

# How is a pH meter calibrated?

Mr. M. Gonzalez

How is a pH meter calibrated?

# Do now (5 minutes)

- ▶ Grab an Apron.
- ▶ There are some that are cut short for our classmates. If you can use a longer apron, then use it and leave the ones that are cut off for others.
- ▶ **THANK YOU!**

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# Do Now: Germination Rate Calculation

- Today is day 6 from when we began germination.
- Calculate today's "real rate."

Day	Sprouts	Sponge Total	Hyp. Rate %	5% error	Real Rate %	Support Y / N
6		32				
7		32				
8		32				
9		32				
10		32				

How does temperature affect germination?

# Objectives

- ▶ I can calibrate a pH meter.
- ▶ I can understand what instrument error is.

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# Materials

## ► Calibration

- Hanna Combo Meter (pH meter)
- pH buffer capsules for pH 4, 7, and 10
- Distilled water
- Graduated cylinder
- Stirring rod optional
- Jar with cap (greater than 100mL)
- Colored labeling tape
- Paper towels
- Apron and goggles
- Non latex gloves

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Fig. 01. Hanna Combo meter (pH).

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Fig. 02. Calibration Standards

How is a pH meter calibrated?



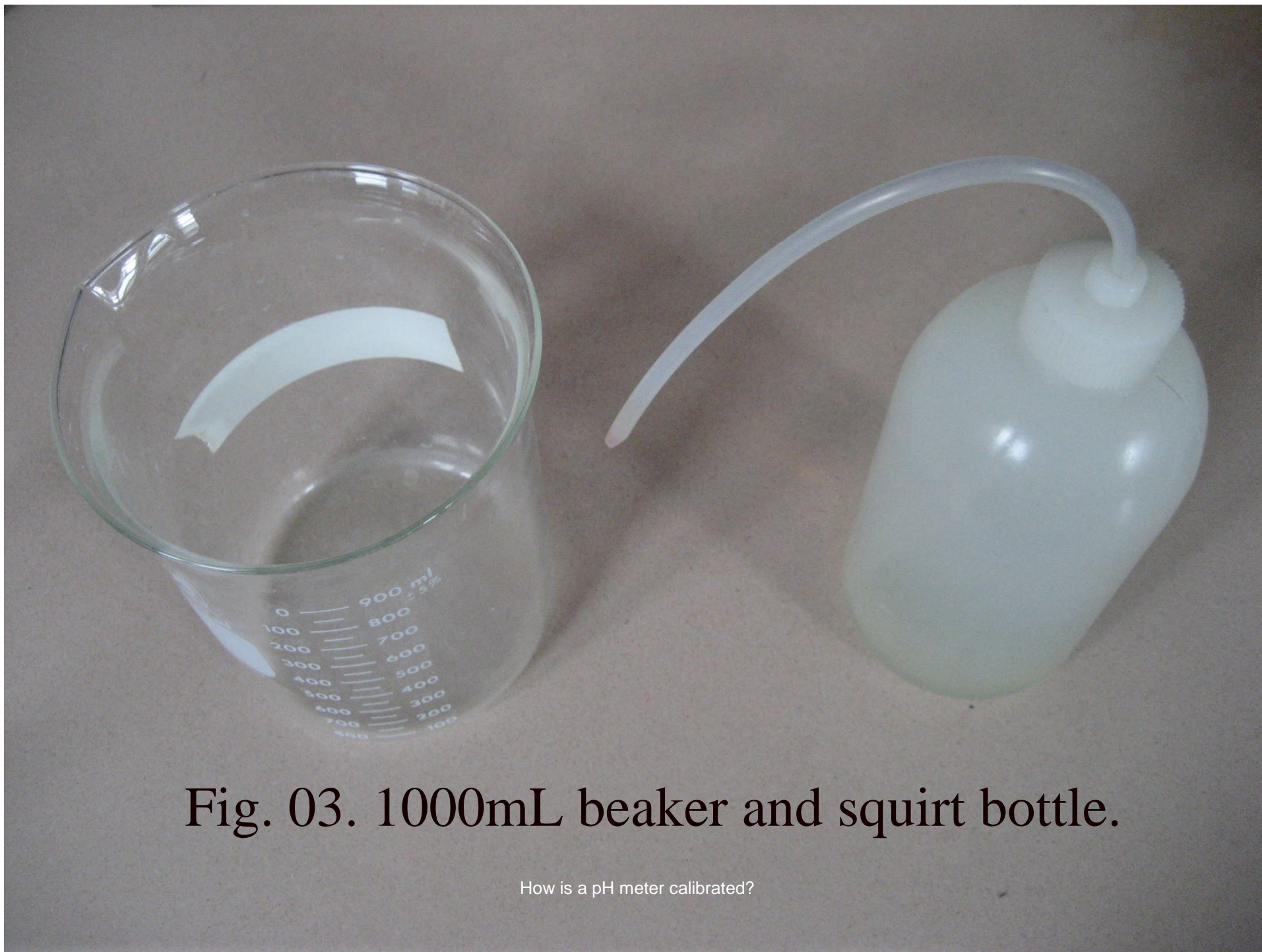


Fig. 03. 1000mL beaker and squirt bottle.

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Fig. 04. Probe storage solution and probe.

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# Procedures

## ► Calibrating Meter

- Take the cap off
- Rinse off the probe
- Turn meter on
- Press “Set” button until reading pH
- Press and hold “Mode” button until it reads “Off” turns to “Cal”
- Place probe into standard 7.



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# Procedures

## ► Calibrating Meter

- When meter changes to 4, rinse off probe and place in the 4 standard
- Wait until the “Cal” display stops blinking
- Meter is now calibrated and ready for use.

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# Activity

- Create the following data table:

Meter	pH
Yours	
Other Group 01	
Other Group 02	
Other Group 03	

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# Activity

- ▶ Measure the pH of the water sample with your meter.
- ▶ Add your reading to the table.
- ▶ Get another three readings from other groups.
- ▶ Explain why the instruments are not all reading the same pH.

