

## TEACHER RESOURCE GUIDE

# WATER QUALITY TEST KIT

### DEVELOPED BY:

University of Cincinnati's  
NIEHS Environmental Health Center



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# KIT CONTENTS

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1. Student lab booklet
2. pH meter and calibration solution
3. Total Dissolved Solids (TDS) meter and calibration solution
4. Thermometer
5. Water collection cups
6. Wash bottle (*for distilled water*)

## OUTLINE

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### Collection

In this lab students will learn to collect three water samples:

1. Distilled water
2. Tap water
3. Natural water

### Testing

Students will measure the temperature, pH, and TDS of each water sample using the meters included in the test kit. The thermometer and TDS meter can both be used to take the temperature.

### Data

After the data is collected the teacher or students will submit the information to Google Fusion. Google Fusion will map the data so students can view their classes samples and compare them to other water collections from neighboring schools.

### Understanding

The students will use the charts on the last page of the booklet to interpret the data and determine how clean the water samples are.

# CARE AND CALIBRATION

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## TDS Meters

- Calibrate the TDS meters using the 342 ppm NaCl solution prior to first use.
  - \* Follow instructions included with the TDS meter to calibrate.
  - \* TDS meters will retain calibration for at least one year.
- The calibration solution has a one year shelf life if unopened, and a 6 month shelf life once opened.
- After several uses, or direct skin touching of the TDS probe, clean with alcohol or distilled water.
- Do not store in high temperatures or direct sunlight.



## pH Meters

- Follow the instructions included in the pH meter case to calibrate. The pH meter should be calibrated the first time it is used and recalibrated if the meter has not been used for over one month or if it has been heavily used.
- pH meter should soak in distilled water for five minutes before each use.
- Replace the batteries if the digital display becomes faded.
- Do not touch the electrode with anything other than soft tissue paper. Use only soft tissue paper to clean the electrode.



## Thermometers

- The thermometer does not require any calibration.
- After each use, rinse off the thermometer using distilled water. Dry it with tissue paper. Place the thermometer back in its case.



# ENTERING DATA ON GOOGLE FUSION

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## Accessing Google Fusion

- An invitation email will be sent to you. In order to access the Google Fusion Table you must accept this request. When you receive the request, press the “Open” button in the email to access the table.

## Entering the Data

- To add one set of data, click “Edit”, and then select “Add Row”.
- Date: Enter the date the sample was collected.
- School: Select the number from the drop down list that corresponds with your school.
- Type of Sample: Select the option from the drop down list that corresponds with your sample (Natural Water or Tap Water).
- Source of Tap Water: Select the source of the collected tap water from the drop down list. *Skip this step if you are entering data from a natural water sample.*
- Name of Natural Water Source: Specify where the natural water sample was collected. Example: Seneca Lake. *Skip this step if you are entering data from a tap water sample.*
- Time of Collection: List the time when the water sample was collected. *Skip this step if you are entering data from a tap water sample.*
- Weather Conditions: Note the weather conditions at the time when the sample was collected. *Skip this step if you are entering data from a tap water sample.*
- Latitude: Enter the latitude coordinate from where the sample was collected.
- Longitude: Enter the longitude coordinate from where the sample was collected.

- TDS: Enter the TDS (mg/L) of the sample.
- pH: Enter the pH of the sample.
- Temperature: Enter the temperature (F°) of the sample.
- Notes: Optional—Add any notes or important information.
- Press “Save” if you are only entering one data set. Press “Save and add another” if you wish to save the data set you just entered and continue to add more.

### **Completed Data Entries**

- To view your data on the map, click the “Map of Location” tab.
- The data is automatically saved on the Google Fusion Table.

### **Optional: Copying Information to Multiple Cells**

- Click once on a row you have already entered.
- Three boxes will appear. The second box will have an image with two pieces of paper in it; this is the duplicate a row button. Click that button.
- An “Add new row” box will appear with all the content of the row you’re duplicating. You can then change anything needed to add new data. The information you would like to keep (name, school, class, etc.) does not need to be changed.
- Once the information has been updated, click “Save”. If you choose “Save and add another” an empty form will appear instead of one with duplicated information.

# ADDITIONAL PURCHASES

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After extended use some supplies will need to be purchased to continue using the water quality test kits.

## **Batteries: Button Cell Battery AG13/LR44**

For both pH meters and thermometers.

Cost and where to purchase varies.

## **pH Buffer Powder: pH4.00@25°C and pH6.86@25°C**

Cost: Approximately \$15 (for 5 pack)

Where to purchase: Amazon.com

## **TDS Calibration Solution: HM Digital 342 ppm NaCl Solution**

Cost: Approximately \$10

Where to purchase: Amazon.com or via retailers listed on the HM Digital site ([www.tdsmeter.com/products/calibrationsolution.html](http://www.tdsmeter.com/products/calibrationsolution.html))

# OPTIONAL: DISCUSSION QUESTIONS

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- What factors determine water quality?
- How does water quality play a role in the environment?
- What is the role of TDS in water quality?
- What is the role of pH in water quality?
- If the TDS and the pH are high, can it cause an unsafe environment for living things? Explain.
- If you were a plant, would you prefer living in a more acidic environment or more basic environment? What about fish?

## RECOMMENDATIONS

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- It is recommended that teachers practice using Google Fusion to become familiar with the program before starting the Water Quality Test Kit project with students. For additional support with Google Fusion, you may contact:
  - \* Your school's Technology Coordinator
  - \* Rachael Shepler, University of Cincinnati  
Program Coordinator: rachael.shepler@uc.edu
  - \* Zane Zehnder, Meadowbrook High School  
Science Teacher: zane.zehnder@rollinghills.k12.oh.us
- It is recommended that students practice using the water testing devices in class to become familiar with the supplies before using them independently.

## ADDITIONAL RESOURCES

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- Introduction of the pH scale, how pH is measured, and typical pH measurements across the country: <http://bit.ly/pHmeasure>
- Introduction to TDS and its relation to water quality: <http://bit.ly/TDSimportance>
- Explanation on EPA secondary water quality standards: <http://bit.ly/EPATDS>
- Information on the importance of water quality, the effects of water quality, and how the standards are determined: <http://bit.ly/waterqualitystandards>
- National Institute of Environmental Health Sciences: <http://bit.ly/NIEHSwebpage>

## QUESTIONS ABOUT THE KIT?

### **CONTACT:**

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