

UNIVERSITY OF LOUISIANA AT LAFAYETTE

STEP Committee

Technology Fee Application

**Bring Rotary Evaporator for Sample
Preparation to Analytical Chemistry
Laboratory Courses**

Title

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Name of Submitter
(Faculty or Staff Only)

Chemistry Department

Organization

Title: Bring Rotary Evaporator for Sample Preparation Date: 07/10/2017
to Analytical Chemistry Laboratory Courses

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ABSTRACT (250 words or less):

The purpose of this proposal is to acquire two sets of rotary evaporators for analytes preparations in Analytical Chemistry Laboratory courses: CHEM 222 and CHEM 430G. This two Analytical Chemistry lab courses provide our students with necessary experience in the application of Chemistry concepts by solving analytical problems and using modern chemical instrumentation. Experiments are designed in the courses to measure a variety of trace amount of organic analytes which are naturally existing in our environment, yet harmful to us. Rotary evaporators are standard tools in analytical labs for sample preparation, because they are necessary and excellent in extracting and concentrating trace amounts of organics, such as low vapor pressure organic gases. Unfortunately, we do not have any working rotary evaporator in our Analytical Chemistry teaching Laboratories, students in CHEM 222 and CHEM 430G have to borrow the rotary evaporators from research faculties lab, which are not always available and not safe. The acquisition of this basic technology, two sets of rotary evaporators, would provide the students with decent amount of training in sample preparation, so to be better prepared for their career.

A. Purpose of grant and impact to student body as a whole

The purpose of this proposal is to acquire two sets of rotary evaporators, which are basic technology, for analyte preparations in Analytical Chemistry Laboratory courses: CHEM 222 and CHEM 430G. The analytical lab courses (CHEM 222 and CHEM 430G) provide students with experience in the application of analytical chemistry concepts by solving analytical problems and using modern chemical tools and instrumentation, to obtain precise and accurate results.

A rotary evaporator is a standard tool for sample preparation. It is used for the removal of solvents, efficiently and gently, from samples by evaporation, usually under reduced pressure. Sample preparation is a very important step and usually is the first step in most analytical techniques, because some techniques are often not responsive to the analyte in its in-situ form, or the results are distorted by interfering species. Sample preparation may involve dissolution, extraction, and concentrating or many other techniques. Several experiments in the courses are designed to measure a variety of organic analytes with low concentrations in our environment such as water sample or commercial products. For example, in the experiment of "Identifying the Concentration of Hydrocarbons in Water Sample Using Gas 11 Chromatography", students learn to analyze the concentration of harmful organic chemicals, polycyclic aromatics hydrocarbons commonly known as PAHs, which are naturally present in environment, produced by the incomplete combustion of fossil fuels, carbon, vegetation or other organic matters. PAHs are lipophilic compounds with very low water solubility and therefore, their concentration in water is very low. However, they are known for their mutagenic and carcinogenic properties. This experiment lasts for two weeks, with the first week merely for sample preparation, where *students MUST use rotary evaporators* to extract and concentrate PAHs.

Currently, we DO NOT have any working rotary evaporators in our Analytical Chemistry Laboratory courses. The instructors had to borrow the rotary evaporators from two research faculties, who have to stop their ongoing research for this, which make the evaporators not always available. Furthermore, those two sets of rotary evaporators are located 50 meter away from each other. It is very difficult for one instructor to monitor two groups of students simultaneously when they perform the extraction in two separate research labs. It is not an option for us to move those rotary evaporators into one lab since both of them have their unique customized auxiliary parts attached to. Moreover, rotary evaporators has vacuum device attached, typically a pump or water pump, and heating bath (hot!). Ultimately, it becomes both a technology and safety issue. More importantly, the fact that CHEM 222 and 430G students do not currently have any working rotary evaporator, will be reflected on students' lack in training that is required for their future career. Therefore, it is critical that we improve our technology by implement rotary evaporators and their accessories into our analytical chemistry laboratory courses.

Most of our CHEM 222 and 430G students are biology, environmental, education, chemical & petroleum engineering, and pre-pharmacy or pre-med as well as forensic majors. Two sessions in the fall and one session in the spring, a total of 34 - 45 students take Analytical Chemistry Laboratories in room 206 of Montgomery Hall, and 6 - 9 students enrolled in instrumental analysis (lecture, lab and essay). Each section of the course is limited up to 14 students because of safety concerns and the lab space. The waiting list for each of sections of these courses is the same as the number of students allowed in each session each semester. Therefore, it is estimated that approximately 50 students will learn how to use rotary evaporator and attached knowledge such as vacuum. The two sets of rotary evaporators will give them decent amount of training in sample preparation every semester, since it is a critical part of many biology and

chemistry laboratory procedures in both industry and academy. This will also enhance their education in science and reinforce what they learned in previous chemistry laboratories.

If the funds are approved, two sets of rotary evaporators will be purchased and placed into room 206 of Montgomery Hall. The instructors and professors who oversee the laboratory will maintain the rotary evaporator, and ensure that work for all students for many years to come.

B. Projected Lifetime of Enhancement

The projected lifetime of the instruments requested is over ten years.

C. Person(s) Responsible for:

Implementation: Hui Yan and Febee Louka

Installation: Hui Yan and Febee Louka

Maintenance: Routine maintenance covered by the Department of Chemistry

Operation: Faculty of the Department of Chemistry and Analytical Laboratory Students

Training: Faculty of the Department of Chemistry

Budget Proposal

1. Equipment \$8,500.00

The list price of rotary evaporator is \$4,250.00 (please see attached quote), students in Chemistry 222 and/or 430 will be divided into two groups, and each group will share one set of the rotary evaporator. The total for the rotary evaporators is \$8,500.00.

2. Software \$0

3. Supplies \$0

4. Maintenance \$0

5. Personnel \$0

6. Other (shipping) \$200.00

TOTAL: \$8,700.00

Other Relevant Information

None

Previous STEP projects

Hui Yan and Febee Louka “Improving Precision and Accuracy in Analytical Chemistry Laboratory Courses”, Fall 2016, \$5,137.72

Febee Louka “Economical Micro scale Equipment in Chemistry Labs” Spring 2016 \$16,843.40