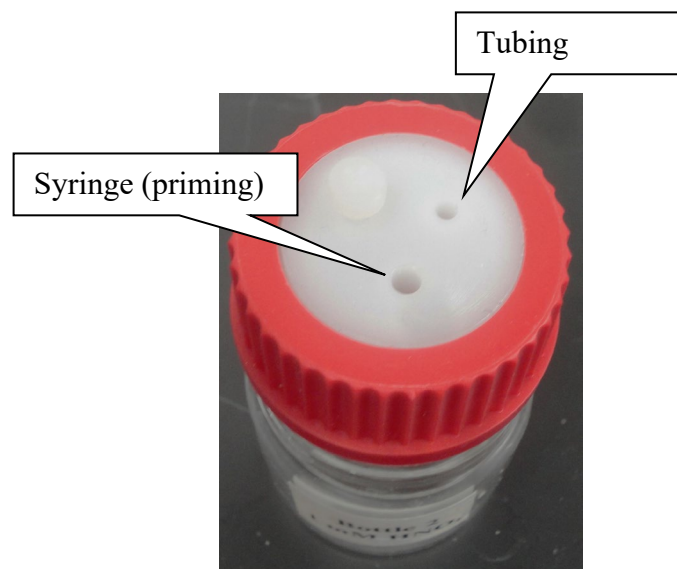


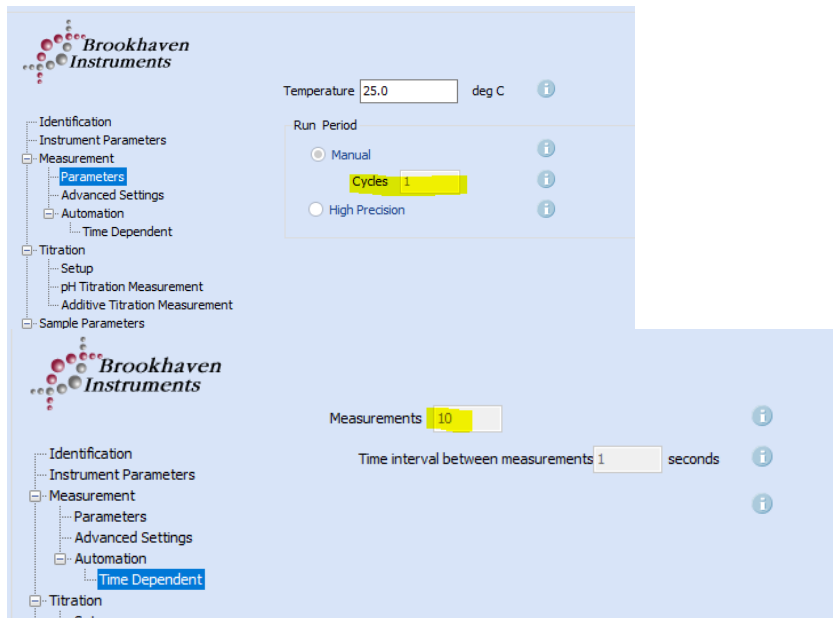
## Installation of a BI-ZTU

1. Check data sheet which includes drop volume. Open ELS software and click onto Titrator/Setup/Diagnostics.
2. Type in drop volumes. Click onto Save Changes and check to make sure these data were saved by exiting and click on setup/diagnostics.
3. Install and check pump and valve connections.
  - a. Plug in USB cable, power supply and pH probe.
  - b. Turn on unit
  - c. Connect pumps to acid/base bottles: Pump 1: 0.1 M HNO<sub>3</sub> Pump 2: 1 mM HNO<sub>3</sub> Pump 3: 0.1 M KOH Pump 4: 1 mM KOH
    - i. These bottles should be 100 mL glass bottles with lids that have 3 openings: 1 for tubing, 1 that will be plugged, and 1 larger one for priming the pumps.

