

## Acid-Base Equilibrium

1. Define the following terms:

a) Arrhenius Acid

proton donor  
( $H^+$  donor)

b) Arrhenius Base

hydroxide ion donor  
( $OH^-$  donor)

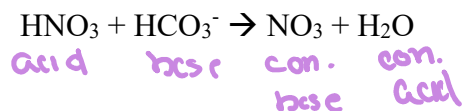
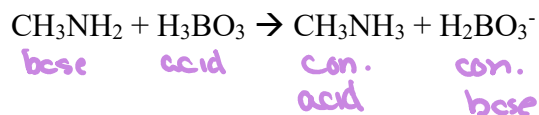
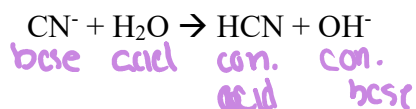
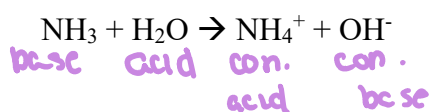
c) Bronsted-Lowry Acid

proton donor  
( $H^+$  donor)

d) Bronsted-Lowry Base

proton acceptor  
( $H^+$  acceptor)

2. Label the acid, base, and their conjugates in the following reactions:



3. What is the formula for pH?

$$pH = -\log[H^+]$$

4. What is the formula for pOH? How do we find pH from it?

$$pOH = -\log[OH^-]$$

$$pH = 14 - pOH$$

5. Calculate the pH of the following solutions:

- a)  $1.0 \times 10^{-3}$  M HCl

$$pH = -\log[H^+]$$

$$= -\log(1.0 \times 10^{-3})$$

$$pH = 3.00$$

- b) 0.0234 M KOH

$$pOH = -\log[OH^-]$$

$$pOH = -\log(0.0234)$$

$$pOH = 1.63$$

$$pH = 14 - 1.63$$

$$pH = 12.369$$

- c)  $6.2 \times 10^{-5}$  M NaOH

$$pOH = -\log[OH^-]$$

$$pOH = -\log(6.2 \times 10^{-5})$$

$$pOH = 4.21$$

$$pH = 14 - 4.21$$

$$pH = 9.79$$

6. Calculate the pH and pOH of a  $7.80 \times 10^{-6}$  M solution of  $Ca(OH)_2$ . Determine if the solution is acidic, basic, or neutral.

$$pOH = 4.807$$

$$pH = 9.193$$

$$2(7.80 \times 10^{-6}) = 1.56 \times 10^{-5}$$

$$-\log(1.56 \times 10^{-5}) = 4.807$$

7. What is a polyprotic acid?

an acid with more than 1 acidic proton

8. List the 7 strong acids:

HCl, HI, HBr, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, HClO<sub>3</sub>, HClO<sub>4</sub>

9. To be considered strong, an acid or base has to:

dissociate completely