Electronic Supplementary Material (ESI) for Environmental Science: Processes & Impacts

Electronic supplementary information

Determination of thermodynamic and transport parameters of naphthenic acids and organic process chemicals in oil sand tailings pond water

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SECTION A: ADSORPTION COEFFIENTS (K_d) FOR SOME MODEL COMPOUNDS ONTO MINERALS

To obtain K_d from batch adsorption experiments, a plot of C_s (concentration of the chemical on the sorbent) vs $C_{l,2}$ (concentration of the chemical in the liquid) was constructed. The slope of the linear region of the curve at the lower concentration was reported in this study as the final K_d value obtained from the batch experiments for the model compound.

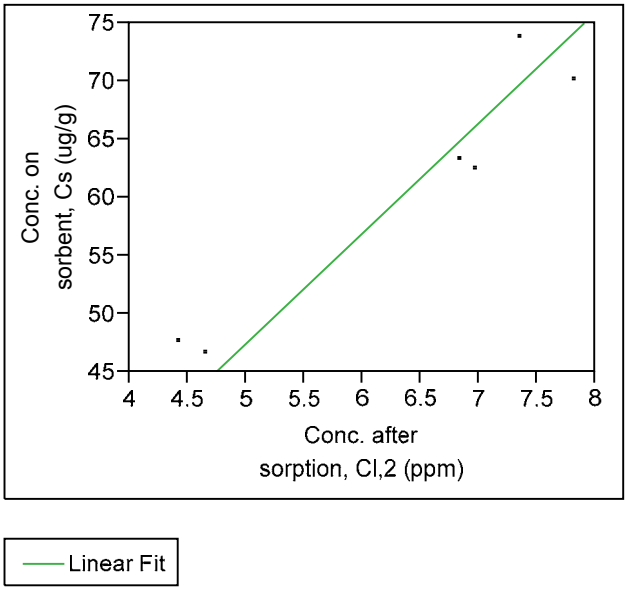

Figure S1 – The adsorption of lauric acid (in 1:1 mixture) onto 2.5% bitumen clay
Linear fit, Conc. on sorbent, $C_s = 0 + 9.5$*conc. after sorption, $C_{l,2}$

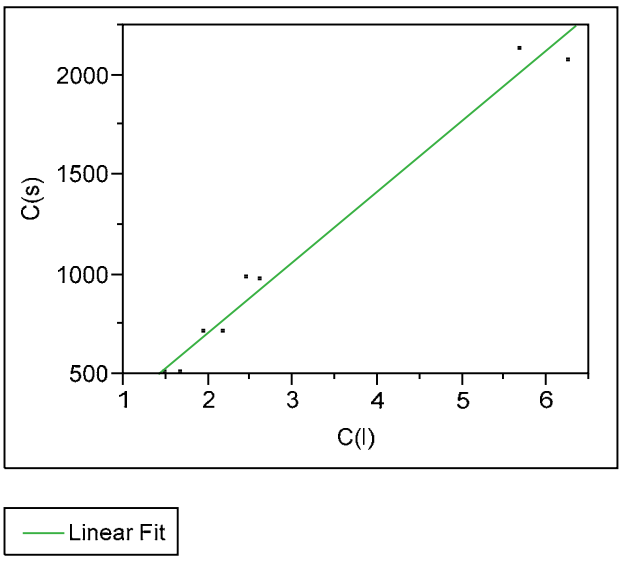

Figure S2 – The adsorption of nonylphenol onto 2.5% bitumen clay
Linear fit, Conc. on sorbent, $C_s = 0 + 354.6$* Conc. after sorption, $C_{l,2}$

