

Supplementary Information

Sensitive Colorimetric Sensors for Visual Detection of Carbon Dioxide and Sulfur Dioxide

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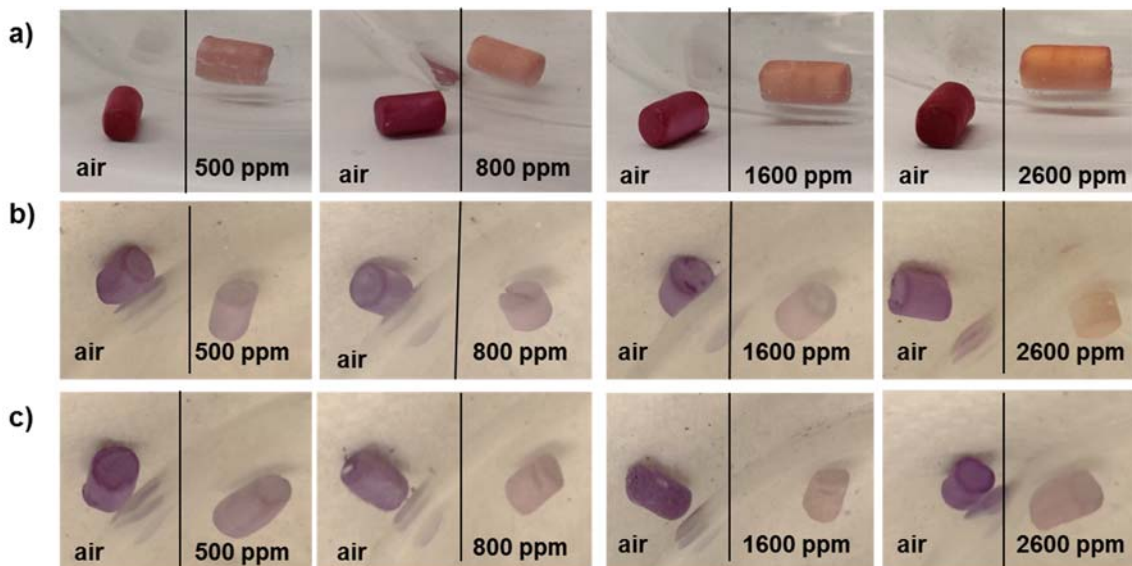


Figure S1. Visual detection and estimation of the amount of dry CO₂ present within an enclosed atmosphere using a) Al₂O₃-dimethylethanolamine-cresol red, b) Al₂O₃-methyldiethanol amine-cresol red, and c) Al₂O₃-triethanolamine-cresol red sensors. The visual color changes in response to 500 ppm, 800 ppm, 1600 ppm and 2600 ppm dry CO₂ in nitrogen are compared with a reference sensor left under ambient air (~ 400 ppm CO₂).

