

Supplementary Material

Designing highly efficient solvents for the Knoevenagel condensation: two novel dicationic dimethyl phosphate ionic liquids

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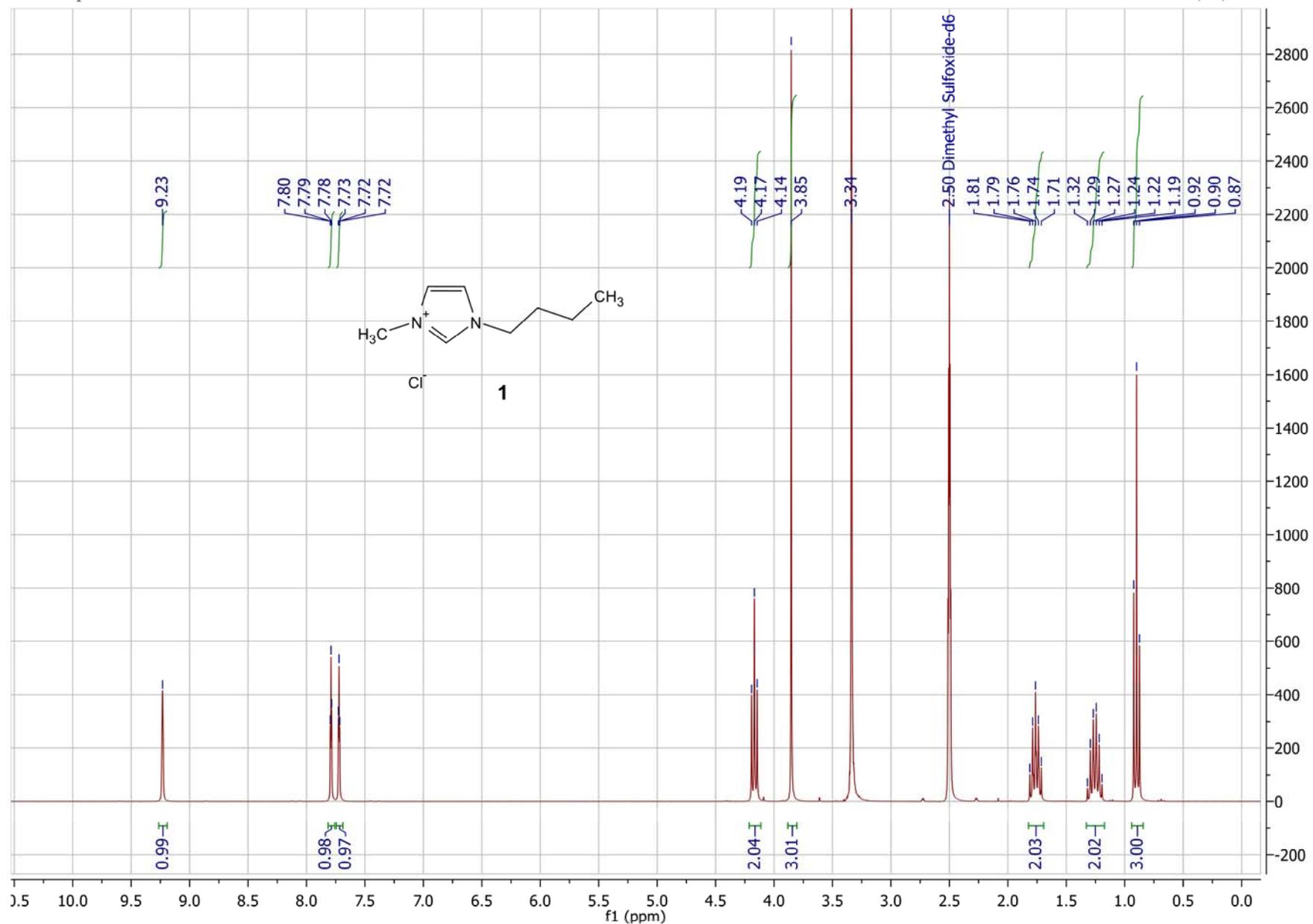


Figure S1. The ^1H NMR (400 MHz, $\text{DMSO}-d_6$) spectrum of 1-butyl-3-methylimidazolium chloride (**1**).

