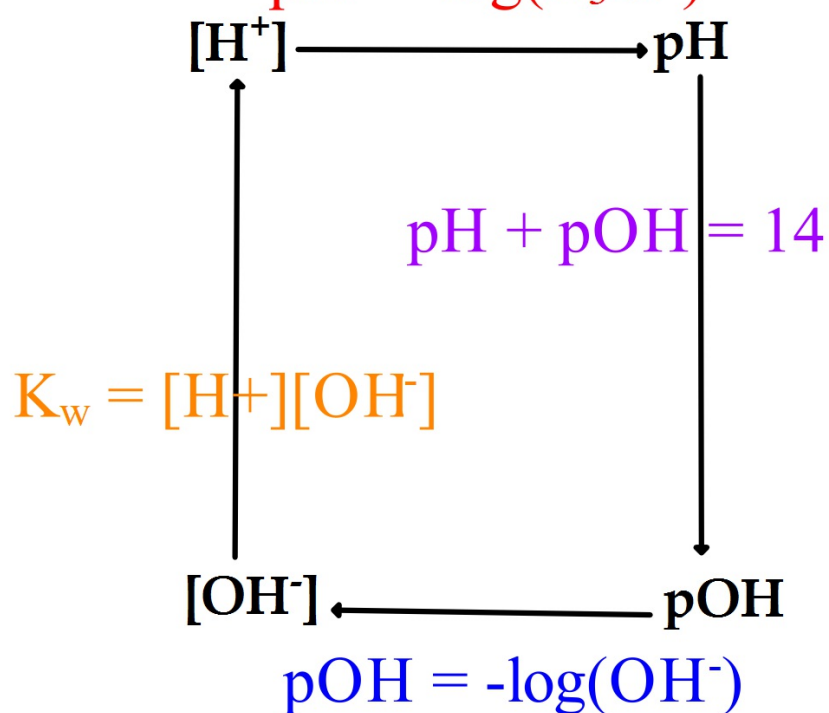# Lesson Overview
Weak Acids and Bases

Objective: The student will be able to calculate the pH of a solution composed of a weak acid or base.

Reminders of the Fundamental Acid-Base Equations from Chemistry I

$$pH = -\log([H^+]) \text{ or }$$
$$pH = -\log(H_3O^+)$$

$[H^+] \longrightarrow pH$

$$pH + pOH = 14$$

$$K_w = [H+][OH^-]$$

$[OH^-] \longleftarrow pOH$

$$pOH = -\log(OH^-)$$

Sample Problem
pH of a strong monoprotic acid

What is the pH of a 0.0023 M solution of nitric acid?

Sample Problem
pH of a strong monobasic base

When 0.556 grams of KOH are dissolved in enough water to make 2.00 liters of solution, what is the pH and the pOH?

Sample Problem
pH of a strong dibasic base

When 2.6×10^{-3} moles of barium hydroxide are dissolved in enough water to make 25.0 liters of solution, what is the pOH, the pH, and the $[H_3O^+]$?

Phenylacetic acid ($C_6H_5CH_2COOH$, or HPAc) builds up in the blood of persons with phenylketonuria, an inherited disorder that, if left untreated, causes mental retardation and death. A study of the acid shows that the pH of a 0.12 M HPAc solution is 2.62. What is the K_a of phenylacetic acid?

Propanoic acid (CH_3CH_sCOOH, HPr) is a carboxylic acid whose salts are used to retard growth in foods. What is the $[H_3O^+]$ of a 0.10M HPr ($K_a = 1.3 \times 10^{-5}$)

Ascorbic acid ($H_2C_6O_6$, or H_2Asc), known as Vitamin C, is a diprotic acid ($K_{a,1} = 1.0 \times 10^{-5}$ and $K_{a,2} = 5.0 \times 10^{-12}$) found in citrus fruit. Calculate the [$HAsc^-$], [Asc^{2-}], and the pH of a 0.050 M solution of H_2Asc.

Complications with sulfuric acid

What is the pH of a 0.122 M solution of sulfuric acid? (Look at the K_a values)

Weak Base Problems

examples / derivation of K_b / meaning

Sodium acetate (CH₃COONa, or NaAc) is used in textile dyeing. What is the pH of 0.25 M NaAc at 25°C? K_a of acetic acid is 1.8×10^{-5}.

Sodium hypochlorite is the active ingredient in household laundry bleach. What is the pH of 0.20 M NaClO? ($K_a = 2.9 \times 10^{-8}$)