Electronic Supporting information (ESI)

Rapid desorption of CO_2 from deep eutectic solvents based on polyamines at lower temperatures: An alternative technology with industrial potential

DESs	Mole ratio	CO_2 uptake (%w/w)	Viscosity (mPa.s) of DESs after CO_2 capture 25 °C	60 °C	80 °C
[MEA][Im]:EG	1:1:0.5	16.94	640	64	21
[MEA][Im]:EG	1:1:1	14.33	465	56	13
[DETA]2[Im]:EG	1:2:2	22.35	9357	275	169
[TEPA]2[Im]:EG	1:2:4	17.36	9549	390	153

Table S1 The viscosity of DESs after CO_2 capture at different temperatures.

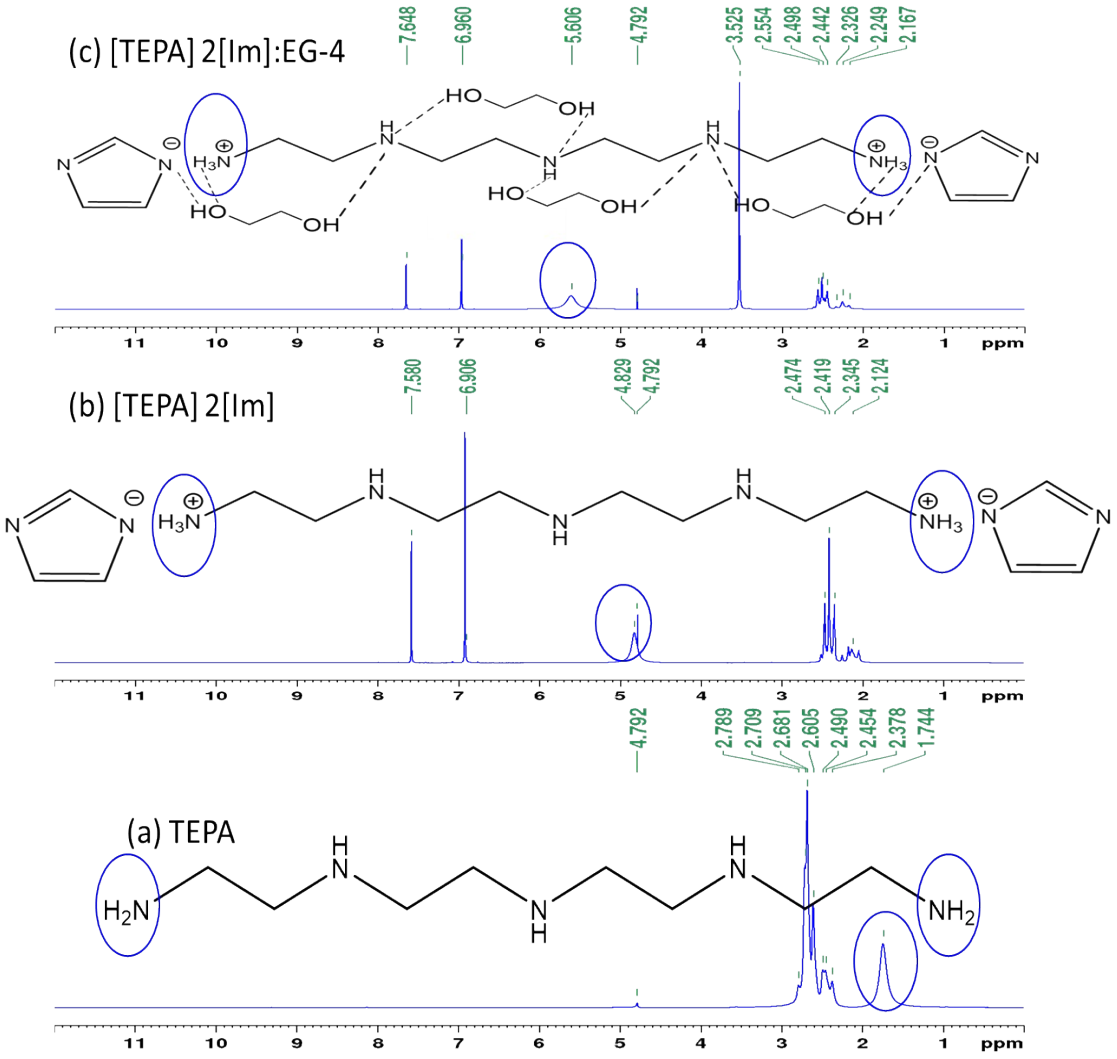

Fig.S1 The proton NMR of (a) TEPA, (b) [TEPA]2[Im] and [TEPA]2[Im]:EG-4 in neat form using D_2O in a capillary tube.

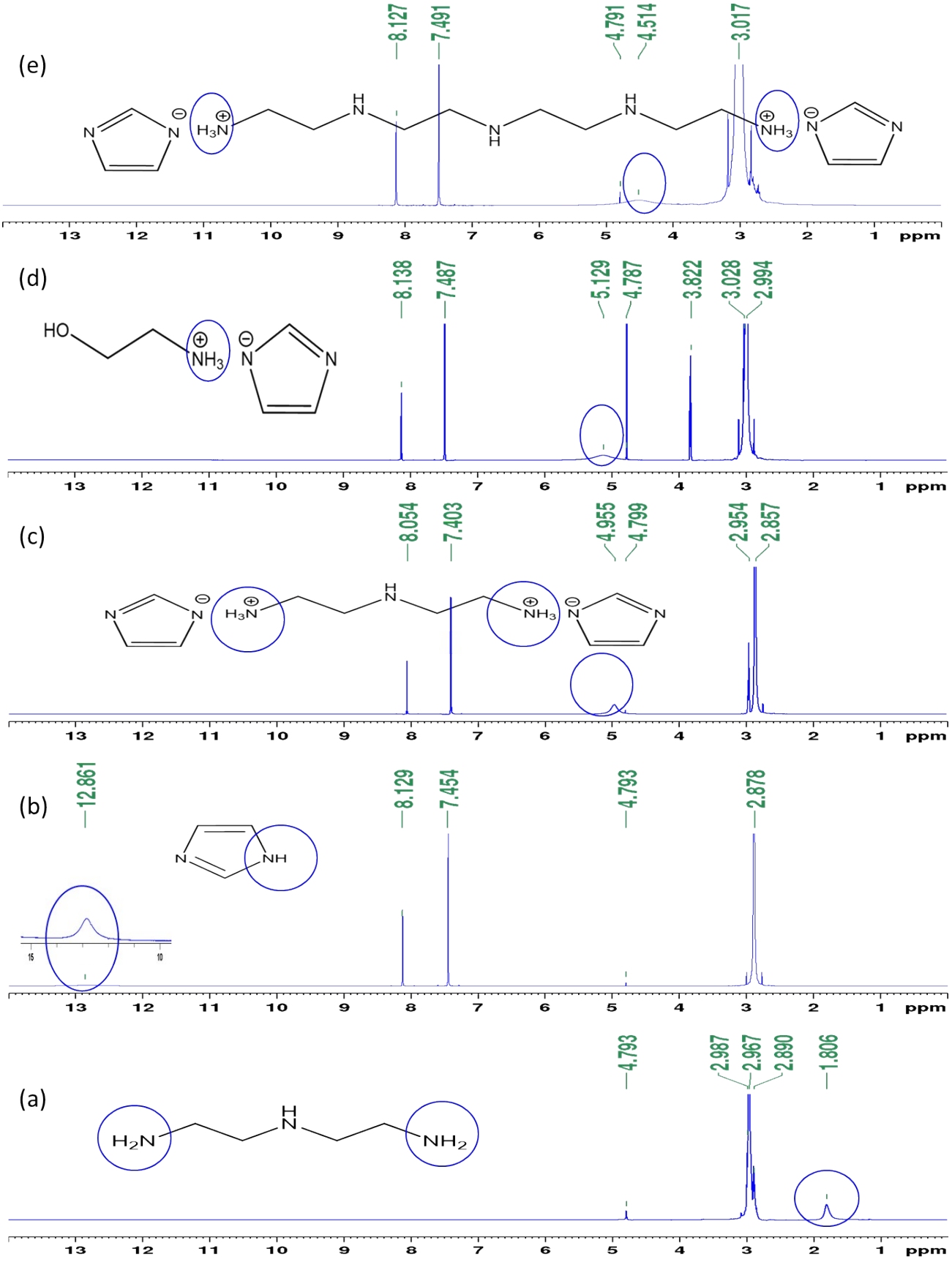

Fig. S2 Proton NMR of (a) DETA, (b) Im, (c) [DETA]2[Im], (d) [MEA][Im] and [TEPA]2[Im] in DMSO as the solvent and D_2O in a capillary tube.

