

FEATURING THE FS-522 WITH *FASTspec*TM
LAB INTERFACE, ASSOCIATED SENSORS
AND WINDOWS BASED SOFTWARE



E-Newsletter

March 2010

Volume I, Number 1I,

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Meet the Editor

Join us at ACS in San Francisco!

You can find MicroLab at
Booth 906 of the Expo at
the March ACS meeting.
Stop by to see the FS-522
with *FASTspec* in action.

Quick Links...

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Ideas?

Suggestions?

*We want to hear
from you!*

If you have a question
about the capabilities of
the FS-522, please ask
us. You may be surprised
at its potential in your

Welcome!

We want to welcome all of our current customers and potential new customers and colleagues to the first issue of the new MicroLab E-newsletter. With each issue, we hope to show you how you can use MicroLab's FS-522 data acquisition unit with its patented integrated *FASTspec* 16-wavelength diode array spectrometer to save time, save space, save money, improve the logistics of your lab, and -- most importantly -- improve student learning outcomes.

Our view is that lab is not just a place to make stuff and collect data. Rather, lab should be a total learning environment - from experiment design and execution to report writing or presentations, lab is the place where students don't just learn the material but learn how science is done.

With ever increasing pressure on lab time, rising costs of chemicals and their disposal, and the increasing role of technology in our curricula, MicroLab can be an important tool to meet your lab goals.

For less than the cost of a simple stand alone single beam colorimeter, you can get the FS-522 and a PC, along with sensors and software site license, to collect research quality data and analyze it - and that includes our patented spectrometer and software to run it! You can use MicroLab in virtually every course in your curriculum. It won't replace your NMR or FT-IR, but it will do just about anything else you can think of. And of course the computer that controls the MicroLab interface can also be used to access the web, do molecular modeling, and prepare reports to communicate results.

Recent additions to our lineup, which include a variety of electrochemistry modules, fluorescence applications, and precision drop dispensing and counting for titrations and elutions, set us apart

situation! Email us (info@microlabinfo.com) or click the MicroLAB Support in the Quick Links box (above) for other contact information.

If you have an interesting application of the MicroLAB system in your lab, we would love to hear from you! Send us an email - just click on the link above.

If you want to contribute a featured lab application to the E-Newsletter, please do contact the editor!

mjcollins@viterbo.edu

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What some of our colleagues using the FS522 say:

"I have been using the MicroLab FS-522 in our general and physical chemistry laboratories. I am impressed with the versatility and the low cost of this interface, it opens new possibilities for experiments."

Dr. David Saiki
California State University Bakersfield

"MicroLab's software is an enormous aid for non-major students to visualize data collection in real time, and leads them to clearly understand the concept of the lab."

from our competitors. And our well thought out software serves all your data acquisition needs - whether student-designed data logging, "Click and Open" ready to run experiments, or sophisticated user written timing and looping programs for research.

We hope you will take a few minutes to see what is new - as well as what is unique - to MicroLab since the last time you looked.

Featured Lab Application

Small Scale Molar Mass by Freezing Point Lowering Viterbo University, La Crosse, WI



The determination of the molar mass of a material is an essential activity in the chemistry curriculum. Many of us did some version of this experiment in college. Maybe you remember the headaches caused by the way

you did it: you needed three people, one on the stopwatch, another on the wire stirrer who also read the thermometer when prompted, and a third serving as stenographer. You used about 30 mL for each run and barely had time to get in a couple of runs, clean up and put things away. Lab time was spent *doing* rather than *thinking*. You probably got together a week later to try to figure it all out, only to find someone had made a fatal error. Maybe some of you have students who are still doing it this way. Well, there's a better way.

A much simpler and pedagogically superior approach to introducing students to the use of colligative properties is to take advantage of the amazing 16 bit precision of MicroLab's FS-522 in its temperature measurement and the user friendly software and graphical interface. Viterbo University does this experiment as part of a project in which students synthesize and characterize benzoic acid or one of its derivatives such as -Cl, -NO₂, -OCH₃.

Potential difficulties with measuring the molar mass of carboxylic acids are (1) their tendency to ionize to different extents and (2) their tendency to dimerize through H-bonding with each other. Both of these problems are eliminated in glacial acetic acid because of the acidic nature of the acetic acid, which suppresses the ionization of added acid, and because of the strong solvating effect of the acetic acid on the carboxylate group. Acetic acid also happens to have a pretty large freezing point lowering constant.

