbamodithioate **(7a)**



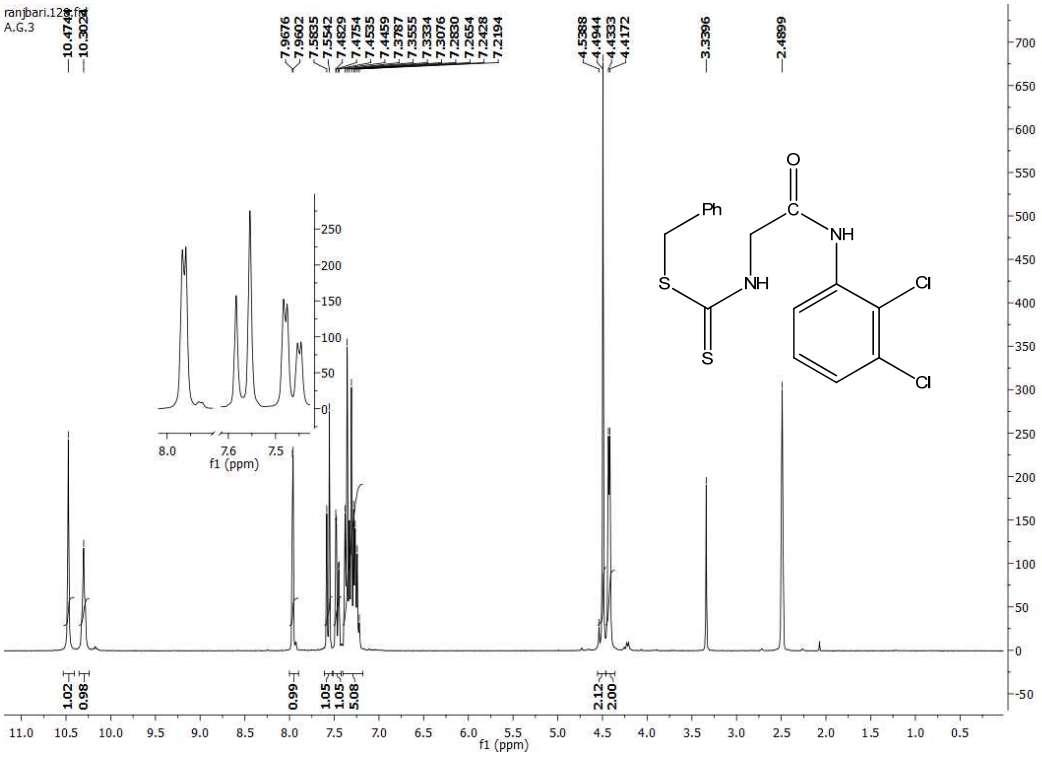


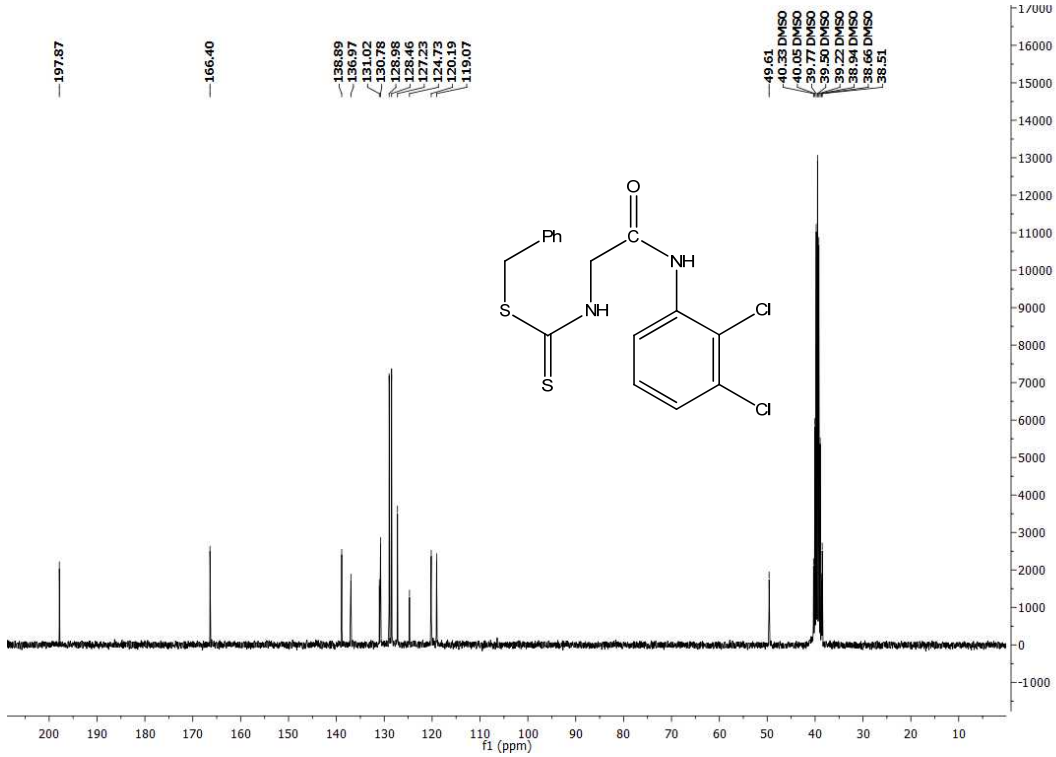
benzyl (2-((4-chlorophenyl)amino)-2-oxoethyl)carbamodithioate **(7b)**



