

# Chemical Adsorption Strategy for DMC-MeOH Mixture Separation<sup>†</sup>

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<sup>†</sup> Dedicated to the 100<sup>th</sup> anniversary of Chemistry at Nankai University

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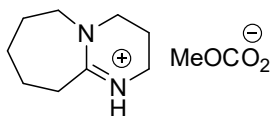
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## 1. Experimental Study

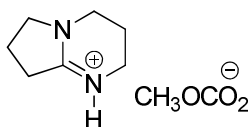
**Table 1.** Solubility of CO<sub>2</sub> in Different Solvents.

Entry	Solvent	Pressure/MPa	Temp./°C	Solvent Volume/mL	Solubility mg/mL
1	hexane	1.0	18	10	6.63
2	toluene	1.0	18	10	14.58
3	DMC	1.0	18	10	19.92
4	DMF	1.0	18	10	58.02

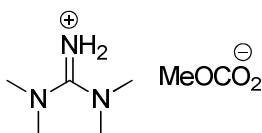
## 2. NMR Data of the Adducts



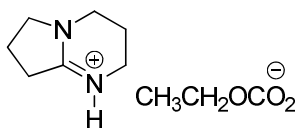
Colorless solid, <sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>): δ 8.98 (br, 1H, -NH), 3.48-3.39 (4H), 3.24-3.15 (5H), 2.68-2.65 (2H), 1.87-1.81 (2H), 1.64-1.57 (6H) ppm. <sup>13</sup>C NMR (100.6 MHz, DMSO-*d*<sub>6</sub>): δ 164.5, 156.8, 52.9, 51.3, 47.8, 38.5, 31.7, 28.5, 26.5, 24.0, 19.6 ppm.



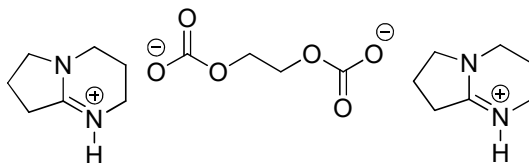
Colorless solid,  $^1\text{H}$  NMR (400 MHz,  $\text{DMSO-}d_6$ ):  $\delta$  10.15 (br, 1H, -NH), 3.53 (t,  $J$  = 7.0 Hz, 2H), 3.34 (t,  $J$  = 6.0 Hz, 2H), 3.27–3.14 (5H), 2.74 (t,  $J$  = 8.0 Hz, 2H), 2.02–1.94 (m, 2H), 1.88–1.82 (m, 2H) ppm.  $^{13}\text{C}$  NMR (100.6 MHz,  $\text{DMSO-}d_6$ ):  $\delta$  163.2, 157.0, 52.5, 51.3, 42.0, 38.4, 29.8, 18.7, 18.6 ppm.



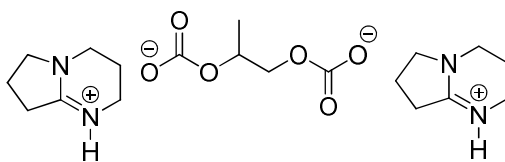
Colorless solid,  $^1\text{H}$  NMR (400 MHz,  $\text{DMSO-}d_6$ ):  $\delta$  7.87 (br, 2H, -NH<sub>2</sub>), 3.22 (s, 3H), 2.83 (s, 12H) ppm.  $^{13}\text{C}$  NMR (100.6 MHz,  $\text{DMSO-}d_6$ ):  $\delta$  162.3, 156.5, 51.2, 39.3 ppm.