Figure

Dr. Angie Sower
Montana State
University

"I'm continually amazed at the research quality data we get from MicroLab. We can do things in teaching and in under-graduate research at a small institution that we never dreamed possible."

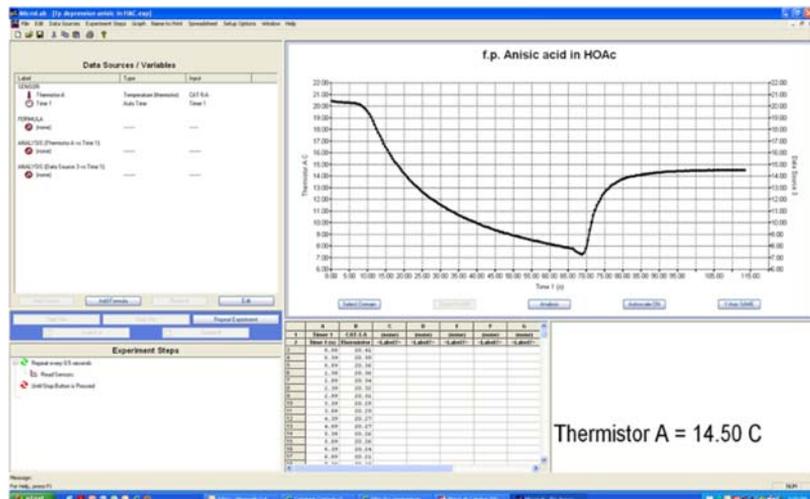
Dr. Tom Kuntzleman,
Spring Arbor
University

"You have an exceptional product. Money is very tight, and I wouldn't be spending this much of it if I didn't think that the MicroLab units were the best such devices on the market. I think that they will transform and reinvigorate the way we teach chemistry at Oglethorpe."

Dr. Keith Aufderheide
Oglethorpe University

"MicroLab has given us a great step forward in the Physical Chemistry lab."

Dr. Clemens Heske
The University
of Nevada
Las Vegas



A typical time-temperature plot from the MicroLAB software's Click and Open thermochemistry experiment. The run took less than 2 minutes. The windows, clockwise from upper left are (1) sensors used (time and temperature); (2) graphing window; (3) real time digital display; (4) spreadsheet; (5) program steps.

The students simply use the "Click and Open" thermochemistry experiment on the MicroLab software's title page along with the Model 103 thermistor probe to measure the freezing point of glacial acetic acid. Students can obtain triplicate measurements on as little as 2.00 g of acetic acid in a 100 mm test tube in about 15 minutes by re-warming the sample and re-freezing it, with a freezing point spread well within 0.1C between runs.

Then they introduce about 150-200mg, massed to the nearest mg, of their organic acid into the same glacial acetic acid in the test tube, warm to dissolve and measure the new freezing point. As with the solvent alone, they get triplicate measurements in just a few minutes. Knowing the two freezing points they can get the freezing point depression, ΔT_f , and use it with the tabulated K_f of acetic acid to compute the molality of the solution and the molar mass of the solute. The freezing point lowering is $\sim 2C$ under these conditions.

There is time even in a two hour lab for students to compute the average molar mass of their sample before they leave the lab. They can copy the graphing window into their report, or export individual runs to Excel or other graphing program to prepare custom plots.

Bottom line in one section of lab: 12 groups; 6 runs each; a total of about 30 mL of glacial acetic acid and about 2 grams of samples - for the entire section! Typical student results are within $\pm 10\%$ of the true molar mass, with many students getting within less than $\pm 5\%$ error. We save money on chemicals. We save on waste. We eliminate broken thermometers. The smaller scale is safer, and the results are better than we ever had the old way.

The experiment is easy and quick, and the students leave lab not only with good data but with the knowledge of how to get the molar mass, with the computed result in hand, with a sense of confidence and accomplishment, and even with the beginnings of their lab

"We used the built-in spectrophotometer to study the absorption/transmission properties of different food dyes. The students really took to the graphs produced for transmittance and absorbance ... they all said it made the ideas we were talking about really clear to see the two graphs."

*Dr. "Skip" Wiley
Middlesex Community
College*

"It used to be that students would spend a three-hour lab gathering data. Now, students can focus on what the data means; this enables them to decide quickly whether or not they need to do the experiment over. The discovery process - how the numbers relate to a concept - takes place in the lab, not when the students are writing their lab reports."

