

## EXERCISE 20

### Hydrolysis of Some Salts

#### **Objectives:**

1. To prepare salt solutions of specified concentrations.
2. To study the hydrolysis phenomenon for several different salts.
3. To calculate pH for a hydrolysis system.
4. To determine the chemical composition of several commercial antacids and write equations for their antacid action.

#### **Equipment**

1. test tubes
2. dial-a-gram balances
3. pH meter
4. 50 ml volumetric flasks
5. beakers and stirring rods

#### **Procedure**

You may work in groups of 4 for this procedure only.

1. Prepare 50 ml of 1 M solutions for each of the following:
  - (a) NaOAc, sodium acetate
  - (b) NaCl, sodium chloride
  - (c) NH OAc, ammonium acetate
  - (d) NH Cl, ammonium chloride

Calculate the weight of solid salt needed to give 50 ml of 1 M solution for each of the above compounds, and show your calculations on answer sheet. Then carefully weigh the amount of material to the nearest 0.01 g and add sufficient water to give exactly 50 ml of solution using volumetric flask. Record the weights of salt used.

2. Using the pH meter and pH paper, determine the pH of distilled water. Then determine the pH of each of these four solutions.
3. Using the appropriate  $K_a$  or  $K_b$  value, calculate  $K_h$  for the solutions that undergo hydrolysis.
4. From  $K_h$  and the known molar concentrations, calculate the  $[H^+]$  for the solutions that underwent hydrolysis, and then calculate their pH. Calculate the percent error between measured and calculated pH values for these solution. Show all calculations on answer sheet.

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### ANSWER SHEET - 1

NAME \_\_\_\_\_ SECTION \_\_\_\_\_

DATE \_\_\_\_\_ SAMPLE \_\_\_\_\_

1. Weight of:

NaOAc ..... \_\_\_\_\_

NaCl ..... \_\_\_\_\_

NH<sub>4</sub>OAc ..... \_\_\_\_\_

NH<sub>4</sub>Cl ..... \_\_\_\_\_

2. Record values of pH:

NaOAc ..... \_\_\_\_\_

NaCl ..... \_\_\_\_\_

NH<sub>4</sub>OAc ..... \_\_\_\_\_

NH<sub>4</sub>Cl ..... \_\_\_\_\_

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**ANSWER SHEET - 2**

NAME \_\_\_\_\_ SECTION \_\_\_\_\_

DATE \_\_\_\_\_ SAMPLE \_\_\_\_\_

3.  $K_h$  Calculations:

NaOAc ..... \_\_\_\_\_

NaCl ..... \_\_\_\_\_

$\text{NH}_4\text{OAc}$  ..... \_\_\_\_\_

$\text{NH}_4\text{Cl}$  ..... \_\_\_\_\_

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**ANSWER SHEET - 3**

NAME \_\_\_\_\_ SECTION \_\_\_\_\_

DATE \_\_\_\_\_ SAMPLE \_\_\_\_\_

4. (a) (H<sup>+</sup>) Calculations:

NaOAc ..... \_\_\_\_\_

NaCl ..... \_\_\_\_\_

NH<sub>4</sub>OAc ..... \_\_\_\_\_

NH<sub>4</sub>Cl ..... \_\_\_\_\_

(b) pH Calculations:

NaOAc ..... \_\_\_\_\_

NaCl ..... \_\_\_\_\_

NH<sub>4</sub>OAc ..... \_\_\_\_\_

NH<sub>4</sub>Cl ..... \_\_\_\_\_

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## ANSWER SHEET - 4

Percent error:

Hydrolysis of Salt

	<u>pH of Distilled Water</u>	<u>pH from Meter</u>	<u>pH from Calculations</u>
NaOAc	_____	_____	_____
NaCl	_____	_____	_____
NH <sub>4</sub> OAc	_____	_____	_____
NH <sub>4</sub> Cl	_____	_____	_____

	<u>Calculated K<sub>b</sub></u>	<u>Calculated (H<sup>±</sup>)</u>	<u>Calculated pH</u>	<u>Percent Error</u>
NaOAc	_____	_____	_____	_____
NaCl	_____	_____	_____	_____
NH <sub>4</sub> OAc	_____	_____	_____	_____
NH <sub>4</sub> Cl	_____	_____	_____	_____