

## Year 12 ATAR Chemistry Units 3 and 4

### Task 2: Extended Response Question on Ocean Equilibria

Part 1: Research Project. Weighting 1%.

Part 2: Validation Test including one calculation question on stoichiometry.

Weighting 4%.

You are to research the questions on Ocean Equilibria. This research is due on Monday Week 6 of Term 1, 2021. To present this research in sufficient detail is likely to require at least a 1000-word type-written report, plus diagrams. A reference list containing at least 5 sources of information from reliable sources is also required.

A validation test on the same topics will be held on Wednesday Week 6 of Term 1, 2021.

Part 1: Research project. Use a variety of sources to find answers to these questions.

1. List as many possible reasons as you can to explain why the concentration of atmospheric carbon dioxide is rising as the result of human activities. Where appropriate, use equation/s to show how this carbon dioxide is generated.
2. Identify other greenhouse gases that are increasing in concentration in the atmosphere because of human activities. Also identify the human activities that are producing these greenhouse gases.
3. Explain why the rising level of atmospheric level carbon dioxide is causing sea-level rise.
4. Explain in terms of the principles of equilibria why the oceans are becoming more acidic.

5. Explain how ocean acidification can impact humans, and how it can affect a variety of marine organisms, including those with shells and those without. Also explain how ocean acidification can affect organisms at the bottom of food chains, and at the top of food chains.
6. Ocean pH has fallen from 8.2 to 8.1. Calculate the % change in hydrogen ion concentration that this represents.
7. Give two examples of positive-feedback cycles that are exacerbating global warming and/or ocean acidification.
8. Explain why fuel from crops, such as bioethanol and biodiesel, do not contribute to global warming, even though when they are burnt in car engines they produce carbon dioxide.
9. Determine whether or not 'prescribed burning' of native bushland by the Department of Parks and Wildlife contributes to global warming. Justify your answer.
10. Some groups of people, sometimes for political or business reasons, argue that either climate change is not real or that climate change is not the result of human activities. Below are some of the arguments that these people have used. Analyse each argument and decide if the argument is reasonable. Justify your response.
  - a. Very large volcanic eruptions worldwide together release far more carbon dioxide than even all the factories of entire countries and therefore to say that the increase in atmospheric carbon dioxide level is the result of human activities is unreasonable.
  - b. Water vapour, which is a naturally-occurring greenhouse gas, is a much more potent greenhouse gas and is present in higher

concentrations than carbon dioxide. Therefore, carbon dioxide is not the major cause of global warming.

- c. Carbon dioxide is necessary for life and is present in the atmosphere in only very tiny concentrations, therefore carbon dioxide cannot have any appreciable effect on the climate or on the pH of the oceans.
- d. Despite claims that the world is getting hotter, cold days, blizzards and snowstorms still occur. Therefore, global warming is not real.

Part 2: A validation test on the same topics as part 1 will be held on Wednesday  
Week 6 of Term 1, 2021. One stoichiometry calculation question will be there.