

化学

## 谷壳对铀(VI)的吸附性能及机理研究

郑伟娜<sup>1</sup>; 夏良树<sup>2,\*</sup>; 王晓<sup>1</sup>; 谭凯旋<sup>2</sup>

1.南华大学 化学化工学院, 湖南 衡阳421001 2.南华大学 核资源与核燃料工程学院, 湖南

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**摘要** 通过静态吸附实验,研究了pH、吸附时间、铀初始质量浓度、吸附剂用量、谷壳粒径、温度等对谷壳吸附铀效果的影响,从热力学和动力学方面对吸附过程进行了分析,并通过红外光谱(IR)和扫描电镜(SEM)探讨了吸附机理。结果表明,单位质量谷壳对铀的吸附量随铀初始质量浓度的增大而增大,随谷壳用量的增大而减小,随温度的升高而增大;在pH=3、粒径为100~120目时吸附效果最好;吸附在60 min基本达到平衡。在25℃时,饱和吸附量 $q_{\max}$ 可达15.14 mg/g。谷壳对铀的吸附遵循Langmuir等温线,符合准二级动力学方程。谷壳吸附铀前后的红外光谱表明,谷壳主要是由羟基、羰基、苯环及碳水化合物组成,通过络合或离子交换的方式吸附铀。

关键词 谷壳 铀 生物吸附 热力学 动力学 机理

分类号

## Adsorption Behavior and Mechanism of Uranium by Chaff

ZHENG Wei-na<sup>1</sup>; XIA Liang-shu<sup>2,\*</sup>; WANG Xiao<sup>1</sup>; TAN Kai-xuan<sup>2</sup>

1. School of Chemistry and Chemical Engineering, University of South China, Hengyang 421001, China; 2. School of Nuclear Resources and Nuclear Fuel Engineering, University of South China, Hengyang 421001, China

**Abstract** By static adsorption experiments, the effects of pH, adsorption time, uranium's initial concentration, adsorbent dosage, chaff size and temperature on the biosorption capacity of chaff for uranium were studied. The unit mass of adsorption process was analyzed in thermodynamics and kinetics, and the adsorption mechanism was analyzed by infrared spectroscopy and scanning electron microscopy. The results show that the adsorption capacity for uranium on chaff increases with the increase of initial concentration of uranium, decreases with the increases of the amount of chaff, and increases with the increase of temperature; the best adsorption is obtained at pH=3, when the particle size is in 100-120 mesh; the adsorption equilibrium is achieved in 60 min. At 25℃, the saturated adsorption capacity  $q_{\max}$  is up to 15.14 mg/g. The adsorption of uranium on chaff follows Langmuir adsorption isotherm, and is in line with quasi-second order kinetic equation. IR micrograph before and after chaff adsorbed uranium indicates that the chaff is mainly composed of hydroxyl, carbonyl, aromatic and carbohydrate, and the main way of adsorption of uranium is the ion exchange or surface complexing.

Key words chaff uranium biosorption thermodynamic kinetics mechanism

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