

An Introductory Experiment of Chemical Equilibrium: Determination of Thermodynamic Parameters for the Chemical Equilibrium Between Nitrogen Dioxide and Dinitrogen Tetraoxide in a Syringe

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It is expected that students' interests and learning effects on the chemical thermodynamics are highly stimulated by applying appropriate introductory experiments in a class and/or students' laboratory at secondary schools and colleges [1]. Various teaching materials of the chemical thermodynamics have been proposed for such purposes [2-4]. As for chemical equilibrium, gas phase equilibrium between nitrogen dioxide and dinitrogen tetraoxide has long been utilized as the teaching material for demonstrating qualitatively the law of mobile equilibrium by the change of color. Using a syringe, Hennis et.al has proposed a simple method for determining the equilibrium constant at room temperature [5].

In the present study, we developed a teaching material of determining thermodynamic parameters for the chemical equilibrium between nitrogen dioxide and dinitrogen tetraoxide by extending the experimental procedures using a syringe. The experimental procedures of measuring equilibrium constants at various temperatures and pressures are described. Usefulness of the present teaching material is discussed by evaluating the apparent thermodynamic parameters determined by the simple experimental procedures.

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