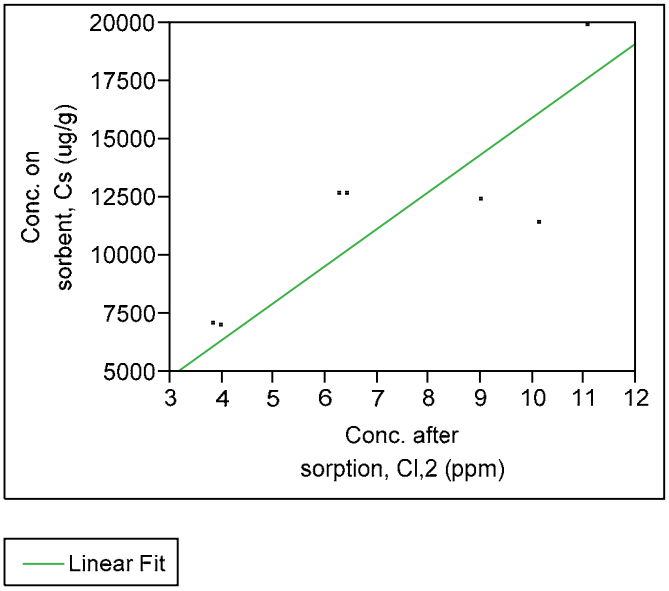

Figure S3 – The adsorption of BAC 14 onto 2.5% bitumen clay
Linear fit, Conc. on sorbent, C_s = 0 + 1594.5*Conc. after sorption, $C_{l,2}$

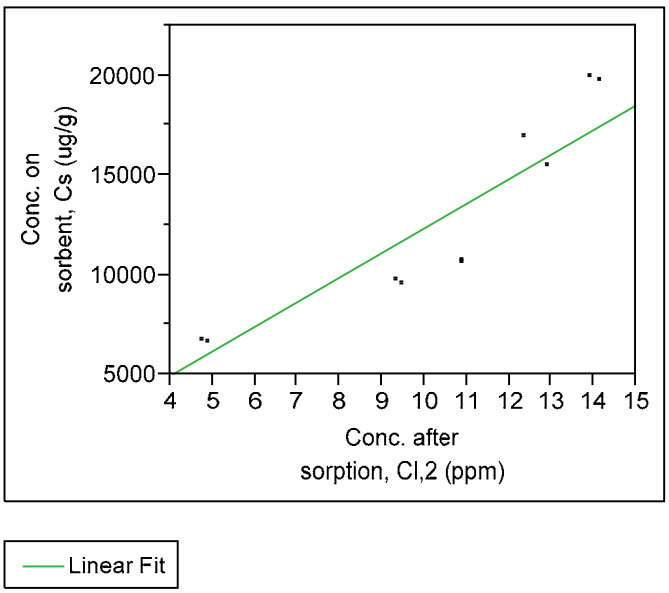

Figure S4 – The adsorption of BAC 14 onto clean clay
Linear fit, Conc. on sorbent, C_s = 0 + 1233.1*Conc. after sorption, $C_{l,2}$

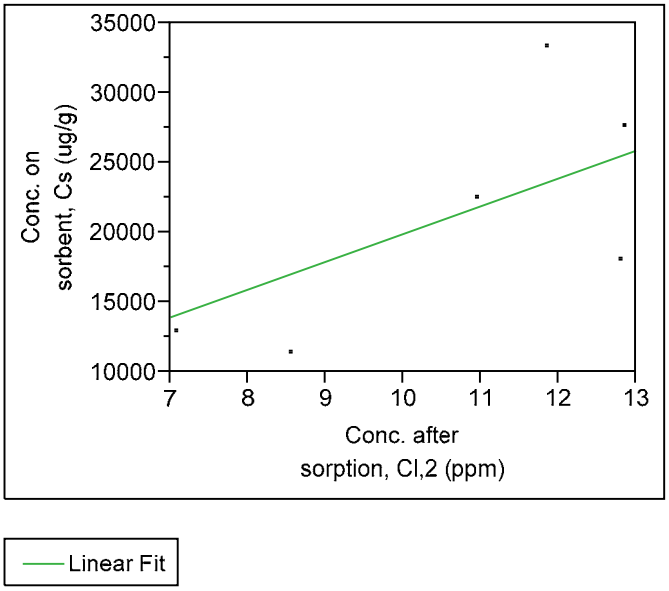

Figure S5 – The adsorption of BAC 16 onto 2.5% bitumen clay
Linear fit, Conc. on sorbent, C_s = 0 + 1988.7*Conc. after sorption, $C_{l,2}$

