

**Applecross SHS**

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**Year 11 Chemistry 2017**

**Comprehension Extended Response Assessment**

**Ocean Acidification Validation Test**

Name :\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Time Allowed : 50 minutes

Materials Allowed ;

* Articles on Ocean Acidification - highlighting key points is allowed but there should be no notes written onto the articles.
* Chemistry Data Sheet
* No extra notes allowed
* Pens, pencils, calculator, etc

Answer All Questions in the spaces provided

Good Luck

1. (a) Which gas is the major cause of ocean acidification. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1)

(b) Why are the levels of this gas in the atmosphere increasing? (1)

(c) Write a chemical equation showing how this gas produces an acid when it dissolves in water. (1)

(d) The acid produced in the equation above is a weak acid. Explain the difference between a weak acid and a strong acid. (2)

(e) Write another equation to show how this weak acid ionises in water. (1)

2. What is pH? (2)

3. The current pH of our oceans is about 8.1.

(a) What does this number mean in terms of acids and bases? (1)

(b) Given your answer to 3.(a), why is this problem called ocean “acidification”?

(1)

4. (a) What is the relationship between the CO2 levels in the atmosphere and the

pH levels in the ocean? (1)

(b) According to the graph, by how much is the pH expected to change from now to the end of this century? (1)

(c) How has the ocean's pH changed from the industrial revolution until now? (1)

5. The drop in pH doesn't seem like it is very significant. However, one of the articles states that this corresponds to a 26% increase in ocean acidity.

Explain how a small change in pH can be a large increase in acidity. (2)

6. Calcium carbonate is a very important compound for many organisms in our oceans.

(a) Give 3 examples of organisms living in the ocean that need calcium carbonate.

(1)

(b) Why is calcium carbonate so important for these organisms? (1)

(c) Explain why the higher levels of acid in the water make it more difficult for the organisms to get calcium carbonate. You must include a chemical equation in your answer. (3)

7. Some organisms can be advantaged by the increased acidity of sea water.

According to the articles, which living thing is most advantaged? (1)

8. Small fish may not be directly affected by the lowering pH levels, but they may be indirectly affected. Explain. (1)

9. As the ocean gets more and more acidic, how will this effect CO2 levels in our atmosphere?

Explain your answer. (2)

10. Not everyone in our society trusts scientists.

So here are a few statements taken from the opinion page of [The Australian](http://www.theaustralian.com.au/opinion/put-the-acid-on-great-barrier-reef-doomsayers/story-e6frg6zo-1227300731557) newspaper about the Great Barrier Reef and ocean acidification.

* Ocean acidification was “invented” in 2005 by climate scientists because global warming wasn’t bad enough.
* Because corals and shellfish have been around for millions of years they’ll be fine if the ocean keeps soaking up all the extra CO2.
* The oceans have a built-in natural “buffer” that stops the water from swinging around the pH scale (the scale used to measure acid and alkaline states).
* People who keep saltwater aquariums at home sometimes add CO2 to the water to make plants grow – therefore, CO2 is great for the oceans.

Write your own argument for **or** against ocean acidification. (4)

You must present a set of “evidence”, logical points or scientific method to back up your argument.