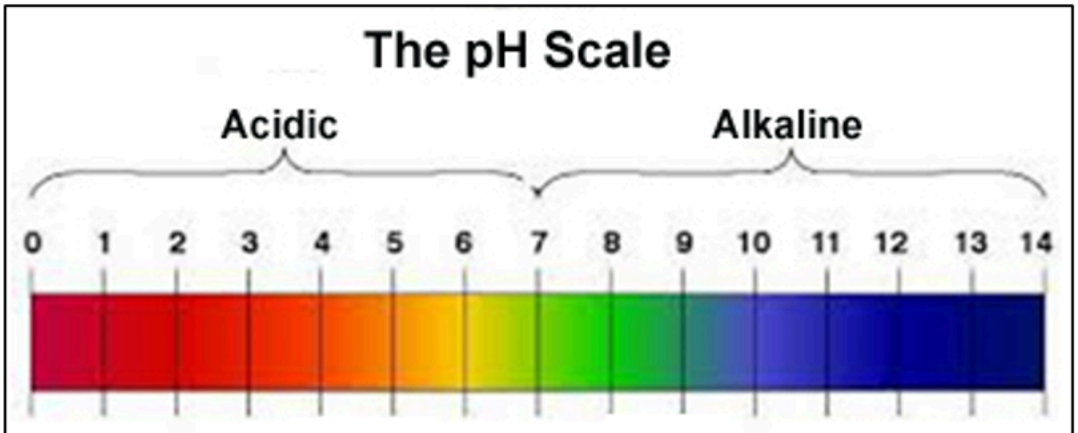
AP Chemistry Daily Videos

8.1 Introduction to Acids and Bases

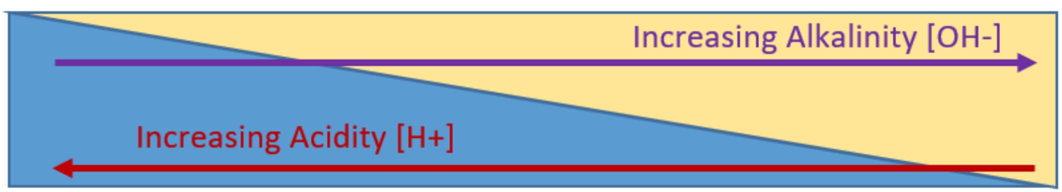
Video #1

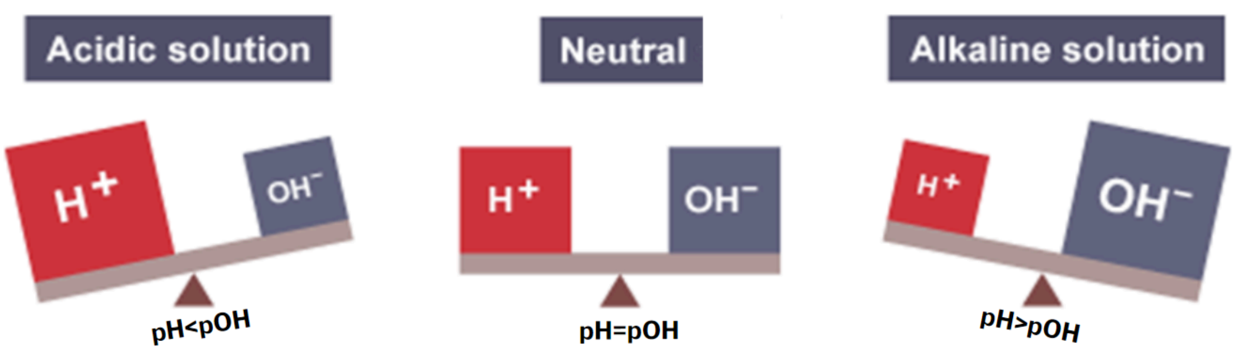
1. What does Kw represent? At what temperature is it equal to $1x10^{-4}$?

2. Complete the following table:



pH															
[H+]															
pOH															
[OH-]															





3. As pH increases acidity __________________________.

4. Did your answers match the instructor's?

(a) Calculate the pOH of a solution with $[\mathbf{H_3O^+}] = \mathbf{6.2 \times 10^{-8}}\ \boldsymbol{M}$
(b) Is this solution acidic or basic? Justify your answer.

[Video #2](#)

1:36

1. Estimate the pH if the [H+]= $5\text{x}10^{-8}$ M

2. If Kw increases as temperature increases, more ___________ is formed. Based on this statement, deduce if the dissociation of water is endothermic or exothermic?

3. Regardless of temperature, [H+] and [OH-] are always _______ in pure water or neutral solutions. For solutions that aren't neutral, you can find the concentrations of H+ and OH- by using the formula Kw=[H+][OH-].

4. Neutral pH doesn't always equal 7. Under what condition does water have a neutral pH of 7?

5. pH and pOH are always _____ in pure water. However, pH + pOH doesn't always equal 14. Under what conditions does pH+pOH=14?

6. How does pKa values relate to Ka values?

7. Complete the table by adding the words strong and weak.

	_____ Acids ⟵⟶ _____ Acids			
pKa	-4	-2	8	14
Ka	$1\text{x}10^{4}$	$1\text{x}10^{2}$	$1\text{x}10^{-8}$	$1\text{x}10^{-14}$

8. Evaluate your work on the following problem.

(a) The hydronium ion concentration of a solution at 50°C is $6.2 \times 10^{-8}\ M$. Calculate the hydroxide ion concentration of the solution at this temperature. $\mathrm{p}K_w = 13.262$ at 50°C.
(b) Is this solution acidic or basic? Justify your answer.

9. As temperature increases, the pH of pure water ___________.

10. What is the best way to determine if a solution is acidic or basic?

11. True or False?

Statement	True/False? If False, rewrite the statement to make it true.
pH=pOH for all neutral solutions at all temperatures	
[H+]=[OH-] for all neutral solutions at all temperatures	
Kw = Ka x Kb at all temperatures	
pKa + pKb = 14 at all temperatures	
Kw=1.0x10^{-14} at all temperatures	
pH+pOH=14 at all temperatures	

Check: The first three statements are true, the last three are false. They are only true at 25°C.

12. Let's work this problem another way to repeat what was stated above:

Calculate the pH of pure water at 40 °C.

$2H_2O(l) \rightleftharpoons H_3O^+(aq) + OH^-(aq)$

In pure water: $[H_3O^+] = [OH^-]$

$2.92\times10^{-14} = [H_3O^+][OH^-] = [H_3O^+]^2$

$[H_3O^+] = \sqrt[2]{2.92\times10^{-14}} = 1.71\times10^{-7}\,M$

$pH = 6.767$

Because this problem is at 40°C, Kw=2.92x10^{-14}

2.92x10^{-14}=[H+][OH-]=$[OH-]^2$

[OH-]=1.71x10^{-7}M

This makes sense because we see that the concentrations of H+ and OH- are always equal in pure water.

Since the concentrations are equal, pH must equal pOH because they are both -log of their ion's concentration.

pOH=6.767

Don't make the mistake of thinking pOH=14-pH, this can only be used at 25°C.

You could use pOH=x-6.767, where x=-logKw=-log 2.92x10^{-14}=13.5346.

At 40°C, pOH=13.5346-pH = 13.5346-6.767= 6.768

pH+pOH=13.5346