SECTION B: LINEAR RELATIONSHIP BETWEEN FLOW RATE AND DISPERSION COEFFICIENT

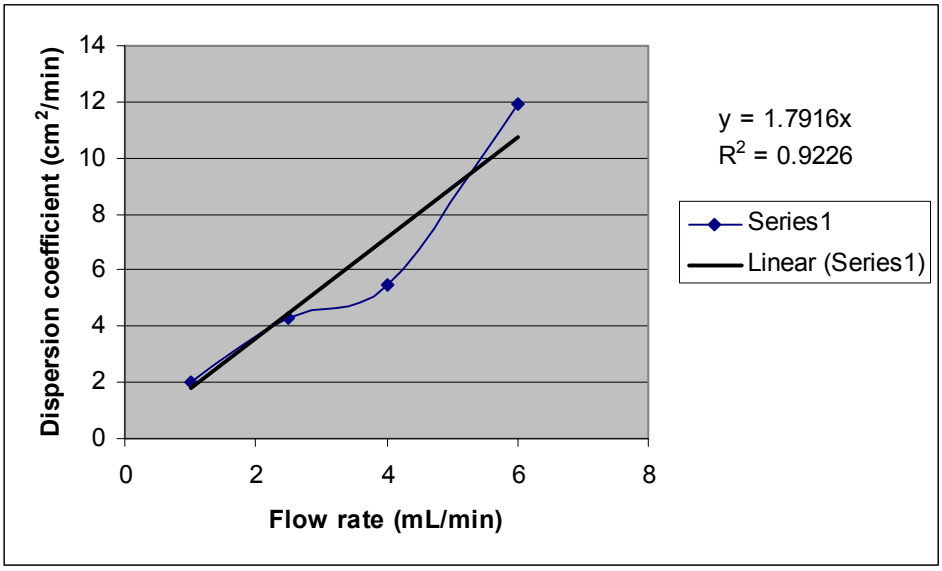

Figure S6 – The relationship of $D = \alpha\bar{v}$ based on glass column experiments. For details, refer to the section "**Transport case study in an Alberta oil sand mining site**" in the main article.

SECTION C: TRANSPORT EXPERIMENT ON CLEAN SAND COLUMN

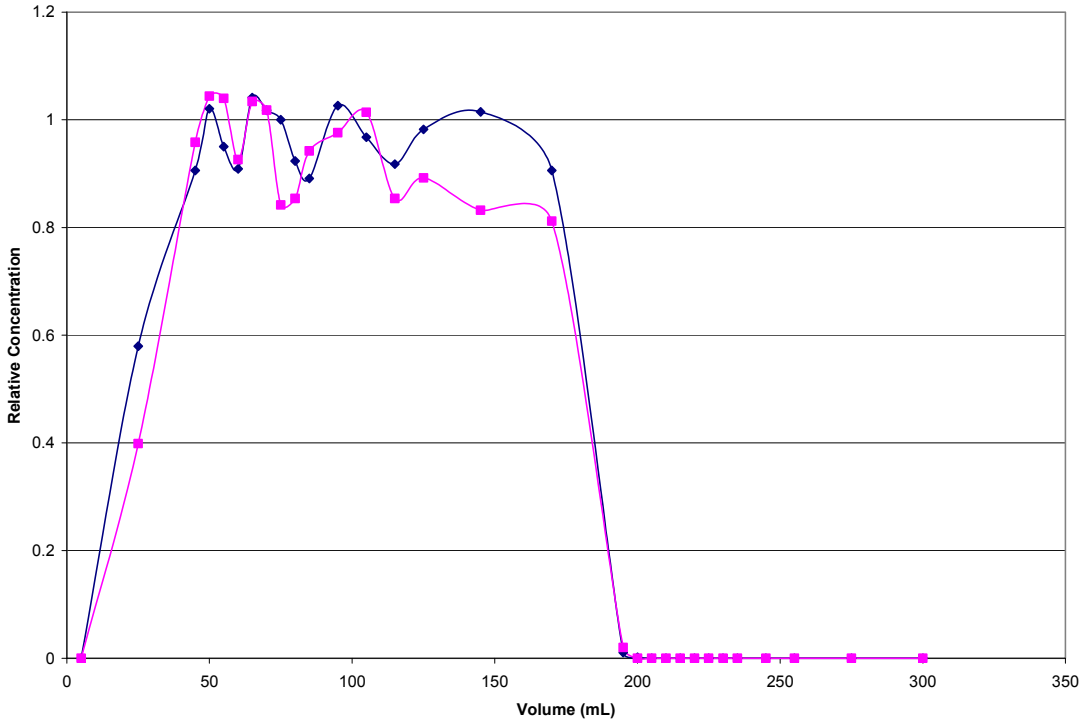

Figure S7 –150mL PCHCA injected onto a sand column (about 30g) at a flow rate of 4.0mL/min (blue line) and 2.5mL/min (pink line).