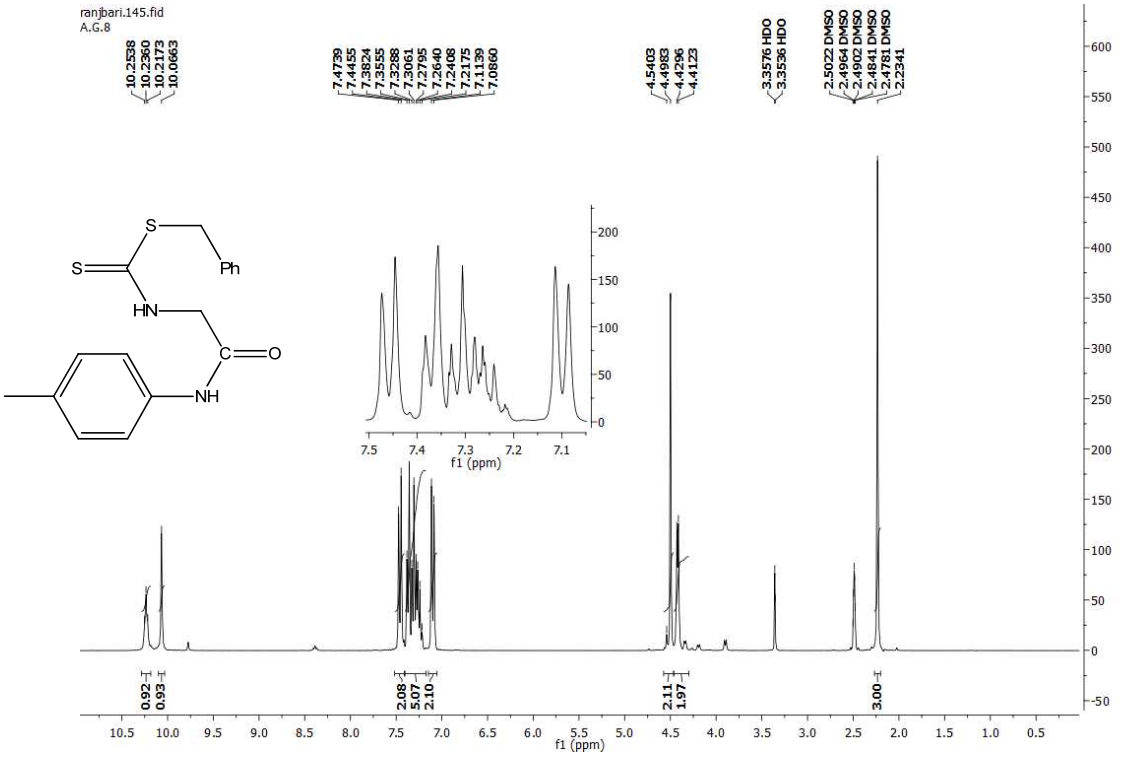


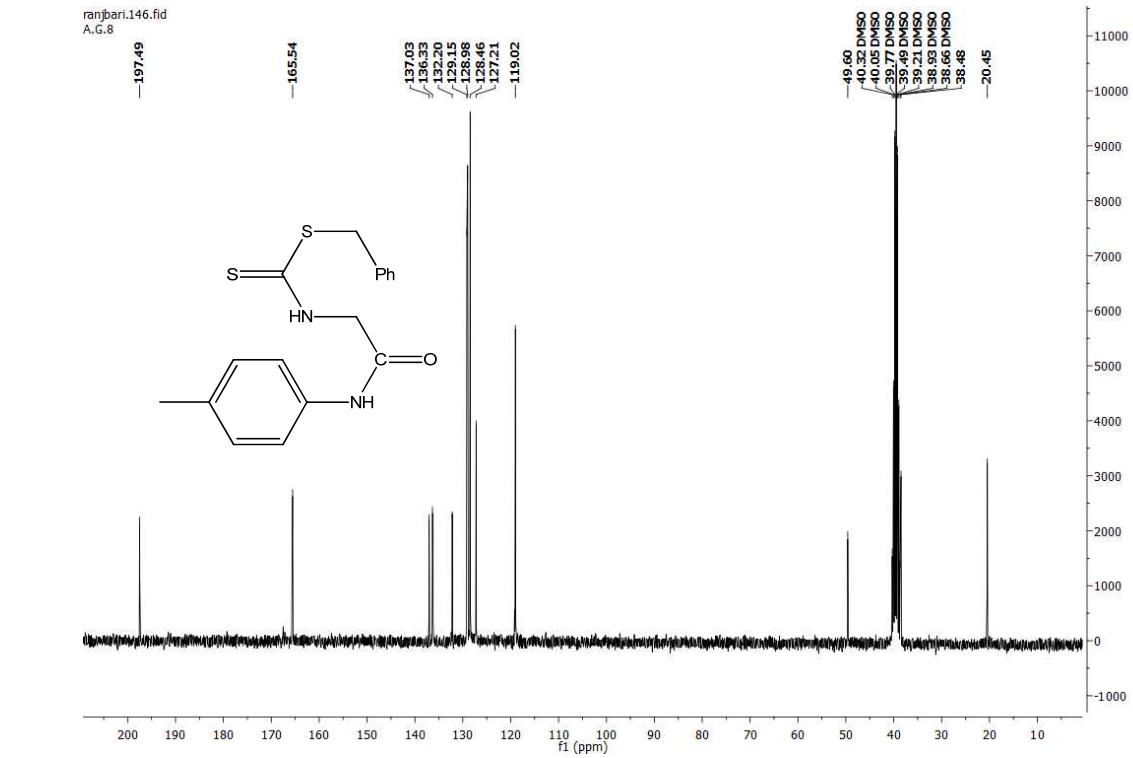
benzyl(2-((2,3-dichlorophenyl)amino)-2-oxoethyl) carbamodithioate **(7c)**