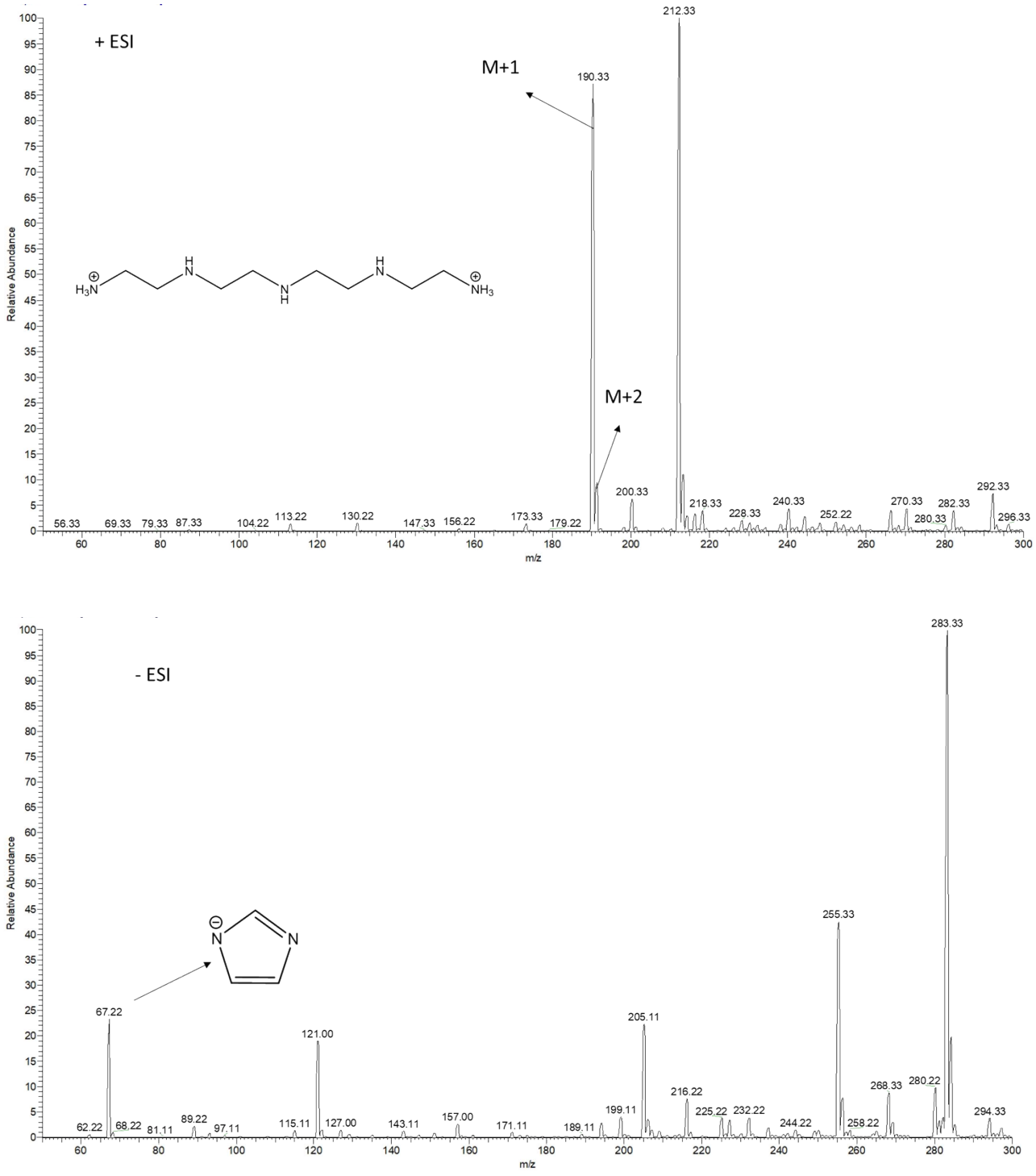

Fig. S3a ESI-MS of [TEPA]2[Im] in methanol

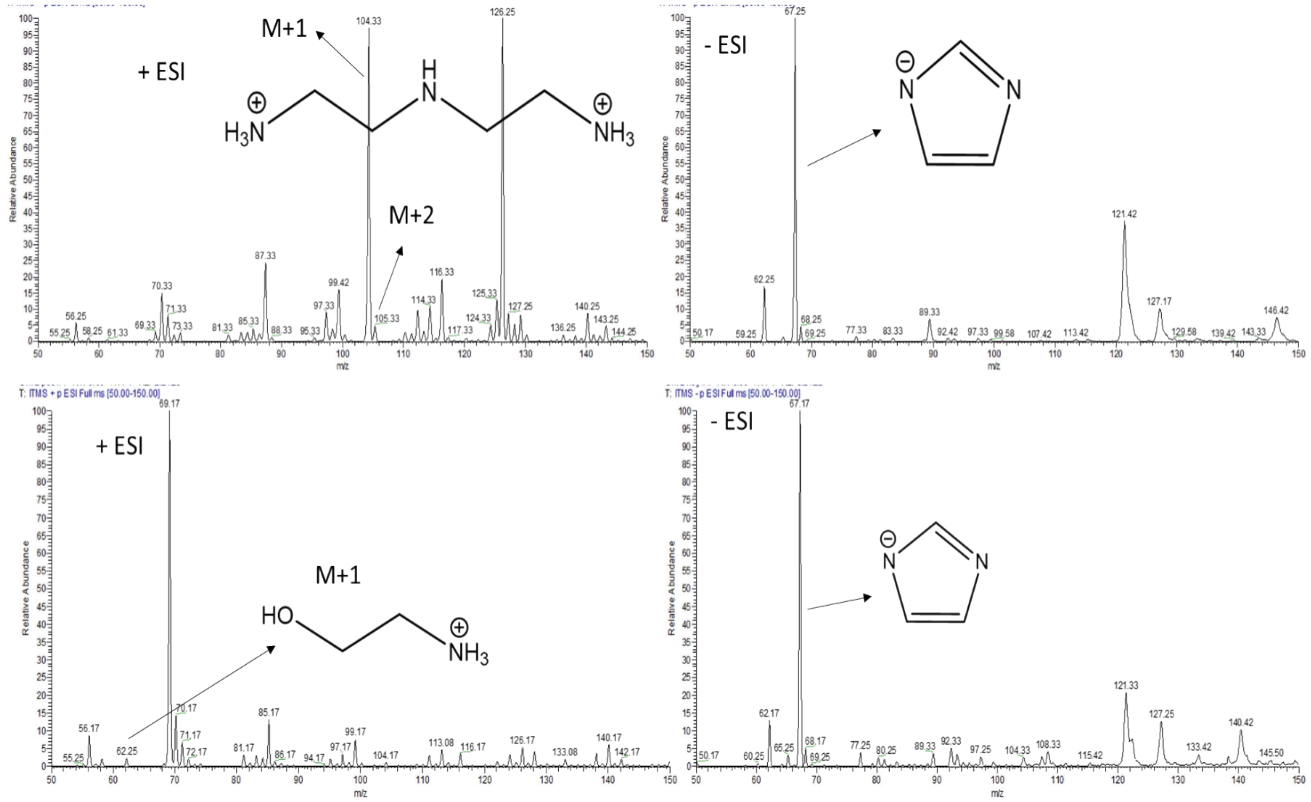

Fig. S3b ESI-MS of [DETA]2[Im] and [MEA][Im] in methanol

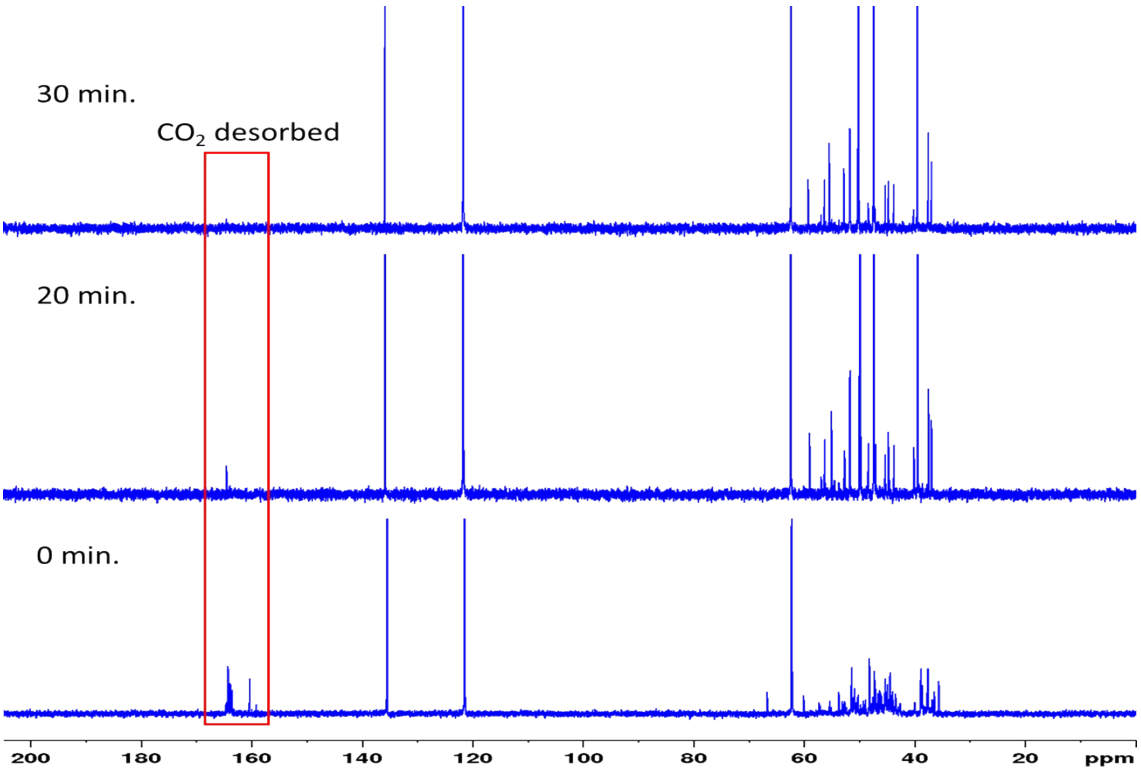

Fig. S4 ^{13}C NMR of [TEPA]2[Im]:EG-4 after CO_2 absorption and desorbed over time at 100 °C under nitrogen flow.