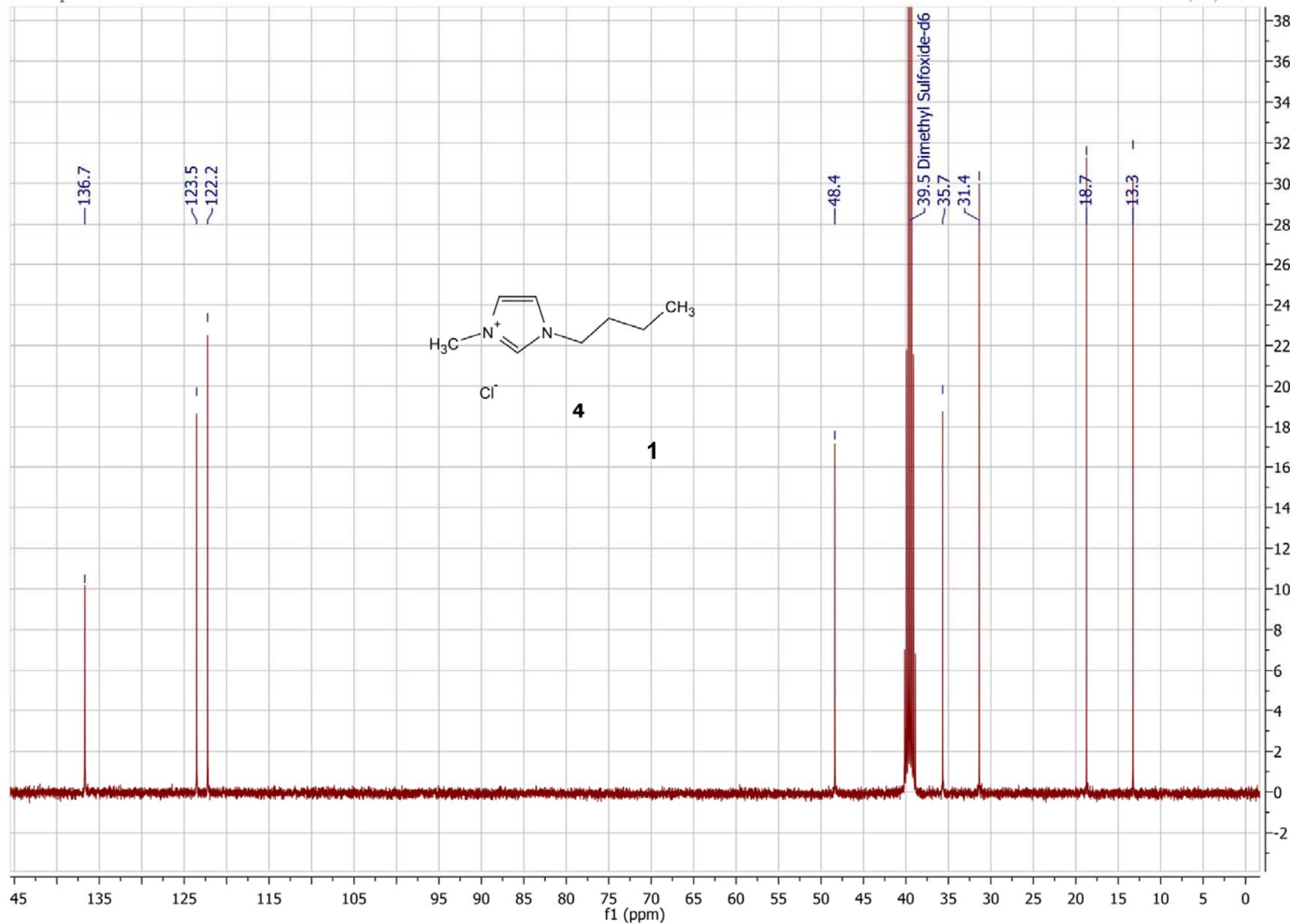


Figure S2. The ^{13}C NMR (100 MHz, $\text{DMSO-}d_6$) spectrum of 1-butyl-3-methylimidazolium chloride (1).

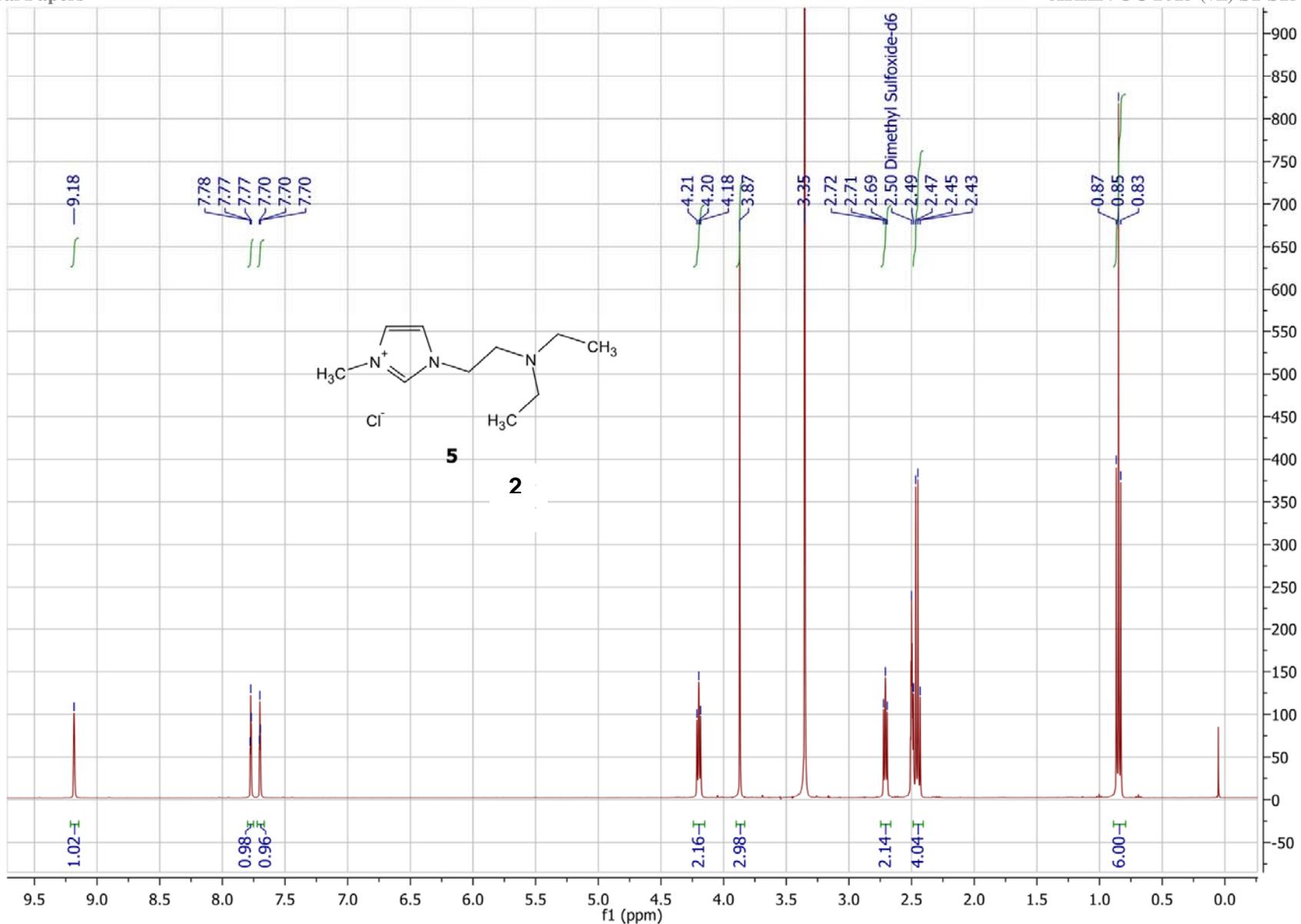


Figure S3. The ^1H NMR (400 MHz, $\text{DMSO-}d_6$) spectrum of 1-[2-(diethylamino)ethyl]-3-methylimidazolium chloride (2).

