INTRODUCTION TO ACIDS, BASES AND TITRATION (#10.6)

The CCLI Initiative
Computers in chemistry Laboratory Instruction

Learning Objectives

The objectives of this experiment are to...

- introduce the nature of acids and bases.
- introduce acid-base indicators, e.g., litmus, wide range indicator papers and the specific titration indicators of methyl orange, bromothymol blue and phenolphthalein.
- Introduce various acid/base reactions
- introduce titration as a means of determining the amount of an acid or base present.

Background

A discussion is presented on the origin of acid base theory as originally defined by Svante Ahrennius and later defined by Bronsted and Lowry.

Indicators

Indicators are defined as weak organic compounds in which the acid form has a different color than the base form and their use in determining what substances are acids or bases, and their use in titrations is disucssed. Experiments are carried out to determine the acid range, transition range and base range of each indicator using buffer solutions from pH 2 to 12.

Titration

The process of titration is defined and the concepts of titrant, analyte, end point and equivalence point are defined. pH is defined as pH = - log $[H^+]$ and the use of the ***MicroLAB*** interface and computer with a pH probe to measure the pH is discussed. A titration of acetic acid is carried out.

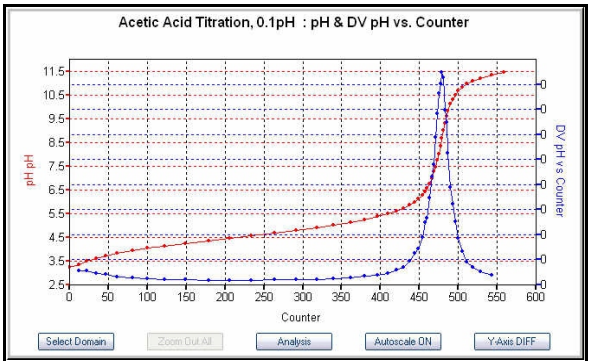

Figure 1. Titration curve of acetic acid with 0.1 M NaOH showing the 1st derivative plot.

Acid-Base Experiments

A series of experiments is carried out in well plates which explores the interaction of different acids and bases with different common substances.

Data Analysis

Guidance is given in each part of the experiment to help the students obtain the goals of the lab.

Instructor Resources Provided

- Sample Report Sheets providing the format to organize the data collection with sample data.
- Questions to consider, answer and turn-in with suggested answers.
- Tips and Traps section to assist the instructor with potential problems and solutions.
- Sample ***MicroLAB*** screen shots and graphs.
- Laboratory preparation per student station.

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