

LAB 7: DISTURBING EQUILIBRIUM

NOTE TO STUDENTS: This is a dry lab. You are only expected to perform the portions of this lab that do not require you to use laboratory equipment or supplies. When appropriate, sample data may be supplied in the lab's data tables to help you answer the questions.

Goals

1. Observe Le Chatelier's Principle
2. Observe a reversible reaction

Materials and Equipment

24-well reaction plate
Bromophenol blue indicator
Goggles
Hydrochloric acid (HCl), 0.1 M
Plastic toothpick
Potassium Hydroxide (KOH), 0.1 M

Materials Not Included

Distilled water

Introduction

A reversible reaction is one that can proceed in both forward and backward directions. For example, when N_2O_4 and NO_2 are mixed, two reactions take place at the same time:



Reversible reactions are usually expressed with a double arrow.



A reaction that will occur in both directions at the same rate is said to be in chemical equilibrium.

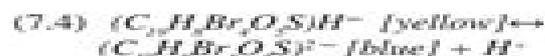
Le Chatelier's Principle states:
If a chemical system at equilibrium

experiences a change in concentration, temperature, volume, or partial pressure, then the equilibrium shifts to counteract the imposed change and a new equilibrium is established.

In this experiment, an acid or base will be added to solutions with an indicator. The indicator will change to partially counteract the acid or base.

Acid-base indicators are weak organic acids or bases that change color when they dissociate (ionize). The acid-base indicator that will be used in this experiment is bromophenol blue ($C_{12}H_7Br_2O_5S$).

The bromophenol blue color reaction is:



Procedure

Part 1: Initial Reaction

1. Use the 24 well reaction plate. Put ten drops of distilled water into Wells A1, A2, and A3.
2. Add two drops of bromophenol blue to Wells A1, A2, and A3. Record the color.
3. Add one drop of 0.1 M HCl to Well A1. Mix with a plastic toothpick. Record the color.
4. Add one drop of 0.1 M KOH to Well A3. Mix and record the color in the table.

Part 2: Reverse the Reaction

5. Add two drops of 0.1 M KOH to Well A1. Mix and record the color change.

Lab 36 Disturbing Equilibrium Answers

G Orfield



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