Saving energy

Conservation of energy is one of the signs of independence. To be more independent we need to save energy.
For this purpose, we decided to make a project to save more energy at home or any type of shelter. We inspired from the structure of thermos and construct a heat insulator into inner wall of house model.
Our hypothesis is 'using a reflector saves heat and lowers demand for power at home.'
Two house models, one is control, without aluminum foil coverage and the second is a test that has aluminum foil at inner surface and light source as a source of energy were equipment of this project.
We compared temperature of two model houses with bulbs of different power. A sudden increase in temperature of model house which is covered with aluminum foil proved our hypothesis.
Not only homes but also green houses, stables and farms of chicken can be covered with light reflecting insulators to save energy.

1. INTRODUCTION

Saving energy as important as supplying it. Because the more you save the less you require it. There are many advantages of energy efficiency. It improves the economy by saving your money. It is also good for the environment since decreases carbon dioxide emission. Beside this it improves national security by enhancing energy independency. Saving energy means Tajikistan need to import and transport less fossil fuel and more energy resources for future generations to use.

Scientific investigation starts with asking questions.

So our question is:

How can we save heat energy more at home? We suggested a solution and our hypothesis is:

If inner surface of home is covered with a heat reflector more energy can be saved.

There are some methods of house insulation from outside of the wall. In addition to this method we decided to build an insulator to inner surface of house.

In a model house we covered inner walls with aluminum foil to check whether it save energy or not.

To test our project we used following methods

1. To build up two model houses
2. Comparison of heat capacity
3. Duration of saving heat
4. Seasonal change

We used different power bulbs to compare heat capacity of two boxes. If we find a difference in temperature between two boxes then our hypothesis will be proved.

In next step we want to check efficiency of keeping heat. For this purpose we covered boxes with Styrofoam to save energy more.

In final method we wanted to answer what happens in summer if the air becomes very hot. Does it keep the room very hot or cool? For this purpose, we will place bottles filled with ice into boxes and measure the temperature change in a time interval. We expect it keeps cooler.

2. METHODS

2.1. To build up two model houses
AIM: To simulate normal and aluminum foil covered houses. First box represents control and second one is testgroup.

2.2. Comparison of heat capacity
AIM:To understand how much Celsius temperature can be reached with different energy amounts in two houses.

2.3. Duration of saving heat
AIM: After switching of energy how fast temperature decrease in two houses. If our system is to work cell with aluminum foil must cool slower.

2.4. Seasonal change
AIM: To understand how much aluminum foil keeps inside of room cool.

2.1. TO BUILD UP TWO MODEL HOUSES

Materials

- Two carton boxes
- Aluminum foil
- A switcher
- 4 sockets
- 2,5 meter cable
- 40- 60 -75 and 100 watt bulbs
- A piece of chipboard for base
- A piece of chipboard for base
- Thermometer
- Styrofoam
- A plug out

Procedure

1. Find 2 same size boxes with proper size and,

2. Open hole at the bottom for sockets.

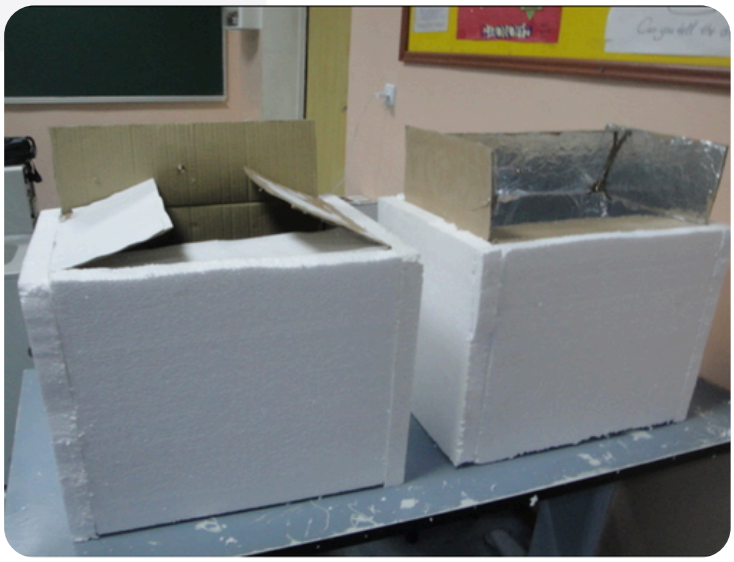
3. Prepare two light sources for each box by using cable, sockets and bulbs.