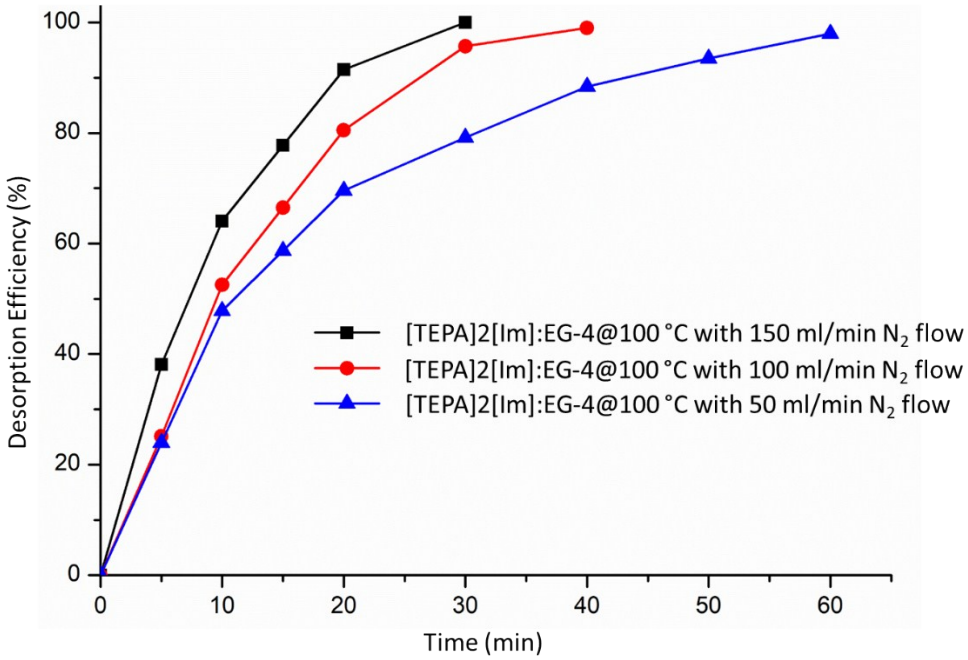

Fig.S5a Desorption efficiency of CO_2 from [TEPA]2[Im]:EG-4 at 100 °C under different nitrogen flow rates.

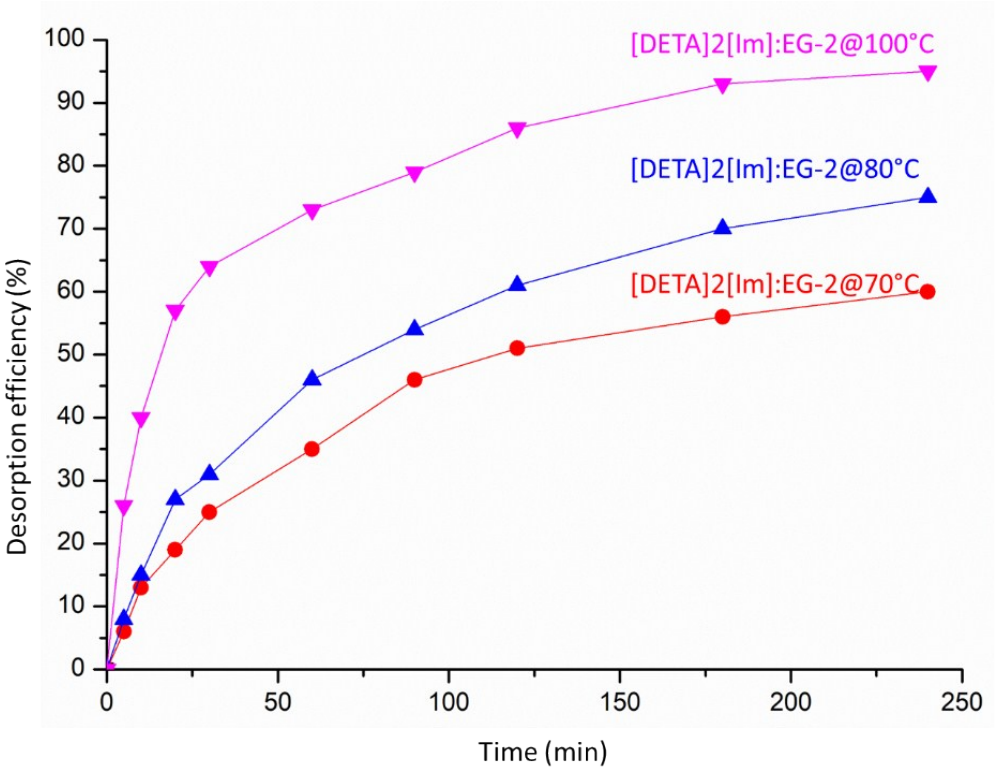

Fig.S5b Desorption efficiency of CO_2 from [DETA]2[Im]:EG-2 at different temperatures under nitrogen flow.

