

THE COIL CANDLE-SNUFFER

A. Question: How can heat be transferred?

B. Materials Needed:

1. Insulated solid copper wire (about 30cm).
2. A wire stripper or knife.
3. A birthday candle and matches.

C: Procedure:

1. Take the copper wire and strip $\frac{3}{4}$ of the insulation off one end (use the wire stripper or knife).
2. Make a spiraling coil of the stripped end of the copper wire.
3. Light the candle and fasten it to the table with a drop of molten wax.
4. Lower the coil over the candle flame quickly; flame snuffed!
5. Relight the candle; and now lower the coil slowly over the flame (hold it in the flame for a while), then lower the coil over the candle; flame stays on!

D: Anticipated Results:

Students should observe a change in temperature when the coil is placed over the flame.

E: Thought Questions for Class Discussion:

1. What made the flame go out when the coil was lowered quickly?
2. Was the flame cut off from the air?
3. Why did the flame stay on after the coil was held in the flame for a longer period?
4. What was the temperature of the coil the first time compared to the second time it was lowered over the flame?
5. Why was the insulation not completely stripped off the wire?

F: Explanation:

In lowering the copper spiral over the flame, it was conducting the heat away from the flame. This made the surrounding of the flame suddenly drop in temperature, which made the flame go out. In other words, the temperature dropped below the **kindling temperature** of the candle wax.

When holding the coil for a longer period of time in the flame, it is heated to a higher temperature. When this hot coil is now lowered over the flame, it will not extinguish it, because the surroundings of the flame have a temperature which is higher than the kindling point of candle wax.

The insulation of the wire was left on at one end of the wire in order to prevent conduction of the heat to the fingers. Without insulation it would be too hot to hold the coil with the bare fingers.