Partitioning of priority contaminants in high-biomass systems and associated impacts on emission control

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Solubility and partitioning values for TCE and other VOCs were found to be heavily impacted by biomass levels, changing by as much as two orders of magnitude. These results should be directly applicable to emission and transport models for a variety of sparingly soluble organic contaminants. We report measurements of solubility limits and Henry's law constant partitioning values for benzene, toluene, TCE, and chloromethane in closed vessels that contain varying levels of biomass. The air/liquid partition constant for benzene decreased from 2.9 x 10^{-3} atm m^3 mol^{-1} to as low as 0.1 x 10^{-3} atm m^3 mol^{-1} and the solubility limit increased from 20 to 48 mM when biomass (in the form of yeast) was added to aqueous batch systems containing this pollutant. The Henry's law constant for toluene decreased from 6.4 x 10^{-3} to 0.17 x 10^{-3} atm m^3 mol^{-1}, while the solubility limit increased from 4.9 to greater than 20 mM. For TCE, the air/liquid partition constant decreased from 0.013 atm m^3 mol^{-1} to less than 0.00013 atm m^3 mol^{-1}, and the solubility increased from 8 mM to more than 1000 mM.