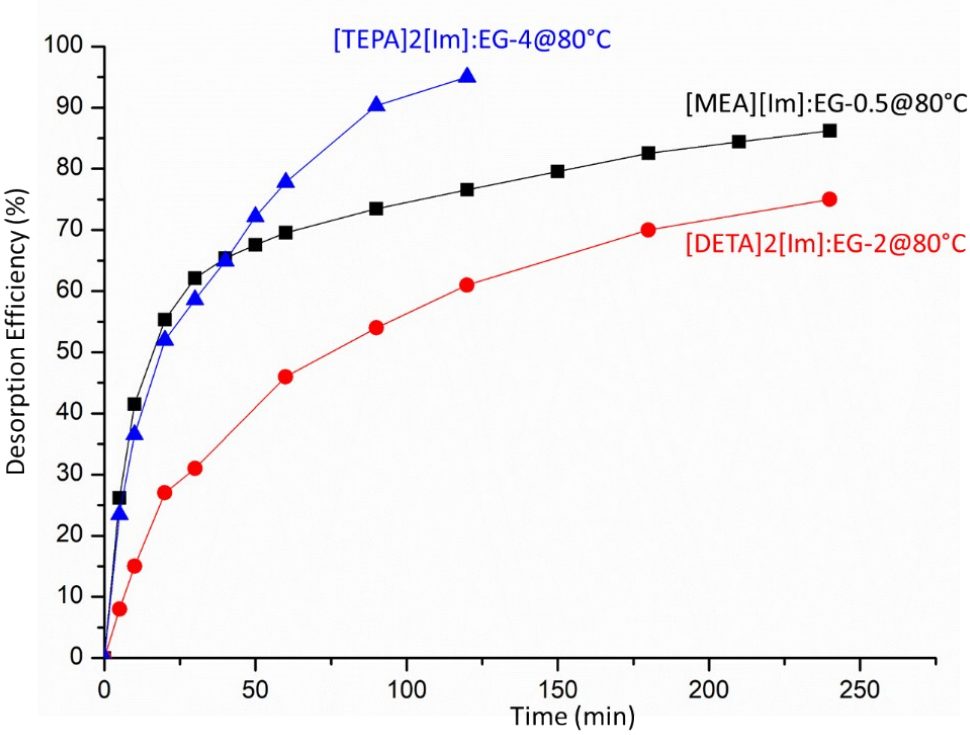

Fig. S6 Desorption efficiency over time of DESs under nitrogen flow at 80 °C.

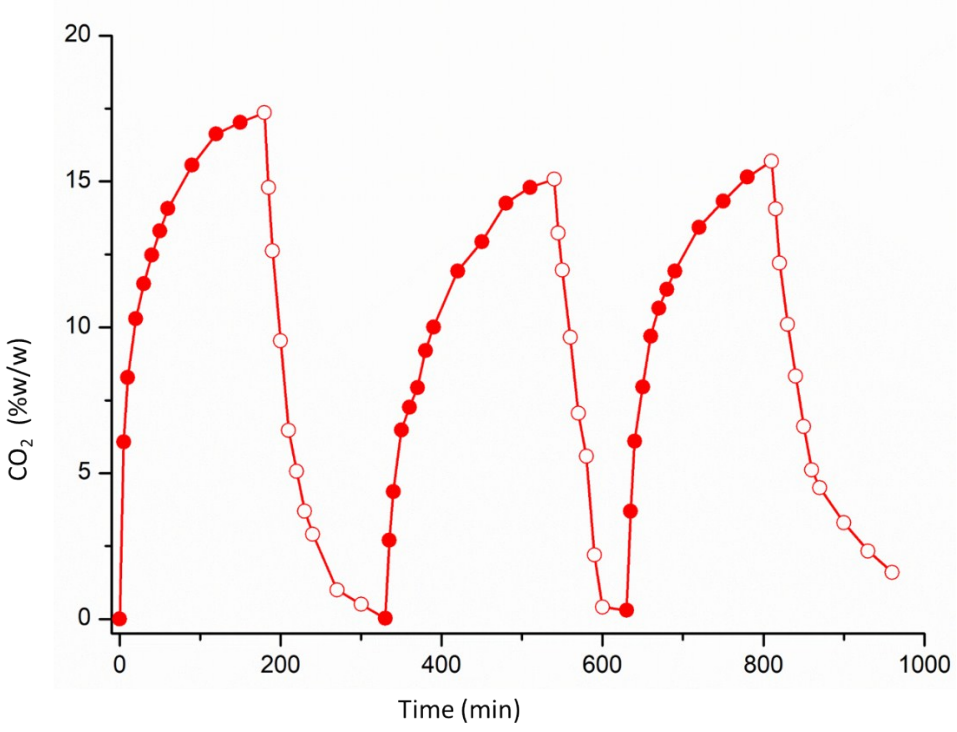

Fig. S7 Desorption efficiency over time for [TEPA]2[Im]:EG-4 under nitrogen flow at 70 °C

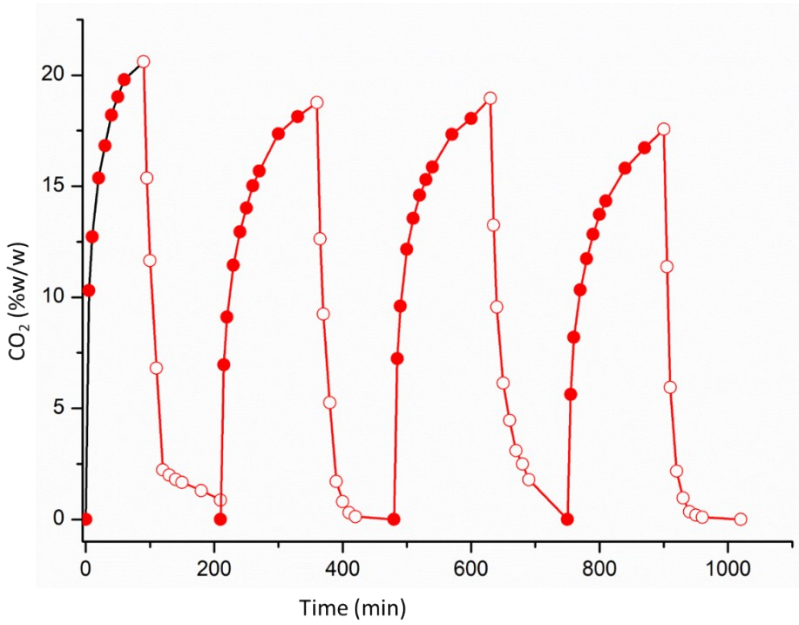

Fig. S8a Desorption efficiency over time for [DETA]2[Im]:EG-2 under nitrogen flow at 100 °C.

