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Water Quality Testing

Introduction

- According to the United States Geological Survey, **water quality** is defined as “the chemical, physical, and biological characteristic of water.”
- Water quality experiments can provide useful information such as the:
  - pH of water
  - presence of halides such as F^-, Cl^-, Br^-, or I^-
  - presence of nitrate, phosphate, and sulfate ions
  - presence of calcium and magnesium (hardness of water)
  - presence of other dissolved solids

Objectives

- Learn about common dissolved solids in water sources
- Correctly name and identify polyatomic anions
- Apply chemistry knowledge to local issues and concerns
- Perform qualitative tests to identify the presence of dissolved anions
- Demonstrate use of a simple conductivity meter to check for presence of dissolved solids
- Use pH probe to examine acidity or basicity of a solution
- Describe the use of a control variable (Di water because it is inert and only contains hydrogen and oxygen
- Explain why results may vary using water from the Tennessee River

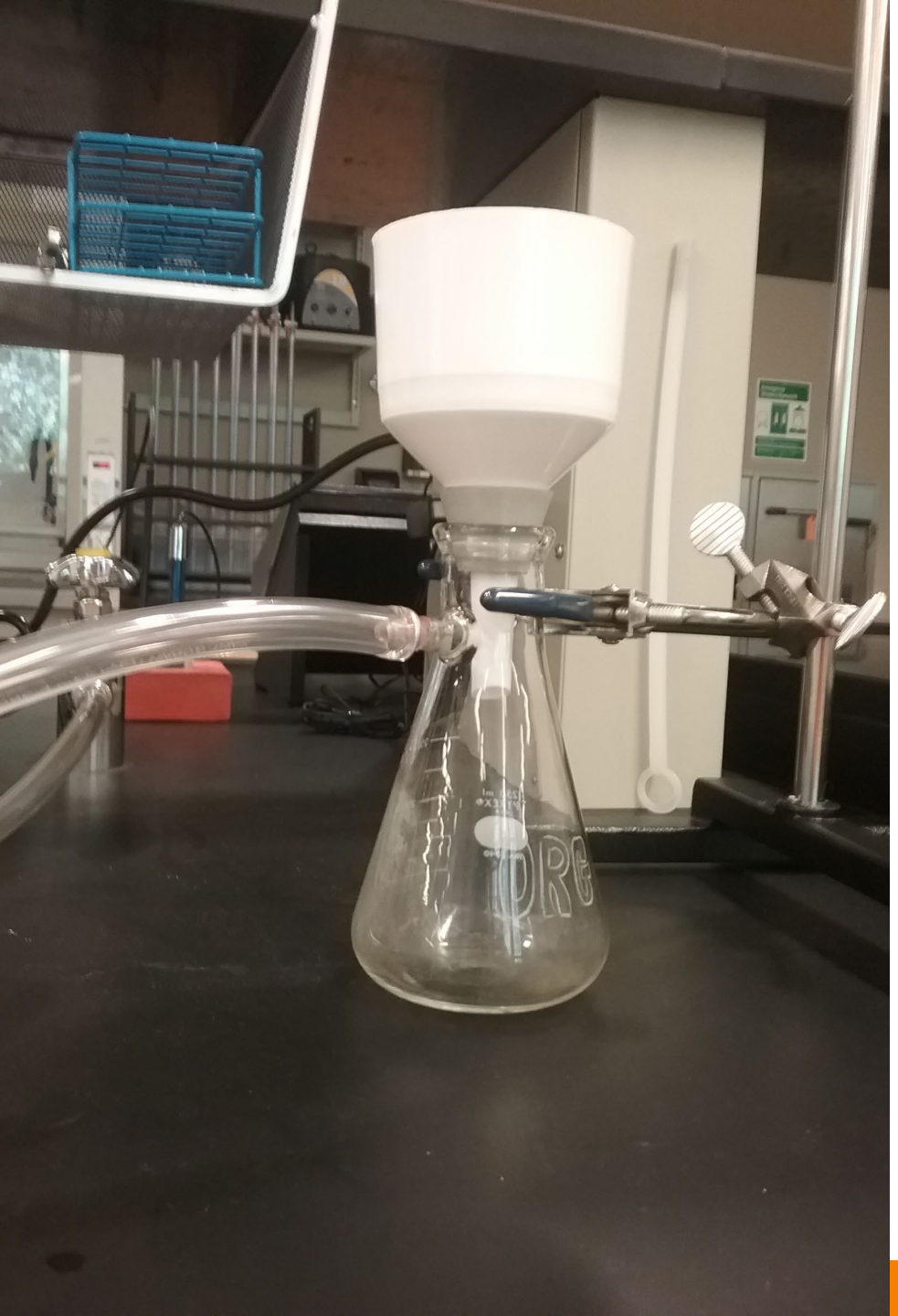
