Inquiry 16.1

Modeling Convection in the Mantle
PROCEDURE

• Look at the materials your teacher has set out. Pick up one jar for your group. It contains a special fluid that is a flow indicator. Observe the fluid in the jar.

• Share your observations with the class. You might have discovered that this fluid is very sensitive to heat. Discuss how you might use it to observe convection cells.
• Collect one copy of Student Sheet 16.1a: Convection in the Mantle

• Collect your materials. Shake the rheoscopic fluid so that you can better observe its flow. Set up your equipment as shown in Figure 16.1. Your teacher will light your candle.
• Place the lit candle under the jar. Shine the flashlight on the fluid to observe its movement. Reposition the candle to observe different patterns of movement in the fluid. Record your observations in both words and pictures. Use arrows to depict the direction in which the fluid moves.
• Shine the flashlight down on the jar (on the glass surface parallel to your table or desk). What do you observe? Discuss your observations with your group. Record them in your notebook.

• Clean up. Blow out the flame on the candle. Use a dry paper towel to wipe off any black carbon marks from the candle that might be on the jar. Return the jar of rheoscopic fluid to the materials center. It will be used by other classes.
REFLECTING ON WHAT YOU’VE DONE

Answer these questions. Then discuss them with the class.

A. What observations did you make of the heated fluid?

B. Under what conditions could you observe convection cells forming inside the jar? How did they move? Compare this motion with what you observed using the Moving Plates Model.
C. What happened to the fluid near the upper surface of the jar (parallel to the table)?
Relate your observations of the jar and candle to the earth. Answer these questions:
A. What causes convection currents in a gas or liquid?
B. On the basis of what you have seen in the jar, what effect do you think convection in the hot mantle might have on the earth’s plates? What observations of the fluid inside the jar support your explanations?
c. Is the jar of rheoscopic fluid an open or closed system? Explain

d. Is the earth’s mantle an open or closed system? explain