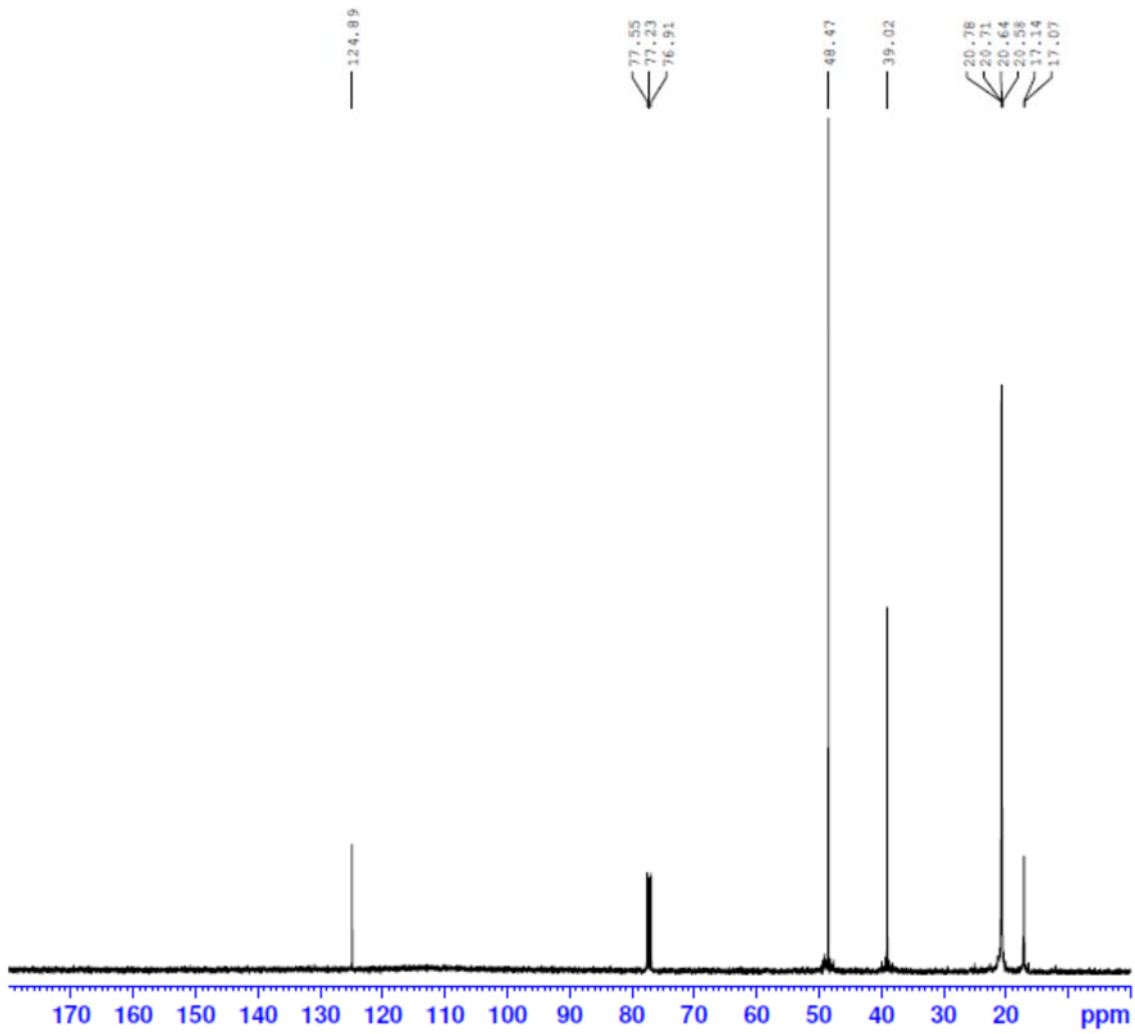


Figure S2. ^{13}C NMR spectra of N,N-diisopropylethylamine in dry CDCl_3 in the presence of $^{13}\text{CO}_2$ (free CO_2 , 124.4 ppm). The formation of bicarbonate was not observed.

