

Explorer Education Programme



Explorers Science Experiments - Hydrothermal Vents

Class: 4th, 5th and 6th

Strand: Energy and Forces / Materials

Strand Unit: Heat / Forces / Properties and characteristics of materials /
Materials and change

Group size: 5-6 students



Hydrothermal vents in the Mid-Atlantic Ridge discovered by the Irish-led VENTuRE scientific expedition aboard the RV Celtic Explorer research vessel

Aim

To examine the physical and chemical properties of hydrothermal vents and how water temperature and salt levels affect the oceans as a whole. Students completing the worksheets will also develop writing and literacy skills.

Experiment suitable for teacher demonstration and/or supervised group experiment for 5th and 6th Class students.

Materials

- Large jar with wide opening
- Small jar
- Food colouring
- Cold water
- Hot water
- Table salt
- Baking tray

Methods

1. Place the large jar on the baking tray and fill it 80% with coloured water.
2. Fill the small jar with hot water and colour with food colouring.
3. Slowly place the small jar in the large jar.

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4. Repeat experiment with both jars filled with cold water but this time add 2 tablespoons of salt to the large jar.

What Happens

- The hot / fresh water in the small jar rises out into the big jar to the surface as the hot water / fresh water is less dense than the cold / salt water.
- Hydrothermal vents are areas in the ocean where heat escapes from the Earth's mantle through cracks in the Earth's crust.
- This heat warms up the surrounding water and causes it to rise as is observed in this experiment.

Discussion Points

- Before the small jar is lowered into the large jar discuss with the class what they think will happen with the water from both jars?
- Discuss what happened and why temperature and salt effect water density?
- Discuss where in the ocean hydrothermal vents can be found?
- How hot does the water temperature around hydrothermal vents get to?
- Are there any animals that can live at hydrothermal vents?
- How does the change in density affect the oceans as a whole with relation to temperatures and salt content?
- Discuss the relevance of salt/fresh water content with relation to different seas and oceans around the world e.g. the Dead Sea and the Arctic Ocean.
- Use temperature differences in these areas as a further discussion point.
- Get students to use the web and/or their school library to research these discussion points and the worksheet questions.

Outcome

The children in the class will have developed skills in the following:

- Questioning
- Observing
- Predicting
- Investigating and experimenting
- Analysing

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- Recording and communicating
- Exploring
- Planning
- Making
- Evaluating

In addition the following skills in English will be developed:

- Reading for pleasure and information
- Developing competence, confidence and the ability to write independently
- Developing interests, attitudes, information retrieval skills and the ability to think

Useful Links

- <http://www.marine.ie/home/aboutus/newsroom/pressreleases/MajorDiscoveryontheMidAtlanticRidge.htm> - VENTuRE expedition discovery of uncharted hydrothermal vents in the Mid-Atlantic Ridge
- <http://www.divediscover.whoi.edu/vents/index.html> - Information on hydrothermal vents
- <http://www.onr.navy.mil/focus/ocean/water/salinity1.htm> - Ocean salinity



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Worksheet

What do you think will happen when the small jar, filled with **hot water**, is lowered into the large jar?

My prediction	What happened and the reason why it happened?
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What do you think will happen when the small jar, filled with cold water, is lowered into the large jar, filled with cold water and 2 tablespoons of **salt**?

My prediction	What happened and the reason why it happened?
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Are there any animals that can live at hydrothermal vents?

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