**teachers guide**

**Buffers 4:**

**Buffering in the ocean**

# Components

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|  | NAME | DESCRIPTION | AUDIENCE |
|  | *Buffering in the ocean*teachers guide | This guide shows how students can use their understanding of pH and buffering in the context of ocean acidification. | teachers |
|  | *Researching ocean buffering*fact sheet | Students examine the work of two scientists, Robert King and Prof Malcolm McCulloch, involved in researching different aspects and consequences of ocean acidification. | students |
|  | *Ocean acidification*worksheet | Students use their knowledge of buffers to interpret diagrams and answer questions about ocean acidification. | students |
|  | *How does the ocean buffer?*procedure sheet | An experiment compares the buffering ability of tap water and seawater, under varying levels of carbon dioxide.Discussion questions are included. | students |

Purpose

To **Elaborate** on student understandings of buffering by examining ocean acidification and how rising levels of acidity may endanger marine life.

# Activity summary

Outcomes

Students:

* understand that ocean buffering is a complex and open system,
* describe how sea water is buffered by the carbonic acid/hydrogencarbonate equilibrium,
* explain how an equilibrium shifts when changes are made to an environment,
* understand there is a limit beyond which buffers are no longer able to stabilise pH in a closed system, and
* apply their knowledge of buffering to real world situations.

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| ACTIVITY POSSIBLE STRATEGY |
| Students read the fact sheet, *Researching ocean buffering*, then complete a ‘3-2-1 summary’ (see Teachers notes below). Share responses as a class. | individual, then share with class |
| Students complete the worksheet, *Ocean acidification*, using the fact sheet, *Researching ocean buffering*, as a reference.Discuss answers as a class. | individual, then share with class |
| Students complete the experiment outlined on the procedure sheet,*How does the ocean buffer?* This can be spread over two lessons if needed. Students answer questions after each part, as well as discussion questions at the end of the worksheet. | small groups, then individuals |
| Discuss answers to questions. | whole class |

# Teachers notes

In the procedure, *How does the ocean buffer?,* a sample of seawater is required. It is possible to store a sealed sample of seawater in a fridge for months. Remove the lid, then allow the sample to come to room temperature and mix with air before using.

**3-2-1 summary**

In a 3-2-1 summary, students list: 3 things I learned today, 2 things I found interesting, and 1 question I still have.