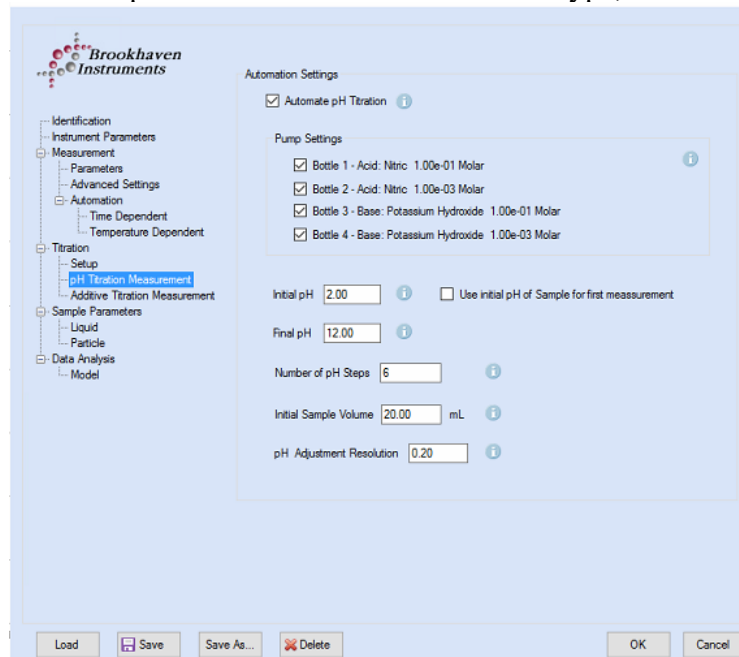


- d. Open up the Particle Solutions software and start a new measurement of interest (DLS, PALS, or ELS).
  - e. From the navigation bar, choose Titrator→Setup and Diagnostics.
  - f. Attach a cup to the titrator arm for catching acid and base.
  - g. Activate each pump and make sure that they turn on (listen for clicks)
  - h. Activate each valve and make sure that they turn on (listen for clicks)
  - i. Activate circulator and make sure it turns on.
4. Prime all metering pumps

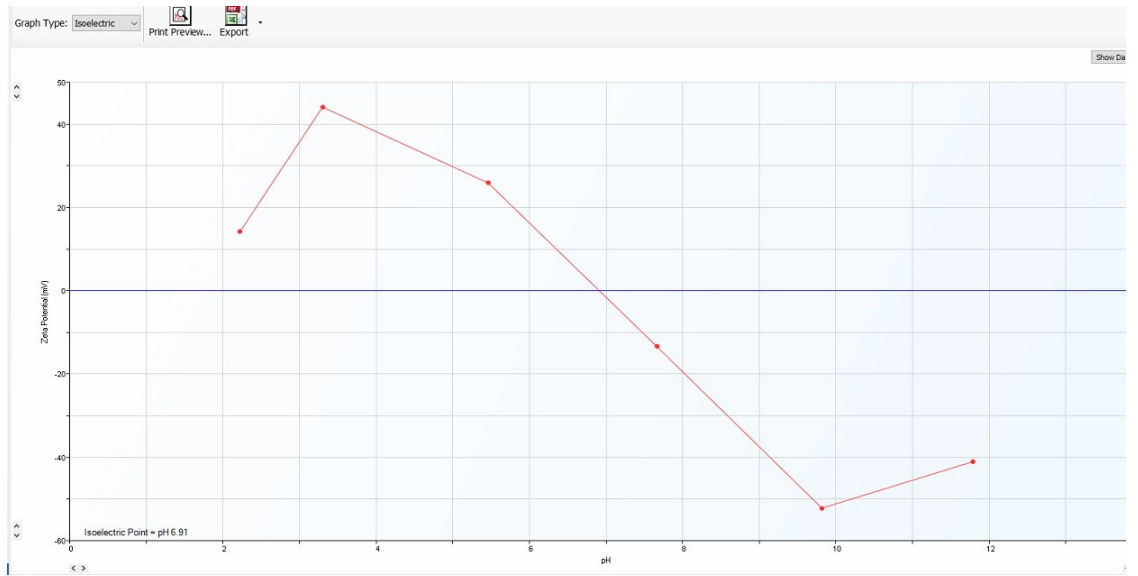
- a. Click on prime all pumps
  - b. Make sure all four pumps are pumping liquid. If they are not, then prime the pumps as described in the manual and below:
    - i. Take a 30 mL syringe and insert into the largest hole on the top of Bottle 1 (see photo above labeled “Syringe (priming)”).
    - ii. Turn on Pump 1. As it is pumping, force air from the syringe into the bottle through the hole. Watch the other end of the tubing on the front of the ZTU to see liquid coming being dispense. You may have to force air through several times before you see drops or even a stream. Then stop forcing air and make sure it is dropping each time the pump makes a click.
    - iii. Repeat for all 4 bottles/pumps.
  - c. After all four pumps have filled their lines and are dispensing reagent, click on Prime All Pumps. All four pumps will go for 200 drops.
  - d. Repeat c. once more.
5. Check flow cell fill/empty and rinse.
- a. Attach a flow cell to the ZTU.
  - b. Replace cup on titrator with a cup containing clean DI water.
  - c. Choose Titrator → Fill cell, and make sure that the cell fills.
  - d. Choose Titrator → Empty cell, and make sure that the cell empties.
  - e. Choose Titrator → Rinse cell, be sure the cell empties and fills through all cycles.
6. Calibrate pH probe.
- a. Carefully remove the pH probe from the box and connect to the BI-ZTU.
  - b. Choose Titrator → Setup and Diagnostics and click “Recalibrate pH probe.” Calibrate the pH probe using a 3 buffer system. Packets of buffers are in the kit.
  - c. After successful measurements are obtained, clean the pH probe with DI water and insert into the top of the ZTU where there is a hole so that it will be submerged in the sample cup.
7. Check overall titration.
- a. Disperse the tip of a pipette of BI-ZTU reference material in 20 mL of 1 mM  $\text{KNO}_3$ .
  - b. Start titration sequence from pH 2-12 in 6 steps in ELS. 10 measurements, 1 cycle each:



i. Set this up in the SOP of the measurement type, here:



- c. Measure the reference material.
- d. Check that the titration curve goes from upper to lower with an isoelectric point of about 6:



e. Rinse the cell three times with DI water.