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First name and last name

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Group

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Date

The Experimental Protocol: Buffers

1. The determination of buffers capacity by titration of the by using a strong base and a strong acids

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|--|-----------|-----------------------|-----------|---|-----------|-----------------------|-----------|
| Prepare a buffer with the pH=4.6 value defined according to the table in <u>Lab test 1</u> and in next step prepare a 10-fold diluted solution of the buffer according <u>Lab test 2</u> | | | | Measure out 100mL of chicken egg white solution and measure the pH value of this solution according <u>Lab test 3</u> | | | |
| The titration of acetate buffer | | | | The titration of chicken egg white | | | |
| pH= | | V=100 mL | | pH= | | V=100 mL | |
| 0.05M/L HCl | | 0.05M/L NaOH | | 0.05M/L HCl | | 0.05M/L NaOH | |
| 1. | | 1. | | 1. | | 1. | |
| 2. | | 2. | | 2. | | 2. | |
| 3. | | 3. | | 3. | | 3. | |
| 4. | | 4. | | 4. | | 4. | |
| 5. | | 5. | | 5. | | 5. | |
| 6. | | 6. | | 6. | | 6. | |
| 7. | | 7. | | 7. | | 7. | |
| 8. | | 8. | | 8. | | 8. | |
| 9. | | 9. | | 9. | | 9. | |
| 10. | | 10. | | 10. | | 10. | |
| cm³ | pH | cm³ | pH | cm³ | pH | cm³ | pH |

- **Give the definition and formula of the buffer capacity (β).**

- What is the buffer capacity (β) for the titrated buffers?

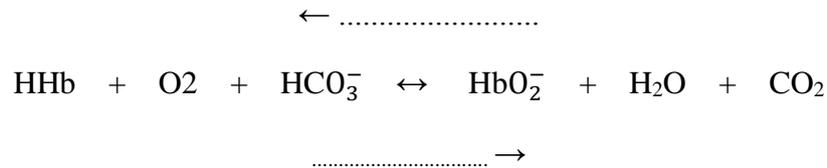
2. Effect of dilution on the pH value of a buffer. Final volume of buffer 50 mL

| | | | |
|----------|---|--|--|
| Dilution | $\times 5$ 10mL + 40 mL | $\times 10$ 5mL + 45 mL | $\times 100$ 0.5mL ... + 49.5 mL |
| pH | | | |

- Calculate the change of buffer capacity for a 10-fold diluted solution of the buffer.
- Compare the change of pH and buffer capacity after dilutions. Explain the differences.
- Mark the correct statement. The buffer capacity is dependent on:
 - a. concentration of buffer
 - b. is not dependent on pH
 - c. determinate the ability of combine H^+ and OH^- ions
 - d. is the lowest for $pH=pK_a$
 - e. decrease with dilution
- The acetate buffer is made by mixing 250 ml of 0.5M acetic acid and 250 ml of 1M sodium acetate. What will be the pH? The pK_a of acetic acid is 4.7

3. The buffers of physiological fluids

- Give the list of buffers important for acid-base balance of human body
- Mark, which for these reactions has place in tissues and which in lungs



- **Fill the gaps:**
 - Phosphate buffer is mainly Normally, phosphate is the only buffer in
 - In the developing urine, the ratio of $\text{H}_2\text{PO}_4^- / \text{HPO}_4^{2-}$ is When the urine is acidified is observed the increase of ions.
 - The kidneys regulate ion concentrations in blood plasma and protect the organism from metabolic acidosis.
 - Bicarbonate buffer is buffer and is unique because
 - Write and explain the Henderson-Hasselbach equation for bicarbonate buffer. Under physiological conditions, the ratio $[\text{HCO}_3^-]:\text{pCO}_2 = \dots\dots\dots$ and $\text{pH} = \dots\dots\dots$
 - The physiological levels of the main gas parameters of the acid-base balance are:

| | | | |
|------------------|-------|-------------------------|-------|
| pO_2 | | pCO_2 | |
| HCO_3^- | | Hb saturation by oxygen | |
 - What do you know about acidosis and alkalosis?