
2009 UNITED STATES NATIONAL CHEMISTRY OLYMPIAD

PART III – LABORATORY PRACTICAL

Student Instructions

Introduction

These problems test your ability to design and carry out laboratory experiments and to draw conclusions from your experimental work. You will be graded on your experimental design, on your skills in data collection, and on the accuracy and precision of your results. Clarity of thinking and communication are also components of successful solutions to these problems, so make your written responses as clear and concise as possible.

Safety Considerations

You are required to wear approved eye protection at all times during this laboratory practical. You also must follow all directions given by your examiner for dealing with spills and with disposal of wastes.

Lab Problem 1

You have been given six numbered pipets containing 0.50M solutions of the sodium salts Na_2CO_3 , NaHCO_3 , NaHSO_3 , NaH_2PO_4 , Na_2HPO_4 , Na_3PO_4 , not necessarily in this order, a 50-mL beaker containing 0.40M HCl, and a pipet containing methyl orange indicator. Devise and carry out an experiment to determine the contents of each pipet, providing both *qualitative* and *quantitative* data to justify your conclusions.

Lab Problem 2

You have been given a thermometer, styrofoam cup with lid, a beaker, a graduated cylinder, and access to room temperature water, heated water and ice cubes. Using these materials, design and carry out an experiment to determine the heat of fusion, H_f , for water.

Answer Sheet for Laboratory Practical **Problem 1**

Student's Name: _____

Student's School: _____ **Date:** _____

Proctor's Name: _____

ACS Section Name: _____ **Student's USNCO test #:** _____

1. Give a brief description of your experimental plan.

Before beginning your experiment, you must get approval (for safety reasons) from the examiner.	Examiner's Initials:
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2. Record your data and other observations.

(data and observations – continued)

3. Based on your observations, write the relevant equations that led to your conclusions:

4. Conclusions

Pipet #	Contents	Justification

Answer Sheet for Laboratory Practical **Problem 2**

Student's Name: _____

Student's School: _____ **Date:** _____

Proctor's Name: _____

ACS Section Name: _____ **Student's USNCO test #:** _____

1. Give a brief description of your experimental plan.

Before beginning your experiment, you must get approval (for safety reasons) from the examiner.	Examiner's Initials:
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2. Record your data and other observations.

3. Calculations and Conclusions.

4. Conclusions: The H_f for water is: _____

5. Sources of Error in this experiment (please number)