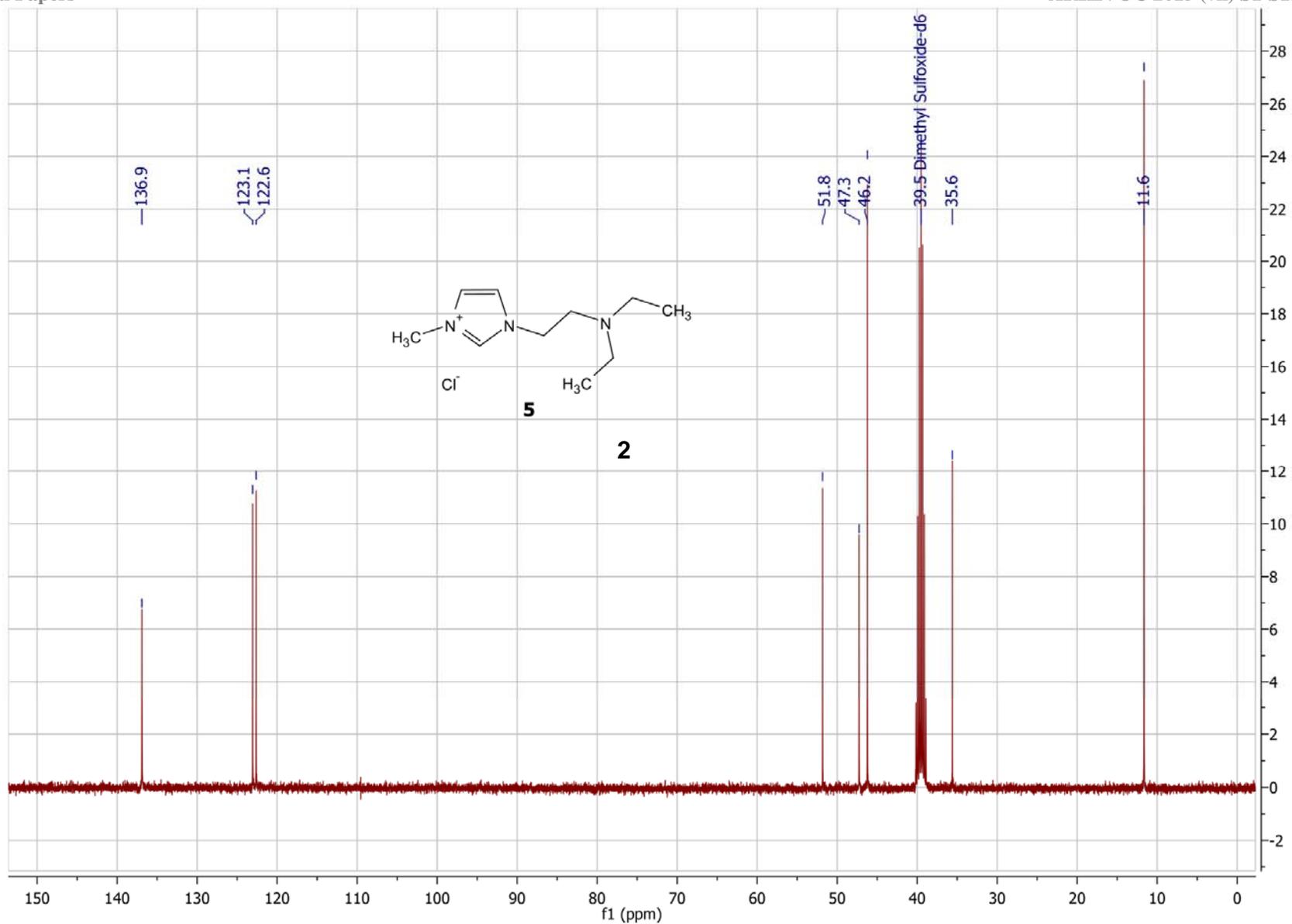


Figure S4. The ^{13}C NMR (100 MHz, $\text{DMSO-}d_6$) spectrum of 1-[2-(diethylamino)ethyl]-3-methylimidazolium chloride (2).

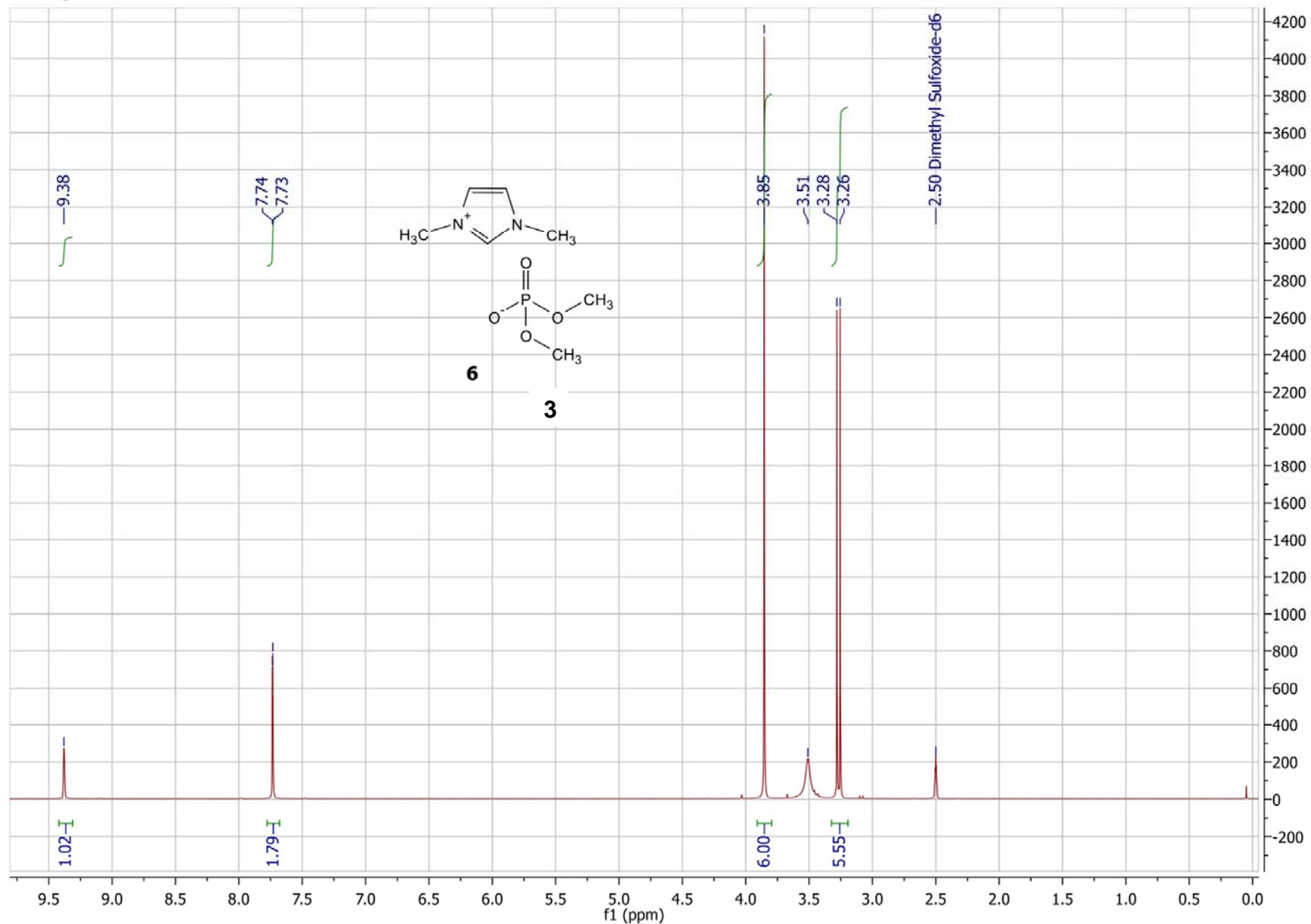


Figure S5. The ^1H NMR (400 MHz, $\text{DMSO-}d_6$) spectrum of 1,3-dimethylimidazolium dimethyl phosphate (**3**).

