

## Guideline Practice **pH Scale**: COMPARING USES

**Directions:** Use the handout “Creating PhET Activities using Guided Inquiry Strategies” to compare the sample activities written for the simulation *pH Scale*. Use your time to focus on comparing the strategies used, not on actually doing the activities.

1. Which sample, A or B, uses the guidelines?
2. Which guidelines do you feel are applied in this activity?
3. How do you think aligning the activity with the guidelines will affect student learning about acids and bases? Discuss your thinking with your partner.

### **Sample Activity A:**

**Directions:** Make sure you are viewing concentrations in mol/L.

1. Using the pull-down menu, change the contents of the beaker to “water”.  
Record: pH \_\_\_\_  $\text{H}_3\text{O}^+/\text{OH}^-$  ratio. \_\_\_\_  
 $\text{H}_3\text{O}^+$  concentration \_\_\_\_ (mol/L)
2. Fill the beaker with drain cleaner.  
Record: pH \_\_\_\_  $\text{H}_3\text{O}^+/\text{OH}^-$  ratio. \_\_\_\_  
 $\text{H}_3\text{O}^+$  concentration \_\_\_\_ (mol/L)
3. Fill the beaker with custom liquid set on pH = 3. Record:  $\text{H}_3\text{O}^+/\text{OH}^-$  ratio. \_\_\_\_  
 $\text{H}_3\text{O}^+$  concentration \_\_\_\_ (mol/L)
5. Fill the beaker with spit. Drain out half, and replace that amount with water.  
Record: pH \_\_\_\_  $\text{H}_3\text{O}^+/\text{OH}^-$  ratio. \_\_\_\_  $\text{H}_3\text{O}^+$  concentration \_\_\_\_ (mol/L)

### **Conclusions:**

- A. Complete these phrases: As pH increases, the concentration of hydronium [ $\text{H}_3\text{O}^+$ ] \_\_\_\_.  
As pH increases, the concentration of hydroxide [ $\text{OH}^-$ ] \_\_\_\_.
- B. For 1-4, find the negative logarithm (-log)  $\text{H}_3\text{O}^+$  measured in mol/L. This should match the pH value you wrote. Does it?
- C. What happens when you add water to acids and bases?

### **Sample Activity B**

**Prelab:** List some common liquids that you think are acidic or basic. For example, do you think orange juice is acid or base? Talk to your partner about why you think the liquid is an acid or base. How do you think adding water changes how acidic or basic the liquid is?

**Directions:** Use specific examples to demonstrate each of the following learning goals.

1. Determine if a solution is acidic or basic using
  - a. pH
  - b.  $\text{H}_3\text{O}^+/\text{OH}^-$  ratio (molecular size representation of just the ions in the water equilibrium)
  - c. Hydronium/Hydroxide concentration
  - d. Color of liquid
2. Predict if dilution and volume will increase, decrease or not change the pH. Test your predictions and make changes if necessary.
3. Organize a list of liquids in terms of acid or base strength in relative order with supporting evidence.