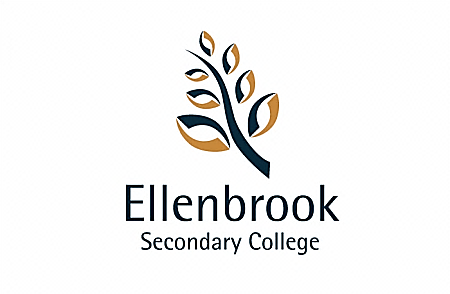
**Year 12 ATAR Chemistry**

Practical Assessment – Validation Test

Making & testing buffer solutions

NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ MARKS: \_\_\_\_\_ /24

**Instructions:**

* You will then be given 30 minutes to complete the test.
* Short response questions should be written in the spaces provided.
* Any calculations must be stated to the correct number of significant figures.
* Scientific calculators are permitted for this test.
* You are permitted to use your scientific report from Part A for your reference during this test.
* A Chemistry Data Sheet will be provided with this test.

**Questions:**

1. What is a buffered solution. [2 marks]

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1. List the TWO (2) factors that affect buffer capacity. [2 marks]

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**Questions 3, 4 and 5 relate directly to the experiment you performed in Part A of this assessment.**

1. Identify the following.
2. The independent variable: [1 marks]

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1. The dependent variable: [1 marks]

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1. TWO (2) controlled variables: [2 marks]

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1. In the table below, the conjugate acid-base pair for the acetic acid-acetate buffer you used have been identified and labelled. Complete the table by doing the same for the second buffer system you used in the experiment. [4 marks]

|  |  |
| --- | --- |
| **Chemical species** | **Label** |
| Acetic acid-acetate buffer | |
| CH3COOH | Acid |
| CH3COO- | Conjugate base |
| Second buffer system | |
|  |  |
|  |  |

1. When setting up the experiment, either HCl or NaOH was added dropwise to the unbuffered solutions until they were the same colour as the buffered solutions.
2. Why is this important? [2 marks]

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1. What was the initial colour and estimated pH of the acetic-acetate buffer solution?

[2 marks]

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1. The delicate pH of blood is maintained at approximately 7.4 by several buffering systems, one of which is shown below. If the pH falls below the normal value of 7.4, a condition called acidosis is produced. If the pH rises above the normal value, the condition is called alkalosis.
2. HCO3- (aq) + H+ (aq) ⇌ H2CO3 (aq)

ii) H2CO3 (aq) ⇌ CO2 (aq) + H2O (l)

iii) CO2 (aq) ⇌ CO2 (g)

In this system, hydrogen carbonate ions are able to absorb excess production of acid by reacting to produce carbonic acid. This carbonic acid can then be converted into carbon dioxide with the aid of the catalyst carbonic anhydrase. This dissolved carbon dioxide can then be excreted as carbon dioxide gas when exhaling.

1. Calculate the [H+] in a sample of ‘normal’ blood. [2 mark]

Our bodies require energy to carry out their daily functions. This energy is created in cells by the reaction of glucose and oxygen. Carbon dioxide and water are also produced, and they react further to produce hydrogen ions.

When we exercise, breathing rate increases to supply more oxygen to our cells. However, after a certain point it becomes difficult to provide enough oxygen in this way and other chemical reactions, that produce excess lactic acid, occur.

1. Is an increased breathing rate your body’s response to prevent acidosis or alkalosis?

[1 mark]

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1. With reference to **collision theory** and the buffering equations above to explain why a person breathes deeper and exhales more CO2 when the [H+] increases in their blood stream.

[5 marks]

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End of Validation Test