环境科学学报
ACTA SCIENTIAE CIRCUMSTANTIAE

环境化学

舒月红,贾晓珊.CTMAB-膨润土从水中吸附氯苯类化合物的机理——吸附动力学与热力学[J].环境科学学报,2005,(11):1530-1536

CTMAB-膨润土从水中吸附氯苯类化合物的机理——吸附动力学与热力学

The mechanisms for CTMAB-bentonites to adsorb CBs from water in the adsorption kinetics and thermodynamics view

关键词： 氯苯类化合物(CBs) CTMAB-膨润土 吸附 动力学 热力学

基金项目： “985工程”二期项目;中山大学重点资助项目(No.32000—3253282)

作　者　单位

舒月红　中山大学环境科学与工程学院 广州 510275

贾晓珊　中山大学环境科学与工程学院 广州 510275

摘要： 采用批量平衡实验,研究了CTMAB-膨润土从水中吸附4种氯苯类化合物(CBs)的吸附特性,并从动力学及热力学角度探讨了CBs的吸附作用机理.结果表明,吸附过程符合伪二级动力学方程,吸附活化能较小,反应速率较快,达到平衡的时间较短.CBs在CTMAB-膨润土上的吸附符合Linear方程,吸附过程主要由分配作用所致;CBs的辛醇-水分配系数越大,其在CTMAB-膨润土中的分配系数Kd也越大.另外,CTMAB-膨润土的有机碳含量越高,其对CBs的Kd也越大.CBs在CTMAB-膨润土上的吸附是一个放热过程,同时伴随着熵值的增加,在288~308K范围内,反应的吉布斯自由能变小,表明主要吸附作用力为疏水键力,吸附反应为自发过程.

Abstract: Abatch adsorption study was carried out to investigate the properties, kinetics and thermodynamics of adsorption process of CBs on CTMAB-bentonites. The adsorption followed pseudo-second-order kinetics with a small energy of activation, which led to large kinetic rate constant and small time to reach adsorption equilibrium. The experimental data yielded excellent fits with Linear isotherm equation, which was resulted from CBs partition into CTMAB-bentonites. With the increase of octanol-water partition coefficients of CBs and the organic carbon contents of CTMAB-bentonites, CBs distribution coefficients increased. The adsorption of CBs was exothermic in nature and was accompanied with an increase in entropy and a decrease in Gibbs energy in the temperature range of 288～308 K, which suggested that the adsorption behavior may be dominated by hydrophobic bonding and the spontaneous nature of the interaction without requiring large activation energies of adsorption.

Key words: CBs CTMAB-bentonite adsorption kinetics thermodynamics

关闭 下载PDF阅读器