Glassware Cleanliness

- Make sure all test tubes, well plates, mortar and pestle, and glassware are CLEAN.
  - If your glassware is dirty, it may skew your results!
- Use soap, water, and brushes to clean glassware
- Rinse all of your glassware at least three times with DI water
- Be watchful for contamination routes!

Experiment Sections

- Looking at
  - four different water samples: DI, Simulated Sea, River, and Fertilizer
  - Prepared fertilizer water
  - Total dissolved solids
- Performing
  - pH tests
  - Pollutant tests
- Halides, Nitrates, Phosphates, Sulfates, Ca/Mg

Start different tests simultaneously



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Vacuum Filtration

- Review the set-up for vacuum filtration
- Need this when preparing your fertilizer water

Video: Vacuum Filtration

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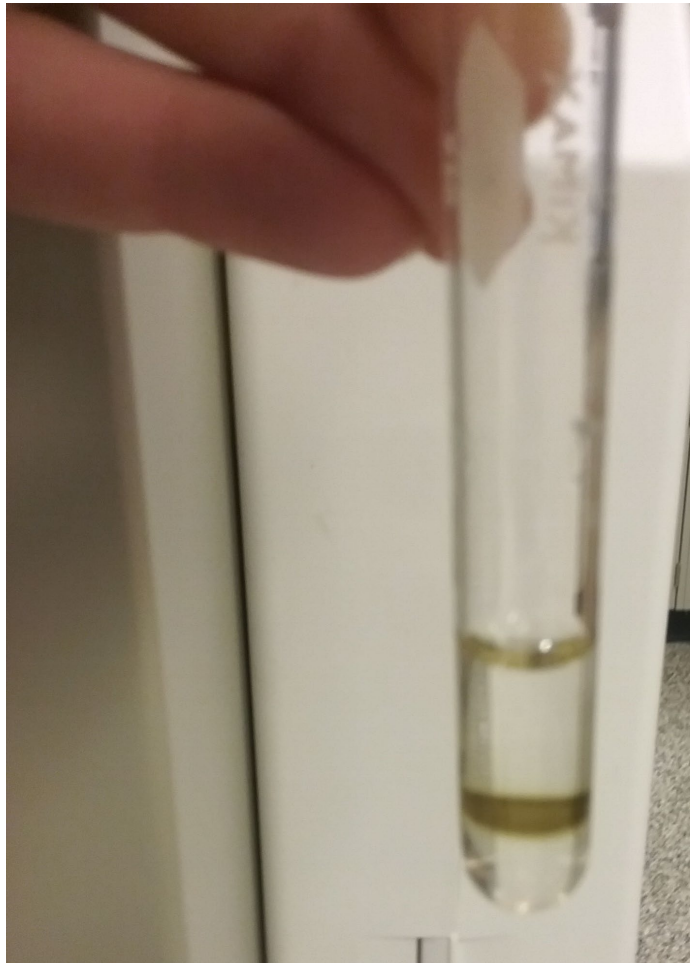
pH Measurements and Total Dissolved Solids

- Again, be careful with the pH probe.
- A new calibration will need to be done
- Be careful with the hot evaporation dish
  - Use gloves or tongs
- Do not place a hot evaporating dish on a balance

