**Lab sheet #7**

**-Titration of a weak acid with a strong base-**

**Objectives:**

* To study titration curves.
* Determine the pKa value of a weak acid.
* Calculate the pH value at a given point.
* Reinforce the understanding of buffers.

**Method:**

You are provided with **0.1M CH3COOH** (weak acid solution) and **0.1M NaOH** (strong base solution)**:**

1. Fill up the Burette with **0.1M NaOH** solution using the funnel.
2. To a beaker, add 10 ml of **0.1M CH3COOH** solution and measure its pH value.
3. Start the titration: slowly add 0.5ml of **0.1M NaOH** (drop-wise) to the weak acid solution and mix, then record the pH value.
4. Keep on titration (step 3) until the pH reaches 9.

**Results:**

|  |  |  |  |
| --- | --- | --- | --- |
| **ml of 0.1M NaOH** | **pH** | **ml of 0.1M NaOH** | **pH** |
| 0 |  | 8.5 |  |
| 0.5 |  | 9 |  |
| 1 |  | 9.5 |  |
| 1.5 |  | 10 |  |
| 2 |  | 10.5 |  |
| 2.5 |  | 11 |  |
| 3 |  | 11.5 |  |
| 3.5 |  | 12 |  |
| 4 |  | 12.5 |  |
| 4.5 |  | 13 |  |
| 5 |  | 13.5 |  |
| 5.5 |  | 14 |  |
| 6 |  | 14.5 |  |
| 6.5 |  | 15 |  |
| 7 |  | 15.5 |  |
| 7.5 |  | 16 |  |
| 8 |  | 16.5 |  |

**1.** Record the pH values in the titration Table

**2.** Plot the titration curve (pH versus ml of 0.1M NaOH added.

**3.** The calculations

1. Calculate the pH of the weak acid HA solution at 0 ml of NaOH and after the addition of 3ml, 5ml, and 10ml of 0.1M NaOH. (using the theoretical Pka = 4.76)
2. Determine pH value from the curve (measured)

(In the discussion: compare between pH values from a&b)

|  |  |  |
| --- | --- | --- |
| **0.1M NaOH (ml)** | **Calculated pH** | **pH from titration curve** |
| **0** |  |  |
| **3** |  |  |
| **5** |  |  |
| **10** |  |  |

1. Determine the pKa value of weak acid from the curve

(In the discussion: compare the calculated Pka value with the theoretical one)

**In the Discussion**

At what pH-range did the acid show the **best** buffering behavior?

What are the chemical species at that region, what are their proportions?