Geophysical Research Abstracts
Vol. 13, EGU2011-11157, 2011
EGU General Assembly 2011


# Degradation of PAHs and biocolloids by High Frequency Ultrasound

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Polycyclic aromatic hydrocarbons (PAHs) are persistent organic compounds, which have been reported in the literature to efficiently degrade at low (e.g. 20 kHz) and moderate (e.g. 506 kHz) ultrasound frequencies. The present study focuses on degradation of naphthalene, phenanthrene, and pyrene by ultrasound at three different relatively high frequencies (i.e. 582, 862, and 1142 kHz). The experimental results indicate that for all three frequencies and power inputs 133 W phenanthrene degrades to concentrations lower than our experimental detection limit (<1$\mu$g/L). Phenanthrene degrades significantly faster at 582 kHz than at 862 and 1142 kHz. For all three frequencies, the degradation rates per unit mass are similar for naphthalene and phenanthrene and lower for pyrene, whereas degradation rates normalized by solubility are faster for phenanthrene and pyrene and lower for naphthalene. Furthermore, naphthalene degradation requires less energy than phenanthrene, which requires less energy than pyrene under the same conditions. No aromatic byproducts are found in the solutions. Furthermore, preliminary results suggest that high frequency ultrasound can effectively be applied for the inactivation of the biocolloids Escherichia coli, MS2, and FX174.