

UNIVERSITY OF LOUISIANA AT LAFAYETTE

STEP Committee

Technology Fee Application

Safe Separation of Chemical Components in the
Chemistry Labs

Title

Febbee Louka

Name of Submitter

(Faculty or Staff Only)

UL Department of Chemistry

Organization

Title: Safe Separation of Chemical Components in the Chemistry Labs Date: 1/12/18
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ABSTRACT (250 words or less):

This is a request to purchase Thermo Scientific Small Benchtop Centrifuge and Rotor Packages for chemistry labs, at a cost of \$12,328.00. We constructed a new lab manual for Analytical Chemistry/Instrumental Analysis labs with new experiments from scratch. Separation of components of chemical samples is very crucial in chemistry labs, which is routinely applied in areas as diverse as Organic, Analytical, Instrumental, Pharmaceutical, Environmental, and Biochemistry, as well as Forensic Science. Purification and separation techniques are extensively used in teaching and research in the previously mentioned fields. Nowadays, too many universities are switching to techniques that doesn't require long contacts with chemicals using different techniques that are more efficient and consume less hazardous solvents. Students must have their hands on wide range of application in their future careers. When constructing the new lab manual, we are focusing on experiments that minimize direct contacts with the chemicals used. We are asking for funding to purchase a clean, safe and economic separation of chemical components in the chemistry labs, which allows the use of small amounts of chemicals. This technique is portable which permits its use in different chemistry labs.

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

This application is to request funding the purchase of the equipment needed for new experiments in Instrumental Analysis and Analytical Chemistry classes. A new lab manual constructed for Analytical Chemistry/Instrumental Analysis labs with new experiments from scratch replacing experiments that failed due to outdated instruments and other ones that use hazards materials such as polarography that uses mercury in analytical analysis.

The extraction and separation of solid chemicals from liquid ones are dominant techniques in environmental, pharmaceutical, food, petroleum, organic and biochemical analysis. Centrifuging has advantages over other methods; it is designed toward cleaner and more economical chemistry by using micro scale experiments, which allows the use of small amounts of chemicals. In this method conical plastic or Teflon containers are used which are not breakable like the glass ones used in combatable experiments. This system is compact and portable which allows its use in Analytical Chemistry labs as well as Organic Chemistry, Inorganic Chemistry and Biochemistry ones.

In contrast to other techniques, which are designed for research, the requested equipment is suited for teaching. Positive funding decision will enable us to deploy the requested equipment for students use in CHEM 430G (Instrumental Analysis a Lecture and Lab course required by American Chemical Society certified chemistry major students approx. 8-15 students/year). Students in this class can use it in pharmaceutical experiments which is determination of calcium in a dietary supplement tablet and determination of iron in vitamin tablets. Another application is a food or cosmetics experiment for CHEM 222 (Analytical Chemistry Lab approx. 35-44 students/year). The Organic Chemistry students can use it in synthesis of surfactants, that can be use in drug delivery for cancer cells and minimizing pollutants, CHEM 233 and/or 234 (Organic Chemistry Labs I and/or II, over 230 students/year). A Biochemistry experiment that can be taught for CHEM 319 (Biochemistry Lab, ~ 14 students/year) for cell cultures. Inorganic Chemistry can use it in the determination of cations of group I – III and anions in CHEM 252 (Inorganic Lab, ~ 20-24 students/year)

Therefore, we strongly feel that it's important for our students to acquire hands-on training in this technique. The Chemistry Department used to have four units of this equipment in the biochemistry labs, three of them failed to work in fall 2017 semester. The requested equipment speeds up experimental work, thereby accommodating rapidly increasing enrollments in our laboratories.

b. Projected lifetime of enhancement

The requested fund will pay for two new centrifuge systems for different types of applications under wider range of temperatures, with a life expectancy 6-8 year. The requested systems ship within 6 - 9 month with factory warranty. It is a simple system that can be used easily by students.

Any regular maintenance is anticipated for this type of equipment. Periodically, new sample vials will be purchased from departmental funding for continued operation.

c. Person(s) responsible for:

i. Implementation: Dr. Febbee Louka

ii. Installation: Since the requested system is portable no installation is required. Dr. Febbee Louka, and Dr. Hui Yan (Analytical Chemistry faculty) will jointly deploy the system for the Analytical laboratories, Drs. Thomas Junk and August Gallo will provide the setup and training for the Organic Chemistry laboratories. Dr. Wu Xu will deploy it for the Biochemistry lab and Dr. Massoud for Inorganic lab.

iii. Maintenance: Dr. Febbee Louka will periodically inspect the unit. There is no regular maintenance anticipated. If a component fails, Dr. Thomas Junk, Department Head, will make arrangements for repairs.

iv. Operation: The units are designed to be operated by students.

v. Training: Chemistry faculty will provide training and demonstrations of proper operation to all students enrolled in their labs.

Budget Proposal

	Unit	# Requested	Total
1. a. Equipment	\$ 4,703.00	1	\$ 4,703.00
b. Equipment	\$ 7,625.00	1	\$ 7,625.00
2. Software	\$ 0.00		\$ 0.00
3. Supplies	\$ 0.00		\$ 0.00
4. Maintenance	\$ 0.00		\$ 0.00
5. Personnel	\$ 0.00		\$ 0.00
6. Other	\$ 0.00		\$ 0.00
TOTAL:			\$ 12,328.00

d. Budget Narrative

Equipment:

Thermo Scientific Sorvall ST 8 Small Benchtop Centrifuge and Rotor Packages (can be used only at room temperature) **\$ 4,703.00**

This bundle includes the items listed below:

Sorvall ST 8 Centrifuge, VentilatedTX-150
Swinging Bucket Rotor 50mL Conical Buckets
(Unsealed, No Adapter Needed) (Set of Four)
Adapters for 15mL Conical Tube (Set of Four)

Thermo Scientific Sorvall ST 8 Small Benchtop Centrifuge and Rotor Packages (can be used at temperature range -10° to +40°C) **\$7,625.00**

This bundle includes the items listed below:

Sorvall ST 8 Centrifuge, Refrigerated; TX-150
Swinging Bucket Rotor with Tall Buckets (Set of Four),
8 x 50mL Conicals (no adapters necessary), 8 x 15mL
Conical Tube Adapters (Set of Four)

Software: is included with the purchase of the instrument at no extra charge.

Supplies: \$ 0.00

Other: \$ 0.00

Previous STEP projects

Febbe Louka "Economical Micro Scale Equipment in Chemistry Labs" funded May 2016. \$ 16,843

Febbe Louka "Economical Micro-Scale Vacuum Assisted DigiFILTER Assembly in Chemistry Labs" funded December 2016. \$13,901.24

Febbe Louka, Co-PI "Improving Precision and Accuracy in Analytical Chemistry Laboratory Courses" funded December 2016. \$5,137.72