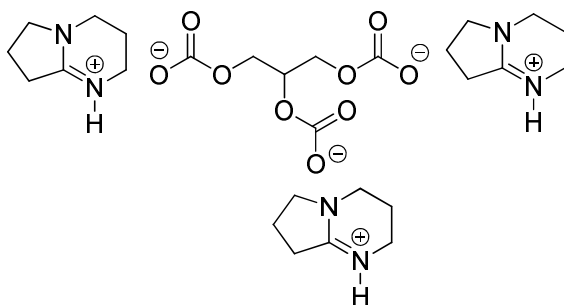
Colorless solid,  $^1\text{H}$  NMR (400 MHz,  $\text{DMSO-}d_6$ ):  $\delta$  10.06 (br, 1H, -NH), 3.69–3.64 (m, 1H), 3.54–3.51 (2H), 3.45–3.40 (1H), 3.34–3.32 (2H), 3.27–3.24 (2H), 2.75–2.71 (2H), 2.01–1.94 (m, 2H), 1.87–1.81 (m, 2H), 1.02 (t,  $J$  = 7.2 Hz, 3H) ppm.  $^{13}\text{C}$  NMR (100.6 MHz,  $\text{DMSO-}d_6$ ):  $\delta$  163.1, 156.6, 58.7, 52.4, 42.0, 38.5, 29.8, 18.8, 18.6, 15.5 ppm.



Colorless solid,  $^1\text{H}$  NMR (400 MHz,  $\text{DMSO-}d_6$ ):  $\delta$  9.24 (br, 1H, -NH), 8.51 (1H, -NH), 3.70 (2H), 3.45–3.37 (6H), 3.29–3.22 (8H), 2.62–2.58 (4H), 1.97–1.92 (m, 4H), 1.82–1.76 (m, 4H) ppm.  $^{13}\text{C}$  NMR (100.6 MHz,  $\text{DMSO-}d_6$ ):  $\delta$  162.1 (162.3), 156.7 (156.5), 65.6, 63.3 (63.0), 61.0 (60.8), 51.9, 42.2 (42.1), 39.8, 30.0 (29.9), 19.3 (19.2), 18.8 ppm.

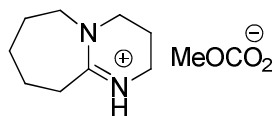


Colorless solid,  $^1\text{H}$  NMR (400 MHz,  $\text{DMSO-}d_6$ ):  $\delta$  9.08–8.81 (br, 2H, -NH), 3.63–3.43 (7H), 3.30–3.22 (8H), 2.65–2.61 (4H), 1.98–1.91 (4H), 1.83–1.77 (4H), 0.98 (t, 3H) ppm.  $^{13}\text{C}$  NMR (100.6 MHz,  $\text{DMSO-}d_6$ ):  $\delta$  162.2, 156.7, 69.8, 67.7 (67.5, 67.3), 65.8, 52.0, 42.2, 30.0, 19.2 (19.1), 18.7 ppm.

