

Instruments:

- a candle
- water bath
- cold water

Experiment:

- Place the candle in the water bath and fill the bath almost up to the upper end of the candle.
- Do not allow the wick or top of the candle to get wet.
- Light the candle and allow the flame to burn a hollow tube down through the candle.

Observations:

The candle continues to burn underneath the surface of the water.

Results:

This experiment depends on the high specific heat of water. The wax in the candle would normally melt in air, but the presence of the water keeps an outer skin of wax cool. The wax can never reach its melting point where it is in direct contact with the water, despite the heat of the candle flame. This heat is pulled outwards into the water bath, since water requires massive quantities of heat to warm it just a small amount. Only the wax inside the skin can reach the temperature necessary to become first liquid, then gaseous, so that it can feed the flame. This is why a hollow tube can form where the water touches the candle.

Template can be found online (in German):

<http://portal.tugraz.at/portal/page/portal/Files/5110/files/Forschung/Thermophysik/DA-RobertSchantl.pdf>