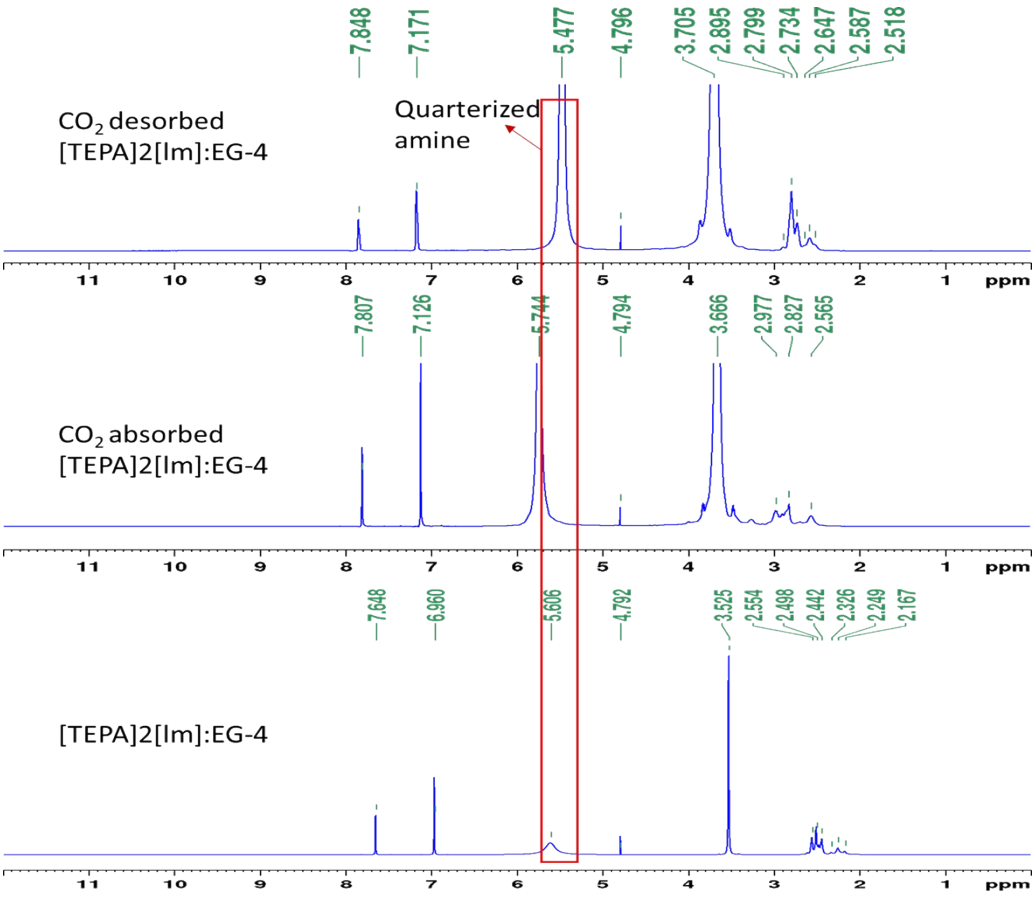

Fig. S8b Proton NMR of [TEPA]2[Im]:EG-4, CO_2 capture and after CO_2 desorption.

