Supplementary Information

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

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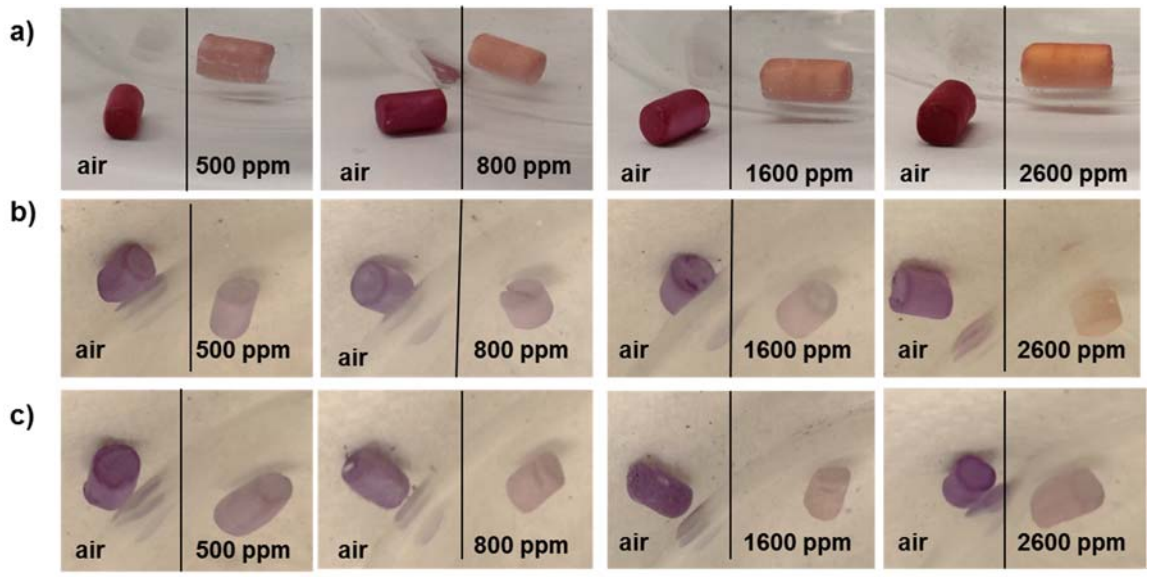

Figure S1. Visual detection and estimation of the amount of dry CO_2 present within an enclosed atmosphere using a) Al_2O_3–dimethylethanolamine-cresol red, b) Al_2O_3–methyldiethanol amine-cresol red, and c) Al_2O_3–triethanolamine-cresol red sensors. The visual color changes in response to 500 ppm, 800 ppm, 1600 ppm and 2600 ppm dry CO_2 in nitrogen are compared with a reference sensor left under ambient air (~ 400 ppm CO_2).

