

## Biology Coursework – Sweating

### Aim

I am trying to find out if sweating helps the body to cool down. I am going to use 2 boiling tubes to represent the human body. I will wrap them in paper towels but one of the paper towels will be wet. These will represent human skin. The wet paper towel will represent skin sweating and the dry paper towel will represent dry skin. I will put hot water in them both and this will represent blood. I will then see which boiling tube cools down the fastest.

### Prediction

I predict that the boiling tube which is wrapped in the wet paper towel will cool down quicker. This is because in the human body when you get hot you lose heat through your skin, this cools you down. This process is sped up by sweating. It is sped up because the heat goes into the sweat and then it is evaporated, so the heat gets away from the body quicker. The test tube should cool down quicker for this reason.

### Apparatus

- 4 paper towels
- 2 boiling tubes
- 2 clamp stands
- Water bath
- 2 thermometers
- 50ml measuring cylinders
- 4 elastic bands
- Stop clocks

### Method

I must make sure that I am safe during the whole experiment. To do this I must be very careful when using the hot water out of the water bath.

I am going to make my experiment fair by keeping the temperature of the water from the water bath the same, the amount of the water the same. The

amount of area covered by the paper towel. I will make sure not to take the thermometer out of the boiling tube when taking the temperature. I will make sure to start the stop clock as soon as all the water is poured in to the boiling tube. I will take the temperature exactly every 30 seconds. The amount of water used on the wet paper towel for when I repeat the experiment. Repeat the experiment and take averages.

Firstly I will wet one of the paper towels with 50ml of water. I will then wrap it around one of the boiling tubes and attach it with 2 elastic bands. I will do the same for the other boiling tube but not wet the paper towel at all.

Then I will attach them both on the clamp stands. Then I will put a thermometer in them both.

Then I will then measure out 35ml of hot water from the water bath using a 50ml measuring cylinder. Then I will pour this water into the boiling tube wrapped in the wet paper towel. I will immediately start the stop clocks as all the water has been poured into the boiling tube. Then every 30 seconds I will take a reading of the temperature. When the temperature stops decreasing I will pour away the water.

I will do all this again but for the boiling tube wrapped in the dry paper towel.

When the temperature stops decreasing for this boiling tube I will repeat the whole experiment again and work out the averages.

Diagrams

## Results

### Set 1

Temperature (°C)		
Time (S)	Boiling tube wrapped in a dry paper towel	Boiling tube wrapped in a wet paper towel
30	53	50
60	49.5	46
90	49	45.5
120	49	43.5
150	48.5	40.5
180	47	40
210	46	39.5
240	45	39.5

### Set 2

Temperature (°C)		
Time (S)	Boiling tube wrapped in a dry paper towel	Boiling tube wrapped in a wet paper towel
30	54	51.5
60	53	49
90	52	47.5
120	51	45
150	50.5	44.5
180	50	43
210	49.5	41.5
240	48.5	40

### Averages

Temperature (°C)		
Time (S)	Boiling tube wrapped in a dry paper towel	Boiling tube wrapped in a wet paper towel
30	53.5	50.75
60	51.25	47.5
90	50.5	46.5
120	50	44.25
150	49.5	42.5
180	48.5	41.5
210	47.75	40.5
240	46.75	39.75

## Analysis

I have found out that the boiling tube wrapped in a wet paper towel cooled down the quickest. I have found only one pattern in my results and that is that as time increases the temperature falls. I have found that my prediction was correct because I said that the boiling tube wrapped in a wet paper towel will cool down quicker than the boiling tube wrapped in the dry paper towel. I know that my prediction was correct because on my graph at every 30 seconds the temperature of the boiling tube wrapped in the wet paper towel was lower than the paper towel wrapped in the dry paper towel. For example after 150 seconds the temperature of the boiling tube wrapped in a wet paper towel was  $42.5^{\circ}\text{C}$  whereas for the boiling tube wrapped in a dry paper towel the temperature was  $49.5^{\circ}\text{C}$ .

This has happened because the heat of the water is absorbed into the water and is then the water is evaporated away with the heat in it.

## Evaluation

The most inaccurate parts of my experiment are the temperature of the water when it is taken from the water bath because the temperature will drop from when I used for the boiling tube wrapped in a wet paper towel to when I used it for the boiling tube wrapped in a dry paper towel. I could have stopped this by putting the lid of the water bath back on. This would have stopped heat loss and the starting temperature would have been the same every time.

The amount of water used from the water bath could have been more accurate by using a volumetric pipette this would have measured out exactly the right amount of water.

I could also take the temperature more accurately and at exactly every 30 seconds. To do this I could use an electronic thermometer.

I don't think that I would have changed my method I would just have used different apparatus which I have mentioned above to make my experiment more accurate.

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I don't think that any of my results were very inaccurate because they all follow the same general pattern as time increases the temperature decreases. But they could have been more accurate as I have stated above.

I think that my results are accurate enough to make a good conclusion because my test was very fair I did the entire thing I stated in my plan although they could have been improved to make my experiment more fair and accurate.