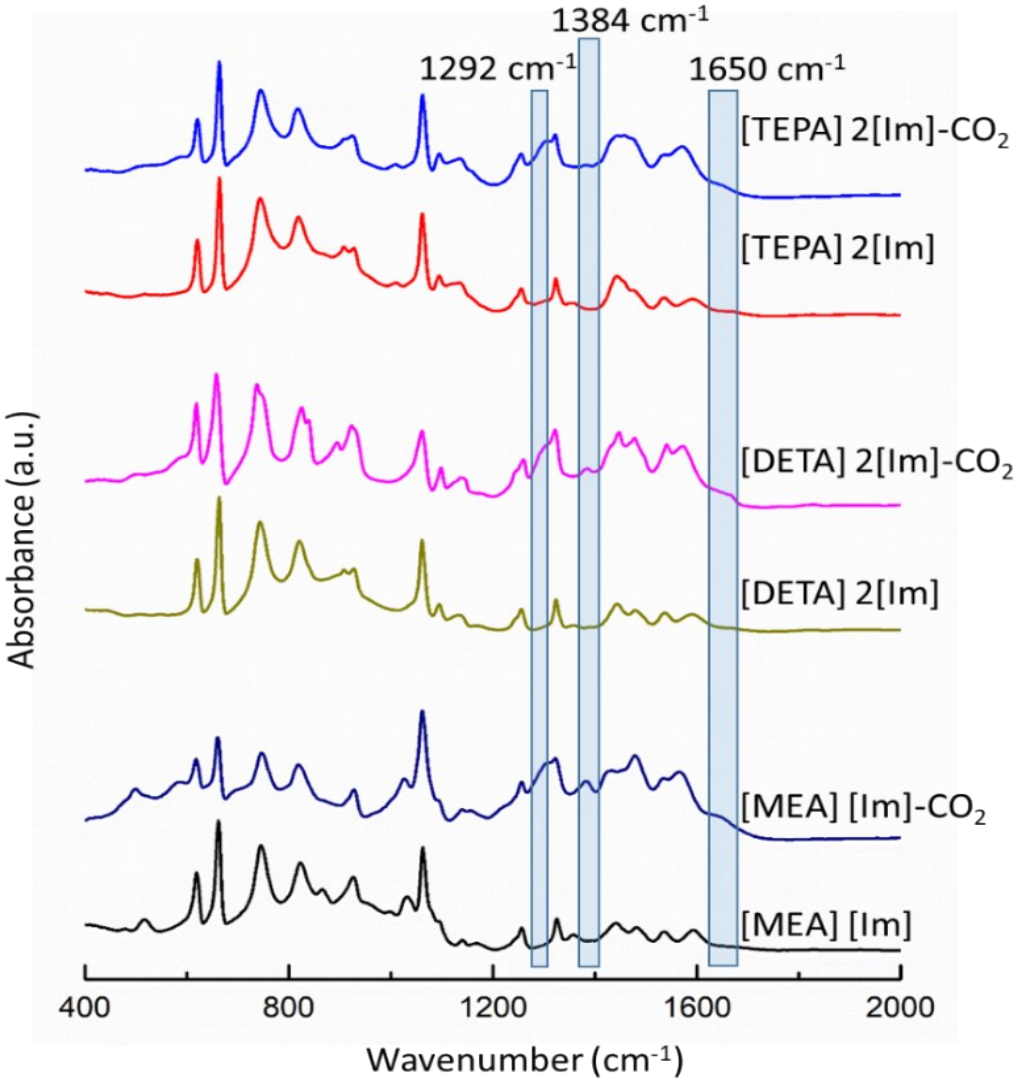

Fig. S9 FTIR spectra of ILs and after CO_2 capture

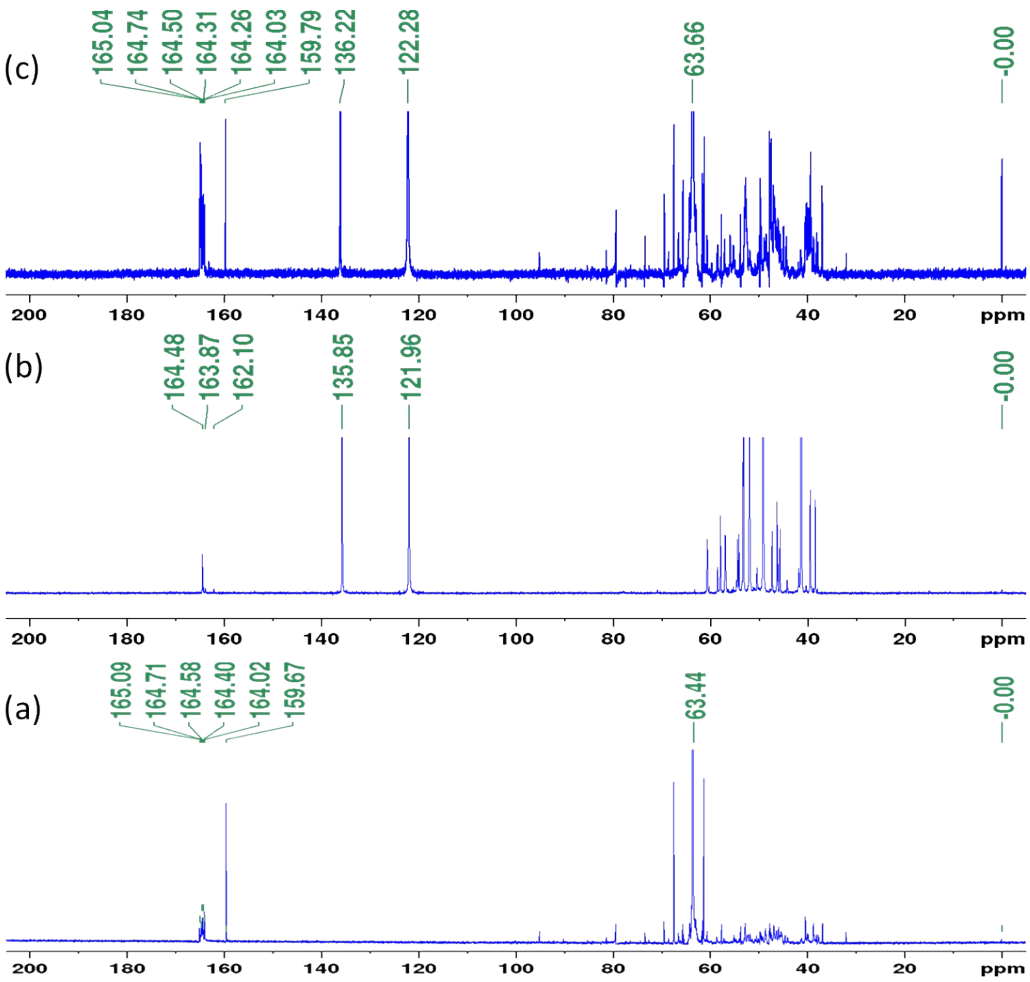

Fig. S10 ^{13}C NMR of CO2 captured (a) TEPA-EG solution, (b) [TEPA]2[Im] and (c) [TEPA]2[Im]:EG-4.

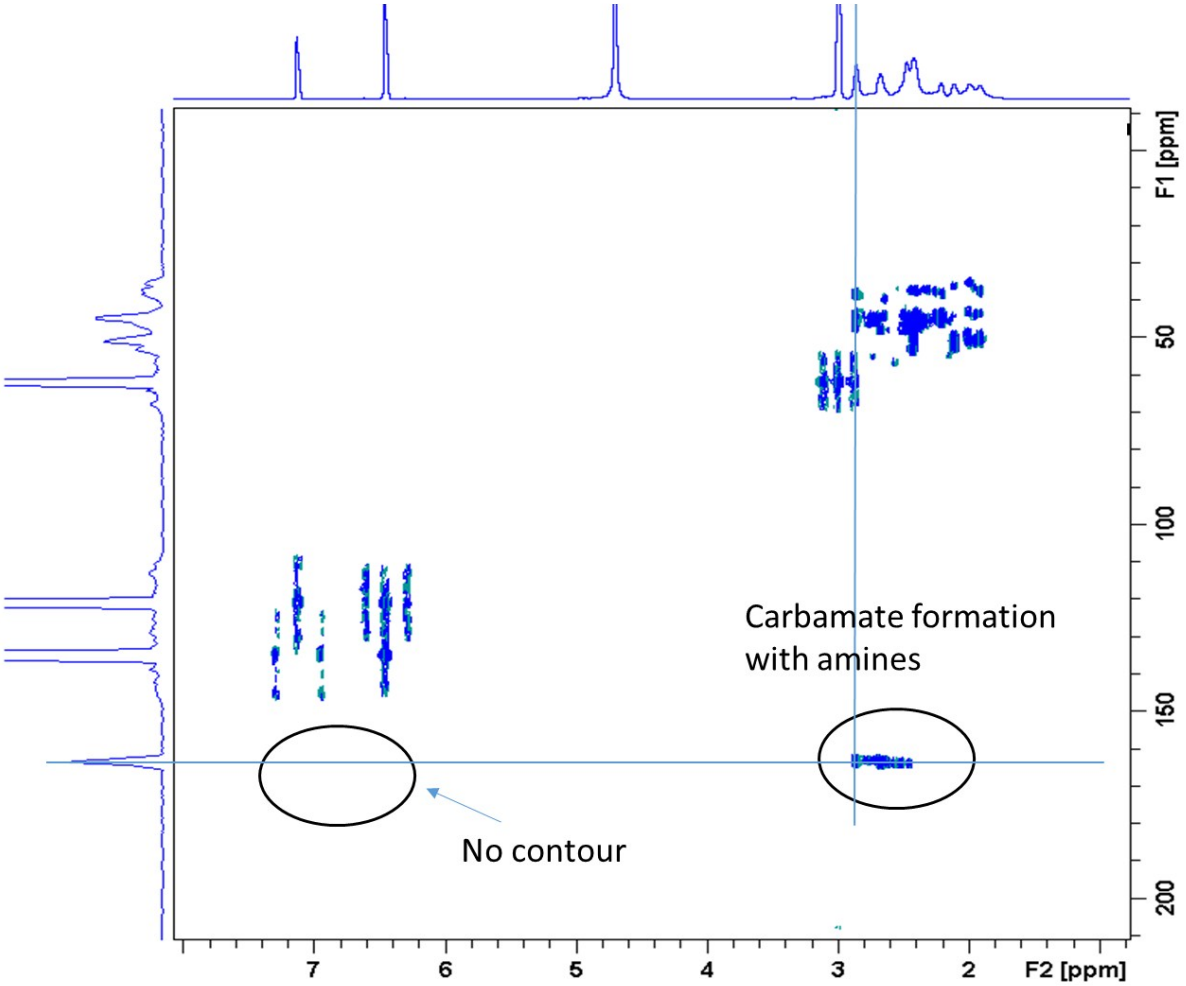

Fig. S11 HMBC spectra of [TEPA]2[Im]:EG-4 after CO_2 capture (in D_2O).

