化学

氨基羟基脲与Pu(Ⅳ)的还原动力学研究

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摘要　研究了氨基羟基脲(HSC)与Pu(Ⅳ)的还原反应动力学，其动力学方程式为：$-d_c$（Pu(Ⅳ)）$/d_t=kc$（Pu(Ⅳ)）$c^{1.06}$（HSC）$c^{-0.43}$（H^+）$c^{-0.58}$（NO_3^-），在22.1 ℃时反应速率常数$k=(11.8\pm1.1)$（mol/L）$^{-0.046}$·s^{-1}，活化能为(71.0 ± 1.0) kJ/mol。研究了氨基羟基脲浓度、H^+浓度、硝酸根浓度、Fe^{3+}浓度、UO_2^{2+}浓度对氨基羟基脲与Pu(Ⅳ)还原反应速率的影响，增加氨基羟基脲浓度，降低H^+浓度、硝酸根浓度，Pu(Ⅳ)还原速度增加；UO_2^{2+}浓度和Fe^{3+}浓度对Pu(Ⅳ)还原速度基本无影响。

关键词　Pu(Ⅳ)　氨基羟基脲　还原反应　反应速率

分类号

扩展功能
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Kinetics of Reaction Between Pu(Ⅳ) and Hydroxysemicarbazide in Nitric Acid Solution

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Abstract　The kinetics of reaction between Pu(Ⅳ) and hydroxysemicarbazide (HSC) in nitric acid solution was studied. The rate equation is found to be：：$-d_c$（Pu(Ⅳ)）$/d_t=kc$（Pu(Ⅳ)）$c^{1.06}$（HSC）$c^{-0.43}$（H^+）$c^{-0.58}$（NO_3^-），where$k=(11.8\pm1.1)$（mol/L）$^{-0.046}$·s^{-1} at 22.1 ℃ and the activation energy $E_a=(71.0\pm1.0)$ kJ/mol. Effects of $c(HSC)$, $c(H^+)$, $c(Fe^{3+})$, $c(UO_2^{2+})$, ionic strength and temperature on reduction rate of Pu(Ⅳ) were investigated. The results show that Pu(Ⅳ) can be rapidly reduced to Pu(Ⅲ) by HSC under normal conditions. The reaction rate can be accelerated by increasing concentration of hydroxysemicarbazide or temperature, and decreasing concentration of HNO_3 or ionic strength. The influence of UO_2^{2+} and Fe^{3+} on reaction rate is negligible.

Key words　Pu(Ⅳ)　hydroxysemicarbazide　reduction　reaction　reaction　rate

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