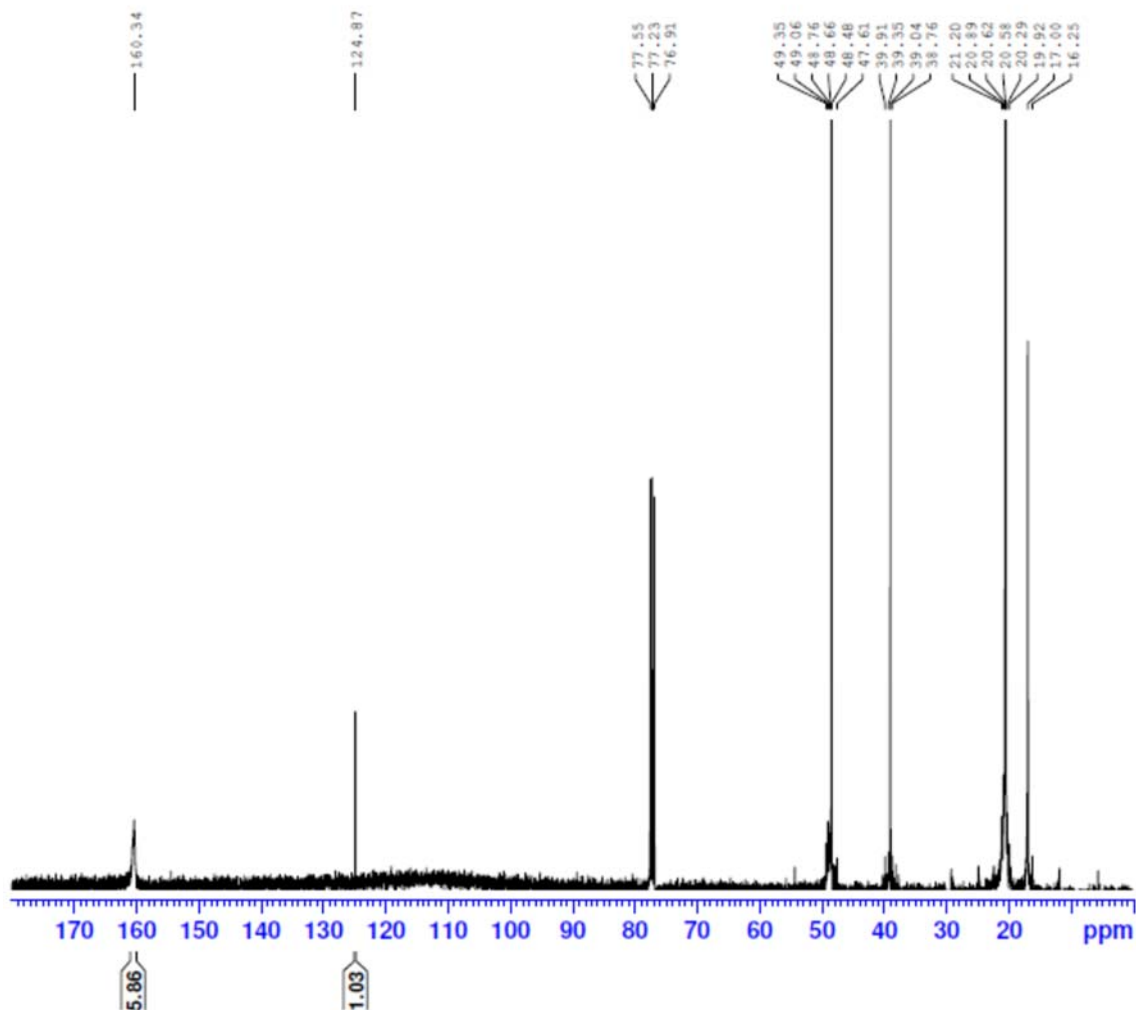


Figure S3. ^{13}C NMR spectra of N,N-diisopropylethylamine in CDCl_3 containing 20 μL D_2O , in the presence of $^{13}\text{CO}_2$ (free CO_2 , 124.4 ppm). The *in situ* formed bicarbonate peak is observed ~ 160.3 ppm.

