DATE: NAME: CLASS:

CHAPTER 8 HANDOUT	Investigation 8.D: Titrating a Strong Base with a Strong Acid	BLM 8.3.8

Sodium hydroxide, NaOH(s), is a raw material for the pulp and paper industry. It is used to neutralize acidic waste water and to manufacture soap from animal fats and vegetable oils, and it turns up in your local supermarket as the principal ingredient of basic drain cleaners. In this investigation, you will design a procedure to determine the concentration of an aqueous sodium hydroxide solution by titrating it with standardized hydrochloric acid and using an appropriate indicator.

Question

What is the molar concentration of a sample of NaOH(aq)?

Prediction

Your teacher will provide you with the approximate concentration of the base. Using this concentration, predict how much HCl(aq) solution you will need to reach the equivalence point.

Safety Precautions

Include all appropriate safety precautions in your experimental design.

Materials

You may specify any appropriate, readily available apparatus and reactants.

Investigation 8.D: Titrating a Strong Base with a Strong Acid

(continued)

Experimental Plan

1. Write a logically sequenced, easily understood, experimental procedure that any chemistry student could use to record good-quality data with which to calculate the concentration of the NaOH(aq). Your procedure must be accompanied by an example of the kind of table necessary to record the data from the titration. Include a materials list and safety precautions. Use Investigation 8.C as a guideline for how to design this experiment. (This experiment is basically the reverse of what was done in Investigation 8.C.)
2. Submit your procedure to your teacher for approval.

Investigation 8.D: Titrating a Strong Base with a Strong Acid (continued)

Data and Observations

3. Carry out your procedure and record all observations.

4. Clean up and dispose of all materials as directed by your teacher.

Analysis

1. For trials that agree to within ± 0.2 mL, calculate the average volume of titrant used in your experiment.

2. Write the balanced chemical equation for the reaction of NaOH(aq) and HCl(aq).

3. Perform a stoichiometric calculation to determine [NaOH(aq)].

Conclusion

4. Compare your base concentration with the values obtained by your fellow student experimenters.

5. List several likely sources of error in this investigation.

6. If you were to repeat this experiment, would you modify your procedure in any way? What would you change? Explain your answer.

Extension

7. If you wanted to analyze the NaOH(aq) content of a concentrated, basic drain cleaner, how would you prepare the sample? Explain your answer. (Do not carry out this experiment without the permission of your teacher.)

8. Suggest two household bases and two household acids that you could analyze by titration. (Do not carry out this analysis without the permission of your teacher.)