Pollutant Test

- Test for halides, nitrates, phosphates, sulfates, and Ca/Mg
- Make sure you compare to the known sample which provides the positive test
- For nitrate test add reagents slowly and look for a brown ring (might be faint)
- For phosphate test, make sure to use the hot water bath (results will not come out properly otherwise)



Brown ring for the nitrate test

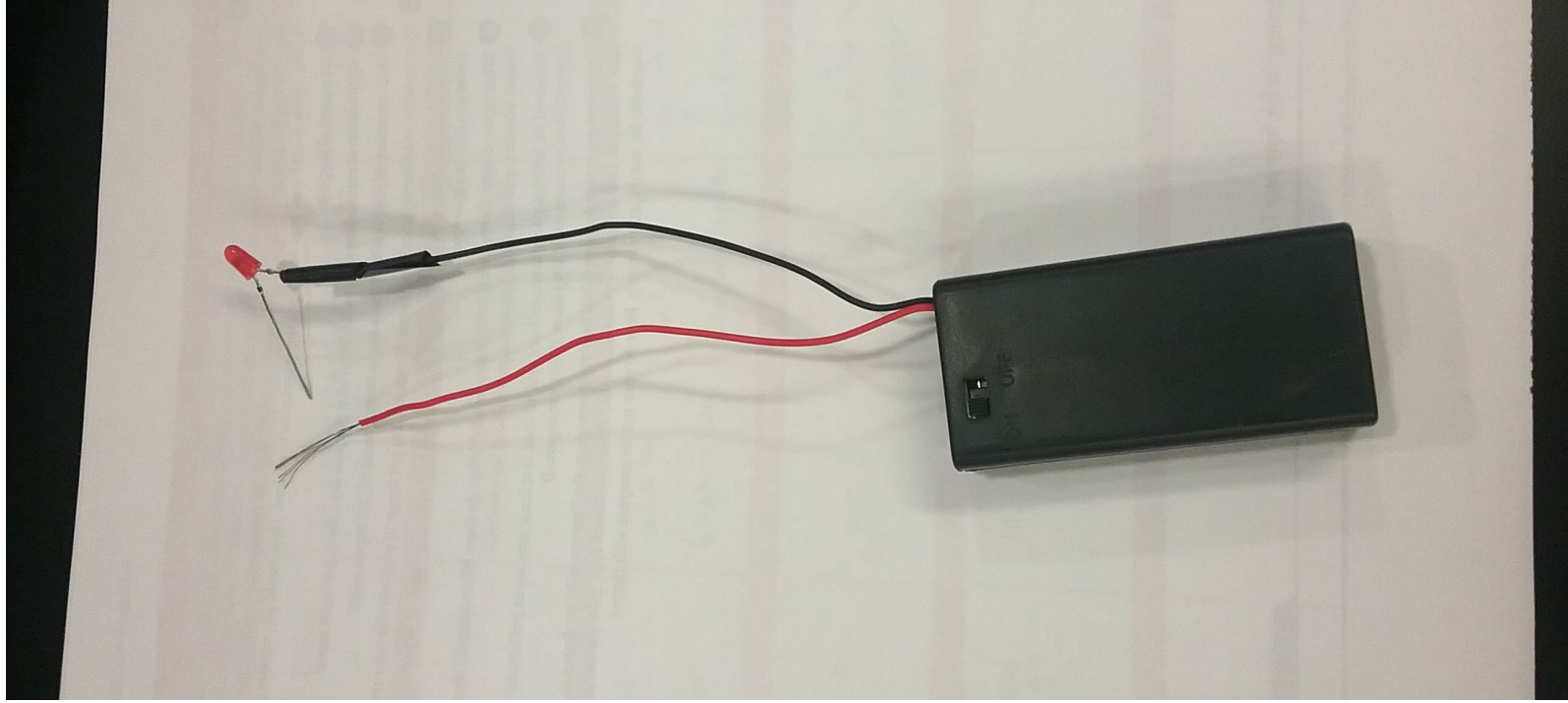
Conductivity Test

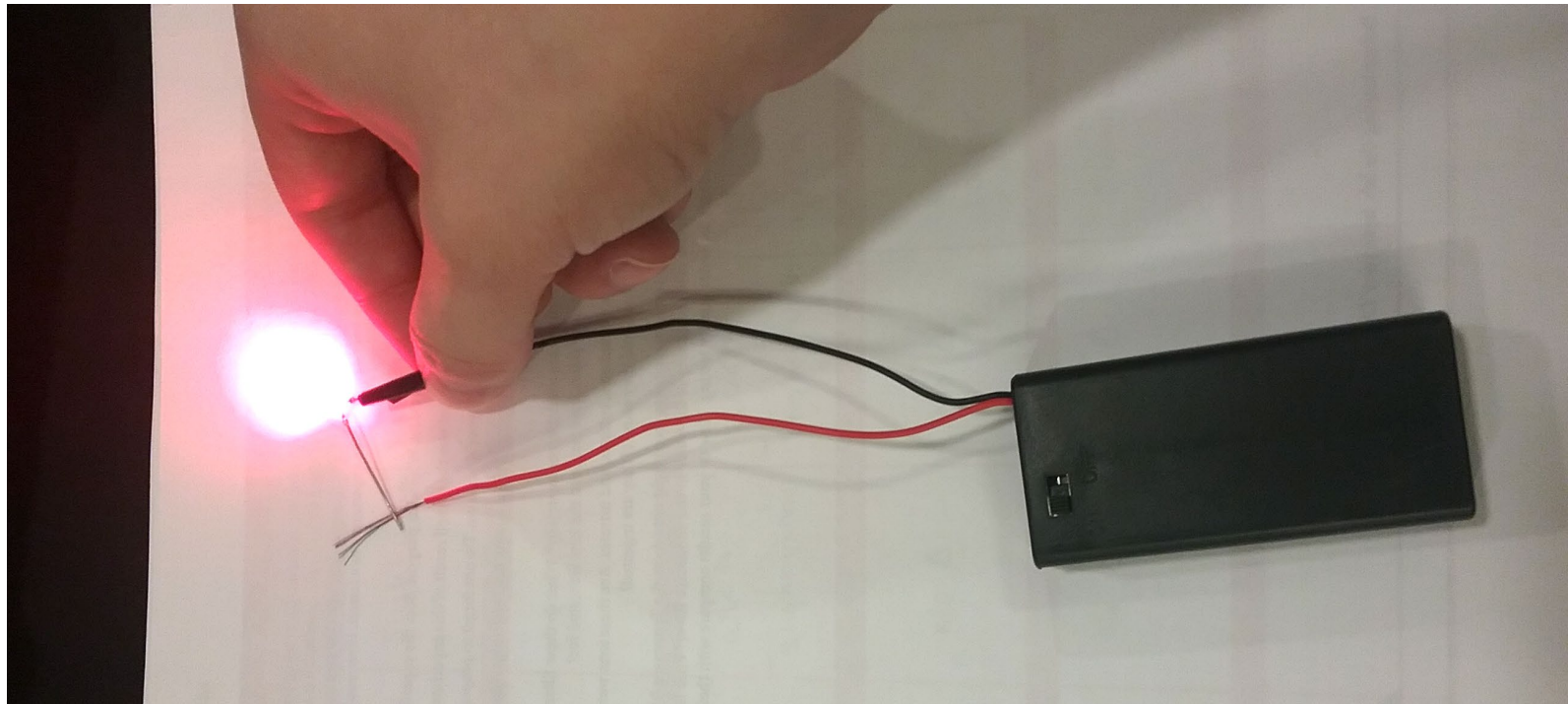
Note: Conductivity meters are already built.

1. Turn on the device (on/off switch)
2. Place the two ends of device into solution
3. Visually inspect brightness of LED

When a circuit is complete the LED will light up

If solution has ionic compounds, the circuit will be complete.





Hazards and Waste

- **Do not place hot dish on balance → use cork ring**
- Wash your hands immediately after handling the sulfuric acid and hydrochloric acid
- Use gloves or tongs to move hot ceramic dishes
- All solutions will be put in the AQUEOUS waste container