Procedure

4. Dismantle second box. Cover and glue aluminum foil to inner surface then rebuild it.

5. Prepare pieces of Styrofoam for the outer surfaces.

6. Cover the outer surface of boxes with Styrofoam.



Procedure

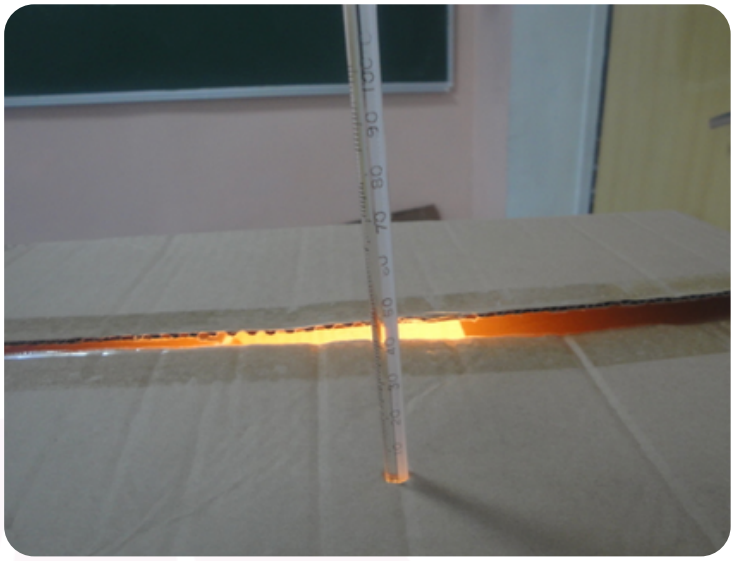
7. Prepare light source and put place them inside boxes.

8. Cover boxes with carton paper.

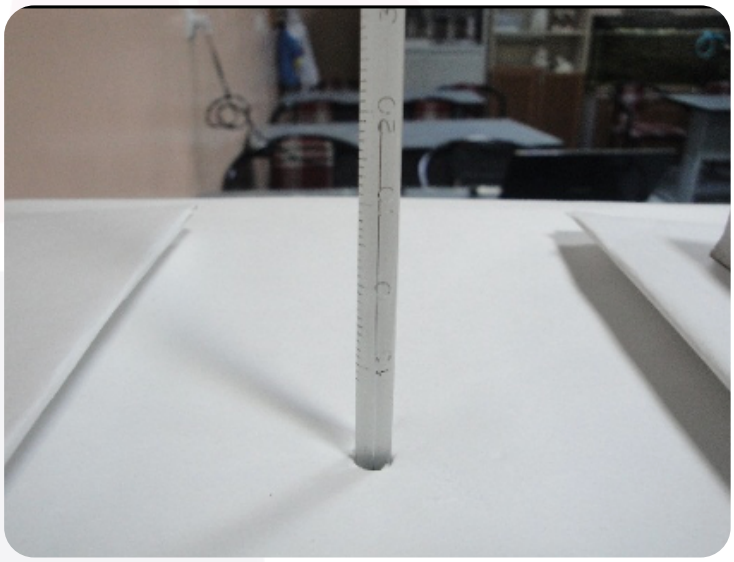
9. Place a thermometer in each box.

2.2. COMPARISON OF HEAT CAPACITY

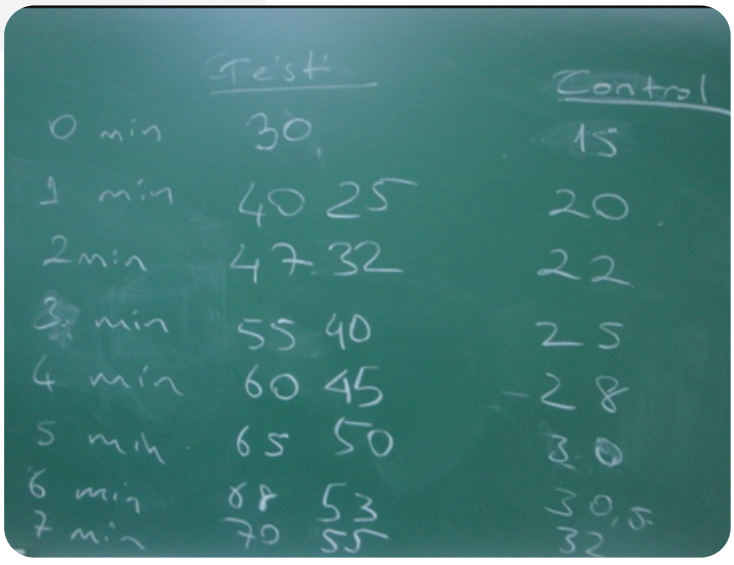
1. Put 40 watt bulb in each socket then measure increase in temperature in each box with 1 minute time intervals.



