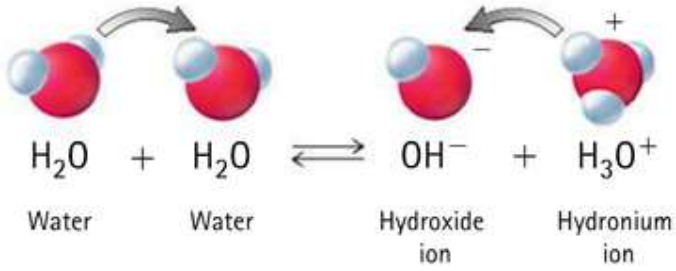
3. AN INTRODUCTION TO pH

UNIT 4 CH40S WIEBE

1

WATER IS AMPHOTERIC



$K_w =$

- In a sample of pure water, occasionally molecules collide effectively and a H^+ transfer occurs.
- This equilibrium is **VERY** reactant favoured.
- All aqueous solutions contain both H_3O^+ and OH^-.

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AQUEOUS SOLUTION RELATIONSHIPS

In neutral solutions	$[H^+_{(aq)}] = [OH^-_{(aq)}]$
In acidic solutions	$[H^+_{(aq)}] > [OH^-_{(aq)}]$
In basic solutions	$[H^+_{(aq)}] < [OH^-_{(aq)}]$

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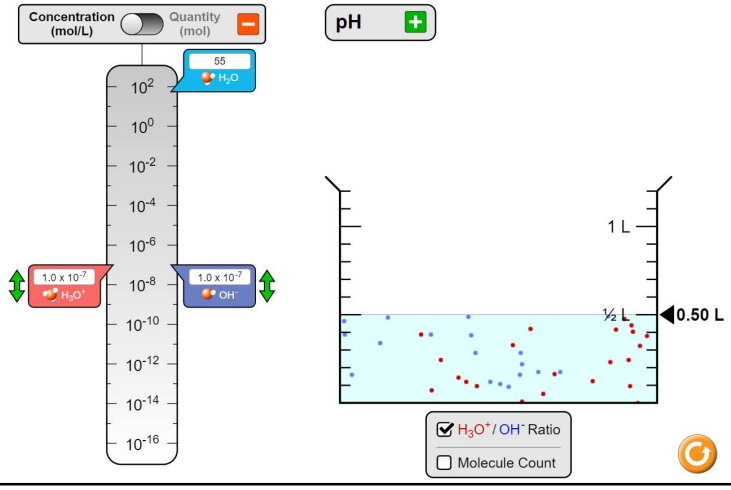
OBSERVE

https://phet.colorado.edu/sims/html/ph-scale/latest/ph-scale_en.html



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WORKING WITH K_w

	$[H_3O^+]$	WORK	$[OH^-]$	Acid Base Neutral
1.	1.0×10^{-8} M			
2.			1.0×10^{-10} M	
3.	1.0×10^{-7} M			

Note that in an <u>acid</u>, the $[H_3O^+]$ is LARGE and the $[OH^-]$ is small.

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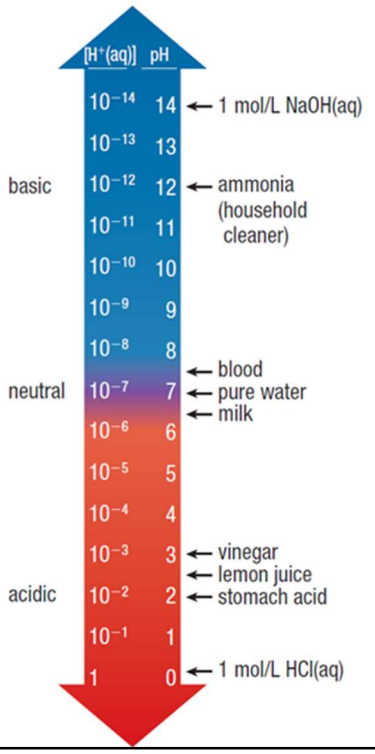
THE pH SCALE