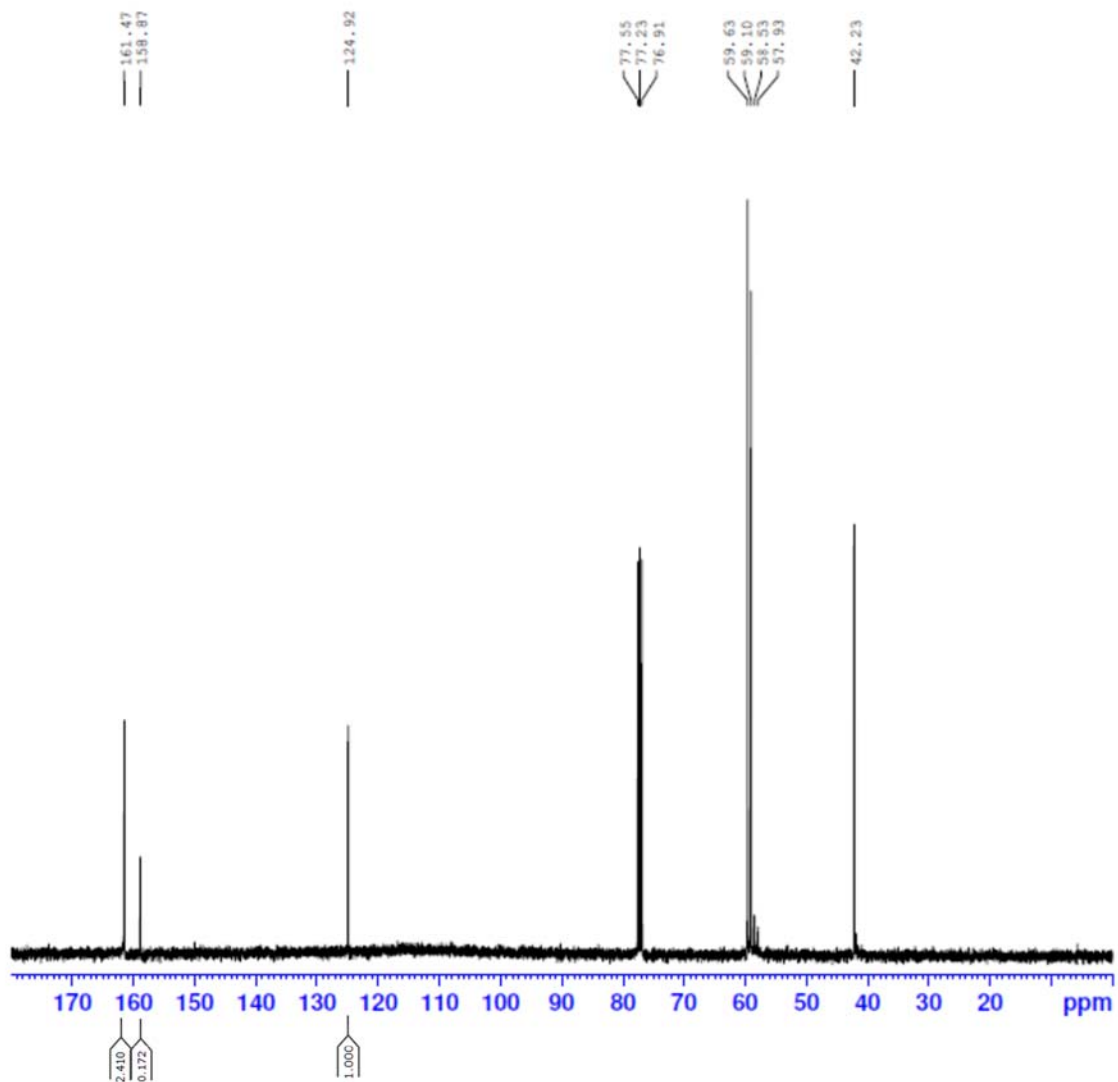


Figure S4. ^{13}C NMR spectra of $^{13}\text{CO}_2$ (free CO_2 , 124.4 ppm) binding by MDEA, in the presence of 20 μL D_2O , in CDCl_3 . The resonance due to alkylcarbonate formation is observed ~ 159 ppm and the bicarbonate peak is observed ~ 161 ppm.