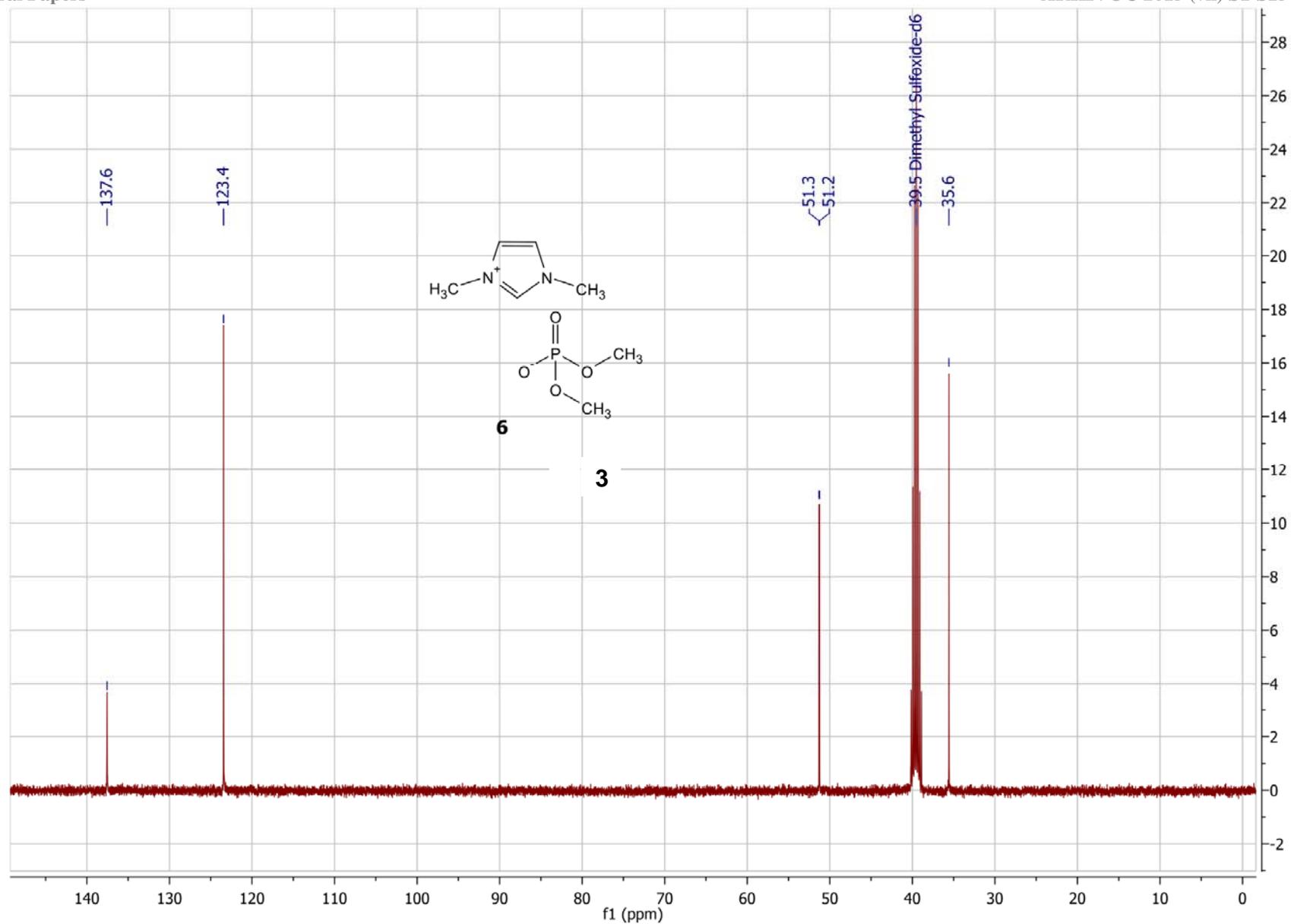


Figure S6. The ^{13}C NMR (100 MHz, $\text{DMSO-}d_6$) spectrum of 1,3-dimethylimidazolium dimethyl phosphate (3).

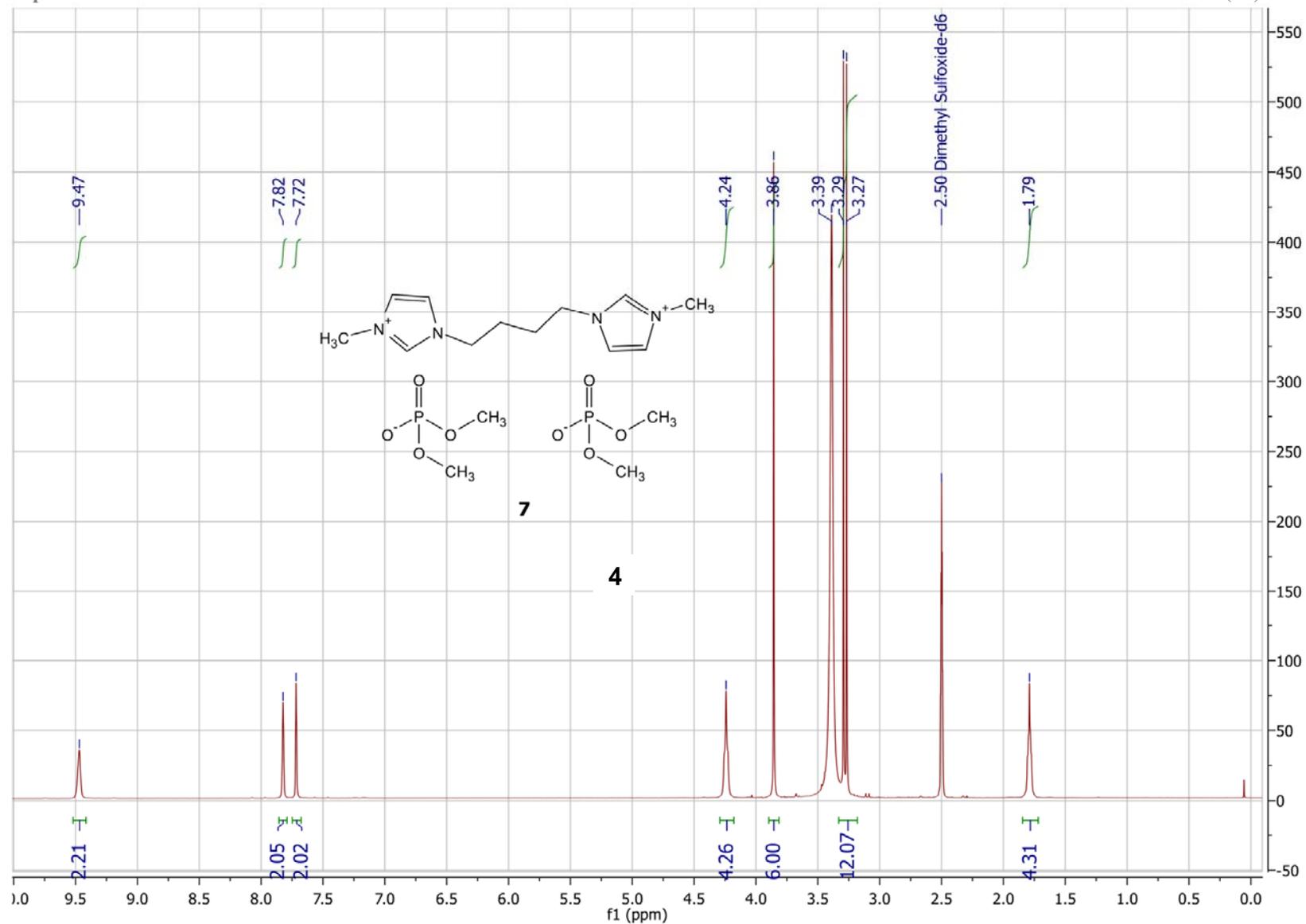


Figure S7. The ^1H NMR (400 MHz, $\text{DMSO-}d_6$) spectrum of 1,4-bis-(3-methylimidazolium-1-yl)butane bis(dimethyl phosphate) (4).