- pH is used to represent the hydrogen/hydronium ion concentration in a solution.
- pOH is used to represent the hydroxide ion concentration in a solution.
- In every solution, the **pH + pOH = 14**.

pAnything = logarithm of that thing



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USING LOGS TO SIMPLIFY THINGS

pH the negative logarithm of the concentration of hydrogen ions in an aqueous solution

$$pH = -\log[H^+(aq)]$$

pOH the negative logarithm of the concentration of hydroxide ions in an aqueous solution

$$pOH = -\log[OH^-(aq)]$$

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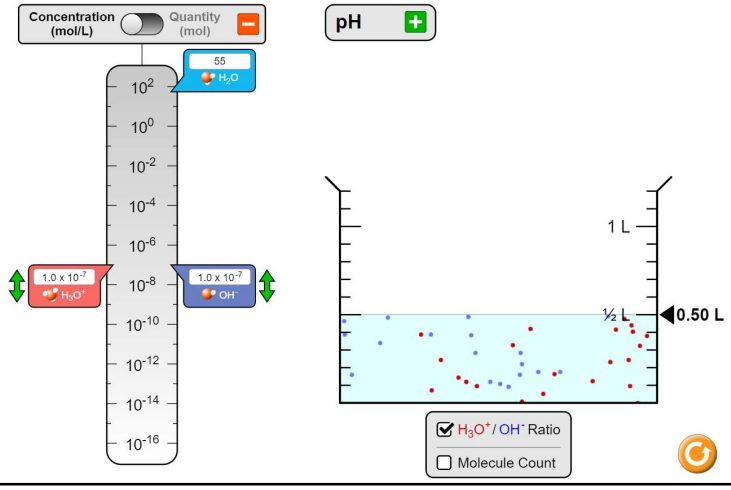
OBSERVE

https://phet.colorado.edu/sims/html/ph-scale/latest/ph-scale_en.html



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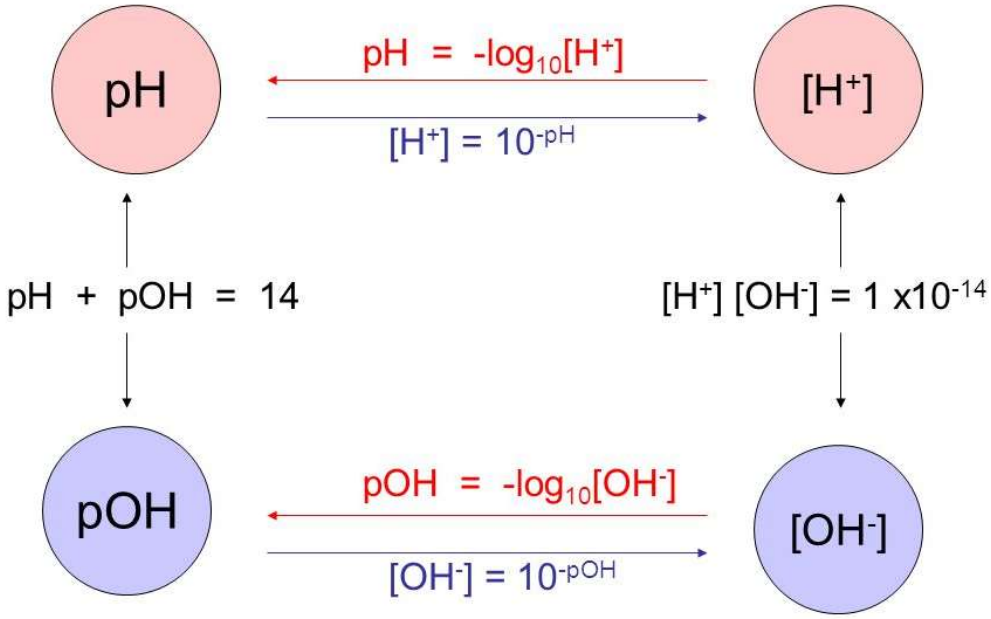
A HANDY TOOL…



