

5<sup>th</sup> International Conference on **Pollution Control and Sustainable Environment**  
&  
10<sup>th</sup> Edition of International Conference on **Water: Pollution, Treatment & Research**

March 14-16, 2019 London, UK

### Effect of saponin and humic acid on the biodegradation of anthracene

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PAHs can be widely dispersed into the environment by atmospheric transport or through stream pathways, and eventually accumulate in soils and aquatic sediments. The existing levels of these compounds in the environment are taken into the special consideration and regulated by government agencies. It is well known that surfactants can increase the solubility of hydrophobic organic compounds by partitioning them into the hydrophobic cores of surfactant micelles, thus surfactant enhanced the solubility of PAHs has been suggested as a promising technology for the removal of PAHs from polluted soil. The influences of saponin (a biosurfactant) and humic acid (HA, a surfactant-like substance) on the biodegradation of anthracene were studied in comparison with the effects of Tween-80 (a chemical surfactant) in this study. About 7 days were needed for microorganisms to produce sufficient glycolipids to dissolve anthracene and to make anthracene bioavailable in the absence of humic acid and other surfactants. Humic acid, saponin and Tween-80 significantly accelerated the biodegradation of anthracene, but humic acid and saponin were much more effective than the chemical surfactant Tween-80 under the same conditions. Furthermore, humic acid and saponin dramatically shortened the onset time for anthracene biodegradation, and the biodegradation rate exceeded 98% within 2~4d. The biodegradation of anthracene is dependent on the added concentrations of humic acid and the initial concentrations of anthracene.

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