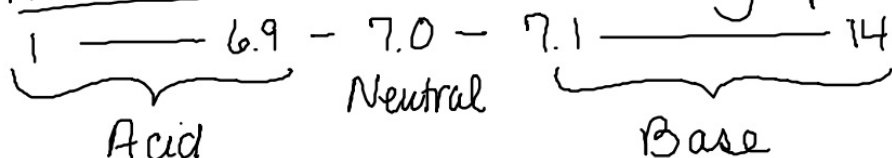


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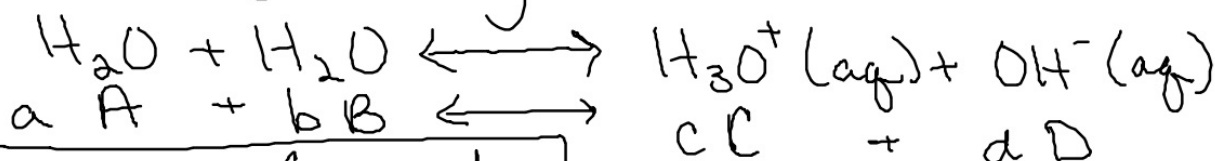
## Acids + Bases - Determining pH



Acids increase the hydrogen in water when they dissociate - this forms  $H_3O^+$

hydronium ion

water self-ionizing



$$K_{eq} = \frac{[C]^c [D]^d}{[A]^a [B]^b}$$

[ ] "concentration of"

$$K_w = \frac{[H_3O^+]' [OH^-]'}{[H_2O] [H_2O]} = [H_3O^+] [OH^-] = 1.0 \times 10^{-14}$$

at room temp -

$$\text{pure water } K_w = [\text{H}_3\text{O}^+][\text{OH}^-] = 1.0 \times 10^{-14}$$

[ ] = concentration calculated by Molarity

$$\text{pure H}_2\text{O} \quad [\text{H}_3\text{O}^+][\text{OH}^-] = 1.0 \times 10^{-14} \quad x^2 = 1.0 \times 10^{-14}$$

$$[\text{H}_3\text{O}^+] = 1.0 \times 10^{-7} \text{ M}$$

$$[\text{OH}^-] = 1.0 \times 10^{-7} \text{ M}$$

$$\text{pH} = -\log [\text{H}_3\text{O}^+]$$

$$\text{pH} = -\log [1.0 \times 10^{-7}] = 7$$

$$\text{pOH} = -\log [1.0 \times 10^{-7}] = 7$$

pH problems:

- ① identify the solute (is it an acid or base)
- ② calculate molarity
- ③ Determine pH or pOH based on problem

Practice:

$$1. K_w = [\text{H}_3\text{O}^+][\text{OH}^-] = 1.0 \times 10^{-14}$$

$$(1 \times 10^{-5} \text{ M})[\text{OH}^-] = 1.0 \times 10^{-14}$$

$$[\text{OH}^-] = \frac{1.0 \times 10^{-14}}{1.0 \times 10^{-5}}$$

$$[\text{OH}^-] = 1.0 \times 10^{-9} \text{ M}$$