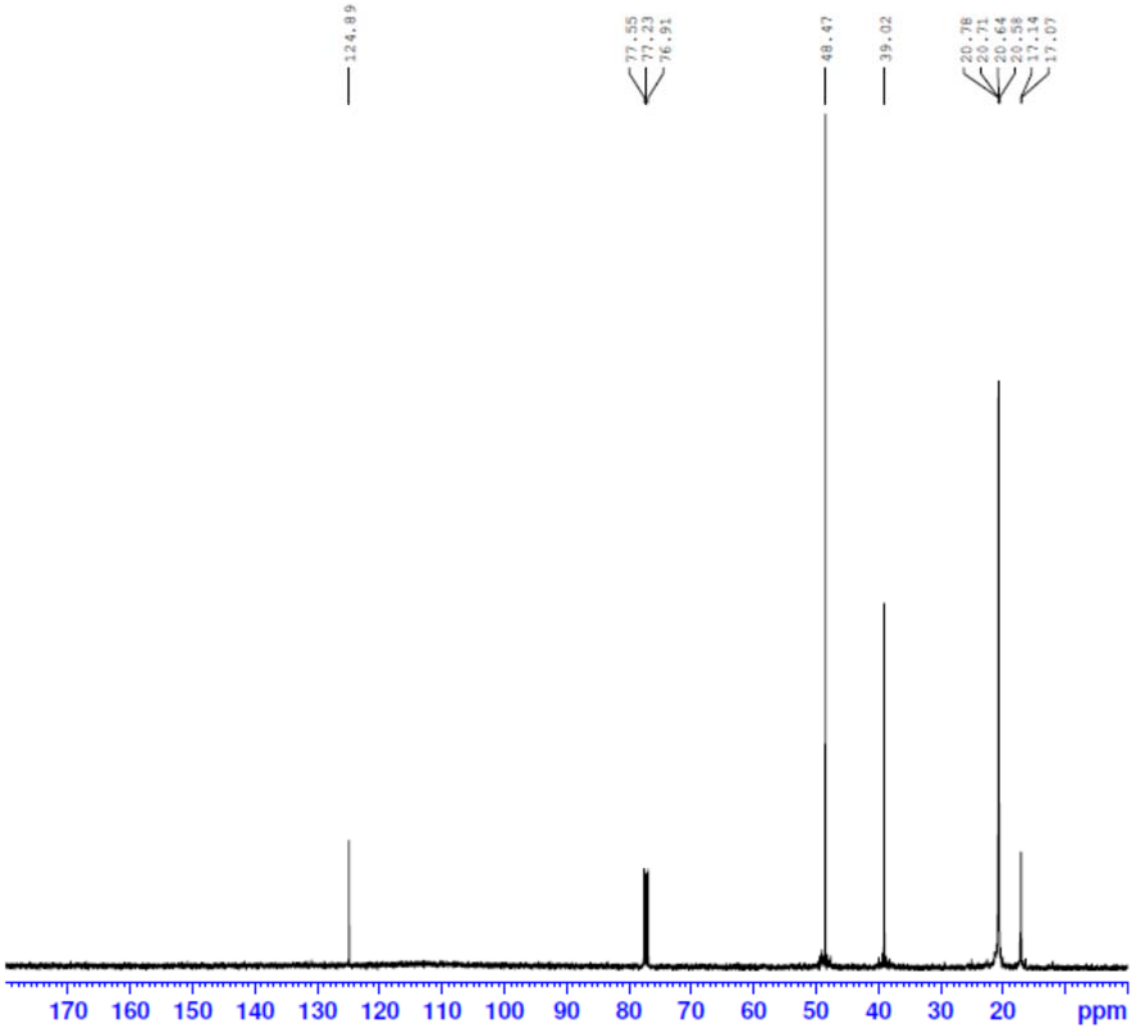

Figure S2. ^{13}C NMR spectra of N,N-diisopropylethylamine in dry $CDCl_3$ in the presence of $^{13}CO_2$ (free CO_2, 124.4 ppm). The formation of bicarbonate was not observed.

