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 antiacids and write equations for their antiacid 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 Ka or Kb value, calculate $K_a$ or $K_b$ for the solutions that undergo hydrolysis.

4. From $K_a$ or $K_b$ 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.
EXERCISE 20

ANSWER SHEET - 1

NAME ____________________________ SECTION ____________________________

DATE ____________________________ SAMPLE ____________________________

1. Weight of:

   NaOAc ......................................................... ____________________________

   NaCl ............................................................. ____________________________

   NH₄OAc ....................................................... ____________________________

   NH₄Cl ........................................................... ____________________________

2. Record values of pH:

   NaOAc ......................................................... ____________________________

   NaCl ............................................................. ____________________________

   NH₄OAc ....................................................... ____________________________

   NH₄Cl ........................................................... ____________________________
EXERCISE 20

ANSWER SHEET - 2

NAME ___________________________ SECTION ___________________________

DATE ___________________________ SAMPLE ___________________________

3.  $K_b$ Calculations:

NaOAc .......................................................... ___________________________

NaCl ............................................................ ___________________________

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

$\text{NH}_4\text{Cl}$ ..................................................... ___________________________
EXERCISE 20

ANSWER SHEET - 3

NAME ___________________________ SECTION ___________________________
DATE __________________________ SAMPLE ___________________________

4.  (a)  (H+) Calculations:

NaOAc ................................................................. ___________________________________

NaCl ................................................................. ___________________________________

NH₄OAc .............................................................. ___________________________________

NH₄Cl ................................................................. ___________________________________

(b)  pH Calculations:

NaOAc ................................................................. ___________________________________

NaCl ................................................................. ___________________________________

NH₄OAc .............................................................. ___________________________________

NH₄Cl ................................................................. ___________________________________
## EXERCISE 20

### ANSWER SHEET - 4

Percent error:

<table>
<thead>
<tr>
<th>Hydrolysis of Salt</th>
<th>pH of Distilled Water</th>
<th>pH from Meter</th>
<th>pH from Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>NaOAc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NaCl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NH₄Oac</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NH₄Cl</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calculated $K_a$</th>
<th>Calculated $p(H^+)$</th>
<th>Calculated $pH$</th>
<th>Percent Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>NaOAc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NaCl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NH₄OAc</td>
<td></td>
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<tr>
<td>NH₄Cl</td>
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