Temperature and Pressure Effects on the Separation Efficiency and Desorption Kinetics in the NH_3-CO_2-H_2O System

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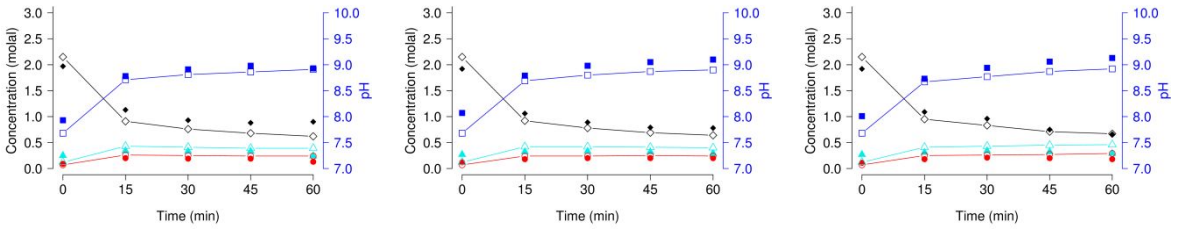
Supporting Information

The comparison between experimental CO_2 speciation and pH measurements (at 25 °C, 1.01 bar) with the OLI-MSE predicted values (25 °C, 1.01 bar) in NH_3-CO_2-H_2O system for all experimental runs (temperature, pressure) is presented in Figure S1. Table S1 presents the regressed overall desorption rate constants k (min^{-1}) for NH_3 and CO_2 from the NH_3-CO_2-H_2O DDS.



(a) (b) (c)

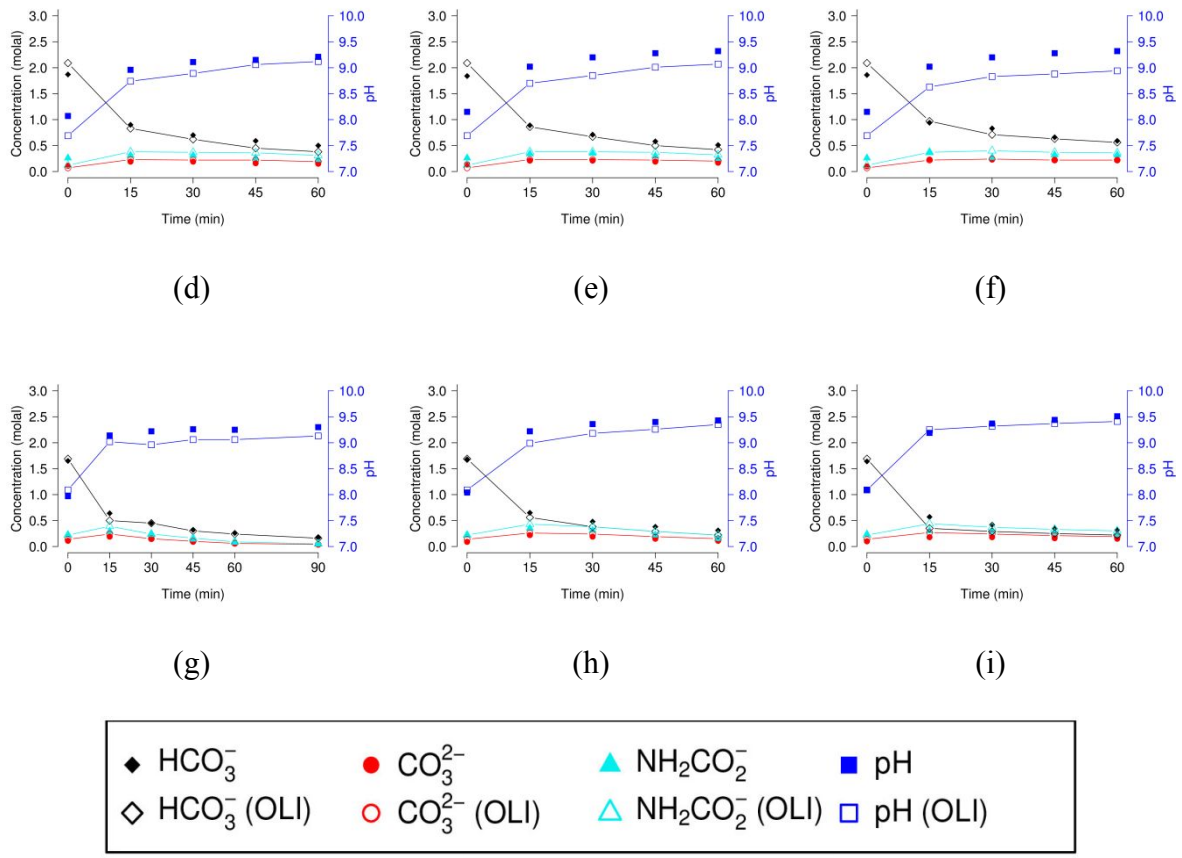


Figure S1 –Experimental CO_2 speciation and pH in NH_3-CO_2-H_2O (measured at 25 °C, 1.01 bar) vs. predicted values (25 °C, 1.01 bar); experimental (temperature, pressure) in (a) (30 °C, 0.35 bar), (b) (30 °C, 0.55 bar), (c) (30 °C, 0.75 bar), (d) (40 °C, 0.35 bar), (e) (40 °C, 0.55 bar), (f) (40 °C, 0.75 bar), (g) (50 °C, 0.35 bar), (h) (50 °C, 0.55 bar), and (i) (50 °C, 0.75 bar)

Table S1 – Overall desorption rate constants k (min^{-1}) for the separation of NH_3 and CO_2 from an NH_3-CO_2-H_2O DDS (15-60 min)

NH_3(total dissolved) ⇌ NH_3(g)			(R18)
T (°C)	P (bar)	k (min^{-1})	R^2
30	0.35	0.0031±0.0005	0.9394
40	0.35	0.0056±0.0004	0.9540
50	0.35	0.0182±0.0003	0.9708
30	0.55	0.0028±0.0003	0.8545
40	0.55	0.0048±0.0006	0.9732
50	0.55	0.0123±0.0010	0.9051
30	0.75	$0.0003 \pm 3.6 \cdot 10^{-7}$	1.0000
40	0.75	0.0042±0.0004	0.8567
50	0.75	0.0063±0.0005	0.9001
CO_2(total dissolved) ⇌ CO_2(g)			(R19)
T (°C)	P (bar)	k (min^{-1})	R^2
30	0.35	0.0054±0.0006	0.9693
40	0.35	0.0105±0.0003	0.9987
50	0.35	0.0198±0.0009	0.9787
30	0.55	0.0047±0.0007	0.9613
40	0.55	0.0100±0.0002	0.9987
50	0.55	0.0168±0.0005	0.9980
30	0.75	0.0041±0.0013	0.8021

40	0.75	0.0068±0.0008	0.9748
50	0.75	0.0090±0.0006	0.9918