MicroLab Electrochemistry – at Home!

An Introduction to the Electrochemical Series

Overview and Materials:

This Citrus Battery experiment is fast, safe, fool-proof, and inexpensive. It quickly produces a lot of data which, when manually entered and organized with MicroLab's Electrochemistry Series software, is easily visualized and develops several basic electrochemical concepts.

An inexpensive digital voltmeter (hardware store, $15) is the only measuring instrument required for this experiment.

The experiment begins with a flashlight battery, and then shifts to three citrus fruits – a lemon, lime, and orange, using them as salt bridges for simple galvanic cells. Three electrodes are used: A steel nail, a zinc-coated galvanized nail, and a copper wire. Each electrode is used successively as a "reference electrode" generating, for each citrus fruit, a three-element list ordered according to each element's ability to gain electrons from the other elements in the list.

The lesson from the experiment is that a list of elements ordered by ability to gain electrons is the same regardless of the choice of reference electrode. The choice of citrus fruit has no effect on this natural order – the citrus fruit is acting only as a salt bridge. This natural order of electron-attracting ability is expanded into the Electrochemical Series in the next experiment.

Experiment Narratives:

Experiment narratives for the Citrus Battery and Electrochemical Series experiments are available for free download from the MicroLab web site.

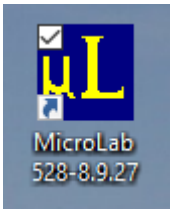
Software:

MicroLab software may be freely downloaded from this drop-box location. This software runs on Windows computers.

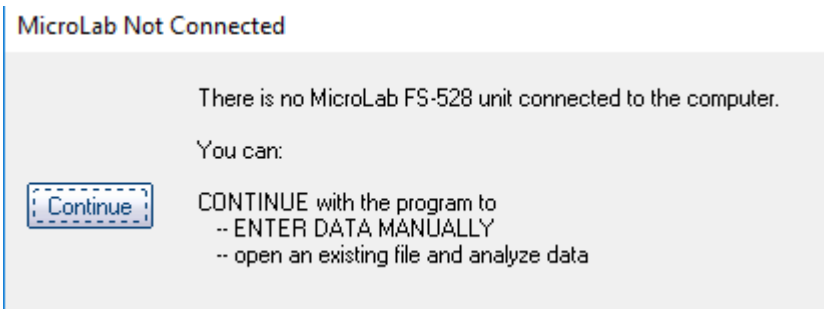
https://www.dropbox.com/s/r903yabsfcwnm23/SetupMicroLab_528-8.9.27.exe?dl=0

1. Install the MicroLab software from the Setup icon.

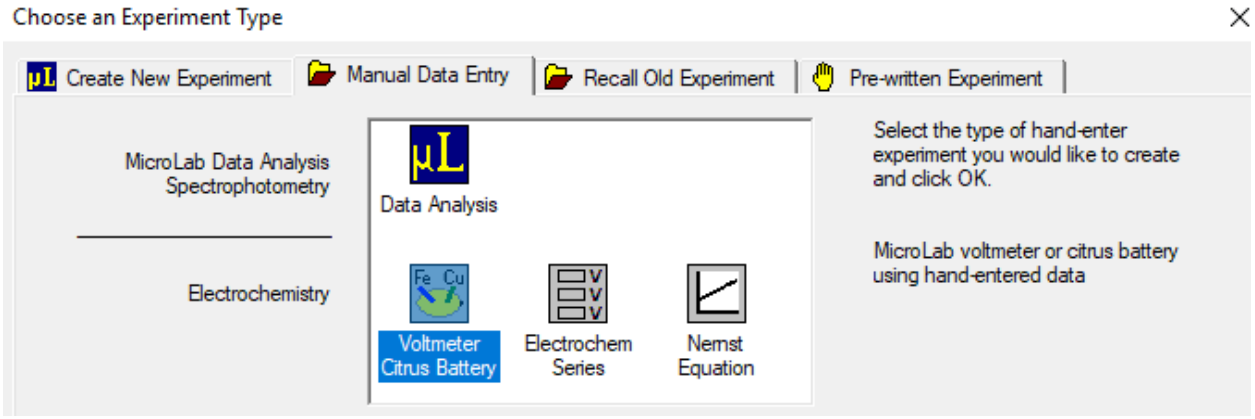
2. Click the MicroLab icon:



3. Choose "Continue" to start manual data entry.

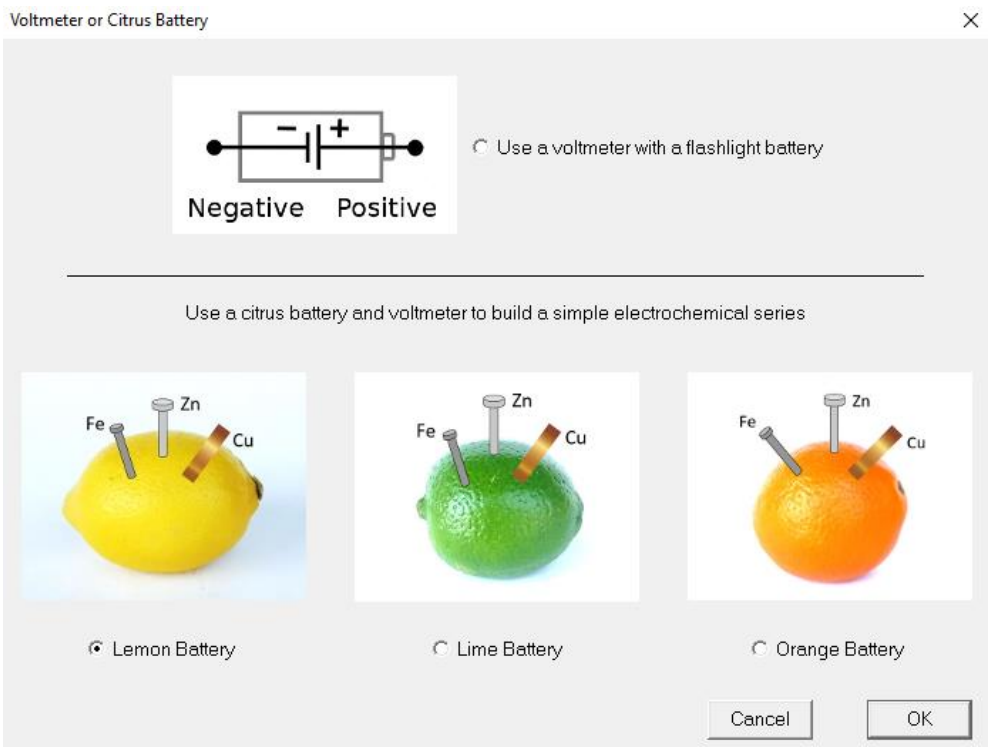


4. Choose the "Citrus Battery" experiment. You can also run the other three MicroLab programs, using manual data entry from your computer keyboard.



5. Choose which part of the experiment you would like to run first.

   We suggest starting with the flashlight battery.



6. Proceed with the experiment. Experiment narratives for the Citrus Battery and Electrochemical Series experiments are available for free download from our web site.