

## Experiment 8

### Determination of a Solution

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#### Pre-Lab Assignment

Before coming to lab:

- Read the lab thoroughly.
- Answer the pre-lab questions that appear at the end of this lab exercise.
- Read and review Introduction 2: Writing Scientific Lab Reports

#### Purpose

An experiment will be designed to determine the concentration of sodium hydroxide (NaOH) in commercial Drano. The results will then be used to prepare a 1.0 M solution of sodium hydroxide from the Drano mixture.

#### Background

The steps of the Scientific Method include observation, hypothesis, and development of scientific law and theory. To test a hypothesis, experiments must be designed that are repeatable, accurate and precise, and can gather conclusive data that can prove, disprove, or improve the hypothesis to formulate it into scientific law.

Most hypotheses do not come with prewritten procedures. Laboratory scientists must research in scholarly articles and journals about work on the topic has been previously done and then use this information to inspire the design of their own novel experiments. Learning how to develop your own procedure based on research and prior knowledge is an essential skill. It may seem daunting at first, but even seasoned researchers spend much of their time in lab undergoing trial and error to develop a workable experiment.

A laboratory researcher must keep detailed records of what they did in lab both for themselves and so they can share what they have learned with others. Scientific reports are written and published so that other researchers can replicate the results as well as expand upon the studies done to increase the overall knowledge of the scientific community. They should concisely and clearly describe the procedure, data, and results in a way that others would be able to follow and understand. There is an accepted format for writing scientific reports. Refer to the Introduction: Scientific Report Writing in this lab manual for review.

Commercial Drano is primarily NaOH, but also contains other ingredients. You will need to develop an experimental procedure to determine the concentration of NaOH only present in the Drano solution and then use this value to prepare a 1.0 M solution of NaOH from the Drano using your knowledge of prior experiments and outside research for ideas. It may take many trials and much tweaking and adjustment to develop a solid procedure and procure your data. Stay flexible and open-minded, as even inconclusive results can often point you in the right direction. Record everything you do in lab so that you know what worked and what did not. You will be preparing a full lab report detailing your successful procedure, data, and results that needs to be written clearly enough that another ChemV01AL student could follow the instructions and understand the explanations.

## Procedure

Design your own procedure to determine the molarity of NaOH in commercial Drano and then prepare a 1.0 M solution of NaOH from it. This procedure must be approved by your instructor before you can begin experimentation. It will most likely change as you work in lab. You will also need to decide what data to record. Include the finalized procedure, your data, and conclusions in your formal lab report.

Your completed lab report will be turned in as your data sheet and post-lab assignment.

Consider:

- Drano is primarily NaOH and many other ingredients.
- NaOH is the only base present in the mixture.
- Consider techniques to use the unique physical and chemical properties of NaOH from the rest.
- Think carefully about the amounts of solution you wish to use. You will probably need to adjust this by trial and error.
- Be precise; it will be important to run multiple trials whose results agree.
- Any chemicals and equipment required will be provided upon request and instructor approval. You may use any laboratory technique learned thus far in this course.

## Experiment 8—Pre-Lab Assignment

**Name:** \_\_\_\_\_

1. Design a preliminary procedure to individually determine the molarity of NaOH(aq) in an unknown solution. Use your knowledge of the chemicals, their properties, and the laboratory techniques learned thus far in this course. Any chemicals and equipment that you require will be provided in the lab. This procedure must be approved by your instructor before you can begin experimentation.