

Activity 1: pH of Common Acids and Bases

Equipment	Solutions / Mixtures
pH Wide Range Test Strips or Universal Indicator 5 test tubes with cork stoppers Rack or beaker to hold test tubes Graduated cylinder	Distilled water Pond water Rain Water Vinegar Ammonia

****Use caution when handling ammonia as direct inhalation of fumes can cause lightheadedness. Always keep covered with plastic wrap when not in use.***

Procedure:

1. Use the graduated cylinder to measure 5 mL of each liquid from the master beakers into the properly labelled test tubes. You should rinse the cylinder between liquids to avoid contamination.
2. If using test strips - Carefully remove one test strip for each solution and close the container immediately to avoid contamination of the remaining strips. Dip the test strip into the solution and remove. Compare strip to colour strip on the container to determine pH. Record information in the table below. Continue to step 6.
3. If using Universal Indicator – Carefully add 5-10 drops of indicator to the test tube and cover the tube with the cork stopper.
4. Secure the cork in the test tube opening with your thumb and invert the tube to help mix the tablet in with the liquid. Record your observations in the table below.
5. Use the colour guide at your station to determine the pH and record this on your table.
6. Repeat for each liquid.

CLEAN UP INSTRUCTIONS:

- ☐ LEAVE the MASTER beakers & remaining test tablets for the next group – be sure to cover with plastic wrap.
- ☐ dispose of all test tube liquids down the sink with lots of running water.
- ☐ rinse all glassware well and dry the outside with a paper towel.
- ☐ Dispose of pH test strips in the garbage.
- ☐ Leave all equipment on your lab bench for the next group.

Observations:

Solution / Liquid Name	Colour Change Observed	Approximate pH
Distilled Water		
Pond Water		
Rain Water		
Vinegar		
Ammonia		

Activity 2: Is exhaled breath acidic or basic?

Equipment	Solutions / Mixtures
250 mL beaker Medicine dropper Clean plastic straw Glass stirring rod	Distilled water Bromothymol Blue indicator

***** Use caution when blowing bubbles into the beaker – do NOT suck up the liquid. Be sure you are wearing your safety goggles to avoid getting splashed in the eye.***

Procedure:

1. Using the measurement lines on the beaker, pour approximately 100 mL of distilled water into the beaker.
2. Add 10 – 20 drops of Bromothymol Blue indicator to the water and record your observations.
3. Using a clean, plastic straw, blow bubbles into the indicator solution.
4. Continue blowing until you observe a change and record your observations.
5. Answer the questions at the end.

CLEAN UP INSTRUCTIONS:

- ☐ Dispose of the used straws in the garbage
- ☐ Your indicator solution can be poured down the sink with running water.
- ☐ Rinse the beaker with water and dry the outside.
- ☐ Leave the equipment on your lab bench for the next group.

Observations:

Initial observations	Colour of Water + BTB	Colour after blowing through straw

Questions:

1. Did the gas in exhaled breath dissolve in water to become a solution that is acidic, basic, or neutral? List the evidence that you have to support your conclusion.
2. Which gas in exhaled breath caused the change?

Activity 3: Drop by Drop Neutralization – introduction to titration

Equipment	Solutions / Mixtures
3 labelled syringes 3 small labelled beakers 2 Medicine droppers Glass stirring rod	1 M hydrochloric acid (HCl) Bromothymol Blue indicator (BTB) Sodium Hydroxide (NaOH) Baking Soda Solution Antacid Solution

*****Use extreme caution when handling strong acids and bases. Both HCl and NaOH can cause chemical burns to your skin if you spill. Notify your teacher immediately of spills or skin contact.***

Procedure:

1. Place 5 drops of BTB indicator in the bottom of the small beaker labelled NaOH.
2. Use the labelled graduated cylinder to measure 5 mL of NaOH from the master beaker into the small beaker.
3. Use the stirring rod to mix the BTB into the NaOH and record your observations.
4. While stirring, carefully add HCl a few drops at a time until you notice the colour change lasting for about 5 seconds.
5. While stirring, carefully add HCl one drop at a time until you notice the indicator changes colour and lasts 20 seconds or more. Record the number of drops and the appearance of the liquid.
6. Clean the glass stirring rod and repeat the same procedure for the Baking Soda Solution and Antacid Solution.
7. Answer the questions below.

CLEAN UP INSTRUCTIONS:

- ☐ LEAVE the MASTER beakers for the next group.
- ☐ All other solutions can be disposed of down the sink with lots of running water.
- ☐ Wipe up any spills with paper towel.
- ☐ Rinse all glassware with clean water and dry the outside.
- ☐ Leave equipment on the lab bench for the next group.

Solution Name	# Drops needed to neutralize	Other Observations
Sodium Hydroxide (NaOH)		
Baking Soda		
Antacid		

Questions:

1. Which solution was the best at neutralizing the acid?
2. How does 'alkalinity' of antacid compare to NaOH?

3. What would happen if more baking soda solution were added after neutralization occurred? What colour would the indicator turn? Why?