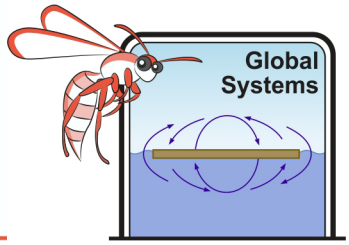


Carbon Cycle in the Oceans – Teachers Notes

Increased carbon dioxide in the oceans can cause ocean acidity. This can cause impacts such as coral bleaching which can kill the coral if the water remains acidic for a prolonged period of time. Water plants can help reduce the acidity of water by absorbing the carbon dioxide during photosynthesis.

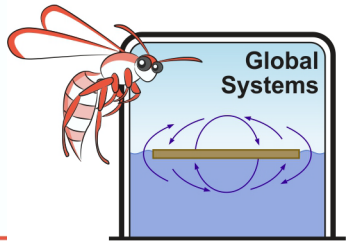
Aim **To demonstrate the effect of water plants on ocean acidity.**

Materials per group:

- Three plastic bottles with lids (500 – 750 mL bottles work best)
- Effervescent tablets (e.g., Aspro Clear)
- Water plant (e.g., Elodea/ Pondweed)
- pH indicator
- 3 x Beakers

Method

1. Fill each bottle nearly to the top with tap water.
2. Add an effervescent tablet to two of the bottles and screw the lids on tightly.
3. When the tablet has stopped reacting, add the water plant to one of the bottles and replace the lid.
4. Leave the sealed bottles in a well-lit position out of direct sunlight.
5. After four hours pour out about 50 ml of water from each bottle into separate beakers. Add a few drops of indicator to determine the pH. Record your results in the table.
6. Repeat step five after one day and two days.



Carbon Cycle in the Oceans – Teachers Notes

Results

Test	pH after 4 hours	pH after 1 day	pH after 2 days
Tap water	Should be 7	Same as initial	Same as initial
Tap water plus effervescent tablet	Acidic usually around 5 (will depend on volume of water and type of tablet)	Acidic usually around 5 (will depend on volume of water and type of tablet)	May be slightly less acidic than day 1 if not well sealed.
Tap water plus effervescent tablet and water plant	Acidic usually around 5 (will depend on volume of water and type of tablet)	Usually around 6	Usually back to 7

1. What effect did adding an effervescent tablet to the water have on the pH? Decreased the pH, the water became acidic.

2. What happened to the pH of the water with the water plant in it over the experimental trial period? Changed from acidic back to neutral (~ pH5 -> pH7)

Discussion

Using scientific knowledge, explain how the plant effected the pH of the water?
When the effervescent tablet dissolves it releases carbon dioxide. This makes the water slightly acidic (carbonic acid). During photosynthesis the plant absorbs carbon dioxide from the water to create energy, thus slowly returning the water to a neutral pH.

Kelp (a type of seaweed) is often hailed as one of the best absorbers of carbon dioxide from the oceans. Warming oceans are affecting many kelp forests negatively. What impact could this have on ocean acidification? Kelp is very sensitive to ocean temperature. Rising temperatures are causing a global decline in kelp forests. This means that there will be less capacity for carbon dioxide uptake from the water plants, likely resulting in further acidification.

Extension: Research more about what has happened to kelp forests in Tasmania and globally, and what some kelp farmers are doing to counteract this.

Suggested website: NOAA Ocean Acidification Program
https://oceanacidification.noaa.gov/Home.aspx (accessed 24/03/2022)