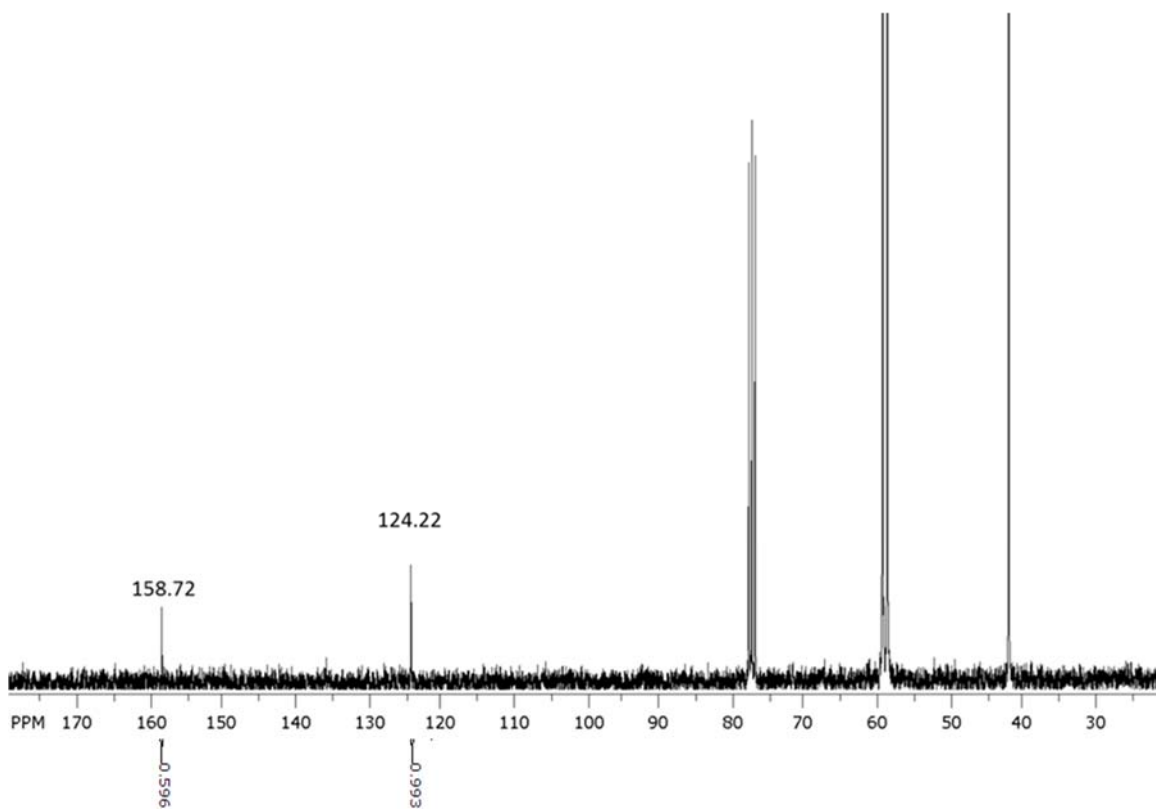


Figure S5. ^{13}C NMR spectra of $^{13}\text{CO}_2$ (free CO_2 , 124.4 ppm) binding by MDEA in dry CDCl_3 . Only the *in situ* formed alkylcarbonate peak was observed ~ 159 ppm.