2. Do same procedure with 25, 60 and 100 watt bulbs.

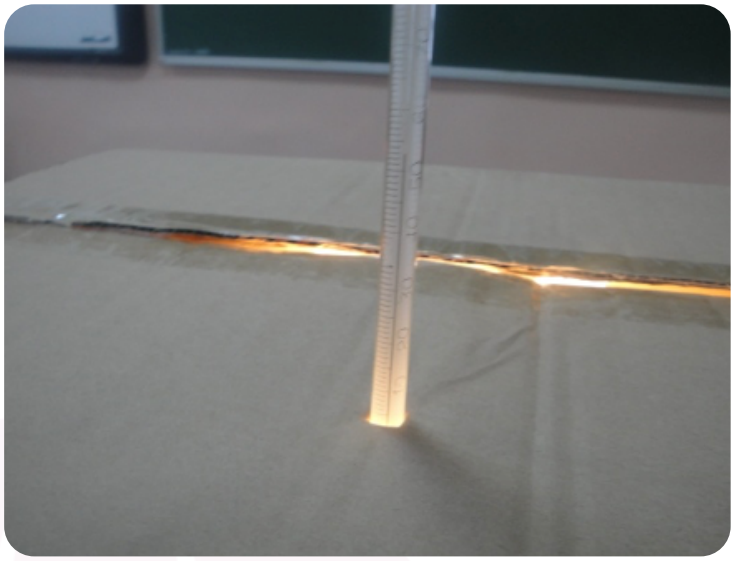


3. Record temperature changes in a table.

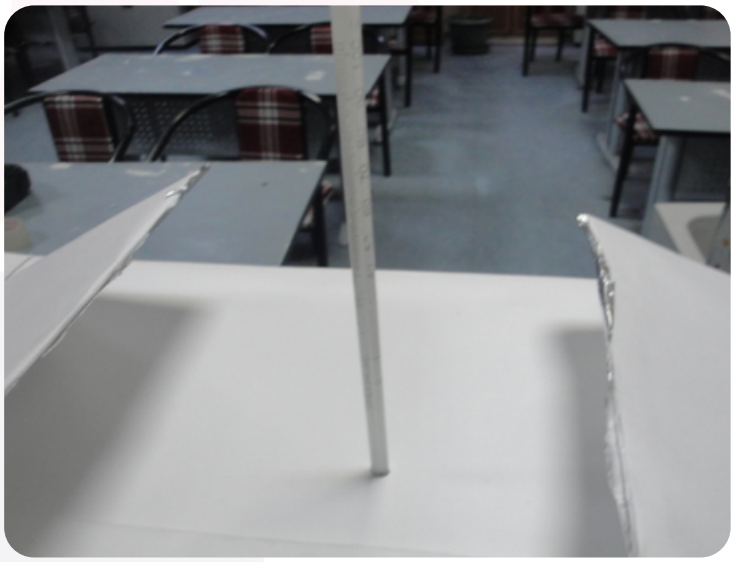


2.3. DURATION OF SAVING HEAT

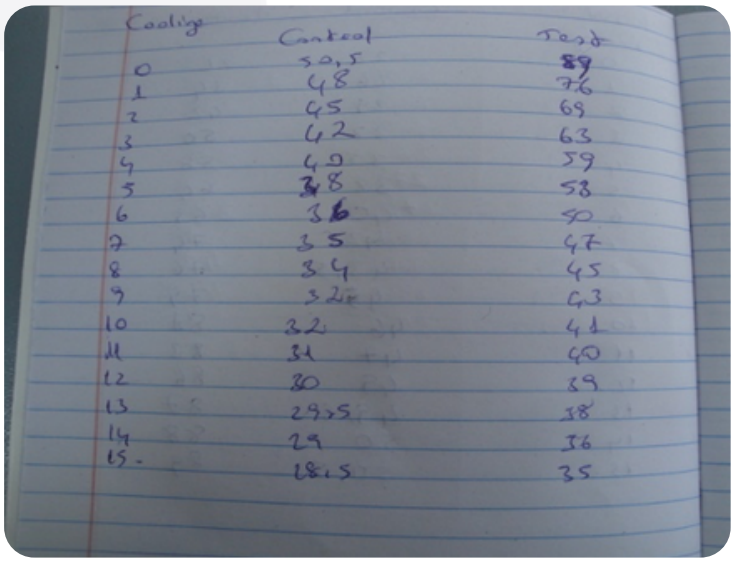
1. Heat boxes with 25,60 and 100 Watt bulbs for 10 minutes.



