

UNIVERSITY OF LOUISIANA AT LAFAYETTE

STEP Committee

Technology Fee Application

Economical Micro-scale Vacuum Assisted DigiFILTER
Assembly in Chemistry Labs

Title

Febbee Louka

Name of Submitter

(Faculty or Staff Only)

UL Department of Chemistry

Organization

Title: Economical Micro-scale Vacuum Assisted
DigiFILTER Assembly in Chemistry Labs

Date:7/05/16

Name (Contact Person): Febbe Louka

Address: Department of Chemistry, P.O. Box 44270, University of Louisiana at Lafayette, 70504

Phone Number: 337-482-5671

Email: frl6631@louisiana.edu

Department/College/Org: Department of Chemistry/College of Sciences

ABSTRACT (250 words or less):

This is a request to purchase economical microscale equipment for chemistry labs, at a cost of \$13,901.24. We are in the process of constructing lab manuals for Analytical Chemistry/Instrumental Analysis labs with new experiments from scratch. Liquid-liquid extraction (LLE) is a crucially valuable technique in chemistry, which is routinely applied in areas as diverse as Organic, Analytical, Instrumental, Pharmaceutical, Environmental, and Biochemistry, as well as Forensic Science. LLE is extensively used in teaching and research in the previously mentioned fields. Nowadays, too many universities replaced LLE by modern techniques that are more efficient and consume less hazardous solvents. Students have to have their hands on more advanced techniques that have wide application in their future careers. When constructing the new lab manual we are focusing on experiments that minimize the amount of hazardous chemicals used. We are asking for funding to purchase a clean and economic micro-scale vacuum assisted DigiFILTER assembly, which allows the use of small amounts of chemicals. This technique is compact and 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 experiment for Instrumental Analysis and Analytical Chemistry classes. A new lab manual is under preparation replacing experiments that failed due to outdated instruments and other ones that use hazardous materials such as polarography that uses mercury in analytical analysis. Briefly, this experiment will use a compact kit that includes DigiPREP MS, 100 mL, 30 Pos (115V/230V), Keypad Ctrl, DigiPREP, Startup Kit for 100 mL MS, DigiPROBE, 6" for 100ml Jr/MS/LS, DigiFILTER Manifold, 15 Pos. for 100 mL, Line cord, N.A. 125VAC w/C19 Connector, and PTFE Vacuum Pump (110 V).

This extraction technique is a dominant technique in environmental, pharmaceutical, food, petroleum, organic and biochemical analysis. It has key advantages over other extraction 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 Teflon or plastic containers are used which are not breakable like the glass ones used in comparable experiments. This system minimizes the sample preparation and eliminates personal errors. It is compact and portable which allows its use in Analytical Chemistry labs as well as Organic Chemistry and Biochemistry ones.

In contrast to other extraction techniques, which are designed for research, the requested system is ideally 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 an environmental experiment which is determination of petroleum hydrocarbons in water samples. Another application is a food or cosmetics experiment for CHEM 222 (Analytical Chemistry Lab approx. 35-44 students/year). Students can determine TiO_2 in Beef samples or cosmetics samples. The Organic Chemistry students can use it in determination of over-the-counter Analgesic pill components experiment in 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) is Digestion of Bovine Liver.

Therefore, we strongly feel that it's important for our students to acquire hands-on training in this technique. The new technique also allows faster measurements, thereby accommodating rapidly increasing enrollments in our laboratories.

b. Projected lifetime of enhancement

The requested fund will pay for new, microscale experiment equipment, with a life expectancy 6-8 years. The requested system ships within 6 - 9 month with factory warranty. It is a simple system that can be used easily by students. It is powered by rechargeable batteries and we anticipate that these batteries will have to be replaced after several years. No other 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. Febee Louka

ii. Installation: Since the requested system is portable no installation is required. Dr. Febee Louka, Dr. Hui Yan, and Dr. Jennifer DeGuzman (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.

iii. Maintenance: Dr. Febee 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 unit is designed to be operated by students (Education Kit).

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. Equipment	\$ 5,897.62	2	\$ 11,795.24
2. Software	\$ 0.00		
3. Supplies	\$ 1,053.00	2	\$ 2,106.00
4. Maintenance	\$ 0.00		\$ 0.00
5. Personnel	\$ 0.00		
6. Other	\$ 0.00		\$ 0.00
TOTAL:			\$ 13,901.24

d. Budget Narrative

Equipment:

Vacuum Assisted DigiFILTER Assembly System Bundle. **\$ 4,703.00** including shipping

This bundle includes the items listed below:

1	DigiPREP MS, 100 mL, 30 Pos (115V/230V)	
1	Startup Kit for 100 mL MS, DigiPROBE	
1	6" for 100 mL Jr/MS/LS, DigiFILTER Manifold, 12 Pos. for 100 mL.	
1	Line cord, N.A. 125VAC w/C19 Connector	
+ 1	PTFE Vacuum Pump (110 V)	<u>\$ 1,194.62</u>
		<u>\$ 5,897.62</u>

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

Supplies:

▪	Startup Kit for 100 mL MS contains: 200 DigiTUBEs (RackLock style), 1 box of 500 watch glasses, 2 of 15-position RackLock racks, and 1 pk/5 Foam Storage Rack 100 mL.	\$ 353.00
▪	DigiPROBE, 6" for 100 mL Jr/MS/LS	\$ 250.00
▪	DigiFILTER Manifold, 12 Pos. for 100 mL	\$ 235.00
▪	Line cord, N.A. 125VAC w/C19 Connector	\$ 0.00
▪	Rack for Hotblock 50ml Tubes, 18 Pos.	\$ 45.00
▪	DigiTUBEs 50ml RackLock w/caps (750)	<u>\$ 170.00</u>
		\$ 1,053.00

Other: \$ 0.00

Previous STEP projects

Febbe Louka "Economical Micro scale Equipment in Chemistry Labs" Spring \$ 16,843.40