

Activity: Ocean Currents

Grade level: Grade 8

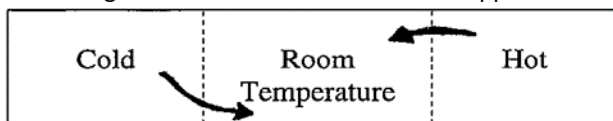
Purpose: To investigate how changes in water temperature form ocean currents.

Background: Currents are masses of water that flow in a definite direction. Ocean currents affect the climate, fishing, and the movement of boats and marine creatures. Ocean currents are driven by several factors including tide, wind (near the surface), and thermohaline circulation. Thermohaline currents are caused by differences in the density of adjacent waters due to changes in temperature and salt concentration. Temperature affects the density of water by expanding the molecules when heated and contracting the molecules when cooled. As a result fewer molecules of water will fit into a given volume when hot than when cool.

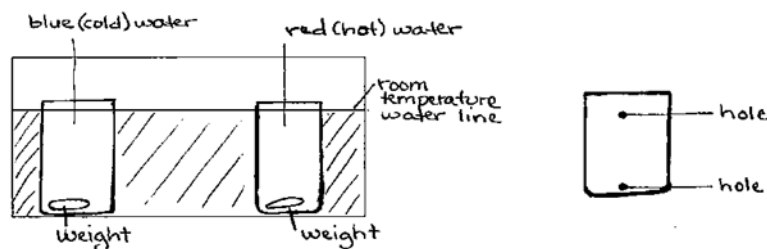
Materials: glass tank, two clear plastic cups, red and blue food colouring, large bucket of room-temperature water, 250ml beaker of chilled water (0-4°C), 250ml beaker of hot water (50-70°C), weights, thermometer

Procedure:

- Using a direction of flow diagram, draw arrows to predict what will happen to the flow of water after the experiment begins. The diagram below shows what should happen.



- Make two holes in each clear plastic cup (see diagram). Put weights in the cups, place the cups apart from each other in the glass tank and orient the cups so the holes are opposite each other.



- Mix red food colouring in the beaker of hot water and blue food colouring in the beaker of chilled water.
- Pour room-temperature water into the tank containing the cups. Fill the tank up to the level even with the top hole on the side of the cups.
- Fill one plastic cup with the red hot water and the other cup with the blue chilled water (at the same time).
- Observe the red and blue streams of water pouring from the cups as they come in contact.
- Compare your prediction of the direction of flow with the actual direction of flow.

Questions:

- How did the predictions compare with the actual results?
- Which type of water is denser? What evidence was collected to verify the answer?
- Using the same equipment test the interaction of water of different salinities.