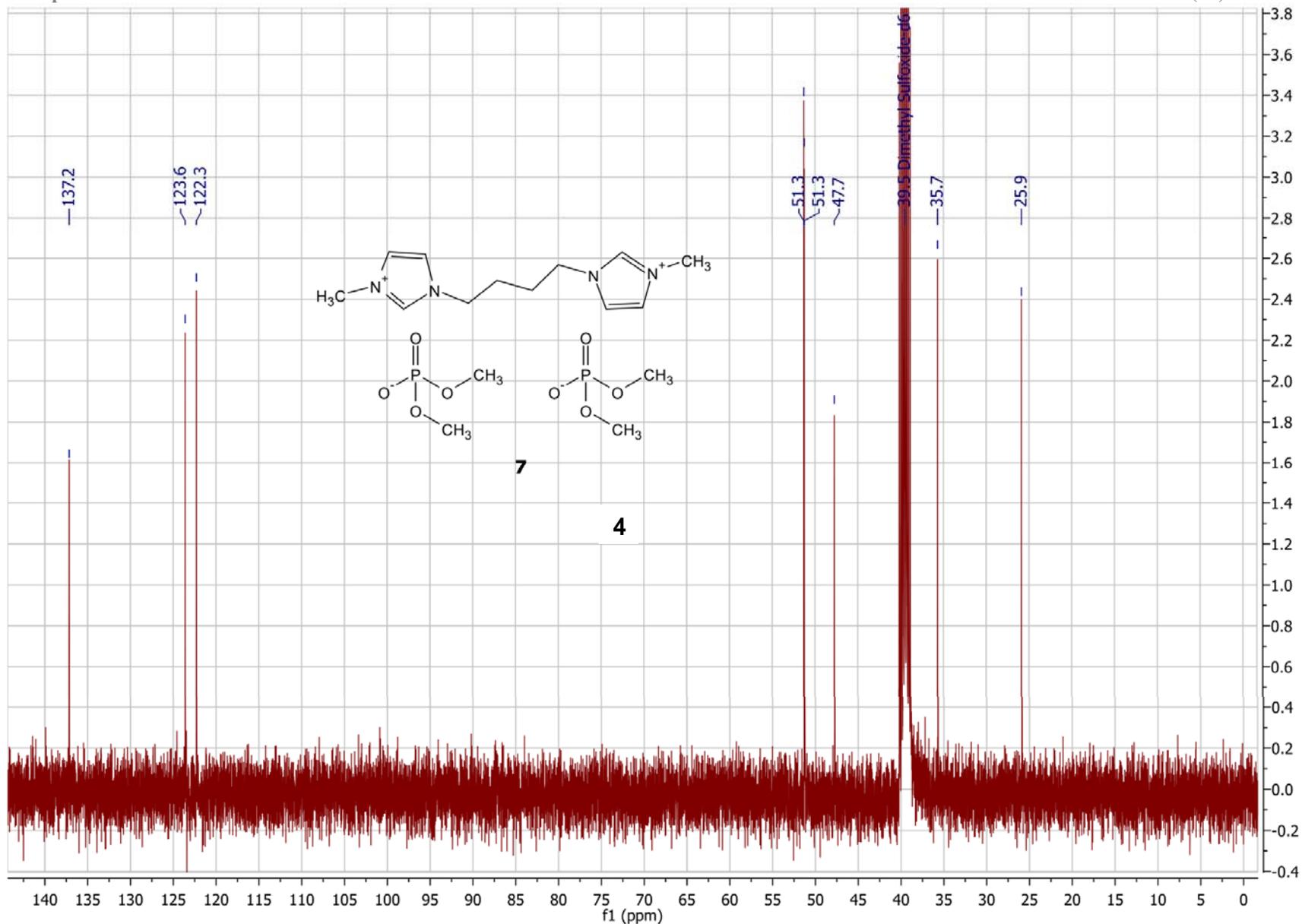


Figure S8. The ^{13}C NMR (100 MHz, $\text{DMSO-}d_6$) spectrum of 1,4-bis-(3-methylimidazolium-1-yl)butane bis(dimethyl phosphate) (**4**).

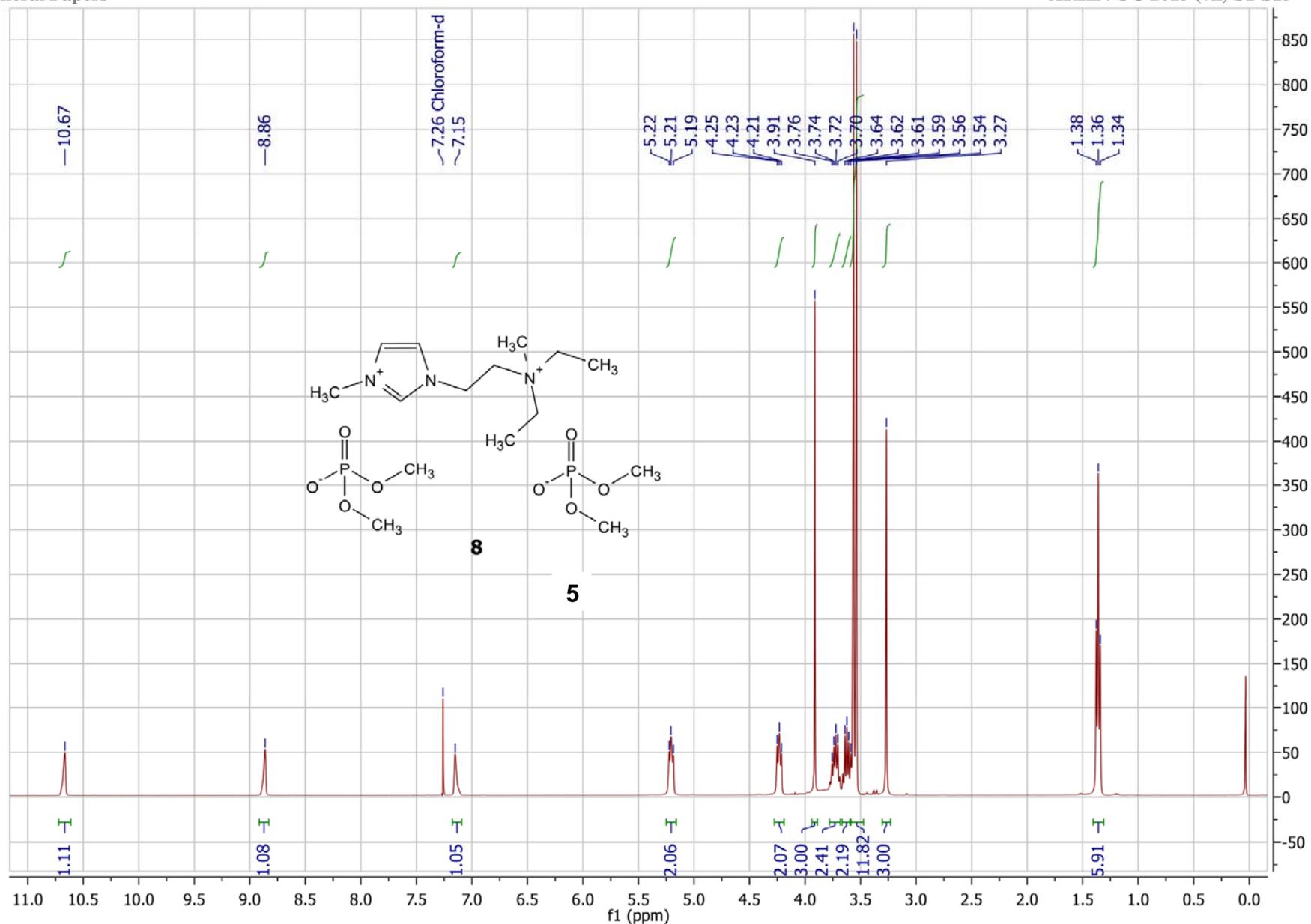


Figure S9. The ^1H NMR (400 MHz, CDCl_3) spectrum of 1-[2-(diethylmethylammonium)ethyl]-3-methylimidazolium bis(dimethyl phosphate) (**5**).

