HAND BOILER

Next: Materials and Explanations

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HOMEMADE HAND BOILER

Are you hot enough to make water bubble with just the heat from your touch? There is no way that the human body (~98.6°F) could make water boil (~212°F). It just can’t happen. Well, you’re right, but the Homemade Hand Boiler is a fun trick that you can play on an unsuspecting friend or family member. You’ll even teach them a little bit about the properties of air, water, and molecules while you’re at it.

Materials
• Water
• Small drinking glass
• White handkerchief
• Rubber band
• (Optional) Food coloring

EXPERIMENT
1. Fill a small, clear drinking glass nearly full with water.
2. Cover the top of the glass with a white handkerchief, or similar piece of cloth, and fix it in place with a rubber band.
3. Place your hand over the cloth and quickly turn the glass over so that the cloth is facing down and remove your hand. No water will come out! (For an entire experiment on why this works, see the Mysterious Water Suspension experiment.)
4. With the cloth still facing down, ask a friend to take two fingers and warm them up by rubbing them on their sleeve.
5. Ask your friend to hold their fingers beneath the cloth (they don't even need to touch it).
6. While your friend's fingers are below the cloth, push down on the glass with one hand while pulling up on the cloth with the other.
7. The water inside of the cup will begin to boil!

HOW DOES IT WORK?
When you first turn the glass upside down, you might expect the water to come flowing out, but surprisingly that isn't the case. Although handkerchiefs and pieces of cloth are not waterproof, they seem to do the trick here. Handkerchiefs and pieces of cloth have tiny holes in them that should let the water through, but because of the molecular bonds of water, this doesn't happen. The bound molecules of water create what is referred to as surface tension. If holes are small enough, the surface tension of the water is able to span the tiny holes, making the cloth nearly waterproof.

So what is making that water bubble? Bubbles are trapped air within a liquid, so that means that there is air entering the cup and the water. Although the surface tension of the water isn't letting any water out, somehow air is getting in when you stretch the cloth. This is because molecules of air do not share the molecular bonds of water. Stretching the cloth pulls the holes in the cloth wider than normal and allows the air molecules to fill the little bit of space in the cup.
HERE IS WHAT YOU NEED

CUP
HANDKERCHIEF
RUBBER BAND
WATER
FOOD COLORING
1. Fill the glass with water.
2. Drape the cloth over the cup and secure it with a rubber band.
3
INVERT THE CUP AS SHOWN

4
HAVE YOUR FRIEND HEAT UP THEIR FINGERS BY RUBBING THEM AGAINST THEIR SHIRT
5

THEN ASK HIM TO LIGHTLY TOUCH THE BOTTOM OF THE CUP TO START THE BOILING

FOOD COLORING HELPS TO SEE THE EFFECT
HERE'S HOW IT REALLY WORKS
As you're squeezing around the cup, push down with the top hand.

Check it out! You can do this experiment without the help of a friend.