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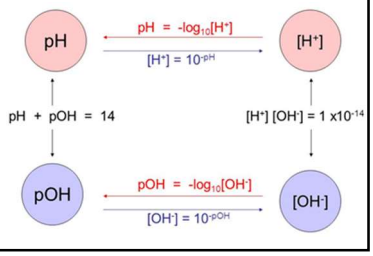
WORKING WITH pH

$[H_3O^+]$	$[OH^-]$	pH	pOH
1.0×10^{-4} M			



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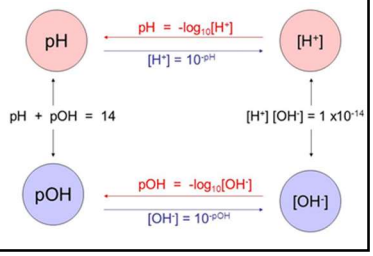
WORKING WITH pH

$[H_3O^+]$	$[OH^-]$	pH	pOH
2.3×10^{-2} M			



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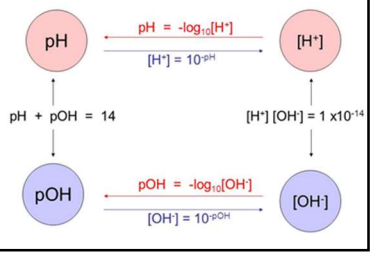
WORKING WITH pH

$[H_3O^+]$	$[OH^-]$	pH	pOH
	1.0×10^{-6} M		



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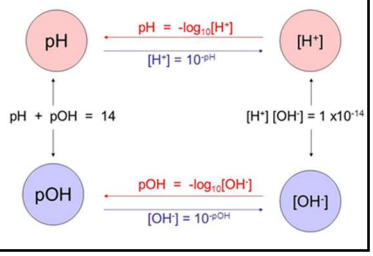
WORKING WITH pH

$[H_3O^+]$	$[OH^-]$	pH	pOH
	7.2×10^{-5} M		



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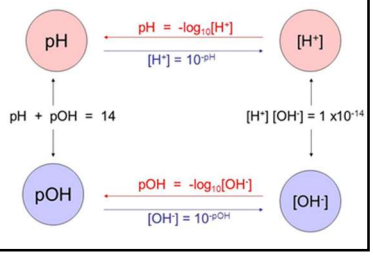
WORKING WITH pH

$[H_3O^+]$	$[OH^-]$	pH	pOH
		3.00	



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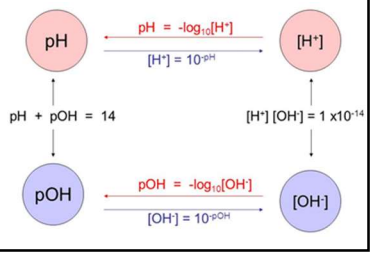
WORKING WITH pH

$[H_3O^+]$	$[OH^-]$	pH	pOH
		8.35	



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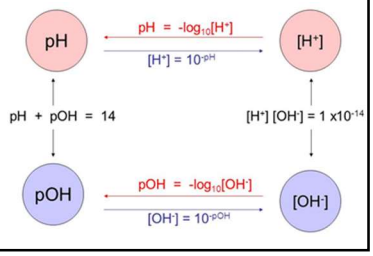
WORKING WITH pH

$[H_3O^+]$	$[OH^-]$	pH	pOH
			11.00



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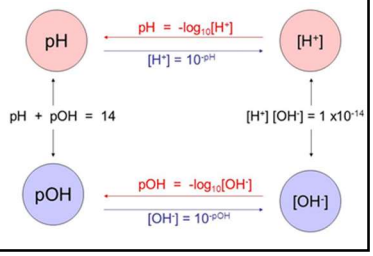
WORKING WITH pH

$[H_3O^+]$	$[OH^-]$	pH	pOH
			5.73



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