

Carbon Capture & Storage Lab

Quick guide to Groundwater Monitoring Lab

Pre-preparation of the lab:



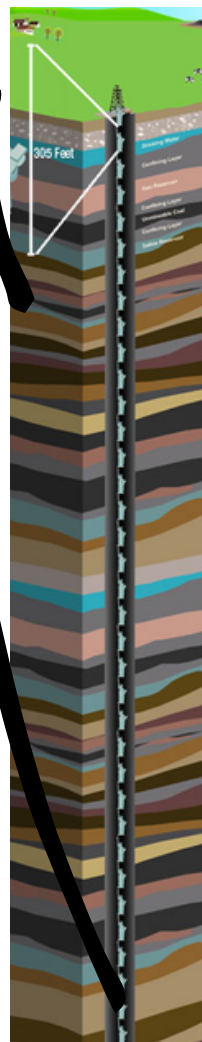
- Fill aquifers with the diffuser centered at the bottom
- Use a binder clip to act as a hook
- Calibrate digital sensors (pH, TDS testers)
- Label sample bottles and organize data sheets
- Assign student roles: sampler, recorder, timer, tester, etc.

Step 1: Take baseline measurement

1a: Take a 'field' sample

- Pull ~30mL of a sample for testing
- Place in small beaker
- Hook tubing back upright

Can we
detect CO₂
if it reaches
our water?



1b: pH and conductivity

- Swirl pH sensor gently till reading stabilizes. Record value.
- Swirl pH sensor gently till reading stabilizes. Make sure it is on the microsiemens/centimeter mode. Record value.



1c: Filter the water

- Remove plunger and attach filter to the end of the syringe
- Pour 'field' sample of water into the syringe
- Place syringe over labeled sample bottle
- Use plunger to push water through the filter. May need force.



1d: Alkalinity

- Use 5mL syringe to deposit 4 mL water to test vial
- Add 4 drops of small KH-ind solution to vial
- Use 1 mL syringe and pull 1mL KH solution to the black line
- Add 1 drop of solution in the test vial and swirl till color turns pink/red
- Flip the syringe and read corresponding value from chart inside the kit
- Record both values. Dispose of sample and clean vial



1e: Calcium

- Use 2mL syringe to deposit 2 mL water to test vial
- Add 1 scoop powder into vial and swirl
- Use 1 mL syringe and pull 1mL Ca-2 solution to the black line
- Add 1 drop (not 0.6mL like stated in sheet) and swirl till color turns blue
- Flip the syringe and read corresponding value from chart inside the kit
- Record both values. Dispose of sample and clean vial

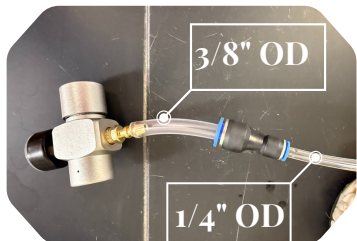


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Reminder! Before moving on to releasing CO₂-

- Time keeper, be ready to take samples every ~10 min
- Keep track of data:
 - Record time, pH, TDS, Alkalinity, Calcium
- You will be making a graph of results



Step 2: Release CO₂ into the aquifer/s

- Connect small piece of 3/8" OD tubing to CO₂ regulator
- Insert adapter with 1/4" OD tube connected to aquifer
- Make sure valve is turned to (-) so that it is closed
- Screw on CO₂ cartridge and gently rotate valve to release CO₂
- Slower injections allow more contact between CO₂ and the rock

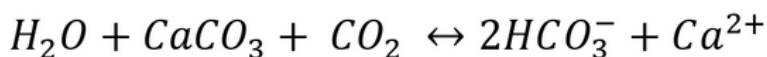


Step 3: Repeat from Step 1a-1e

- Take sample after CO₂ release
- Take additional samples in designated time intervals
- Keep track of the data

Step 4: Discuss

- What trends do you expect to see based on the main equation?



Water Limestone Carbon Dioxide Bicarbonate Calcium ions

Silicate Chamber	CO ₂ Injection Start time		CO ₂ Injection Stop Time					
Sample #	Date	Time Sample Taken	pH	Conductivity	Alkalinity Syringe Reading	Alkalinity Table Value	Ca ²⁺ Syringe Reading	Ca ²⁺ Table Value
S1								
S2								
S3								

Carbonate Chamber	CO ₂ Injection Start time		CO ₂ Injection Stop Time					
Sample #	Date	Time Sample Taken	pH	Conductivity	Alkalinity Syringe Reading	Alkalinity Table Value	Ca ²⁺ Syringe Reading	Ca ²⁺ Table Value
C1								
C2								
C3								

MORE INFORMATION



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