*Dr. Carolyn Mottley
Luther College*

reports. That is hard to beat.

Summer Workshop in Bozeman, Montana July 19-21, 2010

"Integrating Computers into Laboratory Instruction:
Balancing Content, Inquiry Skills, and Increasing Enrollment."

A two and a half day workshop will be held at Montana State University for faculty in the chemical sciences. Participants in this two-and-a-half day conference will work together with national leaders in chemical education to explore, practice, and evaluate new instructional strategies and the use of computer technologies to improve learning; to use limited lab time and space more effectively; and to reduce chemical costs and increase safety. They will also have an opportunity to enjoy Montana's gorgeous Mountain West.

Click on the link in the Quick Links box.

Featured Products

AUTOMATED CONSTANT VOLUME DROP DISPENSER

This is an electronic version of our Model 154 Precision Drop Dispenser along with our optical Model 226 Drop Counter that operates under software control from the MicroLab FS-522. It has an Industrial quality teflon solenoid valve to control reagent or eluent addition. The user can easily program the FS-522 to stop or start reagent addition at any predetermined temperature, conductance, pH, redox potential, or other measurable quantity. Great for routine repetitive titrations, chromatography elutions, reflux with addition, or education. Call (1-888-586-3274) or email (info@microlabinfo.com) for pricing or for more information.



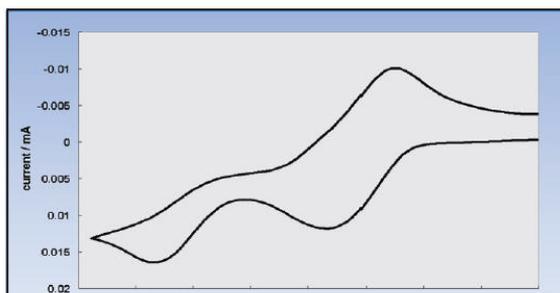
MODEL 170 CYCLIC VOLTAMMETRY MODULE



In the September, 2009, issue of the Journal of Chemical Education, Tom Kuntzleman, *et al.*, published the article "Affordable Cyclic Voltammetry," in which they describe how to connect a Pine Instruments screen printed disposable electrode to the FS-522 to do cyclic voltammetry without a pricey potentiostat. We have made it even easier with the new Model 170 Cyclic Voltammetry Module. Now you can easily and affordably

develop experiments in diffusion controlled methods with the FS-522.

It is a nice complement to our Model 270 Electrochemistry Module, which is designed for bulk electrolysis, electroplating,

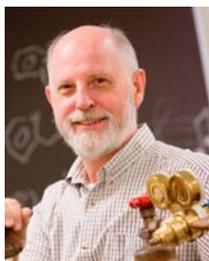


coulometry, and
coulometric

titrations. The Model 170 together with the Model 270 bring the powerful tools and concepts of electrochemistry alive for your classes at every level and at an affordable price.



Meet the Editor: Michael Collins



Michael Collins is Emeritus Professor of Chemistry at Viterbo University in La Crosse, WI, USA. He taught undergraduate chemistry for 38 years at virtually every level - from introductory chemistry for liberal arts, nursing, pre-med, biology and chemistry majors to advanced courses for senior chemistry and biochemistry majors. He was the 1988 CASE Wisconsin Professor of the Year and has won awards at Viterbo for his scholarship, teaching, and service. He has been active in his local American Chemical Society section, and chaired the planning committee for the Great Lakes Regional Meeting that was held in La Crosse.

His interest in computer data acquisition began in the early 1980s, and he became convinced of its ability to enhance the lab experiences of his students as well as to prepare them to function in a modern lab setting. He has developed experiments across Viterbo's curriculum that use MicroLAB for guided inquiry experiments as well as for more routine data logging and analysis. He has also given presentations on the role of computers in the laboratory to facilitate learning chemistry and in the assessment of lab outcomes. He has been using MicroLAB products since they first arrived on the scene, and he continues to develop ideas for new applications of MicroLAB in undergraduate teaching and research.

Thanks for reading! We invite your feedback, ideas, and suggestions. As college educators ourselves, we on your MicroLAB team value your feedback.

Sincerely,

Your MicroLAB team
info@microlabinfo.com



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