2. After switching of electricity, measure the speed of cooling in each box.



2. Record temperature changes.

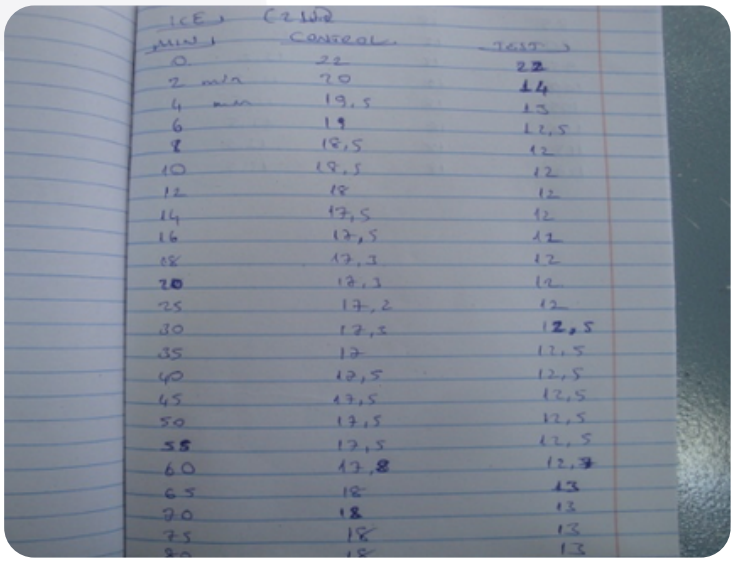


2.4. SEASONAL CHANGE

1. Freeze water in 4 bottles

2. Put 2 bottles in each boxes

3. Measure the temperature change with thermometers.



