

## **Cu ISE General Protocol**

### **Storage and Maintenance:**

- Polish electrode weekly using aluminum oxide followed by silver electrode polish (typically performed on Friday) and condition in buffer (see Buffer preparation below) over the weekend before use after polishing
- For overnight storage, run buffer through the system for 2 minutes (at fast flow rate) to ensure buffer is through the system before turning off the pump

### **Buffer Preparation:**

- Buffer is from Eriksen et al. (1999): (specific amounts to obtain these concentrations can be found in Tara's Lab Book #3)
  - o 1 mM CuSO<sub>4</sub>
  - o 15 mM ethylenediamine
  - o 0.6 M NaCl
- Adjust to approximately pH 8 (NOTE: Buffer is really basic so will need to add drops of concentrated HCl to bring pH to 8)

### **Running Samples:**

1. At fast flow rate (setting at ~9 on Cerampump) run buffer for approximately 2 minutes.
2. Ensure sample is at appropriate pH (this was pH 8 for my copper experiments) then run sample through the system at fast flow rate until the sensing membrane of the reference electrode contained in the waste beaker is covered.
3. Stop the pump and reduce flow rate to 10 ml/h (Just slightly less than 1 on the Cerampump – this flow rate was checked monthly to ensure 10 ml/h)
4. Turn on the pump and start the timer and take initial reading of the sample from the Potentiometer (NOTE: Ensure potentiometer is set to read in millivolts – will reset to pH if power outage etc.)
  - Reading should be negative and become more positive without any erratic jumping (I believe on the potentiometer the reading is from Side B)
5. Record millivolt reading with time until stability criteria of <0.1 mv/min change is achieved  
NOTE: This typically will take about 3.5-5 hours per sample.  
NOTE: If bubbles are present in the system the potentiometer reading will become erratic due to loss of electric circuit. Run the pump at the fast flow rate until the bubbles are through the system then continue running back at the measuring flow rate of 10 ml/h. Typically bubbles will form within the first 2-5 minutes of the run (if using the pump closest to the sink) and once those are pushed through the system at the fast flow rate there are usually no other issues during the run.
6. Record the final pH of the sample when the stability criterion has been achieved.
7. At the fast flow rate, run ASW through the system for 2 minutes followed by the buffer for two minutes.
8. Adjust the pH of the sample to a low pH (~3.3) and follow steps 2-7.  
NOTE: There is some noise associated with the low pH samples usually within  $\pm 0.5$  mV. In this case, the average of the potential readings are taken for the final value once the stability criteria has been met.

