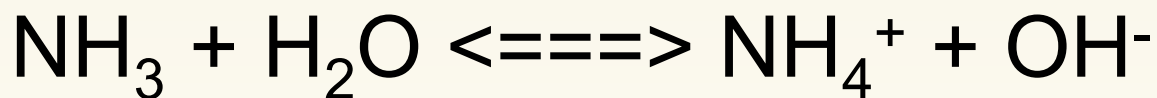


K_b

K_b

K_b – dissociation constant for weak bases



The K_b , the stronger the base.

The K_b , the weaker the base.

K_b

Similar to K_a values, pK_b values can be calculated.

The larger the pK_b value, the weaker the base and the smaller the pK_b , the stronger the base.

K_b

How are K_a and K_b related?

K_b

RECALL: Equilibrium Law

When chemical equilibria are added together, the equilibrium constants are multiplied together.

$$K_{\text{eq final rxn}} = K_{\text{eq rxn 1}} \times K_{\text{eq rxn 2}}$$

K_b

K_b Calculations

Two types of calculations may also be completed:

- 1) Calculate the values of K_b and pK_b from the pH of a solution of a weak base of known initial concentration.
- 2) Calculate the pH of a solution where pK_b and initial concentration are known.

K_b

Example 1

Methylamine, CH_3NH_2 , is one of several substances that give herring brine its pungent odor. In 0.100 M CH_3NH_2 , the pH is 11.80. What is the K_b of methylamine?

$\therefore K_b$ is 4.24×10^{-4}

K_b

Example 2

$C_{17}H_{19}NO_3$ Morphine is an alkaloid (an alkaline compound obtained from plants), which is a weak base. The pH of 0.010 M morphine is 10.10. Calculate K_b and pK_b morphine.

K_b

Example 2

$C_{17}H_{19}NO_3$ Morphine is an alkaloid (an alkaline compound obtained from plants), which is a weak base. The pH of 0.010 M morphine is 10.10. Calculate K_b and pK_b morphine.

$$\therefore pK_b = 5.8, k_b = 1.6 \times 10^{-6}$$

K_b

Example 3

Calculate the values of pH, pOH and $[\text{OH}^-]$ of a 0.20 M solution of ammonia. K_b of ammonia is 1.8×10^{-5}

$$\therefore \text{pH} = 11.3, \text{pOH} = 2.7, [\text{OH}^-] = 1.9 \times 10^{-3} \text{M}$$

The characteristic taste of tonic water is due to the addition of quinine. Quinine is a naturally occurring compound that is also used to treat malaria. The base dissociation constant, K_b , for quinine is 3.3×10^{-6} . Calculate $[\text{OH}^-]$ and the pH of a 1.7×10^{-3} mol/L solution of quinine.