

# Ocean Acidification

4

## Big Idea

Oceans are becoming more acidic and this is affecting marine species with shells or skeletons made from calcium carbonate.

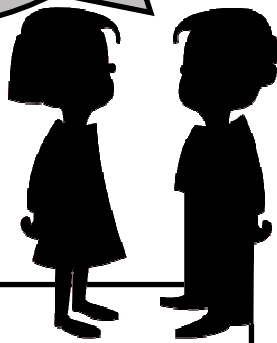
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1

Level

The activity is aimed at this level but can be modified to suit other levels.



## Learning Intentions

- ✓ We are learning about ocean acidification and the possible impacts on marine animals with shells.
- ✓ We are learning to do an experiment that tests the effects of varying pH levels on eggshells.

## Success Criteria

- ✓ I can explain the effect that acids have on shells (calcium carbonate).

## Other Resources

### Building Science Concepts

Eggs (Level 1/2)

### Assessment Resource Bank

MW5097 – Acids and Bases

## What you need to know

- Sea shells, coral skeletons and egg shells are just some of the things made from calcium carbonate.
- Calcium carbonate is affected by acids.
- pH levels in the oceans are decreasing which means oceans are becoming more acidic. pH is a measure of the acidity or alkalinity of a solution.
- As oceans become more acidic organisms may grow more slowly, produce thinner shells or may even stop growing shells at all.
- Oceans are becoming more acidic because they absorb about 1/3 of all human produced carbon dioxide (CO<sub>2</sub>) emissions in the atmosphere. The more CO<sub>2</sub> absorbed by the ocean the more the acidity of the ocean is increased.
- Sea water normally has a pH of around 8.
- Ocean acidification is the name given to the increased acidity of the ocean.

## Curriculum Links

### Nature of Science

Investigating in science – Build on prior experiences, working together to share and examine their own and others' knowledge. (L3/4)

Ask questions, find evidence, explore simple models and carry out appropriate investigations to develop simple explanations. (L3/4)

Participating and contributing - Explore various aspects of an issue and make decisions about possible actions. (L3/4)

### Material World

Properties and changes of matter – Compare chemical and physical changes. (L3)

### Key Competencies

Participating and contributing – Relate their science knowledge to issues affecting the world.

## What you need

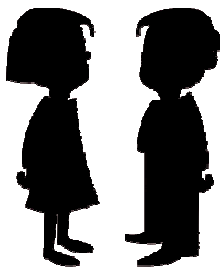
- 3 eggs
- 3 beakers or clear glass jars (with lids to avoid spills, at least 300ml capacity)
- 250ml tap water
- 50ml vinegar
- 50ml household ammonia

## What to do

1. Make a list of all the different types of marine animals that have shells made of calcium carbonate (eg – shell fish, coral, bryozoa).
2. Introduce the effects of ocean acidification.
3. Prepare 3 beakers with the following:
  - Acidic solution - 100ml tap water and 50ml vinegar
  - Basic solution - 100ml tap water and 50ml household ammonia
  - Neutral solution - 150ml tap water
4. Put 1 egg into each beaker.
5. **Predict** what they think will happen.
6. **Record** any observations.
7. Leave the beakers in a cool area for 24 hours.
8. **Record** any observations and changes.
9. Do this 4 more times and continue to record any changes.
10. At the end of this time carefully remove the eggs from the beakers and gently touch them.
11. **Record** any differences between the eggs.
  - After about 72 hours the eggs in the acidic solution will no longer have a shell because the acetic acid in the vinegar has dissolved the calcium carbonate.
  - The students may have observed bubbles. This is because when the acid reacts with the calcium carbonate carbon dioxide is released, which causes the bubbles.

### Questions

- What differences did you observe between the 3 solutions?
- What did each of the 3 solutions represent? (basic = sea, neutral = fresh water, acid = decreased pH of sea water)
- How do you think ocean acidification might affect marine animals with shells? What about those with skeletons?
- How do you think ocean acidification might affect the marine food web?
- What can we do to reduce ocean acidification?



### What's Next?

Try using seashells.

Try using different concentrations of vinegar.

Investigate what you can do to stop CO<sub>2</sub> emissions.

### Safety

- Always use household chemicals with adult supervision.
- Do not eat or drink any of the substances.
- Chemicals used can be washed down the drain with water.