

Impact of biomass on the measured solubility of priority contaminants and predicted effects on biofiltration

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Critical parameters for biofiltration systems include the partitioning characteristics of the substrate (VOC) in the aqueous environment where the active enzyme or microbe is present. Contaminant solubility is generally presumed to be identical to that measured in pure water. Here, we present measured data for solubility limits and Henry's Law partitioning constants for sparingly soluble VOCs such as propane, benzene, and TCE measured in high-density aqueous biomass. Partitioning values were found to change in some cases by up to two orders of magnitude; TCE solubility, for example, increased from 8 mM to more than 1000 mM. The biomass levels used are typical of those observed in biofilms such as are used in bioremediation. We will present measured solubility values for a variety of biomass levels and demonstrate the impact that changes in these parameters have on predictive bioconversion modeling in a trickle-bed biofilter.