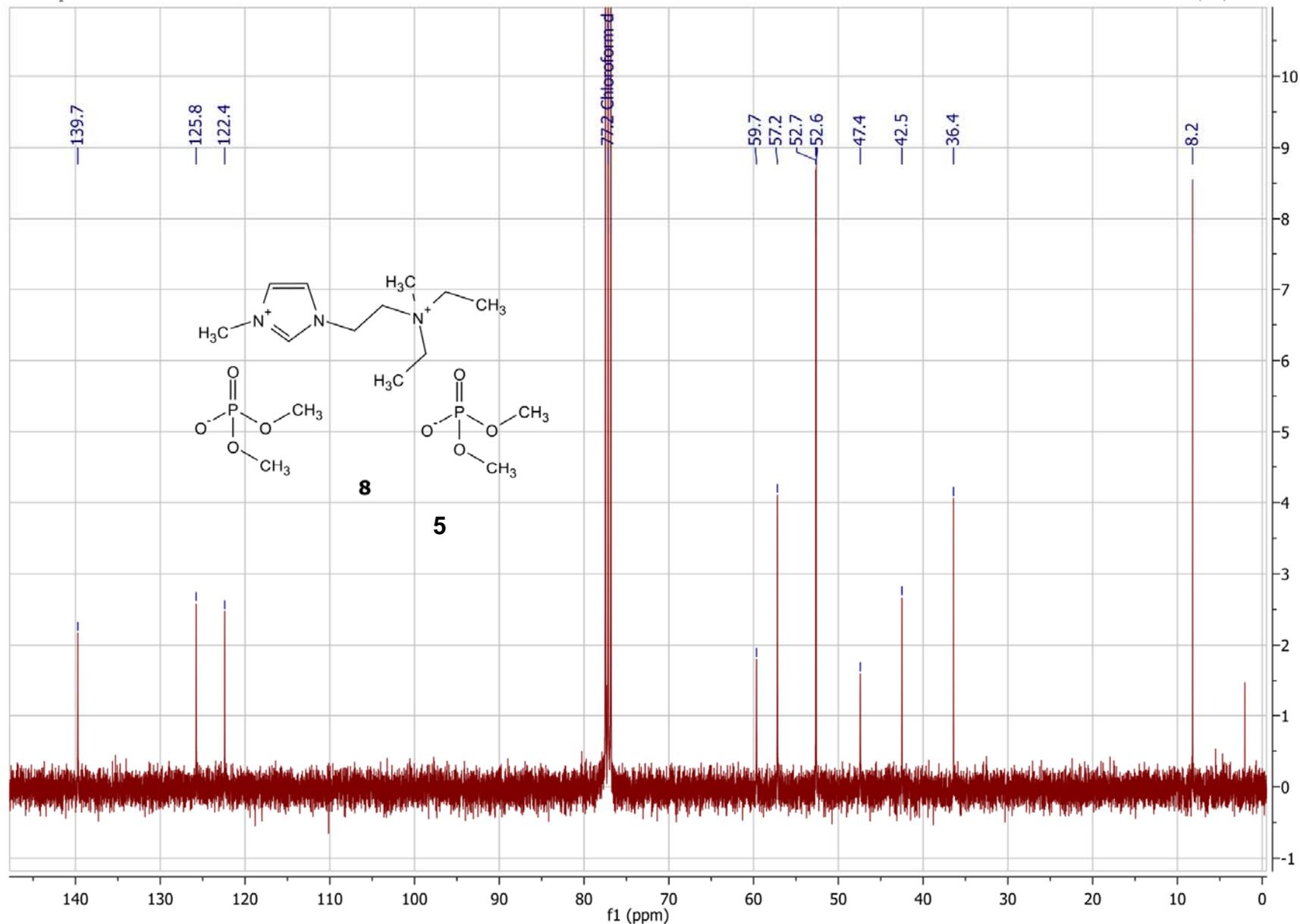


Figure S10. The ^{13}C NMR (100 MHz, CDCl_3) spectrum of 1-[2-(diethylmethylammonium)ethyl]-3-methylimidazolium bis(dimethyl phosphate) (**5**).