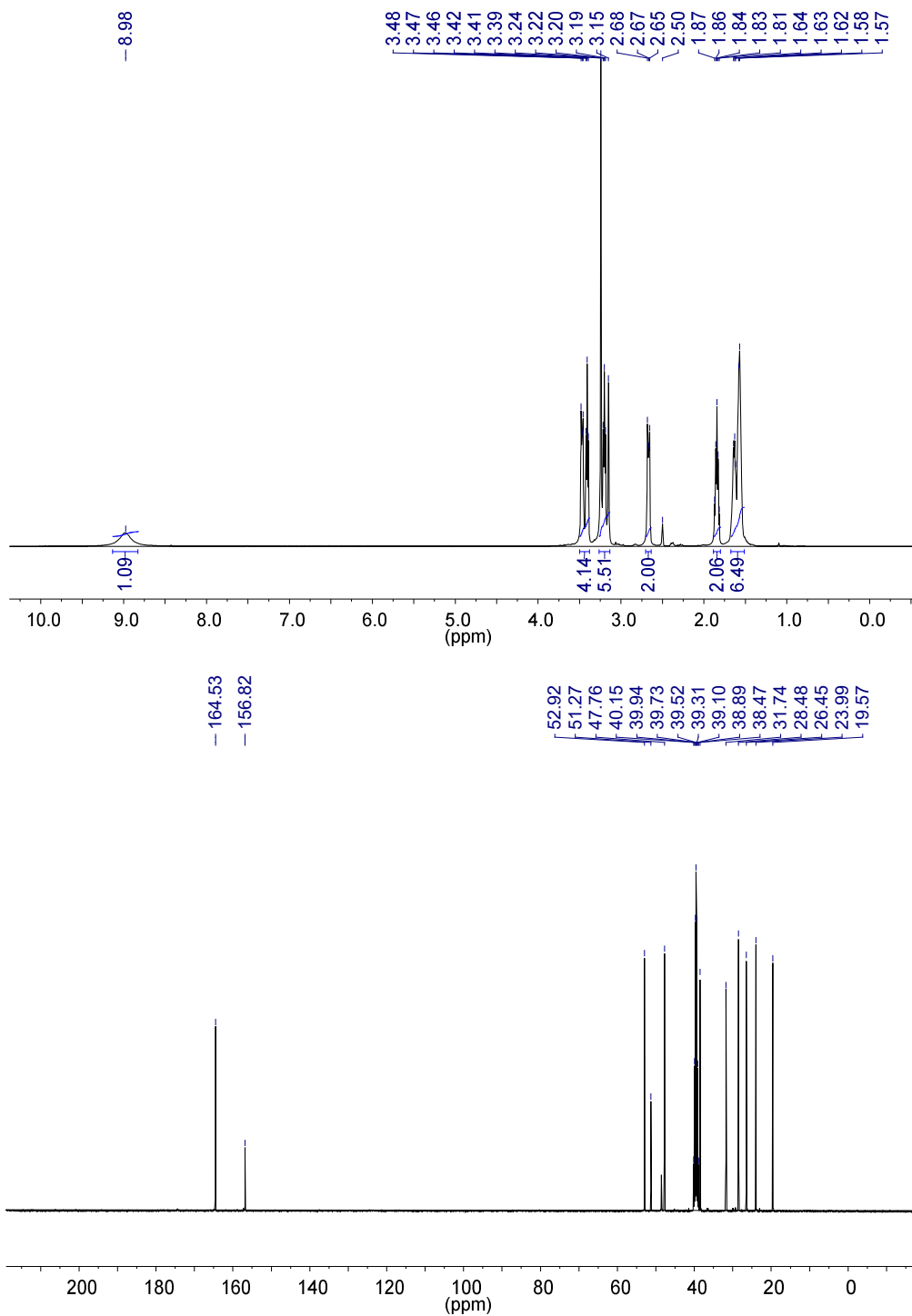


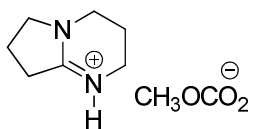
Colorless solid,  $^1\text{H}$  NMR (400 MHz,  $\text{DMSO-}d_6$ ):  $\delta$  8.60 (3H, -NH), 3.65–3.61 (2H), 3.42–3.39 (7H), 3.27–3.19 (13H), 2.55 (t, 6H), 1.95–1.88 (m, 6H), 1.79–1.74 (m, 6H) ppm.  $^{13}\text{C}$  NMR (100.6 MHz,  $\text{DMSO-}d_6$ ):  $\delta$  162.2, 157.5, 71.9, 66.7 (66.4), 63.7, 52.2, 42.6, 40.7, 30.5, 19.9, 19.3 ppm.

