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Determination and Correlation of the Partition Coefficients of 48 Volatile Organic and Environmentally Relevant Compounds Between Air and Silicone Oil

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Abstract

Many emerging bioprocesses include a second, non-aqueous phase liquid in which the key substrate or product partitions for either enhanced interphase mass transfer, concentration dampening, or in-situ product extraction. Knowledge of the partition coefficient between air and the non-aqueous is relevant for process optimization and modeling. In here, experiments were conducted to determine the air-silicon oil partition coefficients (P) of 48 environmentally relevant compounds including many volatile organic compounds, chlorinated solvents, and aromatics compounds. A mass balance method gave reliable results, whereas the EPICS method did not. The value of the ratio of Henry's constant (H) divided by P which is the partition coefficient between silicone oil and water served as a parameter to distinguish which compound would most benefit from including silicon oil as a non-aqueous phase. P values decreased slightly with decreasing viscosity of silicon oil between 50 and 5 cSt, and a simple relationship was proposed to calculate P at 5 or 50 cSt based on values at

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