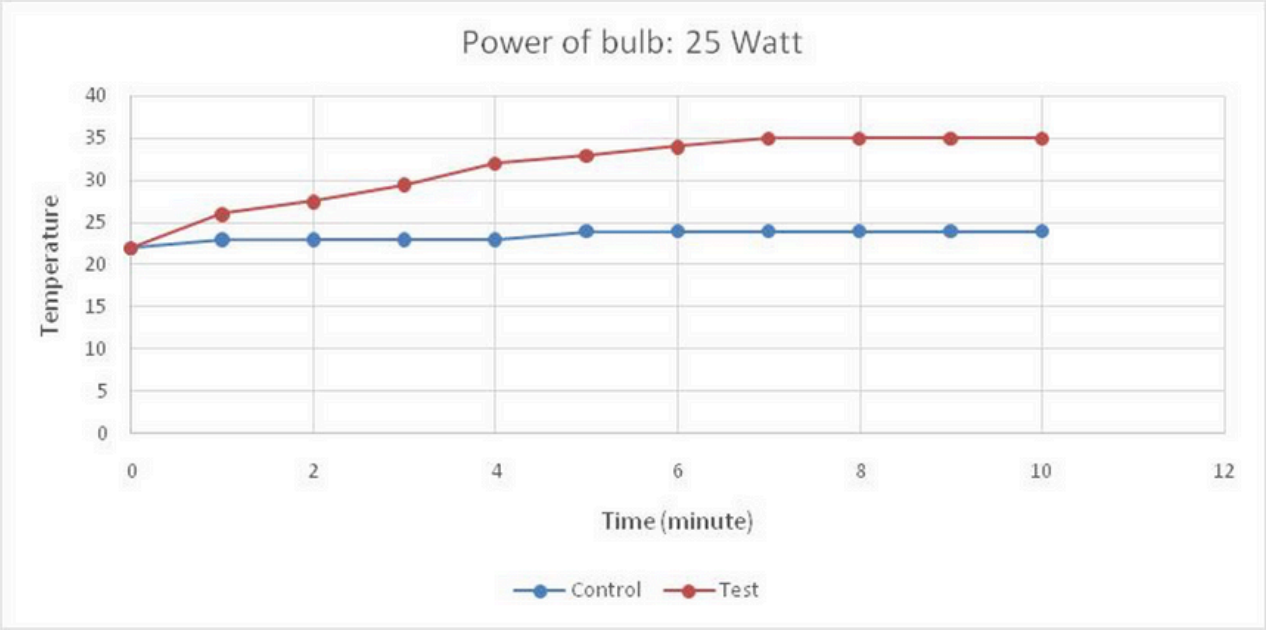
3. RESULTS

3. 1. COMPARISON OF HEAT CAPACITY

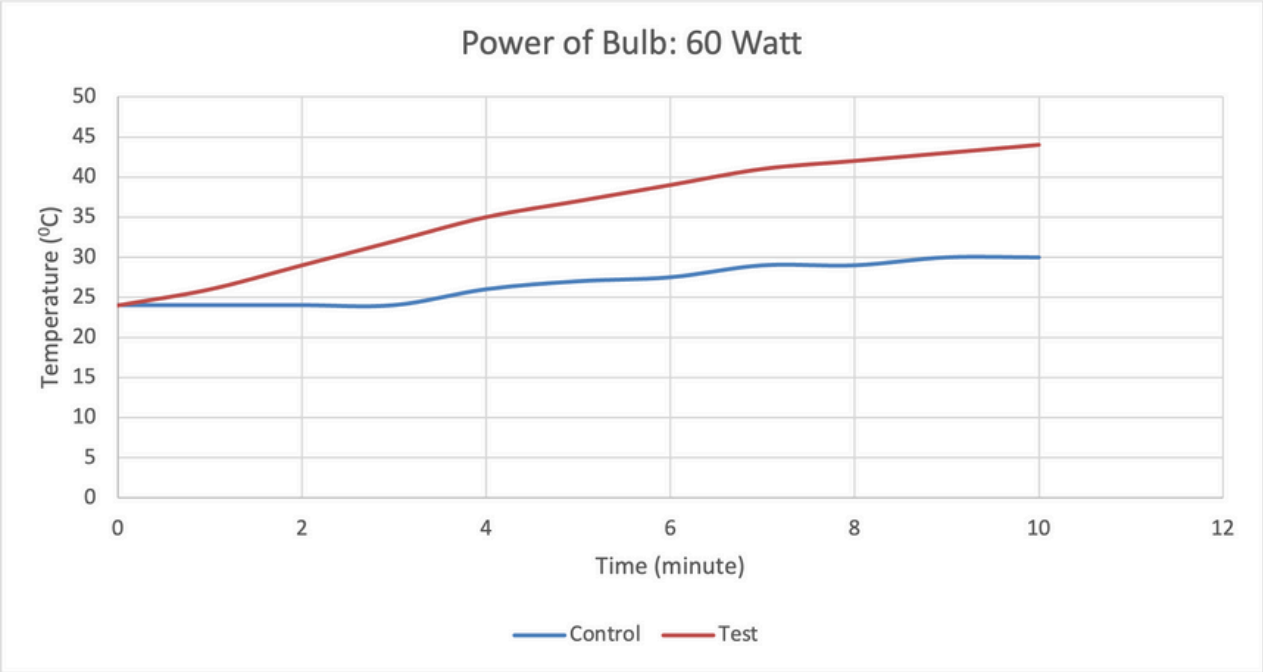
Comparative result of increase in temperature of boxes after switching on light with different power bulbs were given below.