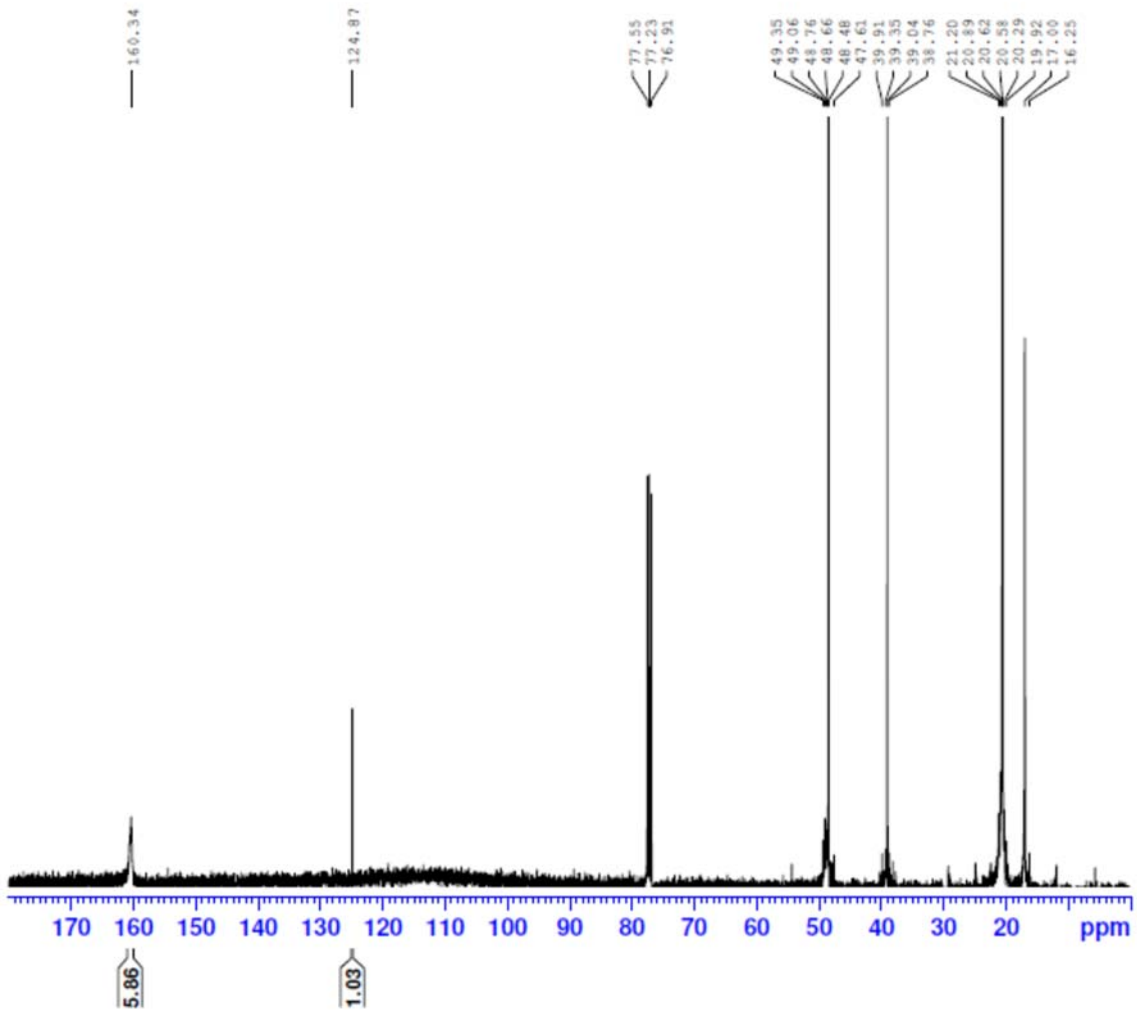

Figure S3. ^{13}C NMR spectra of N,N-diisopropylethylamine in $CDCl_3$ containing 20 μL D_2O, in the presence of $^{13}CO_2$ (free CO_2, 124.4 ppm). The *in situ* formed bicarbonate peak is observed ~ 160.3 ppm.

