

Occurrences of Surfactants in Lake Sediments

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Abstract

With population surge, industrialization and urbanization; use of surfactants has increased manifold. After their use in households and industries, surfactants either end up in sewerage systems or are directly discharged into surface waters. They can hence be found dispersed in water phase or adsorbed onto aquatic sediments and sewage sludge. Due to limited metabolic pathways, most of the common surfactants are not degradable in anaerobic conditions that generally prevail in sewage ingressed water bodies so sludge accumulated in these water bodies after the anaerobic digestion process is rich in surfactants (Ying, 2006, Environ. Int.). Sediment is a complex mixture of organic (bacteria, proteins, humic and fulvic acids, humin, etc.) and inorganic (silica, minerals, metal oxides and hydroxides, aluminosilicates) components. Absorptivity of surfactant depends on the sorbent composition and type of surfactant (Ishiguro & Koopal, 2016, Adv. Colloid Interface Sci.). A crucial question related to surfactant absorption is its reversibility- as to whether the surfactant can desorb. The knowledge of this can be beneficial in understanding the environmental fate of surfactants. The presence of surfactants in water bodies can form foams. Generally, foaming in surface water is a result of a mixture of surfactants from various sources (Schilling & Zessner, 2011, Water Res.). However, contribution of sediment as a source of surfactant in a foaming water body has not been studied adequately. Also, existence of surfactants in water, beyond certain concentrations not only induces unpleasant taste and odor, but also causes undesirable changes in the ecosystem. Thus, it becomes imperative to study the ratio of the surfactant associated with water, to the extent of surfactant associated the sorbent such as sediment/sludge to understand the environmental risk associated with surfactant. This study aims to understand a foaming urban lake which foams only after heavy rainfalls. This study tests the hypothesis that surfactants accumulate in the lake sediment in significant proportions and desorbs upon dilution occurring due to addition of rainwater into the lake. This when churned by heavy runoff causes large quantities of stable foam. This study aims at analyzing the role of lake sediment in foaming of a lake.

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