

CHEM 1451 Lab Week 11 Acid-Base Portfolio Report

Name: _____ Date: _____

Coach's Name _____

Instructions

Make sure to use the correct number of significant figures and units when you answer questions.

To complete a box titled "Measured", copy your measurement that you made in the previous week.

Part A: Measuring the pH of solutions

I. Complete the following table. Show all work below the table. (40 pts)

Solution	Measured pH	$[H_3O^+]$	$[OH^-]$	pOH	Acidic, Basic, or Neutral
Orange Juice	pH = 5.00				
Milk	pH = 7.50				

Calculations for Orange Juice:

Calculations for milk:

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Part B: Determination of K_a of Acetic Acid

2. The concentration of distilled white vinegar is written as 5% (w/v) of acetic acid (CH_3COOH). Convert the concentration in the unit of molarity. Express your answer in four significant figures. Show your work here. (10 pts)

Consider 1 L = 1000 mL of vinegar
the mass of CH_3COOH = 5% of 1000 mL
= $5/100 \times 1000 = 50\text{g}$
moles of CH_3COOH = mass/molar mass of CH_3COOH
= $50/60.052 = 0.8326\text{mol}$
Molarity = moles of CH_3COOH / volume
= $0.8326/1 = \boxed{0.8326\text{M}}$

3. Calculate the concentration of hydronium ions $[\text{H}_3\text{O}^+]$ of vinegar from the measured pH values. Express your answer in two significant figures. Show your all work. (10 pts)

Measured pH	Calculated $[\text{H}_3\text{O}^+]$
pH = 2.50	

Calculations of $[\text{H}_3\text{O}^+]$:

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4. Using the initial concentration of CH_3COOH (from **Problem 2**) and the equilibrium concentration of H_3O^+ calculated (from **Problem 3**), complete the reaction table for vinegar. Then, calculate the acidity constant. Show your work.

Reaction Table: (27 pts: 3 pts for each entry)

	$\text{CH}_3\text{COOH} (aq)$	+	$\text{H}_2\text{O} (l)$	$\rightleftharpoons$	$\text{CH}_3\text{COO}^- (aq)$	+	$\text{H}_3\text{O}^+ (aq)$
Initial			-				
Change			-				
Equilibrium			-				

Using the concentrations at equilibrium in the table above, calculate the acidity constant (K_a) of acetic acid. (13 pts)