

Investigate: Properties of Acids and Bases

Adapted from the Flinn Chemtopic Labs Volume 13

Introduction: Acids and bases are useful reagents in the chemistry laboratory and play an important role in biology and nature. What are acids and bases? What properties can be used to distinguish acids and bases? Let's explore the properties of acids and bases and identify the characteristic features that will allow us to

Purpose: The purpose of this experiment is to explore the properties of aqueous solutions and to classify them as acidic, basic or neutral. The results will be used to develop working definitions and to analyze the pH scale for identifying acids and bases.

Materials:

$\text{HC}_2\text{H}_3\text{O}_2$ (aq)	litmus paper	Conductivity probe
NH_3 (aq)	pH paper	forceps
HCl (aq)	reaction plate	Bottle with distilled H_2O
NaOH (aq)	pipets	stirring rod
$\text{HC}_6\text{H}_7\text{O}_7$ (aq)	Universal indicator	
$\text{Ca}(\text{OH})_2$ (aq)	Magnesium metal	
Distilled H_2O	Phenolphthalein	

Safety:

List all safety concerns associated with this lab in this space in your lab book.

Procedure:

1. Watch as your teacher tests the eight solutions with the conductivity tester. Record your observations in data table A on the next page.
2. Obtain a reaction plate. Fill eight wells half full with the eight different solutions: $\text{HC}_2\text{H}_3\text{O}_2$, HCl , $\text{HC}_6\text{H}_7\text{O}_7$, distilled water, NH_3 , NaOH , and $\text{Ca}(\text{OH})_2$. Be sure to record what is contained in each well.
3. Test each different solution with both red and blue litmus paper by taking a small strip of each paper (approximately 1 cm in length) and dipping it into the solution. Record the color of the paper in your results. Repeat with both colors of litmus paper for all of the different solutions.
4. Using the same method that you used in step 3, test each solution using a pH test strip. Use the color chart on the pH paper container to assign a numerical pH value to each solution. Record the pH value for each solution in Data Table A.
5. Add 1 drop of phenolphthalein solution to each well. Record the color of each solution in your results.
5. Clean the plate.
6. Fill eight wells half full with the eight different solutions. 8
7. Using the forceps, place a small piece of magnesium in each well. Record your observations in Data Table A.
8. Empty the plate into the designated container and clean it. Put all materials away.

Results:

	Distilled H ₂ O	HC ₂ H ₃ O ₂	HCl	HC ₆ H ₇ O ₇	NH ₃	NaOH	Ca(OH) ₂
Conductivity							
Reaction with Mg							
Blue Litmus Paper							
Red Litmus Paper							
Phenolphthalein							
pH Paper							

Post Lab Questions:

1. Use the results of the conductivity test to identify each solution as a strong electrolyte, weak electrolyte or nonelectrolyte.
2. Identify the solutions as acids, bases or neutral. Check with your teacher before continuing to the next question.
3. How can litmus paper and phenolphthalein be used to tell whether a solution is an acid or a base? Be specific.
4. Compare the pH data for the solutions you tested and based on your litmus and phenolphthalein data. What pH values can be assigned to acids and bases?
5. Complete the following table to summarize the properties of acids and bases.

Property	Acids	Bases
Conductivity		
Litmus		
Phenolphthalein		
Reaction with Metals		
pH		