

# Thermal Displacement

Materials:

Metal Rod; Electric Hot Plate; Temperature stick or Crayola; Stand to hold the metal rod.

Procedure: In thermal systems, a temperature difference serves as a forcelike quantity to cause heat energy to flow from regions of high temperature to regions of low temperature. In this lab, a temperature difference is created in a metal rod when heat is applied to one end of the rod. The rod has been lined with wax material from a temperature stick. One then can “see” the heat flowing from the hot end as the coating from the temperature stick changes it’s composition.

1. Draw a line with temperature stick along length of metal rod, and fasten the rod to the stand.
2. Place the “Hot plate” at the free end of the rod, and adjust it so that the rod is barely touching it on the far edge of the coil.
3. Turn on the Hot plate, and observe the line from the heat stick, melt progressively from the hot zone to the cold end. This melting illustrates the movement of heat down the length of the rod. At some point melting of the line may stop because heat in the rod is being drawn off by the cold clamp and stand faster than it can be used to melt wax material on the outside of the rod.
4. Answer the following question:
  - a. How far from the “Hot Plate” did the heat flow? \_\_\_\_\_
  - b. In which direction does heat always flow? \_\_\_\_\_
  - c. What forcelike quantity caused the flow of heat down the length of the rod? \_\_\_\_\_
  - d. How fast does the heat flow?  $v = d/t$
  - e. Compare with other groups, Who had the fastest heat flow?  
Who had the slowest heat flow?  
What were their rod’s made of?