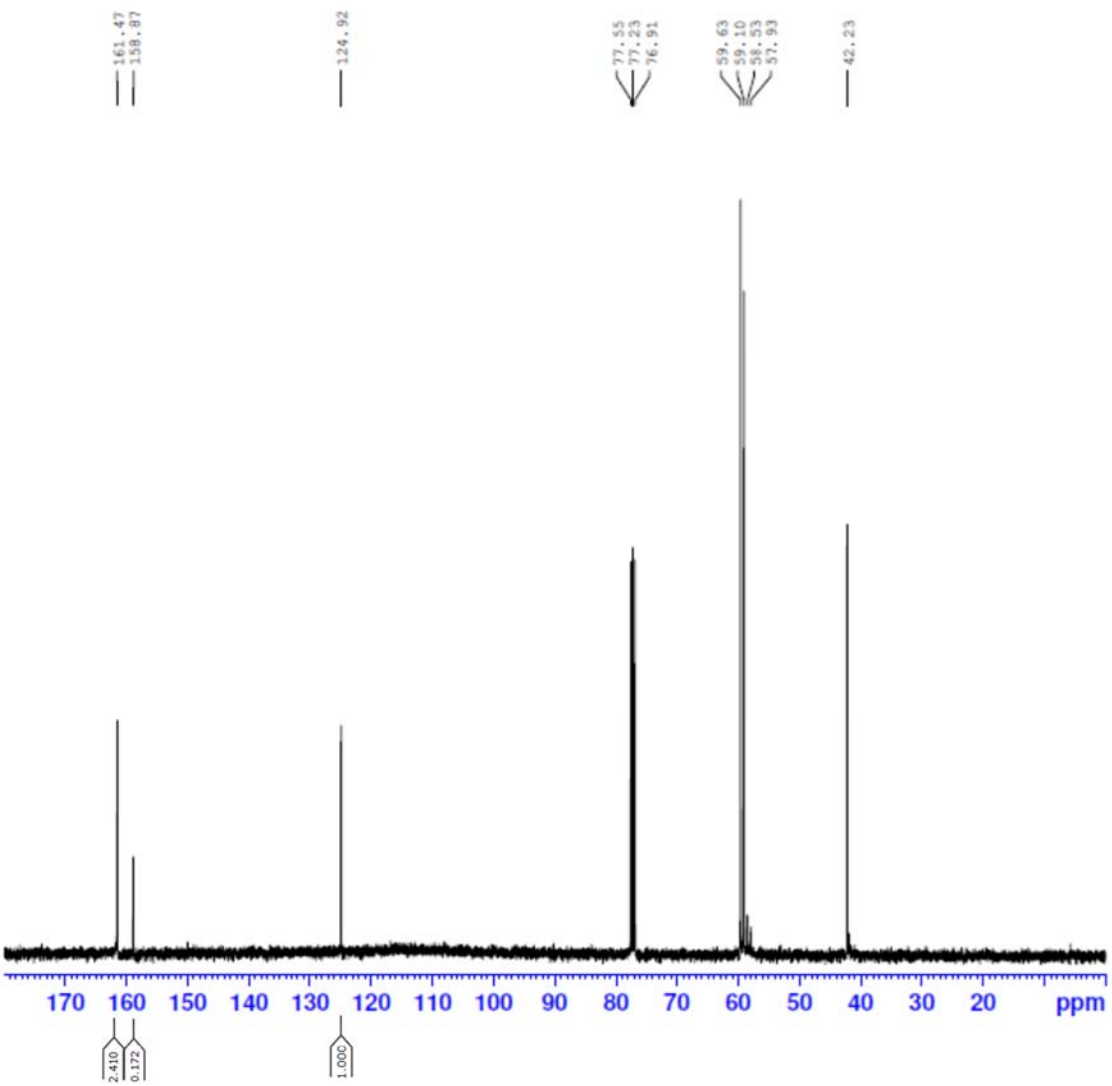

Figure S4. ^{13}C NMR spectra of $^{13}CO_2$ (free CO_2, 124.4 ppm) binding by MDEA, in the presence of 20 μL D_2O, in $CDCl_3$. The resonance due to alkylcarbonate formation is observed ~159 ppm and the bicarbonate peak is observed ~161 ppm.