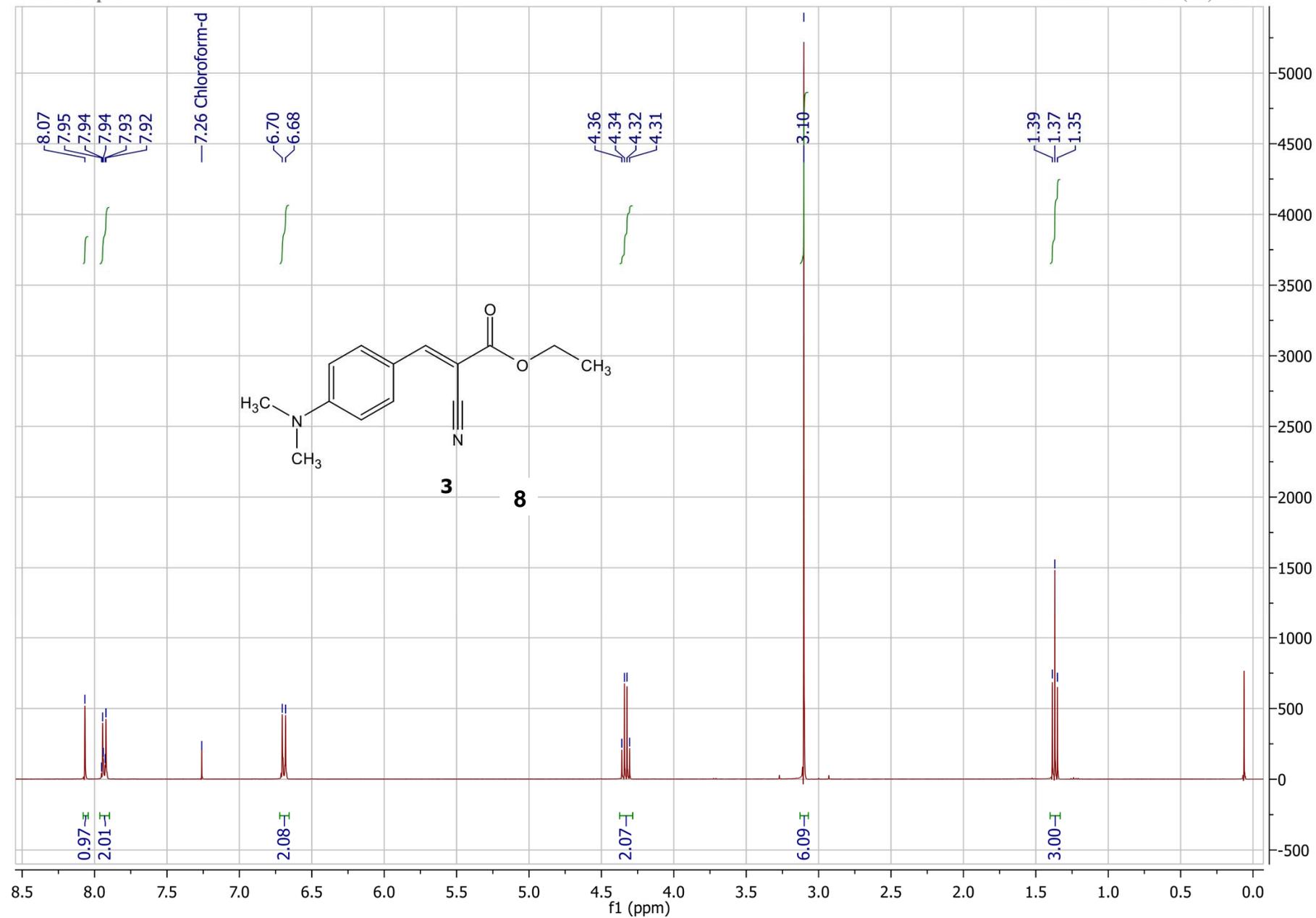


Figure S11. The ¹H NMR (400 MHz, CDCl₃) spectrum of ethyl (*E*)-2-cyano-3-[4-(dimethylamino)phenyl]prop-2-enoate (**8**).

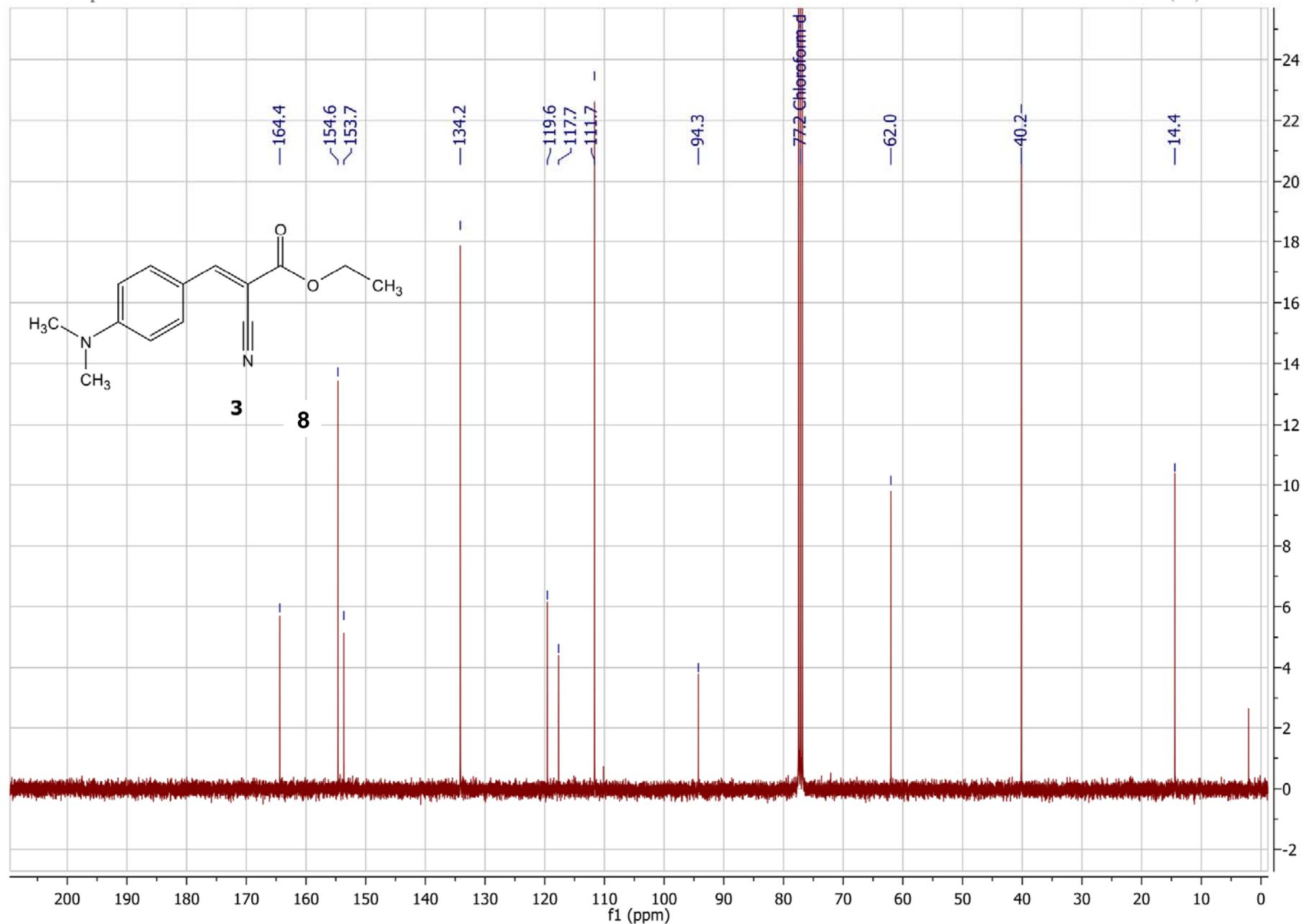


Figure S12. The ¹³C NMR (100 MHz, CDCl₃) spectrum of ethyl (*E*)-2-cyano-3-[4-(dimethylamino)phenyl]prop-2-enoate (8).

