

快报

## 羟胺乙酸与Pu(IV)的还原动力学

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**摘要** 为了解羟胺乙酸(HAAA)对Pu(IV)的还原性能, 用分光光度法研究了羟胺乙酸与Pu(IV)的还原动力学, 其动力学方程式为:  $-dc(\text{Pu(IV)})/dt = kc(\text{Pu(IV)})c^{1.50}(\text{HAAA})c^{-1.00}(\text{H}^+)c^{-0.63}(\text{NO}_3^-)$ 。在15.8 °C时,  $k = (42.1 \pm 4.2) (\text{mol/L})^{-0.13} \cdot \text{s}^{-1}$ , 活化能为  $(78.0 \pm 1.6) \text{ kJ/mol}$ 。研究了HAAA浓度、H<sup>+</sup>浓度、离子强度、Fe<sup>3+</sup>浓度、UO<sub>2</sub><sup>2+</sup>浓度对HAAA与Pu(IV)还原反应速率的影响。结果表明: 增加HAAA浓度、Fe<sup>3+</sup>浓度, 降低H<sup>+</sup>浓度、离子强度, Pu(IV)还原速度增加; UO<sub>2</sub><sup>2+</sup>浓度对Pu(IV)还原速度基本无影响。HAAA在U-Pu分离中具有良好的应用前景。

**关键词** [Pu\(IV\)](#); [羟胺乙酸](#); [还原反应](#); [反应速率](#)

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## Kinetics of Reaction Between Pu(IV) and (Hydroxyamino)acetic Acid in Nitric Acid Solution

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**Abstract** In order to understand the (hydroxyamino)acetic acid (HAAA) of reduction performance to Pu(IV), the kinetics of reaction between Pu(IV) and HAAA in nitrous acid solution was determined by spectrophotometrically method. The rate equation is  $-dc(\text{Pu(IV)})/dt = kc(\text{Pu(IV)})c^{1.50}(\text{HAAA})c^{-1.00}(\text{H}^+)c^{-0.63}(\text{NO}_3^-)$ , where reaction rate constant  $k = (42.1 \pm 4.2) (\text{mol/L})^{-0.13} \cdot \text{s}^{-1}$  at 15.8 °C. The activation energy  $E_a$  is  $(78.0 \pm 1.6) \text{ kJ/mol}$ . Effects of  $c(\text{HAAA})$ ,  $c(\text{H}^+)$ ,  $c(\text{Fe}^{3+})$ ,  $c(\text{UO}_2^{2+})$ , ionic strength and temperature on reduction rate of Pu(IV) were investigated. Pu(IV) can be reduced to Pu(III) rapidly by HAAA under usual conditions. The reaction rate can be accelerated by increasing concentration of HAAA, decreasing HNO<sub>3</sub> concentration and ionic strength as well as rising temperature. The influence of UO<sub>2</sub><sup>2+</sup> on reaction rate is negligible. The application of HAAA in the separation between Pu and U is promising.

**Key words** [Pu\(IV\)](#) [\(hydroxyamino\)acetic acid](#) [reduction reaction](#) [reaction rate](#)

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