## 3. NMR Spectral Copies of the Adducts

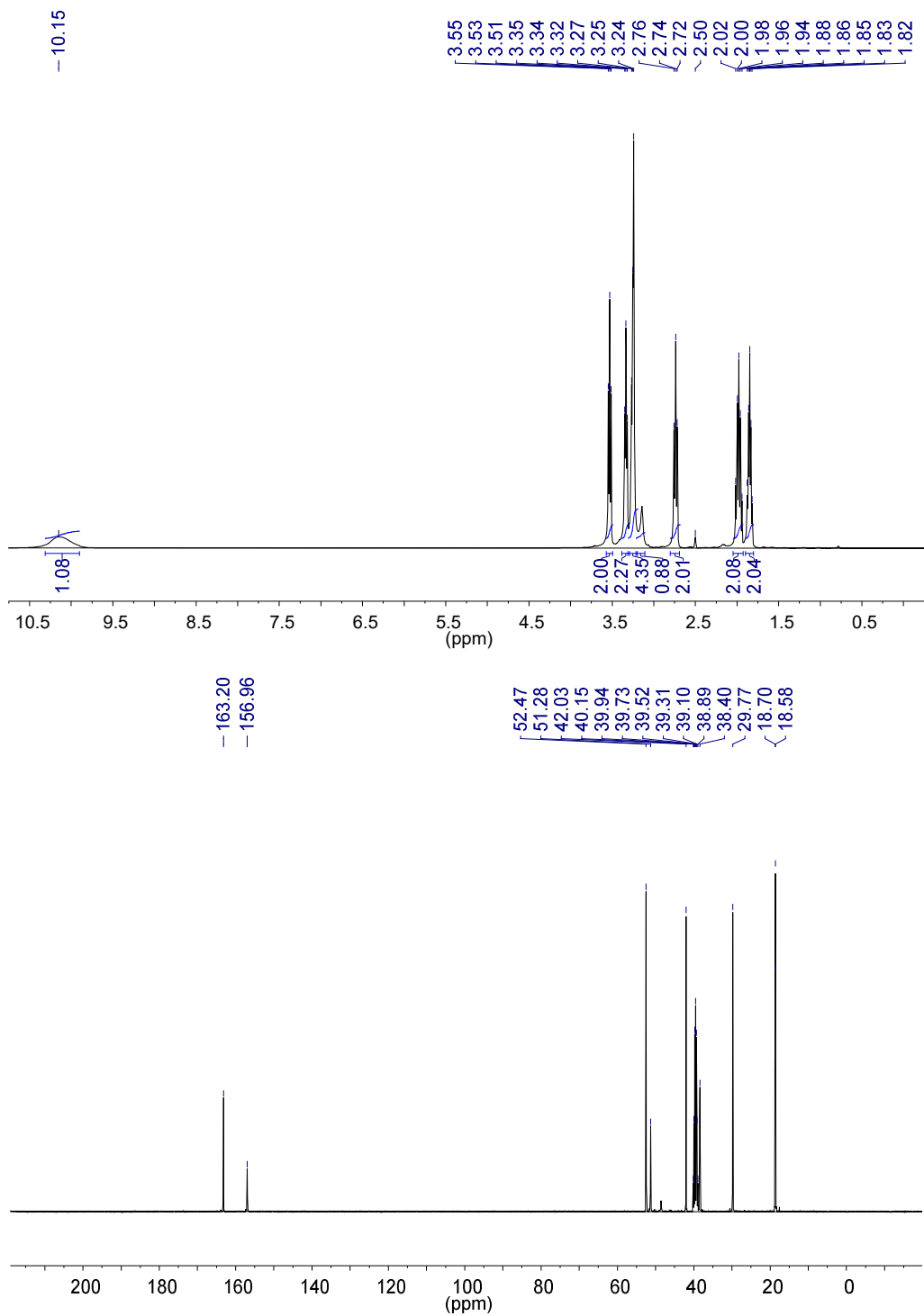


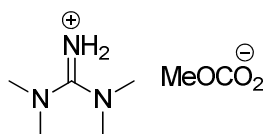
$^1\text{H}$  NMR (400 MHz,  $\text{DMSO-}d_6$ ) and  $^{13}\text{C}$  NMR (100.6 MHz,  $\text{DMSO-}d_6$ )