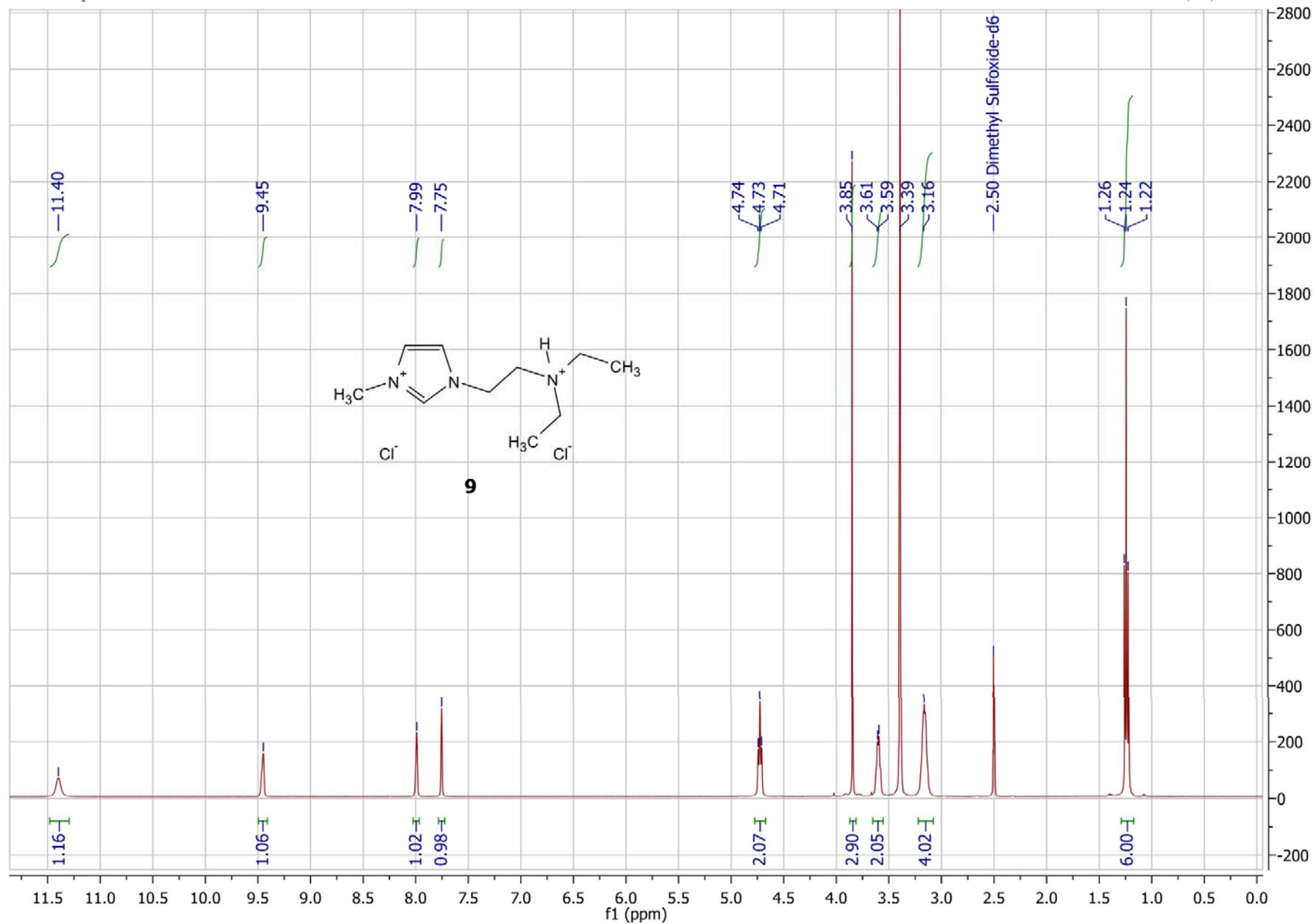


Figure S13. The ^1H NMR (400 MHz, $\text{DMSO-}d_6$) spectrum of 1-[2-(diethylamino)ethyl]-3-methylimidazolium chloride hydrochloride (**9**).

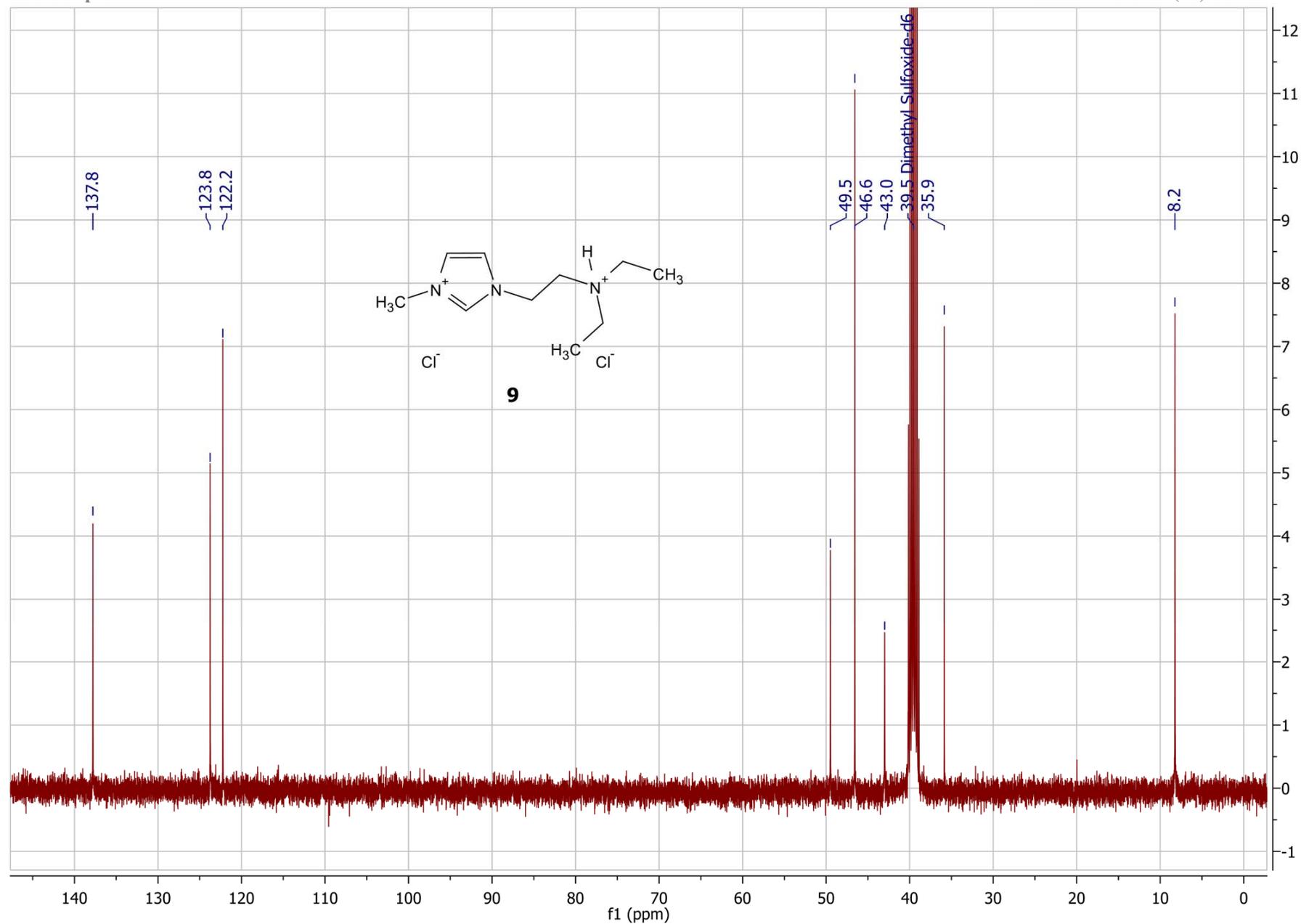


Figure S14. The ^{13}C NMR (100 MHz, $\text{DMSO-}d_6$) spectrum of 1-[2-(diethylamino)ethyl]-3-methylimidazolium chloride hydrochloride (**9**).