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复合污染中Triton X-100在膨润土/水界面上的吸附行为

Sorption behavior of Triton X-100 on the interface of water and bentonite in combined pollution

关键词: [膨润土](#) [吸附](#) [TX-100](#) [表面活性剂](#) [热力学](#) [盐度](#)

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摘要: 研究了水溶液中膨润土对非离子表面活性剂TritonX-100(X-100)的吸附,重点探讨了阳离子表面活性剂CPC、阴离子表面活性剂SDBS、中性无机盐NaCl及温度对膨润土吸附TX-100的影响.结果表明,Na基膨润土吸附TX-100的效果好于Ca基膨润土;低浓度CPC对膨润土吸附TX-100具有增强作用,当CPC初始浓度大于 $10000\text{mg}\cdot\text{L}^{-1}$ (平衡浓度 C_e 约为1CMC)时具有抑制作用,当CPC浓度低于 $3000\text{mg}\cdot\text{L}^{-1}$ (C_e 约为0.03CMC)时, TX-100吸附量与CPC浓度成线性正相关. SDBS能显著降低膨润土对TX-100的吸附,原因是溶液中SDBS与TX-100混合胶束的形成能阻止TX-100与膨润土硅氧表面间的氢键作用及在其表面形成胶束. NaCl的存在可以大大提高膨润土对TX-100的吸附,去除率由56%提高到99%以上.膨润土对TX-100的吸附随温度升高吸附量增大,其吸附热为 $12.68\text{kJ}\cdot\text{mol}^{-1}$,标准自由能的减小和熵值的增大是TX-100在膨润土上吸附的推动力.实验结果对用膨润土处理含表面活性剂废水具有一定的理论价值.

Abstract: Sorption of a nonionic surfactant (Triton X-100, TX-100) on bentonite from water and the effects of anionic surfactant (Cetyl Pyridinium Chloride, CPC), an anionic surfactant (Sodium Dodecylbenzene Sulfonate, SDBS), sodium chloride (NaCl) and temperatures on TX-100 sorption were investigated. TX-100 sorption on Na-bentonite is greater than on Ca-bentonite, which will be enhanced by CPC with low concentrations ($C_e < 0.03\text{CMC}$) but reduced by CPC with high concentrations ($C_e > 1\text{CMC}$) and SDBS. Mixed micelle formation of TX-100 and other surfactants in water could be used to explain the observed TX-100 sorption in the presence of CPC and SDBS. TX-100 sorption will also be enhanced by NaCl enormously, showing the removal rates increase from 56% to 99% when the added NaCl dose is higher than $1.7\text{mol}\cdot\text{L}^{-1}$. The sorption amounts of TX-100 on bentonite were increased with temperatures. The parameter of thermodynamics, $\Delta H = 12.68\text{kJ}\cdot\text{mol}^{-1}$, suggests that the driving force of sorption is the decreasing ΔG^0 and the increasing ΔS^0 . The experimental results provide theoretical values for bentonite application in treatment of wastewater containing surfactants.

Key words: [bentonite sorption](#) [Triton X-100](#) [surfactant](#) [thermodynamics](#) [salinity](#)

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