Procedure

Safety Precautions

- Hot ceramic looks like cold ceramic. Do not move hot items with your hands. Use tongs or thermal gloves.
- Clamp your side-arm flasks to a ring stand. These flasks are expensive and they fall over easily and crack if not clamped.
- Dispose of salt solution (liquid filtrate) into the Aqueous Waste container.
- Dispose of sand into the trash can.

Part A: Setting up Go Direct Temperature Probe with Vernier LabQuest 3

1. Press the power Button located on the top edge of the unit to turn on your unit (see Figure IL.4) The meter screen will appear on the LabQuest 3 screen.

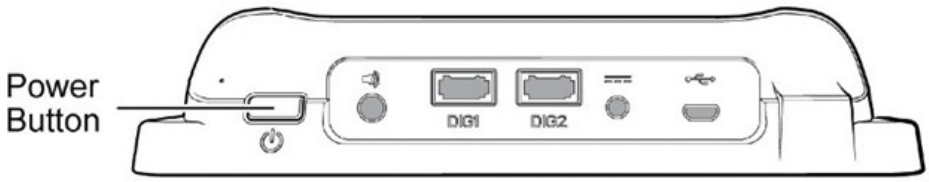

Figure IL.4: Side view of the LabQuest 3 unit, showing the location of the power button.

2. Press the center of the Go Direct Temperature probe to turn it on, a red LED will be blinking.

   - On the LabQuest 3, tap Sensors, and then tap Wireless Device Setup ⍰ Go Direct. This will bring up available probes by showing the serial numbers of the probes. After the probe is identified, tap on its serial number (such as: GDX-TMP 0J200.....), and then tap OK. Make sure the probe you select is the probe that you are using for the lab. The meter screen will appear again, showing a reading for the probe in a red meter box.

3. The right of the LabQuest 3 screen shows three different setting: Mode, Rate, and Duration. Tap Duration and change 180 seconds to 500 seconds, tap Done then touch OK.

4. Upon completing Step 3, the Go Direct Temperature Probe and the LabQuest 3 are ready to collect data for the experiment.

Part B: Using a Balance with Weighing Paper

1. Acquire a sample of an unknown salt/sand mixture. Write your unknown number in your **LAB NOTEBOOK**.

2. Fold a piece of weighing paper (the wax paper-looking square) in half twice to make creases in your paper.

3. Zero your balance and then place your weighing paper on the balance. Record the mass of your weighing paper in your **LAB NOTEBOOK**.

4. Tare your balance with the weighing paper so that it reads "0.000."

5. Measure 1.150 grams of your unknown mixture. Record the exact mass in your **LAB NOTEBOOK**.

6. Get a clean, dry 150-mL beaker.

7. Acquire the mass of your clean, dry beaker and record the mass in your **LAB NOTEBOOK**.

8. Keep your beaker on the balance. Do not tare your balance.

9. Now add your unknown salt/sand mixture which you measured out directly into the beaker and record the mass of your beaker + unknown sample in your **LAB NOTEBOOK**.

10. Clean up your balance area and move to the next part.

Part C: Recording Temperature and Saving Data

1. Set your beaker with your unknown sample on your hot plate.

2. Use your graduated cylinder to measure 50 mL of deionized water and add it to your beaker.

3. Place a stir bar into your beaker and set the stirring to 100.

4. Place your Vernier Go Direct temperature probe into the liquid. Do not let the stir bar hit the temperature probe and make sure the probe is not touching the bottom of the beaker. Use a clamp to secure the temperature probe.

5. When ready, press the Play icon, ▶, at the bottom left of the LabQuest 3 to begin recording data. As data are collected, the graph and table are updated live.

6. Turn your hot plate to 300°C.

7. Continue heating your water until it reaches 65°C.

8. Once the temperature reaches 65°C, press Stop, ■, to to end data collection

9. Email the data file to yourself. To email data, press File ⟶ email ⟶ press Data file or Text File, then type in your email and make sure it's correct. In Subject type "Intro to LQ Temperature data". Press send. On your computer, open the email message you've received from the LabQuest 3. Your data set will be an attachment to the message. Click Download on the attachment. After the download is complete, right click on it and choose Open.

10. To transfer data using USB. To transfer data, Plug the USB flash drive into LabQuest press File ⍰ Export, press in the top field, where "untitled" is shown. A keyboard will appear. Name your file, and then press Done. After the screen changes, press OK. Remove your USB (there is no "safely remove" step). Plug the USB flash drive into your computer. Launch Excel and click File ⟶ Open. Navigate to your flash drive, look for All Files in your flash drive, and choose your file of data. Excel will ask a few questions as it sets up

the file. Answer these questions by clicking Next, Next, and Finish.

11. Use crucible tongs or the thermal gloves (not your bare hands) to remove your beaker from the hot plate.

Part D: Filtration

1. You will need the following of equipment:
    - One vacuum flask/side-arm flask (Erlenmeyer flask with glass nozzle on the side)
    - One Büchner funnel (plastic funnel, comes in two pieces)
    - Rubber funnel adapter (cone-shaped rubber piece)
    - Filter paper (circular piece of paper)
    - Rubber vacuum hosing

2. Secure your side-arm flask to your ring stand using a clamp. It is very easy for the flask to fall over and break if you do not secure it.

3. Your Büchner funnel should have a rubber stopper. Place the stopper into the flask then place the funnel onto the stopper.

4. Use a piece of tubing to connect the arm of the vacuum flask to the vacuum spigot.

5. Place your filter paper into the funnel. Make sure there are no folds and that it is flat and covers all the holes in your filter.

6. Wet your paper with a bit of water from the squirt bottles.

7. Turn on your vacuum.

8. Slowly pour your solution of salt and sand into the funnel.

9. Allow the sand to dry in the funnel for five minutes.

10. Break down your filtration set up.

Part E: Drying Sand

1. When the sand has been filtered, scrape the sand onto the glass watch glass.

2. Set the watch glass onto your hot plate and set your hot plate to 100°C. Let it sit on the hot plate for 10 minutes.

3. While you are waiting, get a piece of weighing paper, fold it properly and acquire the mass of the weighing paper. **RECORD IN YOUR LAB NOTEBOOK**.

4. After you have dried the sand for 10 minutes, take the watch glass off the hot plate and let it cool. (Use tongs or thermal gloves)

5. Carefully scrape the sand onto the piece of weighing paper from Step 3.

6. Acquire the mass of your sand + paper. **RECORD IN YOUR LAB NOTEBOOK**.

Citation Information

”Cite all information sources following the ACS guide: Research Guides: Citing Your Sources: ACS ”The Williams Honor System requires you to properly acknowledge sources you have used in course assignments. This guide provides basic information on how to cite sources and examples for formatting citations in common citation styles.”

Part B: Using a Balance with Weighing Paper

Record your unknown ID number: _____

Mass of your weighing paper: _____

Mass of the unknown mixture: _____

Mass of beaker _____

Mass of beaker + sample _____

Mass of your sample in the beaker: _____

Part C: Recording Temperature and Saving Data

Record your Vernier LabQuest 3 station number: _____

Record the name of your saved file: _____

Upload a copy of your data as a Text, Word or Excel file.

Part E: Drying Sand

Mass of Weighing Paper _____

Mass of Sand + Weighing Paper _____

Mass of Salt in Original Sample _____

Percent of Salt in Original Sample (by Mass) _____

Percent of Sand in Original Sample (by Mass) _____