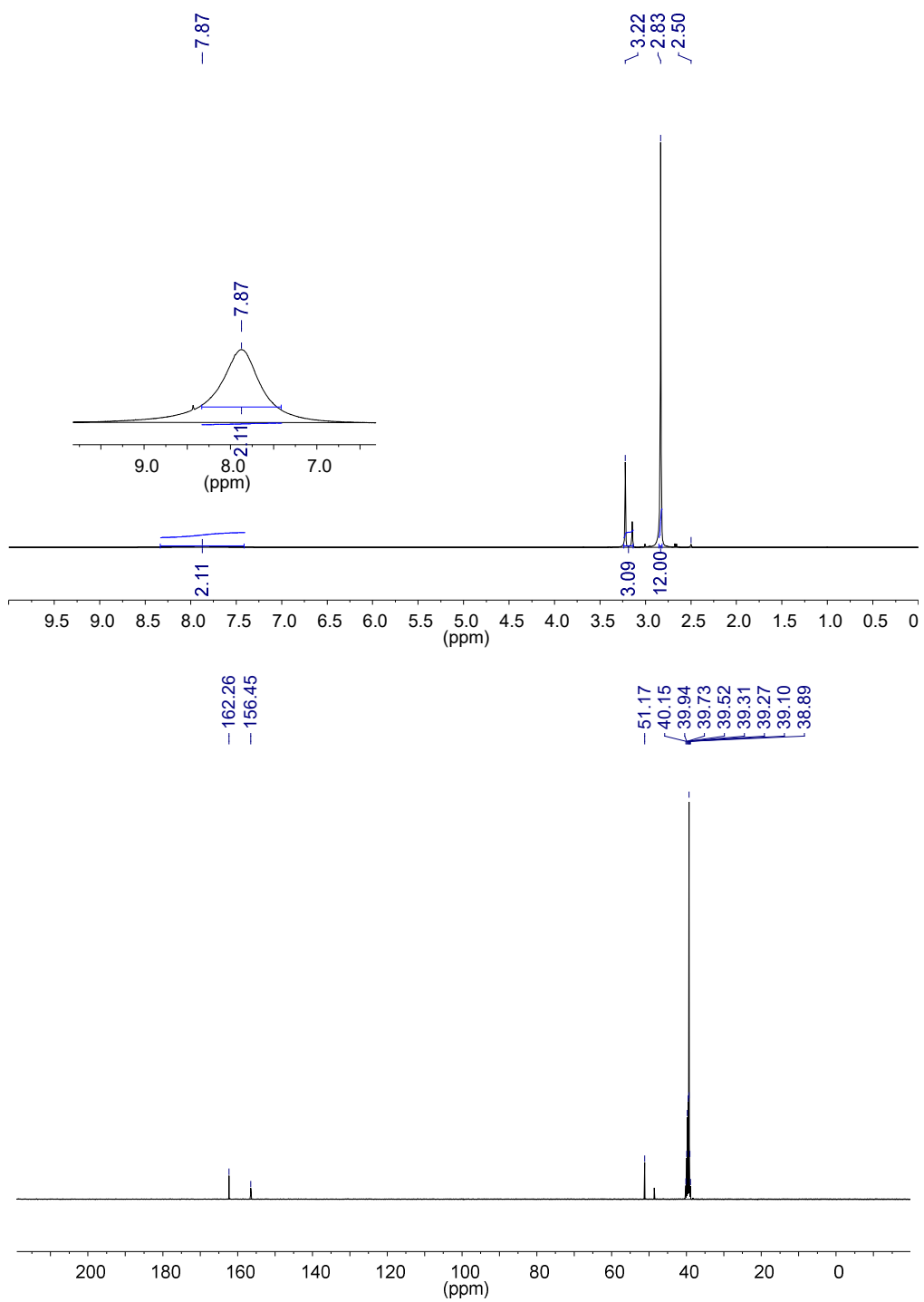


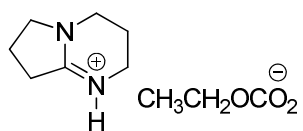