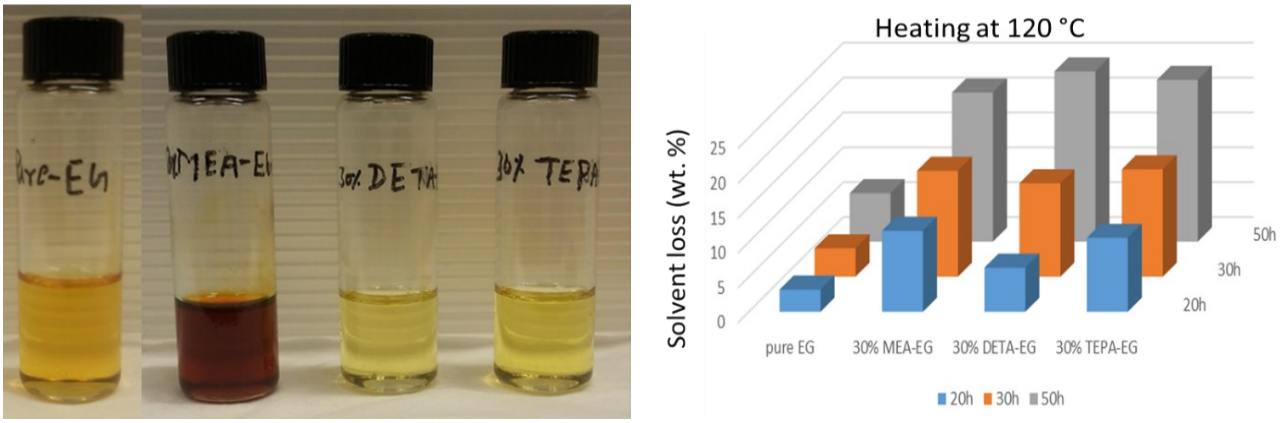

Fig. S12 Solvent loss for a 30 wt% amine-EG solution at 120 °C in 50 hours

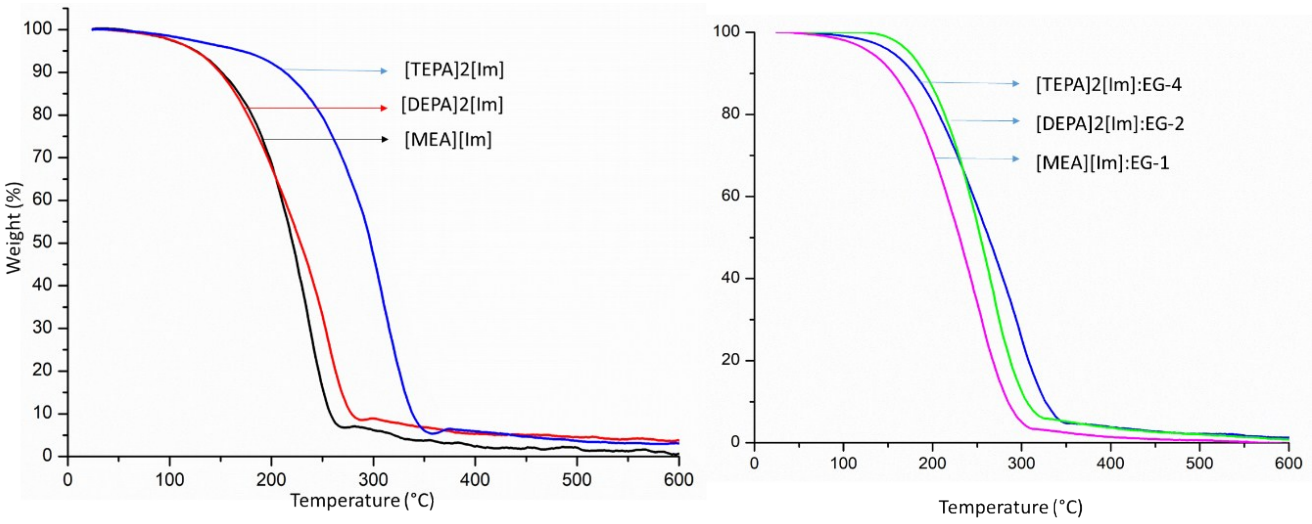

Fig. S13 TGA spectra of ILs and DESs

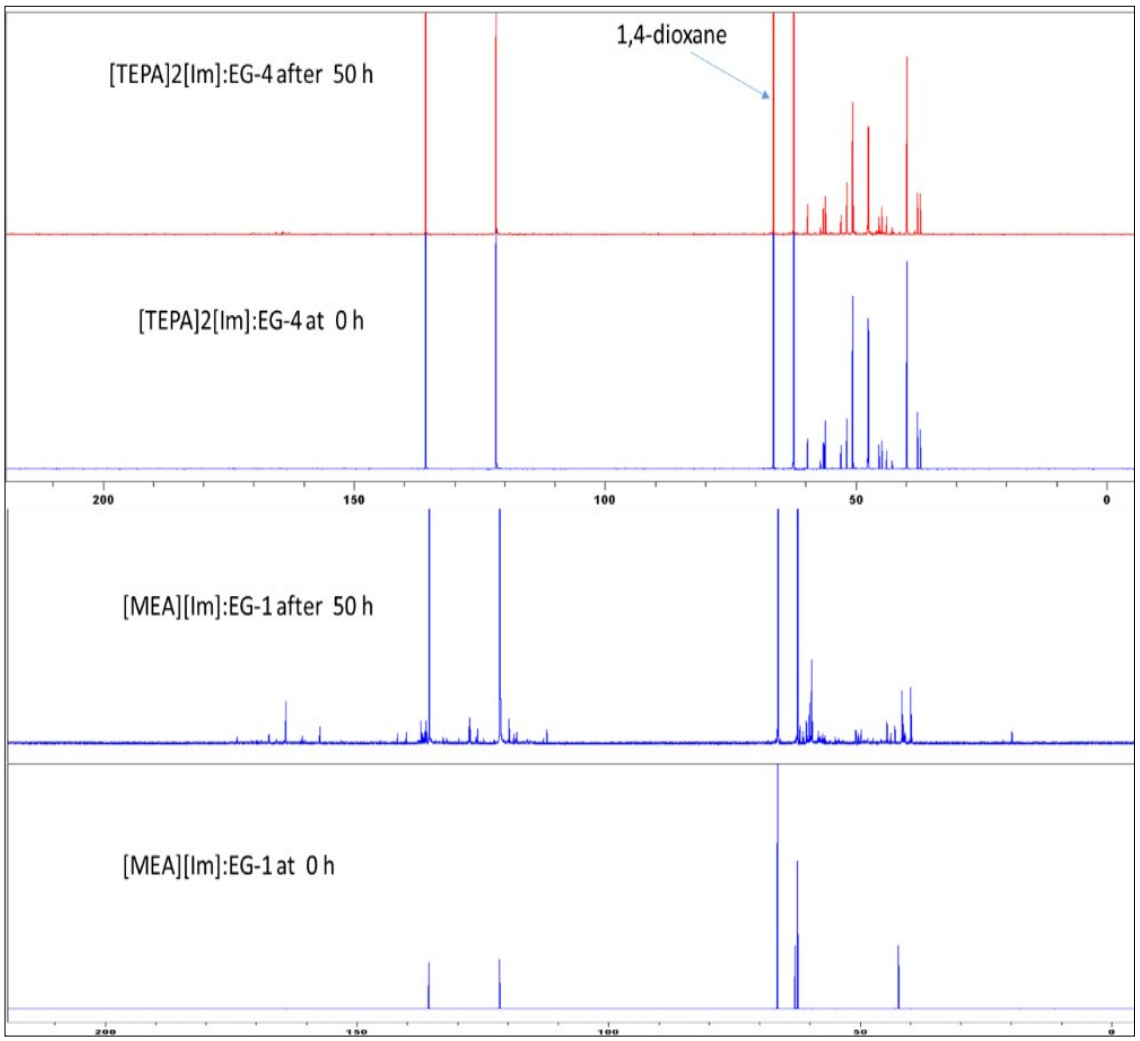

Fig. S14 ^{13}C NMR (in D_2O with reference 1,4-dioxane) of DESs before and after heating at 120 °C for 50 h.

