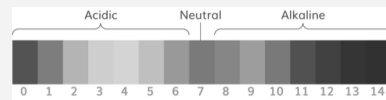


Flint River GREEN: pH

MATERIALS	LaMotte pH Test Kit Gloves (2/person) Safety Goggles (1/person)	VOCABULARY	Acidic Basic (alkaline) Logarithmic Scale Acid Rain Storm Outfall Stream Bed Geology	Leaching Solubility
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WATER QUALITY STANDARDS	<u>DRINKING WATER:</u> 6.5—8.5	<u>SURFACE WATER:</u> 6.5—9
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pH measures how **acidic**, neutral or **basic (alkaline)** water is. The pH scale goes from 0 - 14. Most life does well around the number 7. The further the water is in either direction from 7, the greater stress is upon living things. Strong acids, like “battery acid”, would have pH around 1 while a strong base like bleach would have a pH near 12. pH is a **logarithmic scale**, which means something with a pH of 6 is 10x as acidic as a liquid with a pH of 7. A liquid with a pH of 5 is 100x as acidic as a liquid with a pH of 7. The pH depends on many factors such as stream vegetation, **stream bed geology** and the presence of water pollutants.



WHAT DOES THIS TEST MEASURE?

LOOK FOR THESE CAUSES	<u>EVIDENCE FOR DECREASES IN pH (acidic)?</u> <ul style="list-style-type: none"> • Have we recently had Acid Rain • Is fertilizer runoff possible nearby or upstream? • What types of industrial pollution might occur nearby or upstream? 	<u>EVIDENCE FOR INCREASES IN pH (basic)?</u> <ul style="list-style-type: none"> • What types of industrial pollution might occur nearby or upstream? • What natural minerals might be leaching (limestone increases pH)? • Is it possible there are any soaps/detergents? • Are there any recent fires that produced ash?
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- Michigan soils tend to be high in calcium which prevents lakes and streams from undergoing rapid changes in pH.
- The pH of water determines the **solubility** and biological availability of nutrients (phosphorus, nitrogen, and carbon) and heavy metals (lead, copper, cadmium, etc.). For example, heavy metals tend to be more toxic at lower pH (acidic) because they are more soluble here.

CONNECTING CONCEPTS

WEB LINKS	<ul style="list-style-type: none"> • USGS Water Science School—pH: https://water.usgs.gov/edu/ph.html • Fact Sheets: EPA National Pollutant Discharge Elimination System—Industrial Stormwater Fact Sheet Series (29 industries): https://www.epa.gov/npdes/industrial-stormwater-fact-sheet-series • Document: NOAA Ocean and Great Lakes Acidification and Research Plan (Great Lakes: pg. 107-118): https://www.pmel.noaa.gov/co2/files/feel3500_without_budget_rfs.pdf • Article: PBS—Excess Carbon is Making our Freshwater Lakes More Acidic: https://www.pbs.org/newshour/science/fossil-fuels-are-making-freshwater-lakes-more-acidic-at-triple-the-rate-of-oceans
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1. Check to be sure everyone is wearing gloves and goggles.
2. Inventory the supplies in your test kit.
3. Determine which pH kit you are using before proceeding: you will either find **(A.)** an Octet Comparator with shades of color built into the viewer. OR **(B.)** an Octa-Slide 2 Viewer with color bars that slide in and out of the viewer. Follow the instructions below that correspond to the correct test kit you are using:

For Test Kit A (Octet Comparator):

4. Fill a test tube to the 5 mL line with sample water.
5. Add 10 drops of Wide Range pH Indicator.
6. Cap and mix gently.
7. Insert test tube into the comparator



Kit A



Kit B

For Test Kit B (Octa-Slide Viewer):

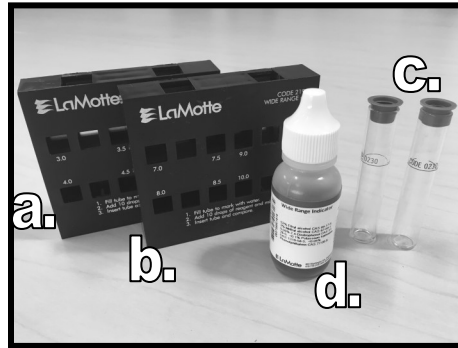
4. Fill a test tube to the 10 mL line with sample water.
5. Add 10 drops of Wide Range pH Indicator.
6. Cap and mix gently.
7. Insert test tube and the pH Octa-Slide 2 Bar into the viewer.