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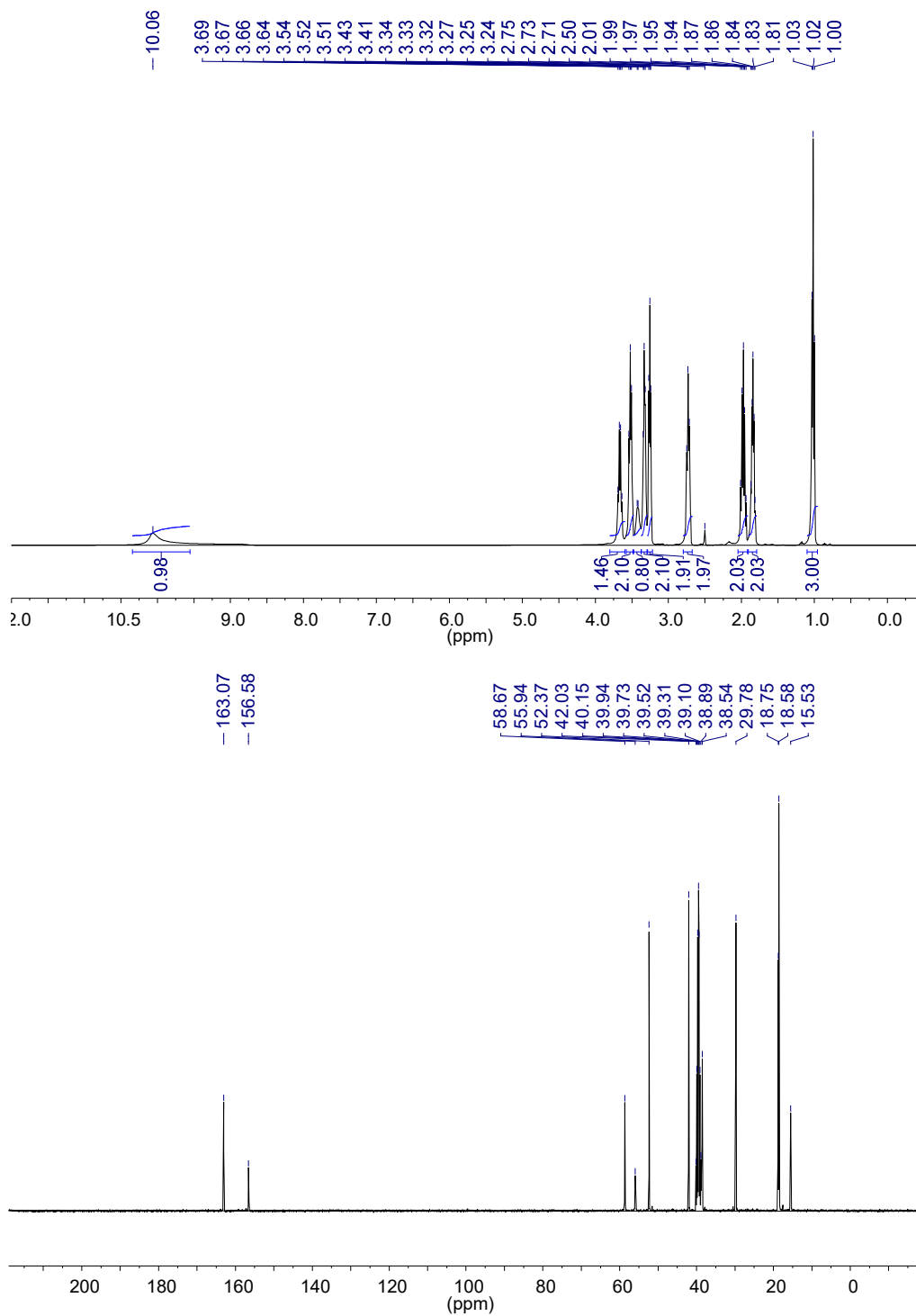