	Power of bulbs (Watt)					
	25		60		100	
Time (minute)	Control	Test	Control	Test	Control	Test
0	22	22	24	24	22	22
1	23	26	24	26	26	34
2	23	27,5	24	29	29	42
3	23	29,5	24	32	32	50
4	23	32	26	35	35	58
5	24	33	27	37	38	64
6	24	34	27,5	39	40	69
7	24	35	28,5	41	42	74
8	24	35	29	42	43,5	76
9	24	35	29,5	43	45	79
10	24	35	30	44	46	81

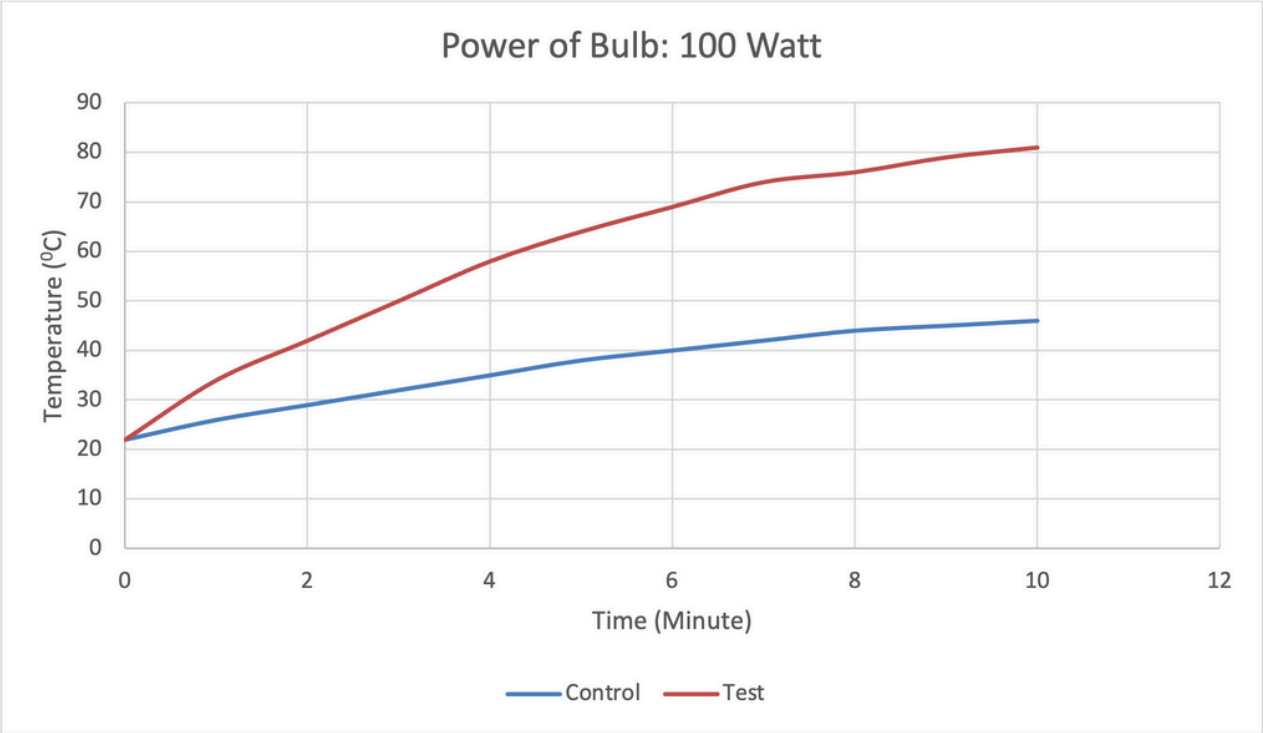
Table 1: Change in temperature in control and test with 25, 60 and 100 bulbs.



Graph 1: Change in temperature with 25 Watt bulb.



Graph 2: Change in temperature with 60 Watt bulb.



Graph 3: Change in temperature with 100 Watt bulb.

