



Sample answer – Mod 6 acid/base

Stage 6 Chemistry - Guided by 2019 NESA examination question and responses

Our excursion at [Orchard Hills Water Filtration Plant](#) applies some content from Module 6 in the NSW Stage 6 Chemistry syllabus. References to excursion experiences can help answer the following HSC exam questions.

Question 22 (4 marks)

A buffer was prepared with acetic acid and sodium acetate. A few drops of universal indicator were then added. When small amounts of either $0.1 \text{ mol L}^{-1} \text{ HCl}(aq)$ or $0.1 \text{ mol L}^{-1} \text{ NaOH}(aq)$ were added, no change in the colour of the solution was observed.

4

Explain these observations. Support your answer with at least ONE chemical equation.

Criteria	Marks
<ul style="list-style-type: none">Identifies that the observed effect is due to small variation in pHExplains what occurs when acid and base are addedIncludes at least one equation	4
<ul style="list-style-type: none">Identifies that the observed effect is due to small variation in pHExplains what occurs when acid or base is addedIncludes a substantially correct equation	3
<ul style="list-style-type: none">Provides a correct equationORIncludes a partially correct equation and shows some understanding of what occurs when acid or base is added	2
<ul style="list-style-type: none">Provides some relevant information	1

Source: NESA Chemistry HSC examination paper 2019 p.15

Content revision

Refresh your knowledge of the [Orchard Hills Water Filtration Plant](#).

Try some of the supporting [HSC Chemistry](#) resources, content and activities.

Haven't been on excursion with us? Make a free [excursion request](#) online.

Please note: information provided in this document is from Sydney Water, STANSW information and NESA accredited sites.

Sample answer context - Stage 6 Chemistry Drinking Water excursion at Orchard Hills Water Filtration Plant

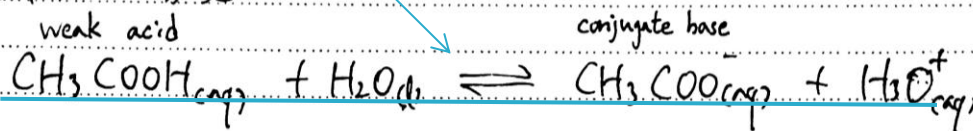
Write an equilibrium equation that included the **appropriate arrow** and the hydronium(H_3O^+) ion.

1 mark

Clearly link an experimental **observation** to a change in pH.

1 mark

The prepared buffer resisted to change in pH, hence the colour of the universal indicator did not change, even with the addition of acid and/or base.



According to Le Chatelier's Principle, the equilibrium position of the buffer equation shifting to partially oppose the effect of the change. i.e. shift left will decrease $[\text{H}_3\text{O}^+]$ and shift right will increase $[\text{H}_3\text{O}^+]$. If HCl_{aq} is added the equilibrium position will shift left, and if NaOH_{aq} is added the equilibrium position shift right. In both situations the concentration of H_3O^+ (i.e. pH) remains almost constant.

Explain the reason for the equilibrium shift with **specific example**, not just describe the direction of the shift or state Le Chatelier's principle.

2 marks