

Strong bases ionize completely in solution.

Typically hydroxides are strong bases.

The conjugate base of a weak acid is also a strong base.

Weak base ionizes very little in solution and have small  $K_b$  values.

General reaction between a base and water:



Equilibrium constant for rxn:

$$K_b = \frac{[BH^+][OH^-]}{[B]}$$

Ex. 1

Calculate the pH of  $5.0 \times 10^{-2} \text{ M}$   
NaOH soln.



$$[\text{OH}^-] = 5.0 \times 10^{-2} \text{ M}$$

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

↓

$$= 1.30$$

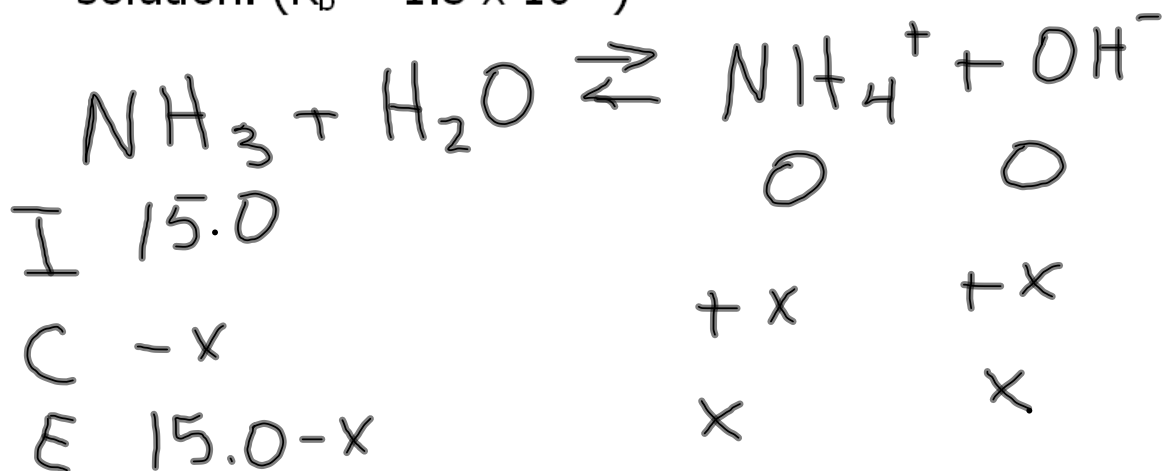
$$\text{pH} = 12.70 = 14 - 1.30$$

$$[\text{H}^+][\text{OH}^-] = K_w$$

$$[\text{H}^+] (5.0 \times 10^{-2}) = 1.0 \times 10^{-14}$$

Ex. 2

Calculate the pH of a 15.0 M  $\text{NH}_3$  solution. ( $K_b = 1.8 \times 10^{-5}$ )



$$K_b = \frac{[\text{NH}_4^+][\text{OH}^-]}{[\text{NH}_3]}$$
$$1.8 \times 10^{-5} = \frac{(x)(x)}{15}$$

AXIS

$$15-x \approx 15$$

$$x^2 = 2.7 \times 10^{-4}$$

$$x = \sqrt{2.7 \times 10^{-4}}$$

$$x = 1.64 \times 10^{-2} = [\text{OH}^-] = [\text{NH}_4^+]$$

$$\begin{aligned} \text{pOH} &= -\log[\text{OH}^-] \\ &= -\log(1.64 \times 10^{-2}) \\ &= 1.79 \end{aligned}$$

$$\begin{aligned} \text{pH} &= 14 - \text{pOH} \\ &= 14 - 1.79 \\ &= 12.21 \end{aligned}$$

Ex. 3

Calculate the pH of a 1.0 M soln. of methylamine ( $\text{CH}_3\text{NH}_2$ ).

( $K_b = 4.38 \times 10^{-4}$ )