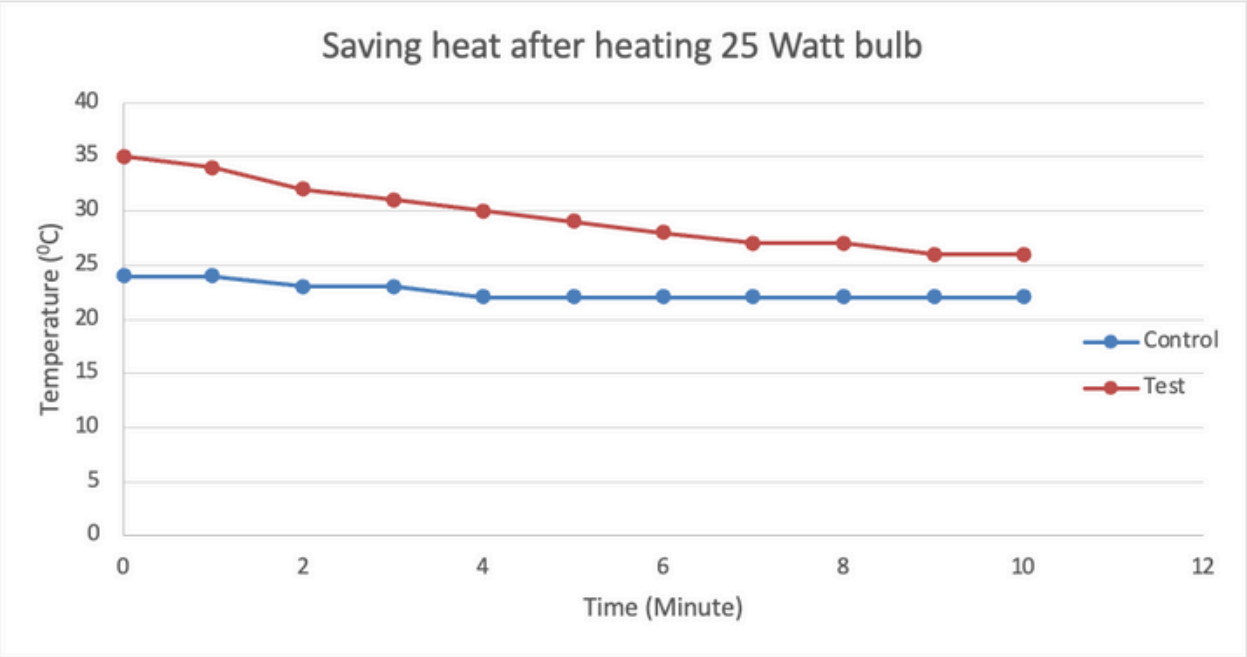
We observed a sharp increase in temperature in test groups with each bulb. This proves that aluminum foil is very efficient to decrease demand of energy.

3.2. DURATION OF SAVING HEAT

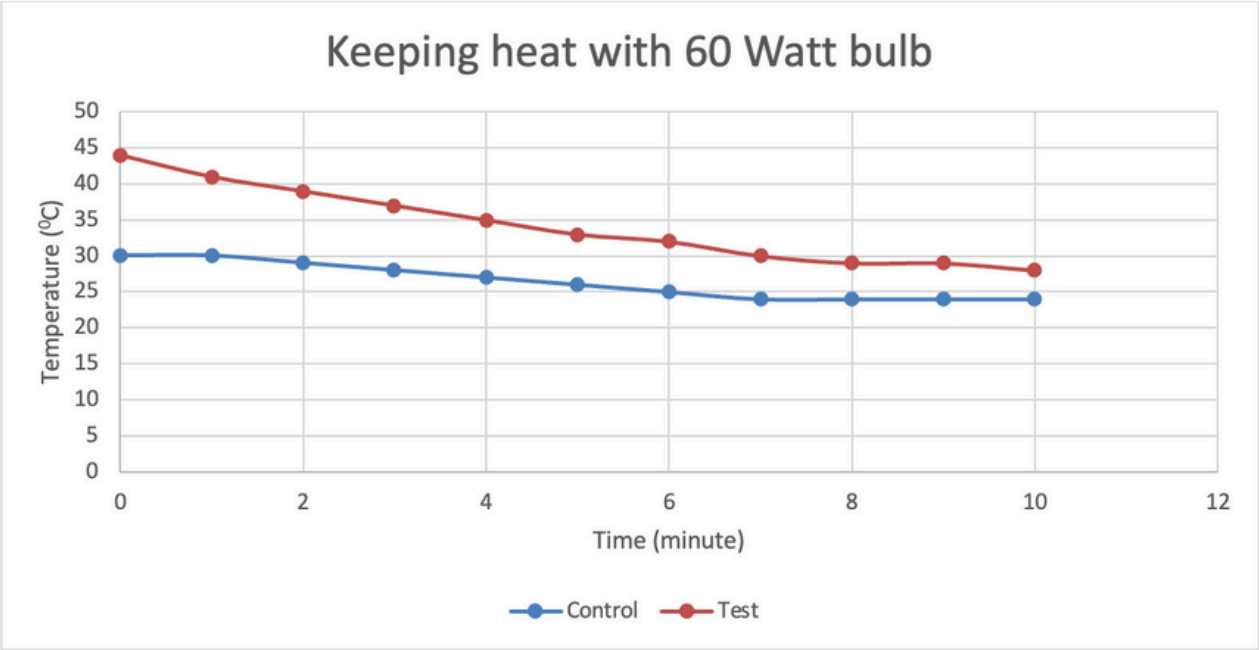
Decrease in temperature after switching of electricity in both boxes are given below:

