核化学与放射化学 2008 30 (3): 129-133 ISSN: 0253-9950 CN: 11-2045/TL

研究报告

水-氢同位素汽-气并流催化交换反应动力学研究

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收稿日期 2007-9-19 修回日期 2008-2-25 网络版发布日期: 2008-8-6

摘要 在憎水催化剂的作用下，于固定反应床中研究了水-氢同位素汽-气并流催化交换反应的宏观动力学，讨论了该反应的速率方程和反应级数，比较了反应温度和所研制的3种憎水催化剂对反应速率常数的影响关系。研究结果表明,在本工作所拟订的实验条件下，该反应具有一级反应的动力学特征；温度对反应速率常数的影响服从阿仑尼乌斯公式，温度越高，反应的速率常数越大；Pt-SDB类催化剂的活化能小于Pt-C-PTFE类催化剂。

关键词 憎水催化剂；水蒸气-氢交换；反应级数；动力学

分类号 0643.14

Kinetics of Isotopic Exchange Reaction Between Hydrogen and Water Vapor Over Hydrophobic Catalyst in a Co-Current Bed

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Abstract The kinetics of isotopic exchange reaction between hydrogen and water vapor over Pt-SDB as a hydrophobic catalyst was investigated in a fixed co- current bed. The influence of various factors on the rate constant of water vapor-hydrogen co-current exchange reaction were studied, including rate equation, order of reaction, temperature dependence of reaction and the species of catalysts. The results show that the overall reaction is first order. The relation of apparent rate constant with temperature accorded with Arrhenius and the apparent rate constant increases with temperature rising. The apparent activation energy of Pt-SDB is lower than Pt-C-PTFE and the rate constant of water vapor hydrogen co current exchange reaction increases when the apparent activation energy of the hydrophobic catalyst decreases.

Key words hydrophobic catalyst water vapor-hydrogen exchange order of reaction kinetics

DOI

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