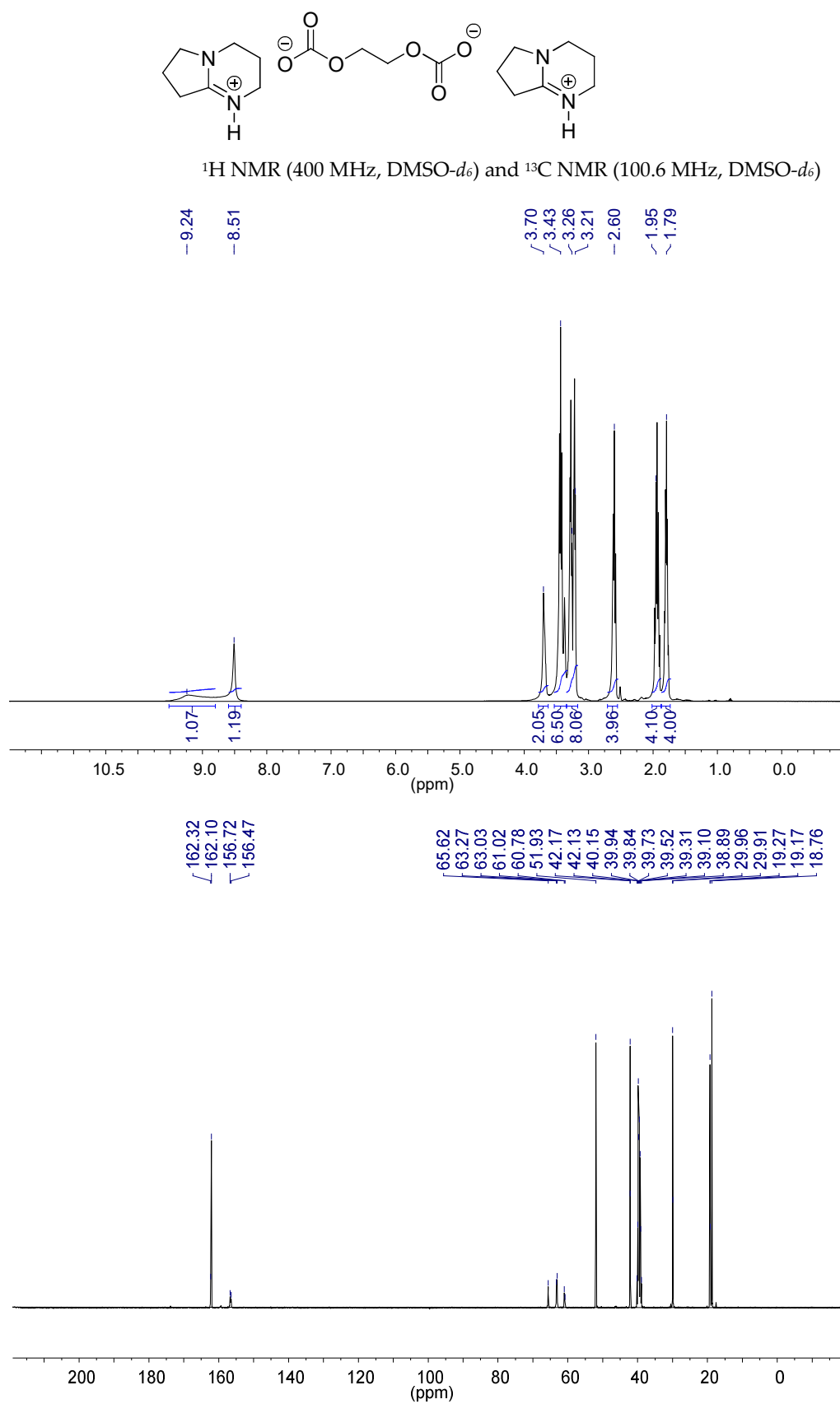
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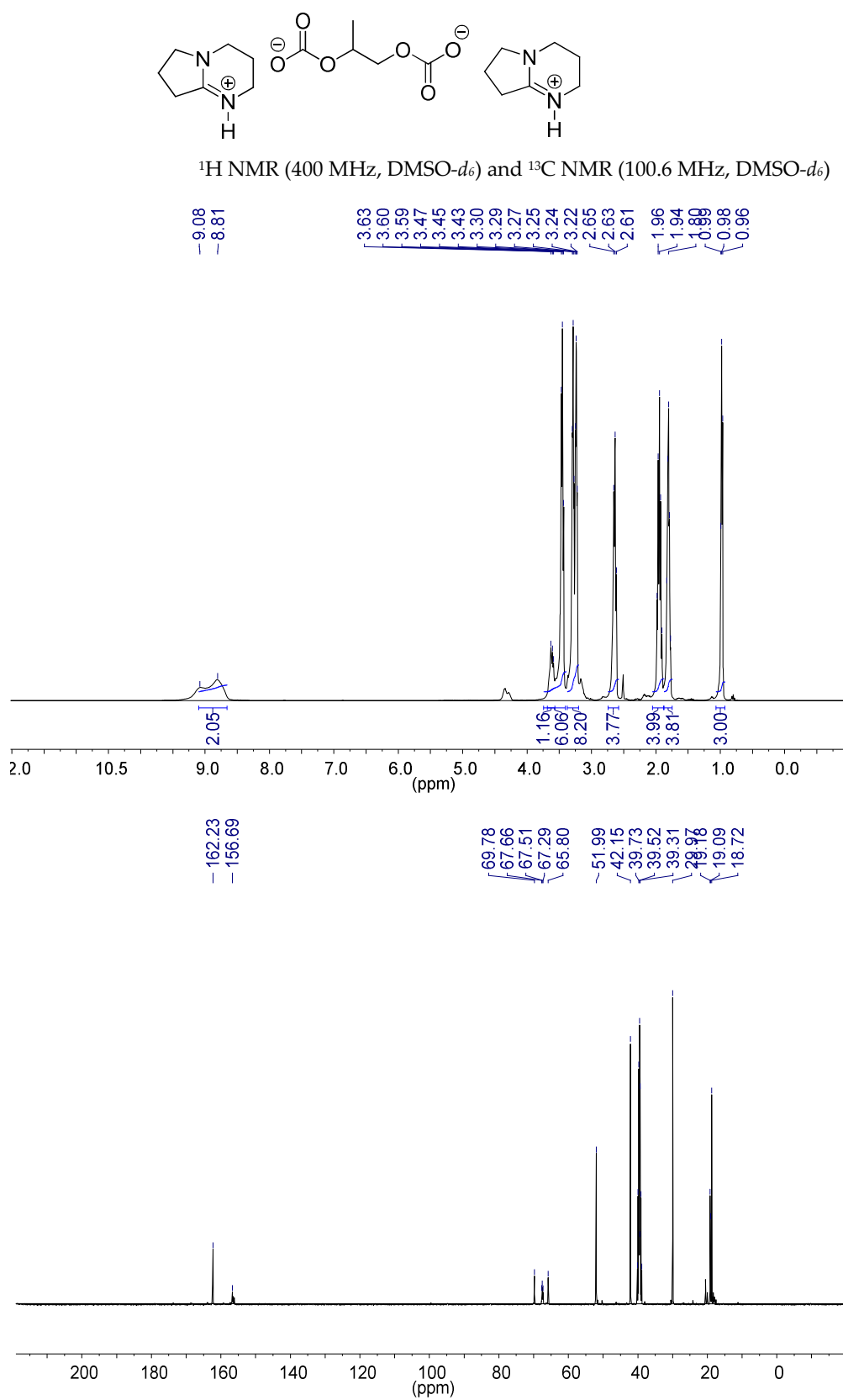


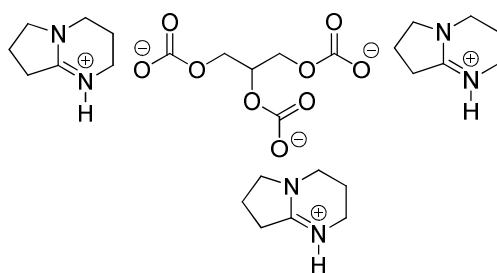
$^1\text{H}$  NMR (400 MHz,  $\text{DMSO}-d_6$ ) and  $^{13}\text{C}$  NMR (100.6 MHz,  $\text{DMSO}-d_6$ )









<sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>) and <sup>13</sup>C NMR (100.6 MHz, DMSO-*d*<sub>6</sub>)