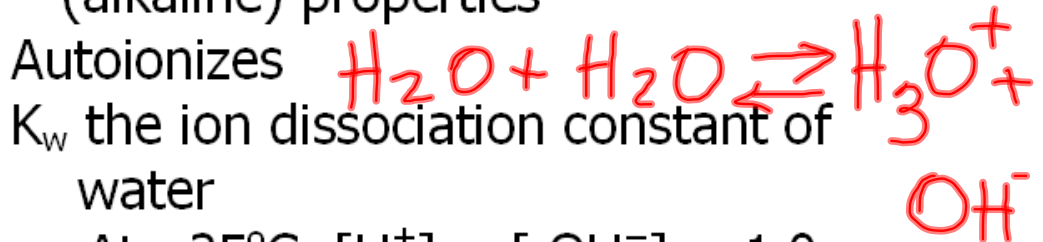


Water:

Amphoteric—has acidic and basic (alkaline) properties

Autoionizes



$K_w$  the ion dissociation constant of water

$$\text{At } 25^\circ\text{C}, [H^+] = [OH^-] = 1.0 \times 10^{-7} \text{ mol/L}$$

$$K_w = [H^+][OH^-] \\ = (1.0 \times 10^{-7} \text{ mol/L})(1.0 \times 10^{-7} \text{ mol/L})$$

$$= 1.0 \times 10^{-14} \text{ mol}^2/\text{L}^2$$

(units are often dropped)

increases as temp. increases

$pH < 7$



neutral soln:  $[H^+] = [OH^-]$

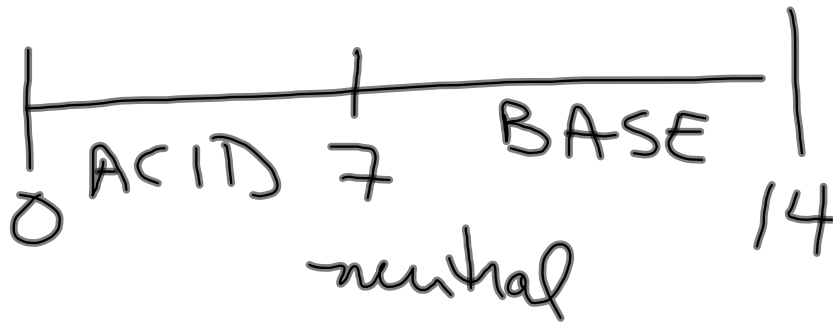
acidic soln:  $[H^+] > [OH^-]$

$pH > 7$



basic soln:  $[H^+] < [OH^-]$

pH scale: used to represent soln.  
acidity



$$\text{pH} = -\log [\text{H}^+]$$

$$\text{pOH} = -\log [\text{OH}^-]$$

$$\text{pH} + \text{pOH} = 14$$

Ex. 1

Calculate the  $[H^+]$ ,  $[OH^-]$ , pH, and/or pOH for the following:

- a.  $1.0 \times 10^{-5} \text{ M OH}^-$
- b.  $1.0 \times 10^{-7} \text{ M OH}^-$
- c.  $10.0 \text{ M H}^+$
- d.  $1.0 \times 10^{-3} \text{ M OH}^-$
- e.  $1.0 \text{ M H}^+$

Ex. 2

The pH of a sample of human blood was measured to be 7.41 at 25°C. Calculate the pOH,  $[H^+]$ , and  $[OH^-]$  for the sample.

Ex. 3

Calculate the pH of the following:

a. 0.10 M HNO<sub>3</sub>

b. 1.0 x 10<sup>-10</sup> M HCl

Fill in the following table:

<b>Solution</b>	<b>pH</b>	<b>pOH</b>	<b>[H<sup>+</sup>]</b>	<b>[OH<sup>-</sup>]</b>	<b>Acid base or neutral</b>
<b>A</b>	<b>6.88</b>				
<b>B</b>				<b>8.4 x 10<sup>-14</sup></b>	
<b>C</b>		<b>3.11</b>			
<b>D</b>			<b>1.0 x 10<sup>-7</sup></b>		