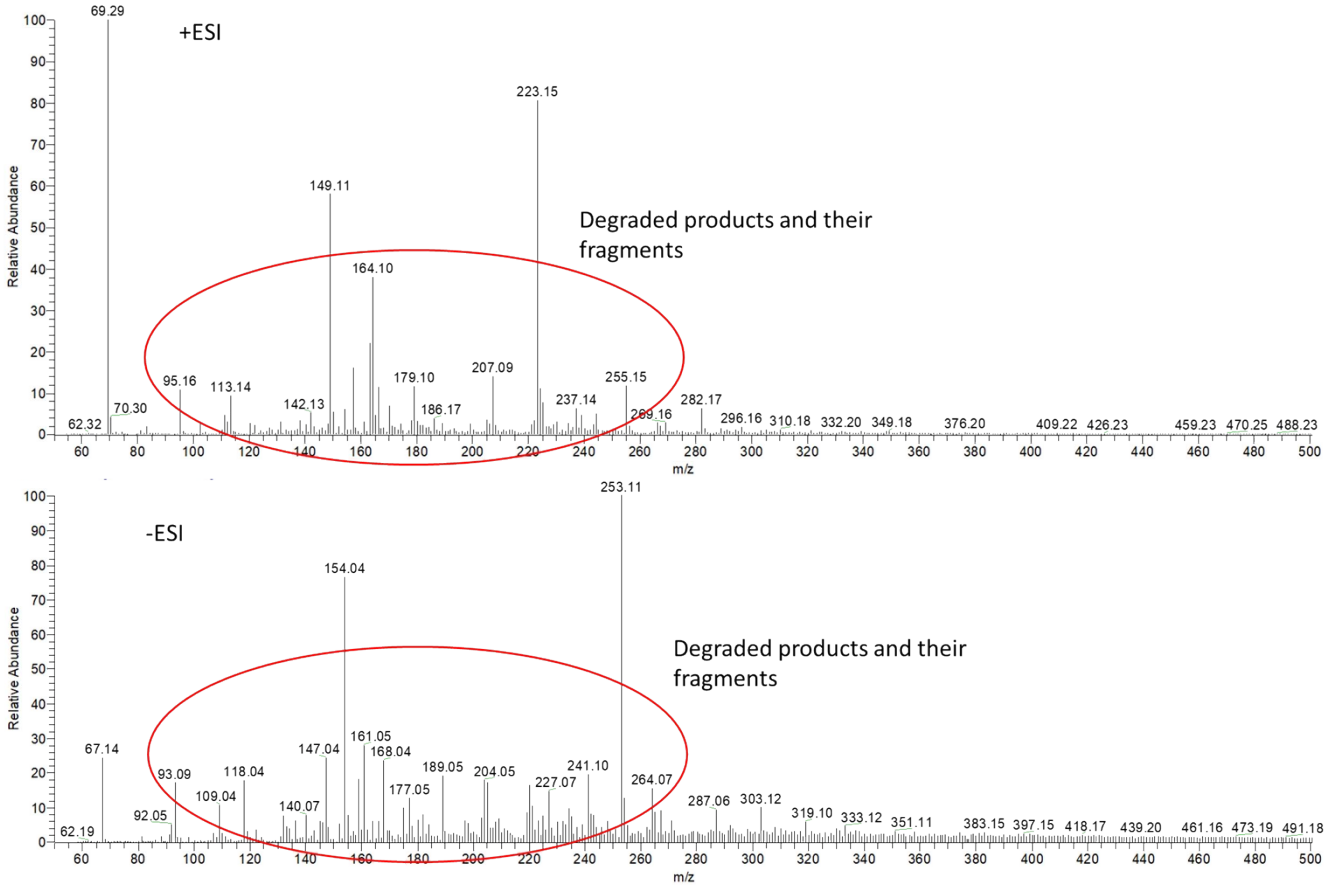

Fig. S15 The ESI-MS of degradation products [MEA][Im]:EG-1 after heating at 120 °C for 50 hours.

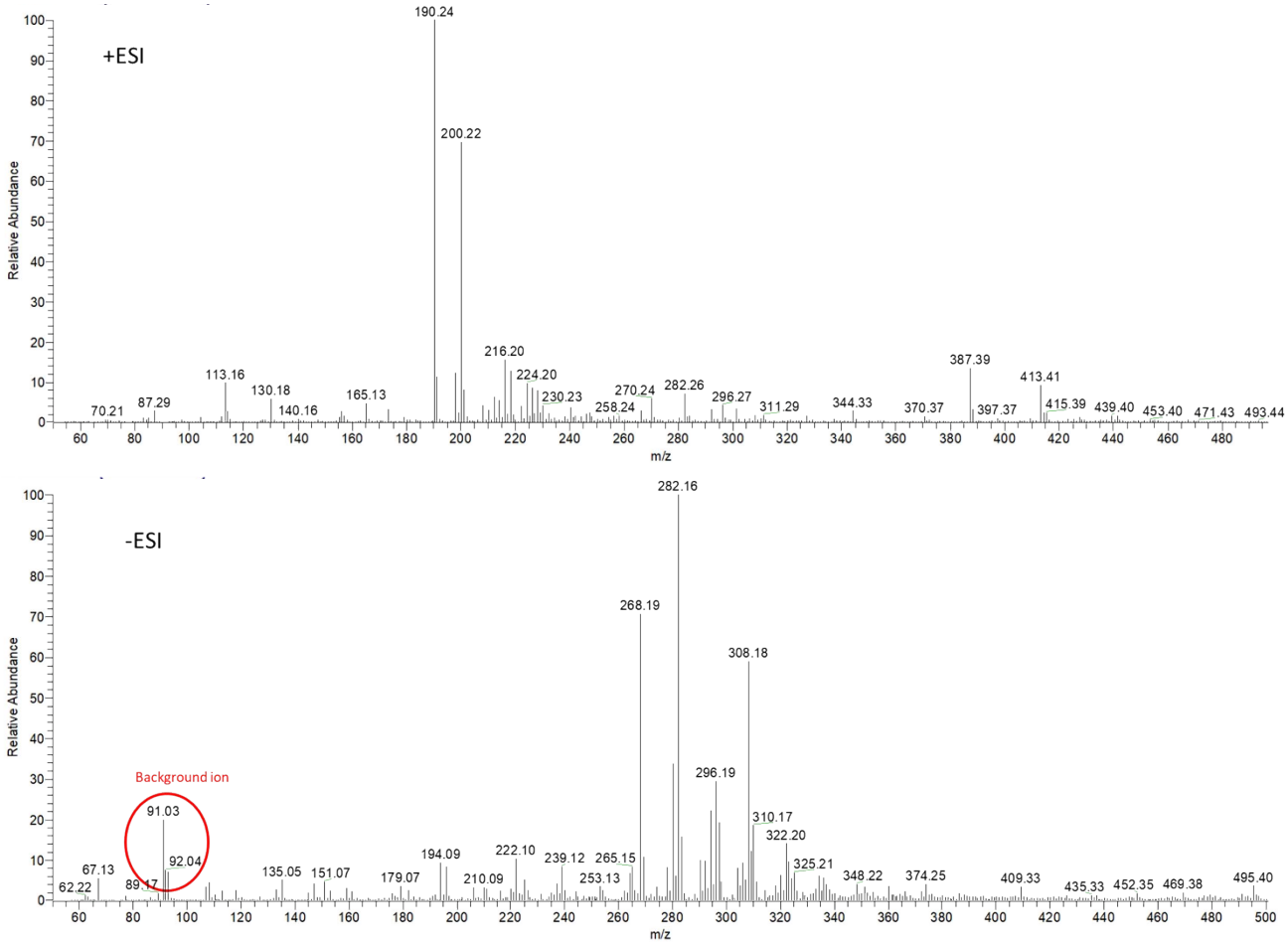

Fig. S16 The ESI-MS of degradation products [TEPA]2[Im]:EG-4 after heating at 120 °C for 50 hours.