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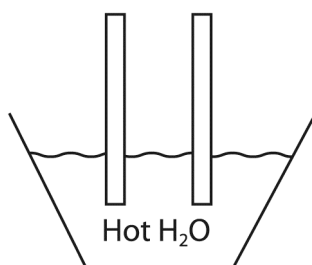
HP-100

Heat Pipe Set

A Demonstration of Vapor Pressure and Heat of Vaporization

by Ron Perkins

Immerse the ends of two pieces of metal into a container of hot water. One becomes hot immediately, while the other slowly increases in temperature. The heat pipe also works when the end is immersed in ice water.

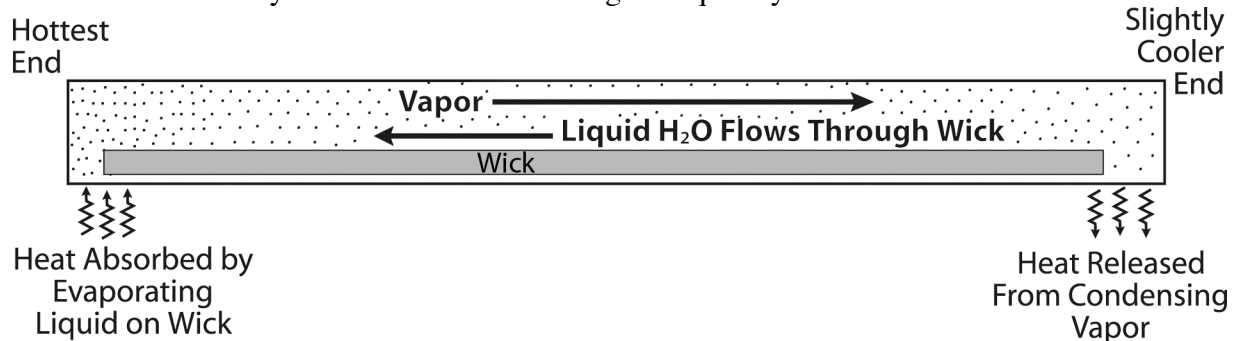


Explanation:

The piece of metal, which conducts heat slowly, is a solid piece of copper. The other piece of metal, which conducts heat quickly, is an evacuated hollow piece of copper containing a small amount of liquid water, water vapor, and a wick. This is called a "heat pipe."

The heat pipe operates on the difference in vapor pressure due to a difference in temperature of the two ends. The greater the temperature; the greater is the vapor pressure of a liquid. At the end where the heat pipe is immersed into hot water, liquid inside the pipe evaporates until it reaches its vapor pressure. This process of evaporation requires the absorption of heat, called the heat of vaporization. Because the tube has been evacuated of air, this hot vapor travels quickly throughout the tube. At the other end where the tube is cooler, the vapor pressure is less. Consequently the excess vapor condenses, releasing heat. There is a fiber wick inside the tube to distribute the condensing liquid.

Heat pipes are used in laptop computers and other devices for cooling, such as certain types of air conditioners. They are useful for transferring heat quickly from one area to another.



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