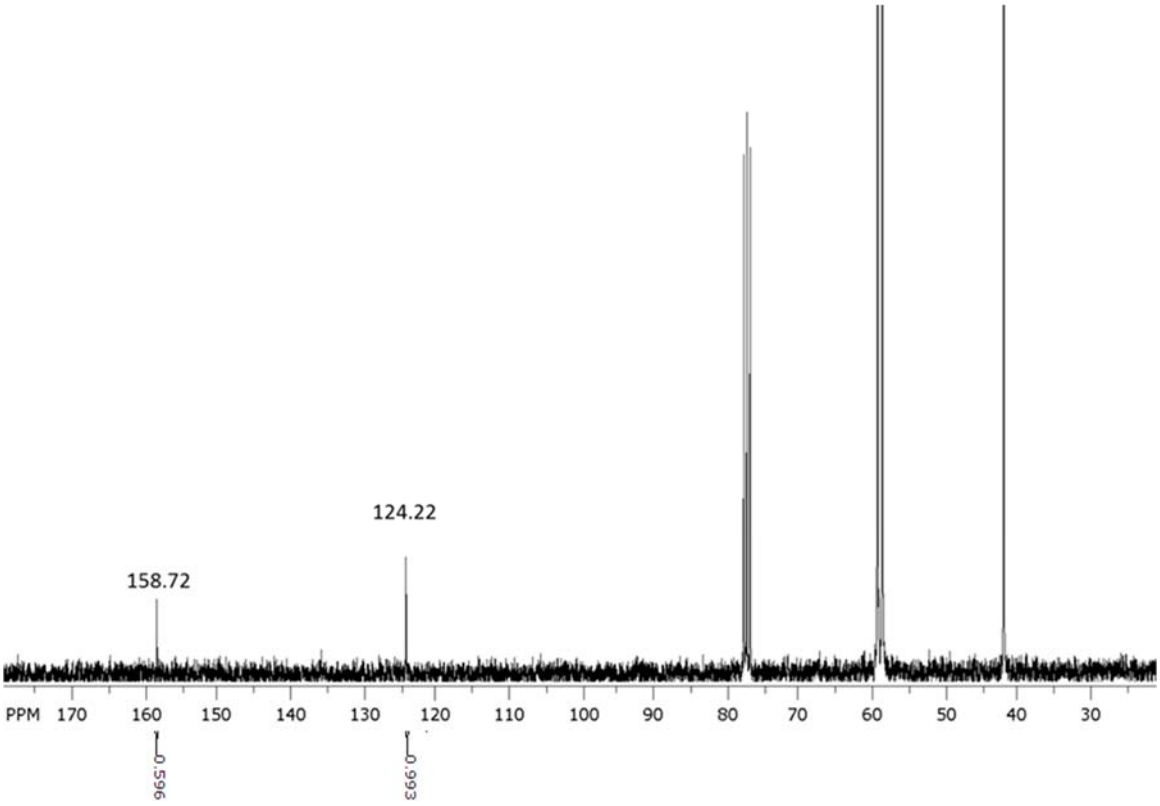

Figure S5. ^{13}C NMR spectra of $^{13}CO_2$ (free CO_2, 124.4 ppm) binding by MDEA in dry $CDCl_3$. Only the *in situ* formed alkylcarbonate peak was observed ~ 159 ppm.