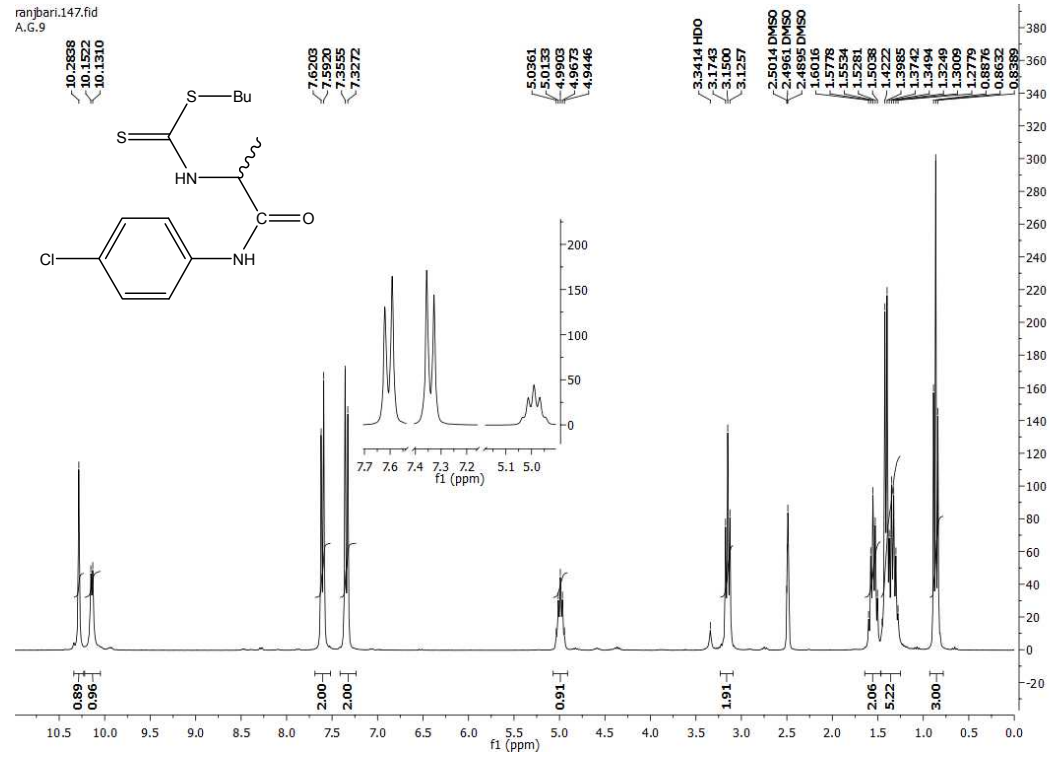


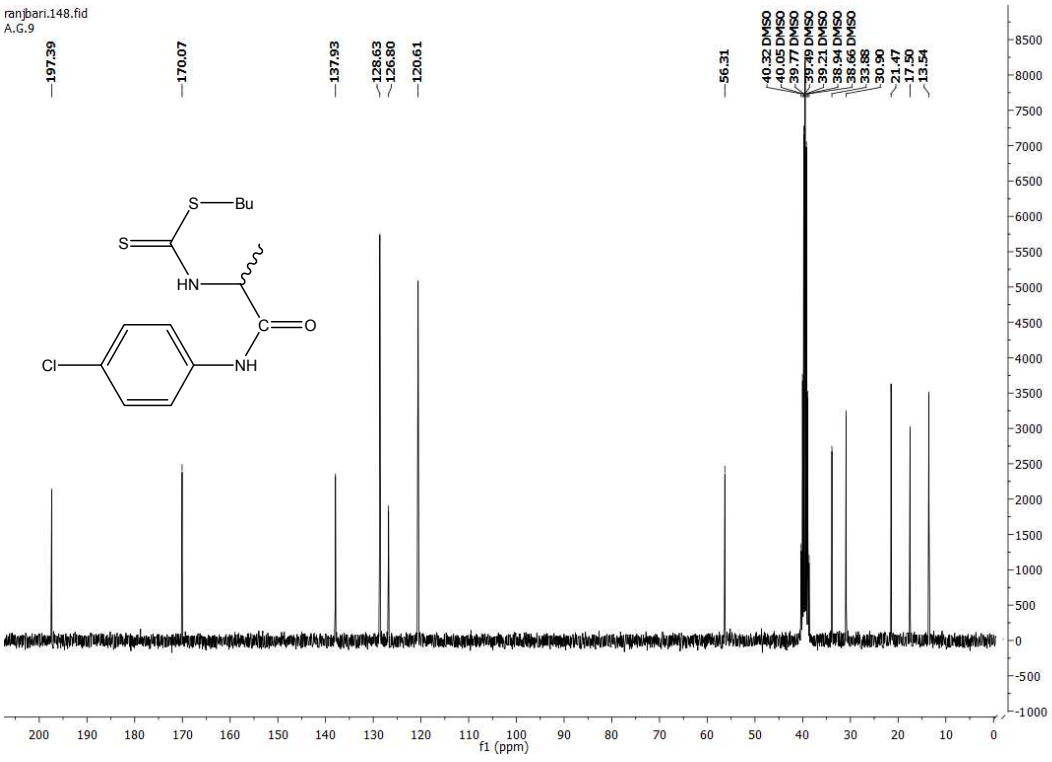
benzyl(2-oxo-2-(p-tolylamino)ethyl)carbamodithioate **(7d)**



