

## Proton Shuffle



Name: \_\_\_\_\_

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

**Purpose:** This activity will provide you with information to expand on your definition of acids and bases.

**Procedure:**

1. Sort the cards into three groups – acid, base and neutral.
2. Look for patterns within the three groups.
3. Sort the cards into smaller groups within each category.

**Answer the following questions:**

1. How did you sort the acids into smaller groups? Show the groups below – include each compound's name and formula.

**Acids**

2. List your reasons for placing the acids in these particular groups.
3. What do all of the acids have in common?
4. How did you sort the bases into smaller groups? Show the groups below – include each compound's name and formula.

**Bases**

5. List your reasons for placing the bases in these particular groups.
6. What are two ways that a substance can form  $\text{OH}^-$  in solution?

7. Explain why some of the compounds are bases when they do not have an  $\text{OH}^-$  in their chemical formula.
8. How did you sort the neutrals into smaller groups? Show the groups below – include each compound's name and formula.

Neutral Substances

9. List your reasons for placing the neutral substances in these particular groups.
10. Excluding water, what is similar about all of the neutral substances? What causes a substance to be neutral?
11. Why don't  $\text{H}^+$  or  $\text{OH}^-$  ions come off of ethanol, ethyl acetate, acetone, and formaldehyde?
12. Would you predict HI to be an acid or a base? Explain.
13. Water can act as an acid or a base. Explain why.
14. Water can be an acid or a base, but it is still classified as a neutral substance. Explain.
15. Would you predict  $\text{Ca}(\text{OH})_2$  to be an acid or a base? Explain.

**Making Sense:**

The Arrhenius definition of acids and bases defines them as substances that release either  $\text{H}^+$  or  $\text{OH}^-$ . How can we expand on this definition to include substances like methylamine,  $\text{CH}_3\text{NH}_2$ , and ammonia,  $\text{NH}_3$ ?

**If you finish early:**

Ammonium chloride,  $\text{NH}_4\text{Cl}$  is an acid. Write an equation explaining what you think is going on in solution.