



3. What is the meaning of pH? **Choose the “micro” screen** from the options at the bottom of the page.
- A. What are the three quantities measured by the scale on the left?
- B. The substances in the boxes are  $\text{H}_2\text{O}$ ,  $\text{H}_3\text{O}^+$  and  $\text{OH}^-$ . Relate these three substances in a balanced chemical equation.
- C. Change the solutions and look at the concentration values. Which concentration level always stays constant?

D. How are the concentration values of the other two substances related?

- E. Now, pick out two acidic solutions and two basic solutions from the previous chart. Indicate which is higher, the  $\text{H}_3\text{O}^+$  concentration or the  $\text{OH}^-$  concentration.

Acidic/basic	solution	Which is higher, $\text{H}_3\text{O}^+$ or $\text{OH}^-$ ?
Acidic		
Acidic		
Basic		
Basic		

- F. Change the logarithmic scale to linear. What do you notice about the position of the boxes on the scale? Why is a logarithmic scale preferred when measuring the concentration of  $\text{H}_3\text{O}^+$  and  $\text{OH}^-$ ?

4. Now, let's see what is happening on a molecular level. Choose the "custom" screen from the options at the bottom of the page

A. Let's see how the pH is affected by these species. Move the sliders on the scale to make the pH read 1. Record the  $[H_3O^+]$  and  $[OH^-]$ . Indicate if the solution is acidic, basic or neutral

pH	$[H_3O^+]$	$[OH^-]$	Acidic/basic/neutral
1			
3			
5			
7			
9			
11			
13			

B. Look at the concentration values of  $H_3O^+$  and  $OH^-$ . Which one of these values relates to pH? How does it relate?

C. In acidic solutions, which is greater?  $[H_3O^+]$  and  $[OH^-]$ ? Give an example.

D. In basic solutions, which is greater?  $[H_3O^+]$  and  $[OH^-]$ ? Give an example.

E. In neutral solutions, which is greater?  $[H_3O^+]$  and  $[OH^-]$ ? Give an example.

F. Now, get out your calculator. Multiply the  $[H_3O^+]$  by the  $[OH^-]$  for a few of the solutions. What do you notice?

5. **Putting it together.** Use the information from the simulation to answer these questions.

A. On a molecular scale, what is the difference between an acid and a base?

B. In solutions, how are the  $[H_3O^+]$  and  $[OH^-]$  related?

C. What does pH measure?