

# Pass the Proton Acid-Base Theories

Name \_\_\_\_\_

Date \_\_\_\_\_ Period \_\_\_\_\_

**Purpose**

To compare acid and base solutions at the particulate level.

**Materials**

- Acid-Base Solution cards

**Procedure and Questions**

1. Sort the cards into three groups based on common features. Write the solution card number, molarity, chemical formula, and chemical name for each solution.

Group 1

Group 2

Group 3

2. What do the solutions in each of the three groups have in common?

Group 1:

Group 2:

Group 3:

3. Is there a second way you might sort the cards? If so, explain how.

4. Fill in the table with the chemical formula of the substance dissolved and the ions in the solution.

Solution number	Name	Molarity and chemical formula	Cations	Anions
1	hydrochloric acid	0.010 M HCl	H <sup>+</sup>	Cl <sup>-</sup>
2	hydrochloric acid			
3	hydrochloric acid			
4	formic acid			
5	acetic acid			
6	sodium chloride			
7	methanol			
8	methanol			
9	sodium hydroxide			
10	sodium hydroxide			
11	ammonia			
12	water			

- Solutions 1, 2, and 3 each contain hydrochloric acid. How are they different?
- Hydrochloric acid, HCl, is a strong acid, whereas formic acid, CHOOH, and acetic acid, CH<sub>3</sub>COOH, are weak acids. Use the Acid-Base Solution cards to explain the difference.
- What do all the solutions with the word *acid* in their name have in common?
- Solutions with OH<sup>-</sup> ions are called basic. Which solutions are basic?
- Solutions 6, 7, 8, and 12 are neutral. What do you think this means?
- Making Sense** Based on what you've learned today, provide your own definitions of acid and base.
- If You Finish Early** Solution 11 is the result of dissolving ammonia, NH<sub>3</sub>, in water. There are no O atoms in the molecule. How is it possible that the solution is basic? (Where do the OH<sup>-</sup> ions come from?)