

pH Lesson Plan

Key Understandings:

- What pH is and some common values
- Why it is such an important factor in Water Quality
- Some main factors that affect pH in a lake / river
- What influence pH can have on the lake/river environment
- How to measure it using litmus paper & color comparator kit.

Time needed:

We suggest taking 1 full lesson to discuss and do a practice lab on this topic. The lab should only take the students about 15 minutes to complete.

Discussion:

Discussion opening: What is pH? Groups work for 3 min to come up with their own definitions; discuss as a class.

- Review common values of pH
- Discuss importance of pH in water quality: reactions, solubility, aquatic life
- Discuss what affects pH levels in lakes & rivers and how (if time remains)
- Demonstrate the proper technique for measuring pH with indicator paper and with the color comparator provided by the Massachusetts Water Resources Authority (MWRA)

Lab:

- Test tap water in a beaker using indicator paper and the MWRA color comparator. Which test is more accurate?
- Blow air into this same water for a minute through a straw. You are adding CO₂ to the water from your breath. Measure pH again with the two methods.

Homework:

- Read CBL pH handout (first two pages)
- Answer the following questions using your lab data (you may need to look on the MWRA web site for some of the answers):
 - Did the two methods produce the same results? If not, which one do you think is more accurate?
 - Why did the pH change after blowing into the beaker? Does this effect occur in nature?
 - Why was the pH of tap water so high?

Handouts:

Vernier Software: Water Quality with CBL – pH

Alternatives to this test, comments and further resources:

It is certainly helpful if pH and acids & bases were studied in the class prior to teaching this unit. Most students understood the concept and the pH range rather well; many had difficulty, however, with understanding the factors that affect pH in a natural water body. We therefore, recommend that you allocate sufficient time for this in your presentation / discussion.

We chose these two tests for pH because they are simple, visual, and give the students more of a sense of doing “wet” chemistry. The CBL pH system, however, is a good option as well. If you are unable to obtain color comparators of the type MWRA lends out, any liquid universal indicator with a good color comparison scale would do.

As an alternative to the CBL pH handout, you may use the *MWRA pH handout* (http://learnweb.harvard.edu/ent/gallery/pop4/PH_MWRA.pdf).