

Name: _____

Period: _____

Seat#: _____

Directions:

- Show your work on binder paper!
- Some answers are provided at the end of the problem. They are underlined.

-
- 1) strong acid solution** – 0.00125M HNO₃
 - a. determine [H⁺]
 - b. calculate pH 2.903
 - 2) strong base solution** – 0.00125M KOH
 - a. determine [OH⁻]
 - b. calculate pOH
 - c. calculate pH 11.097
 - 3) weak acid solution** – 0.00125M HOCl K_a = 3.5 x 10⁻⁸
 - a. determine [H⁺] using ICE box
 - b. calculate pH 5.18
 - 4) weak base solution** – 0.00125M NH₃ K_b = 1.8 x 10⁻⁵
 - a. determine [OH⁻] using ICE box
 - b. calculate pOH
 - c. calculate pH 10.15

For the following problems, assume the 5% rule for all (even if it may not apply) just so you can get some extra practice with the 5% rule.

- 5)** Find the pH of 0.065 M formic acid. The acid dissociation constant (K_a) for formic acid is 1.8 x 10⁻⁴. 2.47
- 6)** Find the pH of a 0.325 M acetic acid solution. K_a = 1.8 x 10⁻⁵. 2.62
- 7)** Find the pH of a solution that contains 0.0034 M lactic acid (K_a = 1.4 x 10⁻⁴) and 0.056 M propionic acid (K_a = 1.4 x 10⁻⁵). 2.80
- 8)** What is the pH of a 0.00056 M butyric acid solution. K_a = 1.5 x 10⁻⁵. 4.04

Challenge Problems (optional):

- Complete these and come show me – if you get it correct I'll give you some tickets!

- 9) Diprotic acid solution** – Calculate the pH of 0.00125M H₂CO₃ K_{a1} = 4.2 x 10⁻⁷ K_{a2} = 4.8 x 10⁻¹¹
 - a. First dissociation – assume all molecules lose one [H⁺]
 - i. Find [H⁺] with simple pH calculation
 - b. Second dissociation – assume all molecules lose the second [H⁺]
 - i. Find [H⁺] using ICE box
 - c. Add [H⁺] from first and second dissociation
 - d. Calculate pH from the sum of all [H⁺]
- 10) Mixture of acid and base** – Calculate the pH of 20.0 mL of 0.00125M HNO₃ + 30.0 mL of 0.00125M KOH
 - a. calculate moles of H⁺ and OH⁻
 - b. determine moles of excess H⁺ or OH⁻,
 - c. determine total volume
 - d. calculate [H⁺] or [OH⁻]
 - e. calculate pH