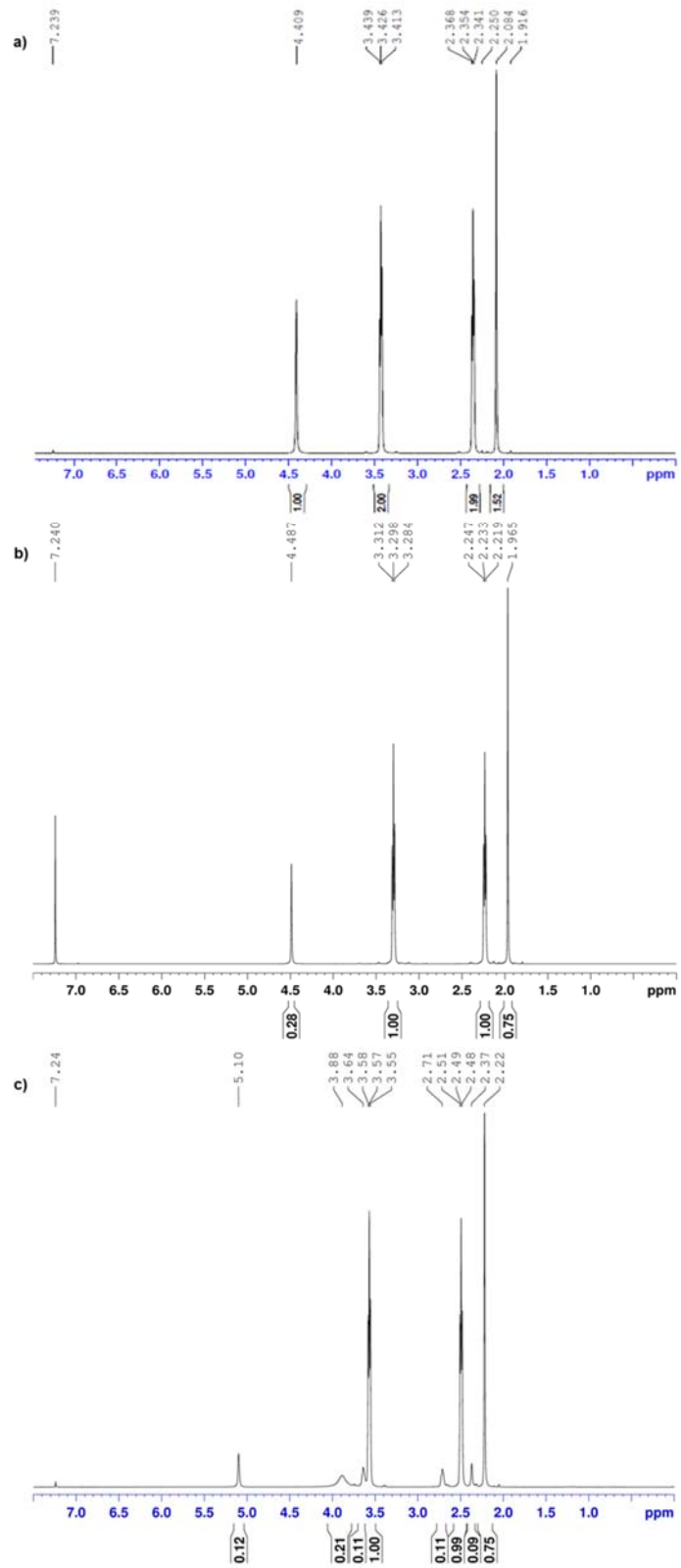


Figure S6. The ^1H NMR spectra of N-methyldiethanolamine in CDCl_3 : a) before CO_2 uptake, b) after CO_2 uptake, and c) after CO_2 uptake in the presence of 20 μL D_2O . New resonances appear only upon the uptake of CO_2 in the presence of water (Figure S6c).

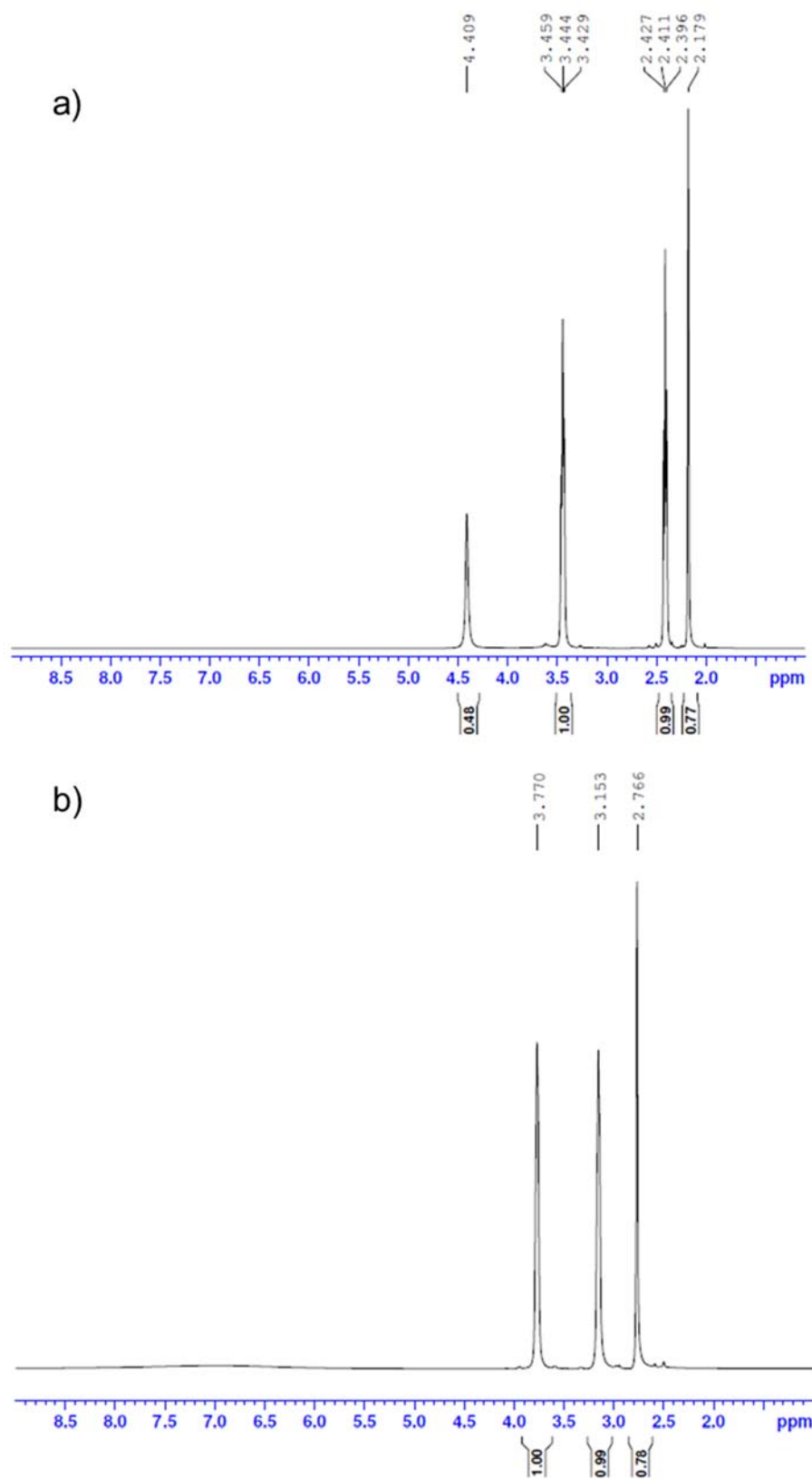


Figure S7. ^1H NMR spectra of a) MDEA and b) SO_2 binding by MDEA in DMSO-d_6 .

