HEATING AND COOLING

Aim – to find out if different sized cans affect the temperature of 140ml of boiled water, when they are left alone to cool.

In this experiment, I will be using two different sized cans (one 12cm tall holding 330ml and another 9cm tall holding 150ml). I will be seeing if each can keeps the boiled water warm for a period of time and testing to find out which one is the best.

Fair Test

To make this a fair test, I will have to do many things. Firstly, I will use the same amount of water (140ml) at the same temperature, as it will have to start at the same temperature to keep it fair and also have the same amount of water to test on. It will also have a roughly similar amount of particles. I will also put them in the same room together so the room temperature will be the same. The cans are made of the same material (aluminium) because I am testing surface area rather than different materials. I will use a water bath to heat the water so both cans will get the same temperature of water. This is how I will make it a fair test.

Method

The method I will be using is; I will boil 140ml of water for each can in a water bath at 80oC. Then put the 140 ml in each of the cans at the same time. I will check each temperature every minute for fifteen minutes. I will then have a set of results.

Equipment

Prediction

I predict that the big can with the larger surface area will keep the water the warmest. I think this because large animals' surface area to volume ratio causes very little heat loss where as small animals ratio is better for heat loss. It is also known that larger things such as animals cool down slower. Therefore this shows why I predict that the large can will keep the water the warmest.

Table of Results

Time (mins)	Temp (large)	Temp (small)
1	71°c	65°c
2	70°c	63°c
3	68°c	63°c
4	67°c	62°c
5	66°c	60°c
6	64°c	60°c
7	62°c	59°c
8	61°c	58°c
9	60°c	57°c
10	60°c	56°c
11	59°c	54°c
12	58°c	54°c
13	56°c	54°c
14	56°c	53°c
15	55°c	52°c

Analysis

From this experiment I can clearly see the small can cools quickest and the big can cools slowest.
After 15 minutes the big can cooled to 55° whereas the small can cooled to 52°c.

Patterns

I have found a trend in both sets of results. Both lines have a negative correlation and move down in small steps of one two or three.

Conclusion

From my experiment I can conclude that the large can is better for concealing heat. This proves my prediction that the big can would be better. The can conducts heat and it is bigger so more conduction can take place. Convection inside the cans keeps the hot air in, as in the big can it will not rise out as the can is too big. Also this proves the point that large animal conceal heat more which is what happened in my experiment. The particles also slow down as they are not using as much energy.
This concludes what I have found out.

Evaluation

I feel that my experiment went well and was a success. It was a fair test and proved my prediction. I feel the test went well as it was accurate although I didn't have enough time to repeat it. However I didn't find any anomalous results. For my method to be better I could add some aluminium on top, where the holes to drink from are so that no air could escape.

For next time to improve my method I would firstly repeat the test, one or two more times to get better, fairer results. I might use more measurements, e.g. up to 20 minutes and even see how long it takes to cool to room temperature. Overall I think that the experiment went really well and I have found out a lot. For further research I could use different amounts of water and different size cans. I could also use can made of different materials.
Overall the test was a success.