

# Physics Coursework

## Keeping heat in a hot water tank

### Aim

*I am going to investigate which out of a number of coatings on a copper tin will insulate heat the best. I am going to repeat the investigation as many times as possible to get the best results. The coatings will include Foam, Tin Foil, Newspaper, Plastic Sheets, Bubble wrapping and no coating at all.*

### Equipment

*All the coatings: Foam, Tin Foil, Newspaper, Plastic Sheets, and Bubble wrapping.*

*Six copper cups*

*Six tins tops*

*A kettle*

*Six thermometers (If you are doing all cups at the same time)*

*A timer*

### Method

- 1. Put holes in the lids for the thermometers.*
- 2. Get equipment set up as the 'Diagram' shows.*
- 3. Boil water, and then put the water in the cups at exactly the same time.*
- 4. Put lids on the cups and measure the temperature of the water and write it down.*

5. Start timing and for every one-minute for fifteen minutes measure the temperature of the water and record it.
6. Repeat experiment for all coatings and repeat all coatings about three times and record the average.

### Diagram

### Prediction

I predict that there will be a wide range of results for the different coatings. I think that the coatings with the most air bubbles will be the best insulators for heat because the bubbles will trap the hot air and circulates inside them so no more heat can get through or not as much heat can get through. That's why I think that the Foam will be the best insulator. I also think that the Tin foil coating will also be a good insulator. I have also concluded that our fair test ideas will help us a lot to get fair results.

### A Fair Test

To make my experiment fair I am going to change/edit a few factors in the test. Firstly I will make sure the temperatures are the same before I start timing. I am only going to test two coatings at a time, so it will be easier for me to concentrate, then I won't make any mistakes. Also I am going to make sure there is the same amount of hot water in each cup. I will also make sure that there is just one wrap round of coating on each one. I will also make sure that the cups are the same size as well.

### Results Tables

#### Experiment 1

Experiment 2

Experiment 3

## Conclusion

During the experiment I found out that the foam was the best insulator out of all that I tested. I found out that no wrapping was the worst insulator. So my prediction was correct; I predicted that foam would be the best insulator because that had more air pockets and the more air pockets there are the more the hot air is trapped.

The best insulator was Foam, then tin foil, lint and bubble, then newspaper and then no insulator. I have done three graphs and I can see that there are a few patterns that I can describe. One of them is that there is repetitive results that foam is the best insulator of heat, I can tell this because the graphs show that foam has the highest ending temperature and on experiment three, foam is the best insulator all the way through the experiment.

I think that because the best thermal insulators are those that have the most tiniest air spaces because a thin layer of air will stop the flow of heat about 15,000 times better than a good metallic conductor of the same thickness.

## Evaluation

In my results and graphs I don't see that there are any results that do not fit the pattern that they are in. Although I think that tin foil does not really fit the pattern that I explained because after my research I would of thought that tin foil would have been one of

*the worst insulators of heat but its one of the best. I can't think of why this maybe but I think if I repeated my experiment a few more times then maybe I would get the results that I might of expected. I think that I repeated my experiment enough to get the results I wanted and I think that my results are reliable because of how many experiments I took and the patterns that keep on repeating. I also think that the experiment was accurate because I used all the fair test objectives that I had planned and I thought that they were very effective for me to get my correct results. I cannot think of any improvements because I did all that was possible.*