

CONVECTIONATOR

A DEMONSTRATION OF HEATING AND COOLING BY CONVECTION

Name: _____ Per: _____ Date: _____

FOCUS QUESTION

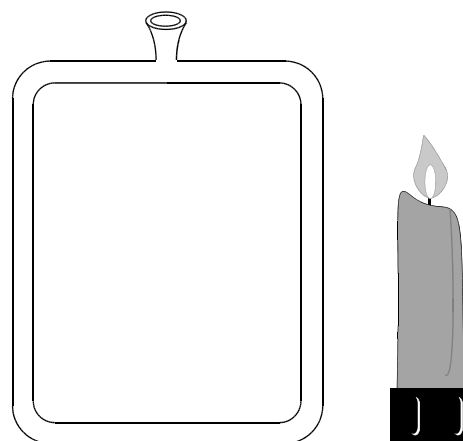
Suppose you are designing a water heater. Your design is simple: a storage tank and a heating device. Where in the storage tank should you put the heating element? Show the location on the diagram to the right and explain your reasoning.



DEMONSTRATION APPARATUS

The convection loop is a glass tube bent into a rectangular loop. It has an open neck to allow for filling and emptying. A candle is placed near the loop to facilitate heating.

We will fill the tube with cold water and place the candle in near the tube to heat the water.



1. HEATING A LOWER CORNER

Describe the demonstration and its results using words and pictures. How is the motion (or lack of motion) of the water made observable?

2. HEATING AN UPPER CORNER

Describe the demonstration and its results using words and pictures.

3. Compared to heating a lower corner, is heating an upper corner a superior or inferior way to induce convection? Explain.

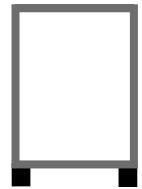
4. ICE PACK

a. A second convection tube is filled with hot water. Where should an ice pack be placed on the tube to induce the same convection pattern seen in part 1 above? Describe and sketch your solution in the space below, and explain why it will work.

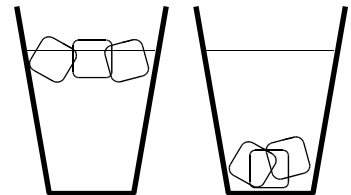
b. Was your design correct? If not, what design was correct and why?

5. POST-DEMO QUESTIONS: Add to the diagrams to complete your answer to each question.

a. What is the best location for the heating device in a water heater? Explain.



b. Professor I. C. Drinck developed an ice cube substitute that sinks to the bottom of a drink and remains at the bottom of the beverage during the consumption process. Comment on the value (or lack of value) of the professor's invention.



c. In Sacramento, air vents for the heating and cooling system are typically found on or near the ceiling. In Michigan, those air vents are typically found on or near the floor. Why the difference?