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# Procedures

## ► Measuring pH

- Turn on the meter by pressing the Mode button firmly.
- If the letters “pH” do not appear at the top right-hand portion of the screen press the set button firmly and continuously until it does.



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# Activity

- ▶ Measure the pH of the water sample with your meter.
- ▶ Add your reading to the table.
- ▶ Get another three readings from other groups.
- ▶ Explain why the instruments are not all reading the same pH.

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# Procedures

## ► Measuring pH

- If necessary, calibrate the meter.\*
- Place the probe into the solution. Wait until the primary display stabilizes (15s) before you read the value.



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# Procedures

## ► Measuring pH

- If it doesn't stabilize, look at the value, look away, count to three, repeat twice and average out the value.
- Unless the value keeps on descending or ascending and the value looks intuitively way off. In this case make a note of the problem and tell the instructor.

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# Procedures



## ► Measuring pH

- Rinse the probe after each sample solution.
- Read other assigned samples.
- After your final rinse place 4 drops of pH storage solution into the little cup located inside the probe cap.

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# Procedures



## ► Clean-up

- Recap the probe **FIRMLY** by lining up the lettering on the cap and the face of the meter.
- Wait for clean-up instructions.
- Clean up your area, dump your rinse water out, dispose of gloves, and return materials.
- Begin work on your bar graph and analysis questions.

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# Instrument Error

- ▶ Why do you think different meters gave different pH values for the same solution?
- ▶ Take notes on the answers given in class about instrument error.

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# Do now

- ▶ Read “Measuring the World” by Chang (2005).
- ▶ Be prepared to answer what the standard for a meter is?
- ▶ Also, how does this knowledge of how we define what we measure change your understanding of measurement in general.

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