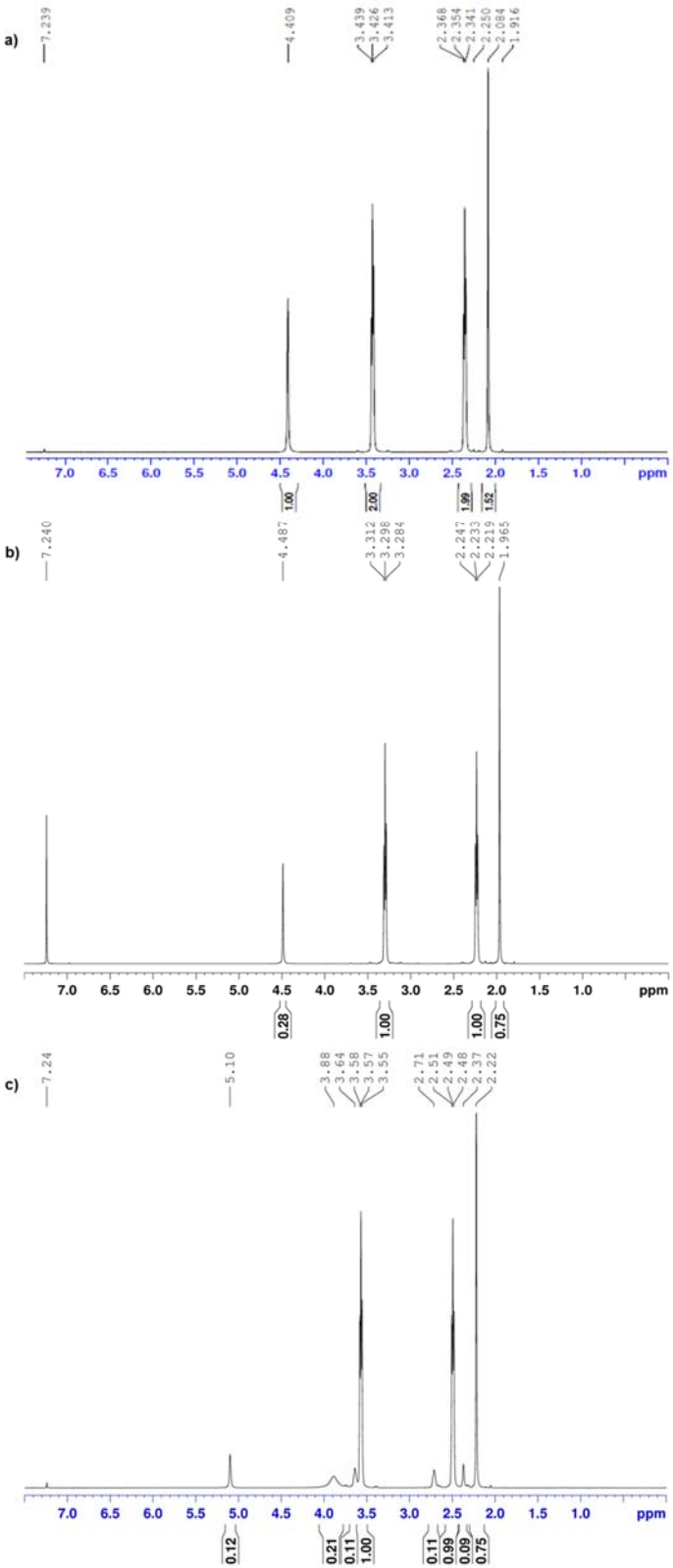

Figure S6. The ^{1}H NMR spectra of N-methyldiethanolamine in $CDCl_3$: a) before CO_2 uptake, b) after CO_2 uptake, and c) after CO_2 uptake in the presence of 20 μL D_2O. New resonances appear only upon the uptake of CO_2 in the presence of water (Figure S6c).

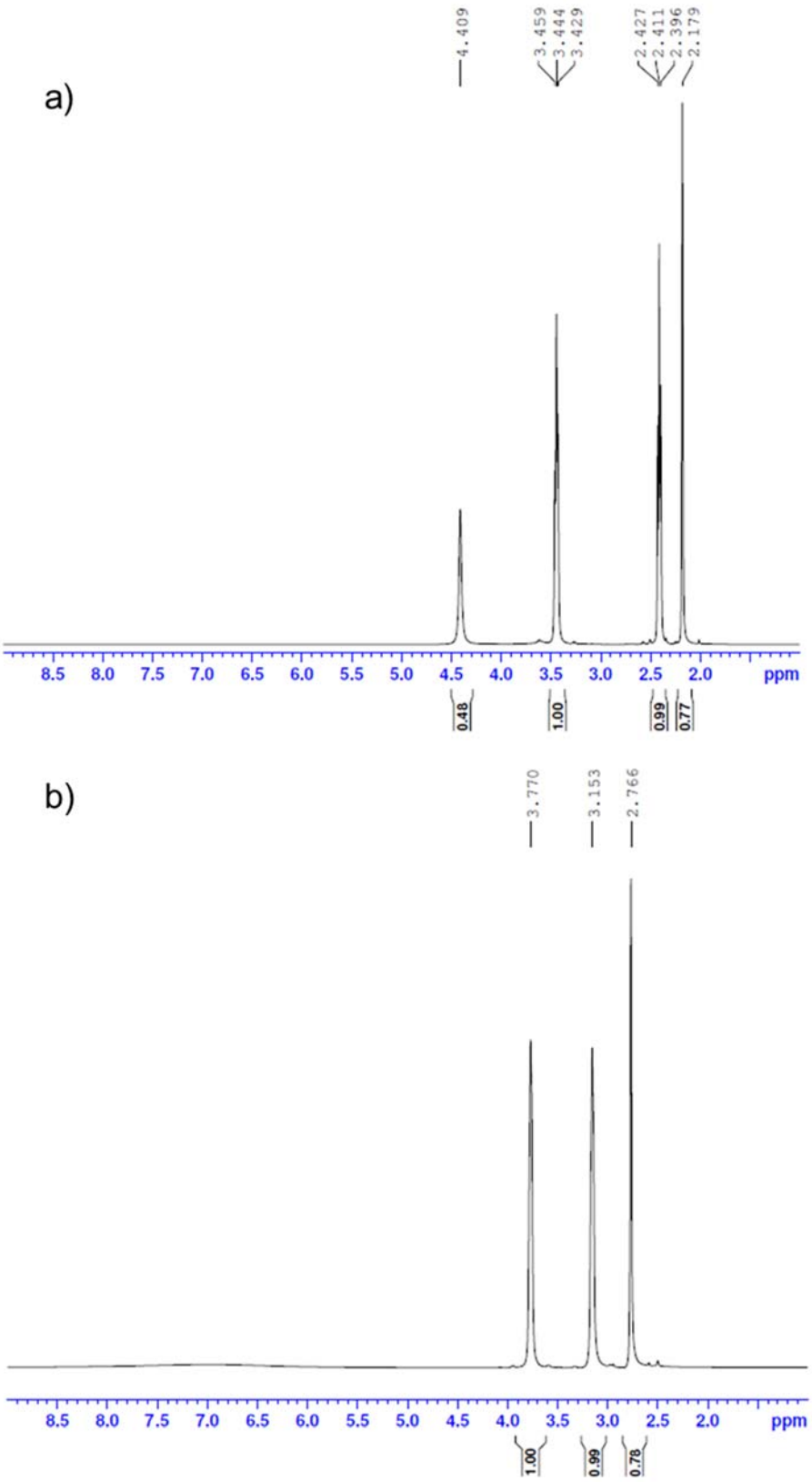

Figure S7. ^{1}H NMR spectra of a) MDEA and b) SO_2 binding by MDEA in DMSO-d_6.

