A Highly Endothermic Reaction

Student Handout

Purpose

To introduce the concept of entropy change through a spontaneous and highly endothermic reaction.

Introduction

A 50 cm^3 conical flask is placed on a damp wooden board. 15 g powdered $Ba(OH)_2.8H_2O(s)$ and 5 g powdered $NH_4SCN(s)$ are introduced and mixed. The temperature of the mixture is measured using a thermometer which can read to – 20 ^oC. After 5 minutes, an attempt of lifting the conical flask is made. Equation for the reaction is:

$$Ba(OH)_2.8H_2O(s) + 2NH_4SCN(s) \longrightarrow Ba(SCN)_2(s) + 2NH_3(g) + 10H_2O(l)$$

Tasks

1. Observe the experiment and record all observations. (http://resources.emb.gov.hk/~science/exemplars_ec.htm)

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2. Explain why the conical flask stuck to the wooden board.

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3. What is the change in the total number of moles of substances after the reaction?

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4. What are the physical states of the reactants and the products? Which of them move more randomly, or have a more disordered state?

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5. Propose a hypothesis for the spontaneous nature of this endothermic reaction.

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6. Is it enough just to consider enthalpy change when predicting whether a reaction will occur or not?

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