8. Match sample color to a color standard and record as **pH:** _____
9. Dispose of your sample and rinse the test tube into the hazardous waste container.
10. Calculate a Q-Value on the pH Chart. **Q-Value:** _____
11. Check the Q-Value by entering your pH data at <http://www.flintrivergreen.org/add-info/add-data/>

WHAT TO WATCH OUT FOR

- Be sure the glass is clean prior to testing, that nothing is left from previous samples.
- Take care to slowly add and count the drops of indicator to the sample. If you add more than 10 drops or if you lose count, dispose of your sample in a hazardous waste container and re-do the test.
- Be sure not to sample too close to a **storm outfall**. Ask a mentor for help if you are unsure.
- Do not disturb the stream bed while taking a sample. Also, do not take your sample too close to the surface or too close to the stream banks. The best place to take a sample is from the middle of the stream.
- It's a good idea to perform a colorblindness test prior to viewing color scales such as pH. There are many free versions online.

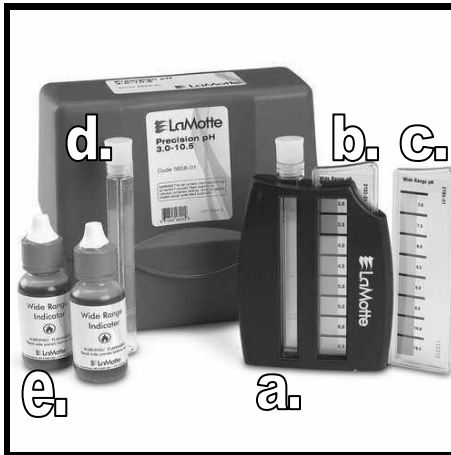
Safety Data Sheet: <http://www.lamotte.com/en/drinking-water/individual-test-kits/3353-01.html>



Kit A: Octet Comparator pH Kit

Contents

- a. Octet Comparator (pH 3.0-6.5) - [2193]
- b. Octet Comparator (pH 7.0-10.5) - [2196]
- c. (x2) Test Tube, Glass, 5mL w/cap - [0230]
- d. Wide Range Indicator - [2218-G]

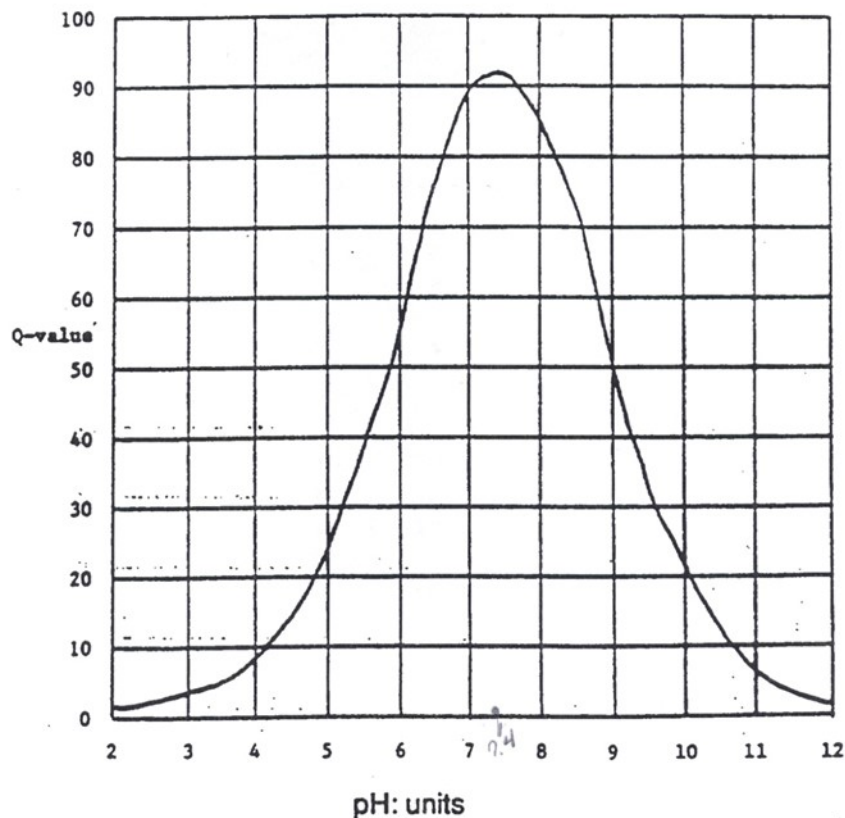


Kit B: Octa-Slide pH Kit

Contents

- a. Octa-Slide 2 Viewer - [1101]
- b. Octa-Slide 2 Bar (pH 3.0-6.5) - [2193-01]
- c. Octa-Slide 2 Bar (pH 7.0-10.5) - [2196-01]
- d. (x2) Test Tube, Square, Plastic, w/cap 2.5-5-10mL - [0106]
- e. Wide Range Indicator - [2218-G]

pH Q- Value Chart



Note: if pH < 2.0, Q = 0.0
if pH > 12.0, Q = 0.0