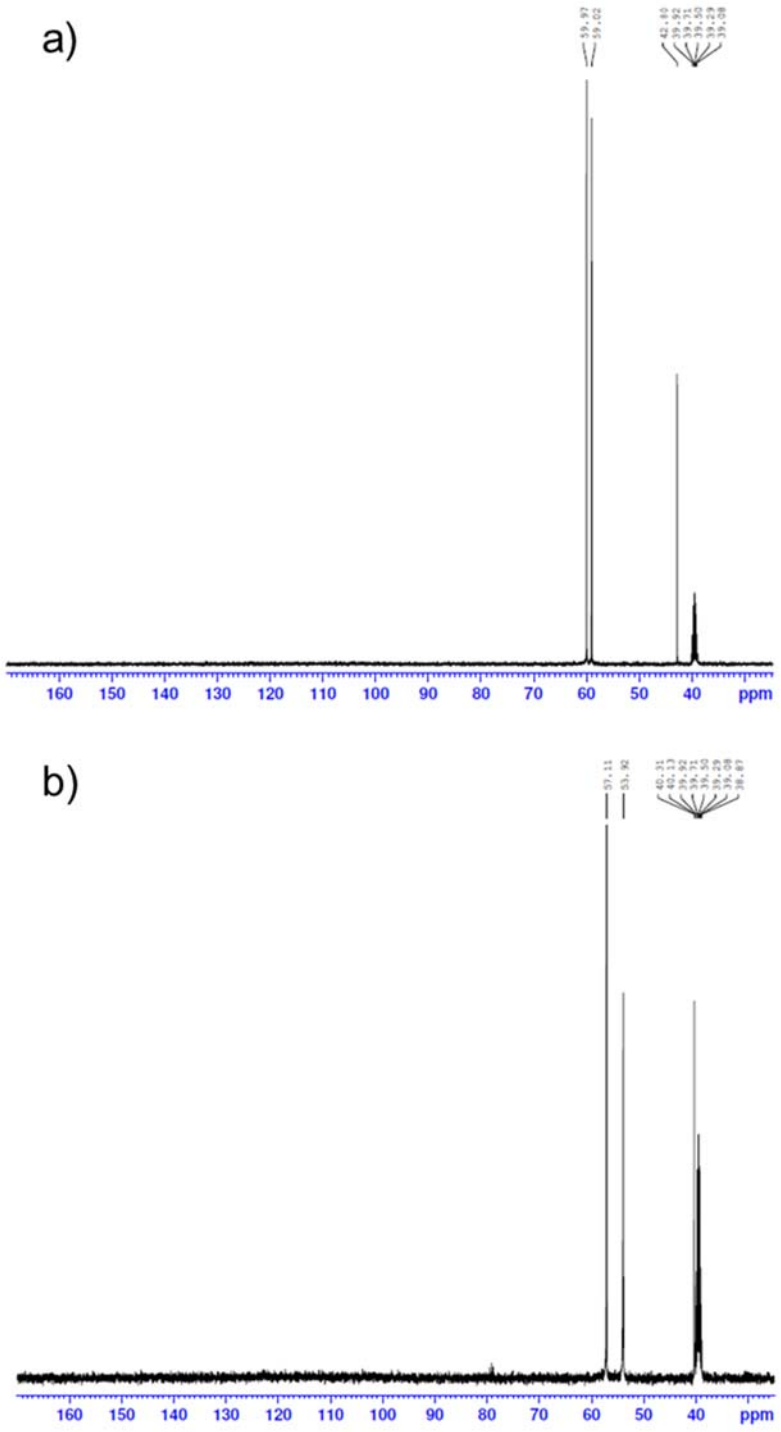

Figure S8. ^{13}C NMR spectra of a) MDEA and b) SO_2 binding by MDEA in DMSO-d_6.