

pHET Simulations: Acid-Base Solutions and pH Scale

Objectives:

1. Describe molecular representations for acid or base solutions
2. Provide relative amounts of particles in acid or base solutions to estimate strength and/or concentration
3. Estimate strength and/or concentration
4. Determine if a solution is acidic or basic

Assignment:

- ACID-BASE SOLUTIONS SIMULATION

1. Open the **Acid-Base Solutions** simulation on the University of Colorado's pHET website (go to LINKS → Unit 8 Links on Mr. Hwang's class website).
2. Answer the following questions:
 - a. For water, describe the ratio of H_3O^+ ions to OH^- ions. _____
(the EQUILIBRIUM CONCENTRATION view may help you here)
 - b. Using the 3 tests available (pH meter, pH paper, conductivity), determine the pH of water. _____
 - c. For strong acids, describe the ratio of H_3O^+ ions to OH^- ions. _____
(the EQUILIBRIUM CONCENTRATION view may help you here)
 - d. Using the 3 tests available, determine the pH of strong acids. _____
 - e. For strong bases, describe the ratio of H_3O^+ ions to OH^- ions. _____
(the EQUILIBRIUM CONCENTRATION view may help you here)
 - f. Using the 3 tests available, determine the pH of strong bases. _____
 - g. For weak acids, describe the ratio of H_3O^+ ions to OH^- ions. _____
(the EQUILIBRIUM CONCENTRATION view may help you here)
 - h. Using the 3 tests available, determine the pH of weak acids. _____
 - i. For weak bases, describe the ratio of H_3O^+ ions to OH^- ions. _____
(the EQUILIBRIUM CONCENTRATION view may help you here)
 - j. Using the 3 tests available, determine the pH of weak bases. _____
 - k. What is the relationship between the $\text{H}_3\text{O}^+/\text{OH}^-$ ratio and pH for acids?

 - l. What is the relationship between the $\text{H}_3\text{O}^+/\text{OH}^-$ ratio and pH for bases?

 - m. What differences do you notice between acids and bases?

n. What similarities do you notice between acids and bases?

o. What are some of the differences (using the 3 tests) that you noticed between strong acids and weak acids? _____

p. What are some of the differences (using the 3 tests) that you noticed between strong bases and weak bases? _____

q. Using the simulation under CUSTOM SOLUTION, draw a molecular representation of a weak acid that you create.

r. Make the solution a *stronger acid*. Draw a molecular representation of this strong acid.

q)



r)



s. Compare and contrast these 2 solutions.

- pH SCALE SIMULATION

3. Open the **pH Scale** simulation on the University of Colorado's PHET website (go to LINKS → Unit 8 Links on Mr. Hwang's class website).

4. Explore the pH of different solutions (in the drop down menu).

5. Answer the following questions:

a. Pick 5 solutions, and state the pH of each solution:

i. _____ pH _____

ii. _____ pH _____

iii. _____ pH _____

iv. _____ pH _____

v. _____ pH _____

b. What is the relationship between solution color and pH? _____

c. Determine if a solution is acidic or basic using hydronium/hydroxide concentration ratio.

d. Predict if dilution and volume will increase, decrease or not change the pH.