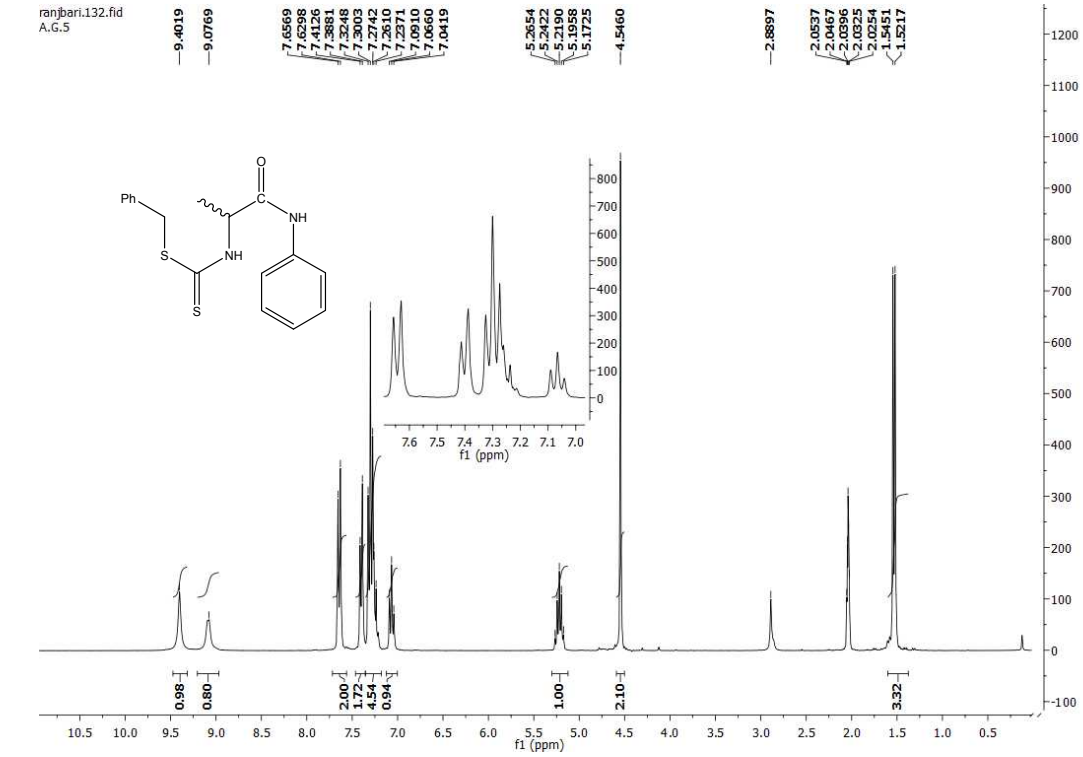


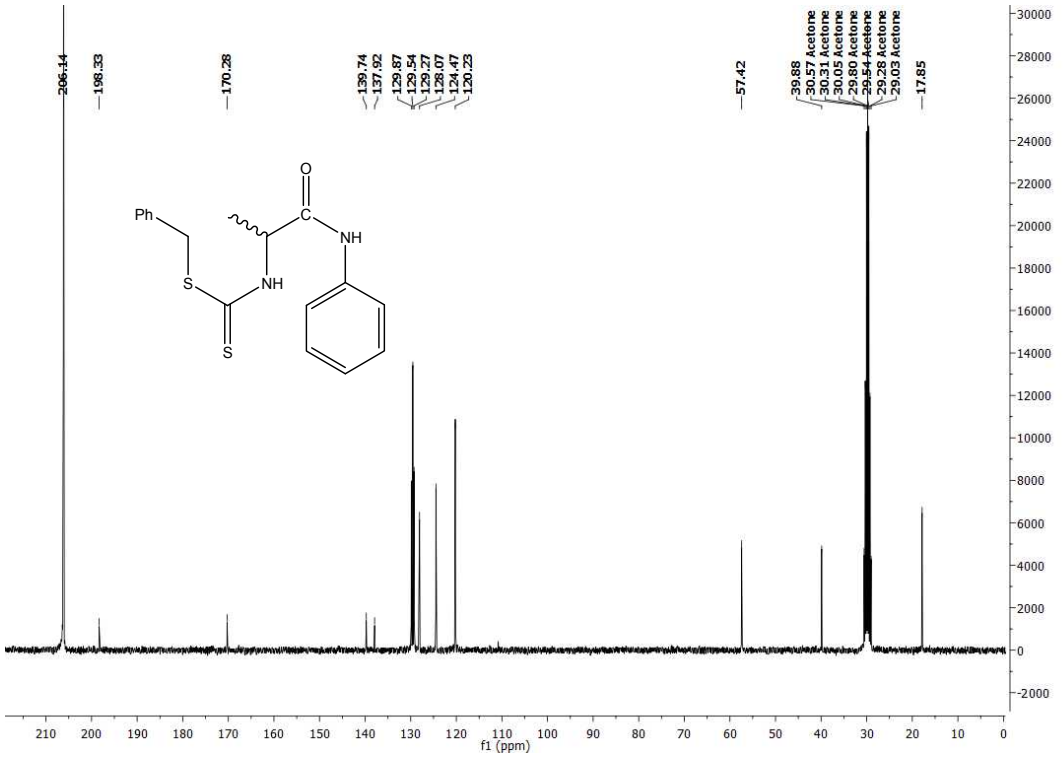
butyl(1-((4-chlorophenyl)amino)-1-oxopropan-2-yl) carbamodithioate **(7e)**





benzyl (1-oxo-1-(phenylamino)propan-2-yl)carbamodithioate **(7f)**





benzyl (2-(naphthalen-1-ylamino)-2-oxoethyl)carbamodithioate **(7g)**