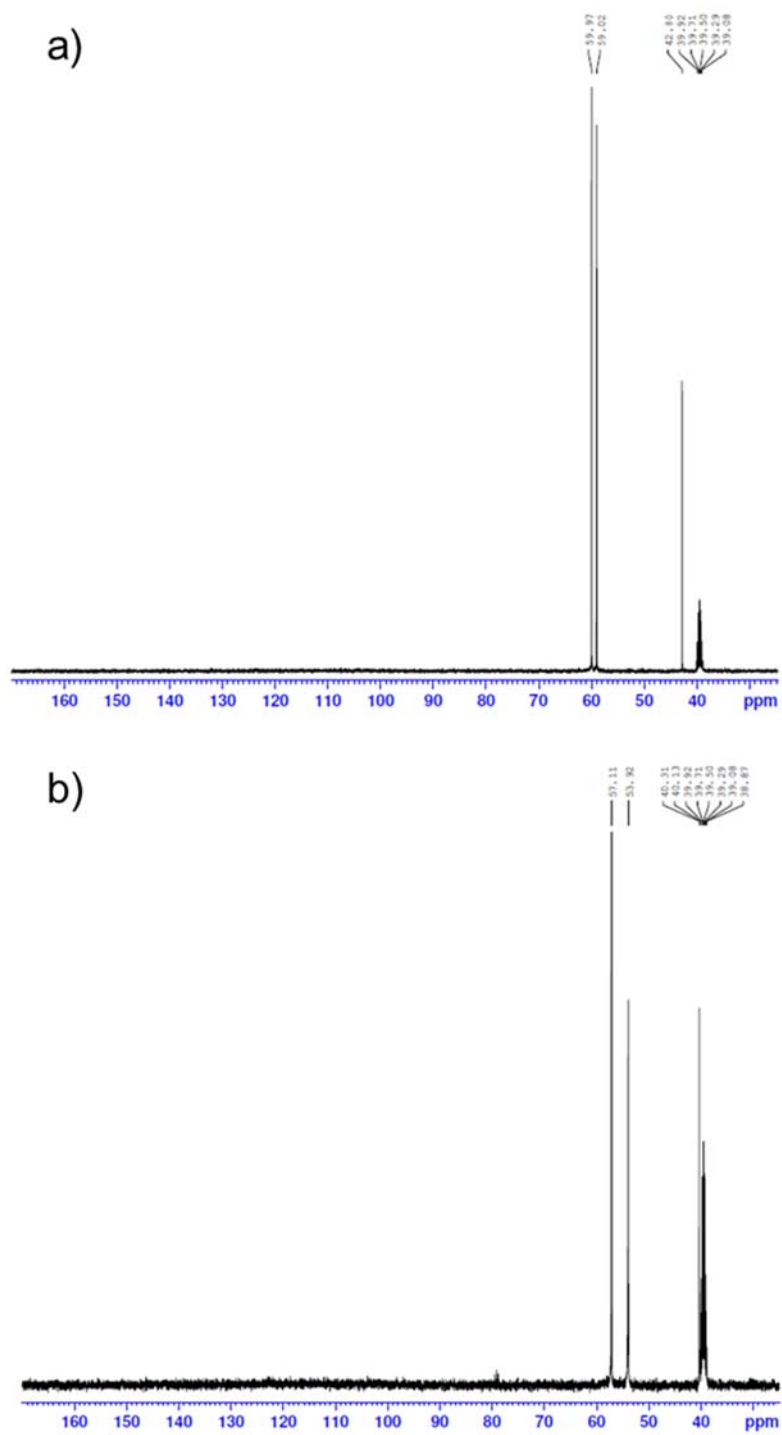


Figure S8. ^{13}C NMR spectra of a) MDEA and b) SO_2 binding by MDEA in DMSO-d_6 .