Applicability of reaction rate in gas phase data to supercritical water region

2004 Fiscal Year Final Research Report Summary

Applicability of reaction rate in gas phase data to supercritical water region

Research Project

Project/Area Number

15560660

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

Reaction engineering/Process system

Research Institution

Kanazawa University

Principal Investigator

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Keywords

hydrated electron / Hydroxyl radical / solvation / dissociative electron attachment / electron affinity / electron transfer / supercritical water / pulse radiolysis

Research Abstract

To study reaction rate of OH radical in high temperature water, the most direct method is to observe the transient absorption of OH radical itself. At room temperature there are a several demonstrations for such direct measurements, however, there are few example under high temperature conditions. In the direct UV absorption measurements, the absorption by sapphire windows prevents the measurement of OH signal. The actual absorption intensity due to OH radical was determined by subtraction of the sapphire window signals. The absorption spectra of OH radical in high temperature water shifted to blue. The absorption coefficient of OH radical at 250 nm decreased with increasing the temperature. At room temperature, the absorption coefficient of OH radical is known as to be 500. At 300 C, we found that the absorption coefficients decreased to 200.
The temperature dependence of OH radical reaction rate was examined. The rates are followed by the Arrhenius temperature dependence up to 125 C. Above 125 C, however, the reaction rates are independent on the water temperature. The reaction rate at 125 C was 1x10^<10> M^<-1>s^<-1>.

Research Products (4 results)

All | 2005 | 2004

All | Journal Article

[Journal Article] Pulse Radiolysis of Supercritical Water. III. Spectrum and thermodynamics of the hydrated electron — 2005

[Journal Article] Pulse Radiolysis of Supercritical Water. III. Spectrum and thermodynamics of the hydrated electron — 2005

[Journal Article] Reaction rates of the hydrated electron with N_2O in high temperature water and potential surface of the N2O anion — 2004

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