SAXS study of humic acid and surfactant complexes. (S02-shang092753-Poster)

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Abstract:

A peat humic acid (HA) dissolved in 0.1 M NaOH (5 g/L) was reacted with a cationic surfactant (hexadecyltrimethylammonium bromide or HTAB) at initial solution concentrations of 1, 5, 10, 20, 30, 40 and 50 mM. The HA precipitated at HTAB concentrations of 20, 30 and 50 mM but the complexes were soluble at 40 mM and below 20 mM. The charge neutralization between humic acid anions and HTAB micelles and the subsequent charge reversal due to hydrophobic interactions explain the behavior of the HA-HTAB complexes. The HA solution (5 g/L), reaction products (supernatants and precipitates), and pure cationic surfactant solutions were studied by the small-angle x-ray scattering (SAXS) technique in order to determine the structure of HA-HTAB complexes. The scattering intensity (I(q)) of various HA-HTAB systems were recorded over a range of scattering vectors (q = 0.053 to 4.0 1/nm) on the 10-m SAXS facility at Oak Ridge National Laboratory. The HA-HTAB precipitates and the 50-mM HTAB solution gave d100 and d110 reflections of a hexagonal structure. The hexagonal array of cylindrical HTAB micelles has a lattice parameter of 5.01 nm in pure solution, and the parameter decreases in the order: 4.96, 4.91, and 4.85 nm for the precipitates of HA-HTAB (50, 30, and 20 mM, respectively), indicating that the structure of HTAB micelles was disturbed by the addition of HA.

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