Time (minute)	Power of bulbs (Watt)					
	25		60		100	
	Control	Test	Control	Test	Control	Test
0	24	35	30	44	50,5	89
1	24	34	30	41	48	79
2	23	32	29	39	45	69
3	23	31	28	37	42	63
4	22	30	27	35	40	59
5	22	29	26	33	38	53
6	22	28	25	31,5	36	50
7	22	27	24,5	30	35	47
8	22	26,5	24,5	29	34	45
9	22	26	24	28,5	32	43
10	22	25,5	24	28	32	41

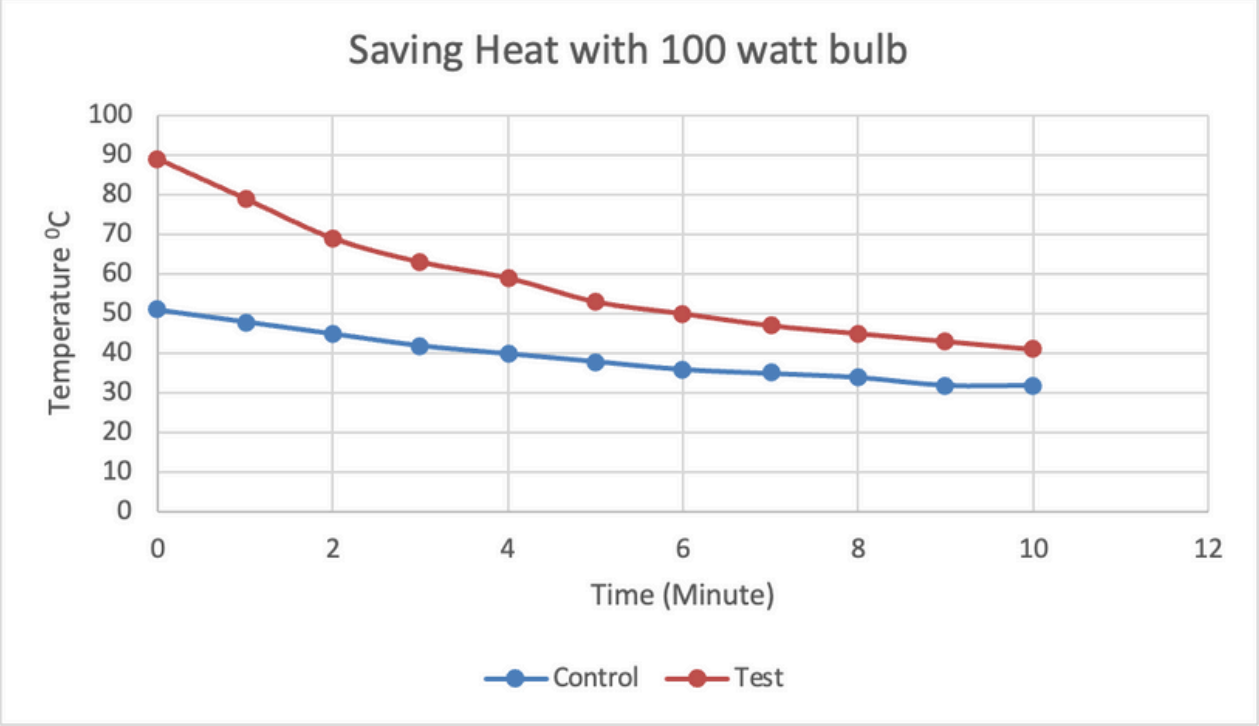
Table 2: Saving temperature in control and test groupwith different power bulbs.



Graph 4: Change in temperature after switching of 25 Watt bulb



Graph 5: Change in temperature after switching of 60 Watt bulb



Graph 6: Change in temperature after switching of 100 Watt bulb

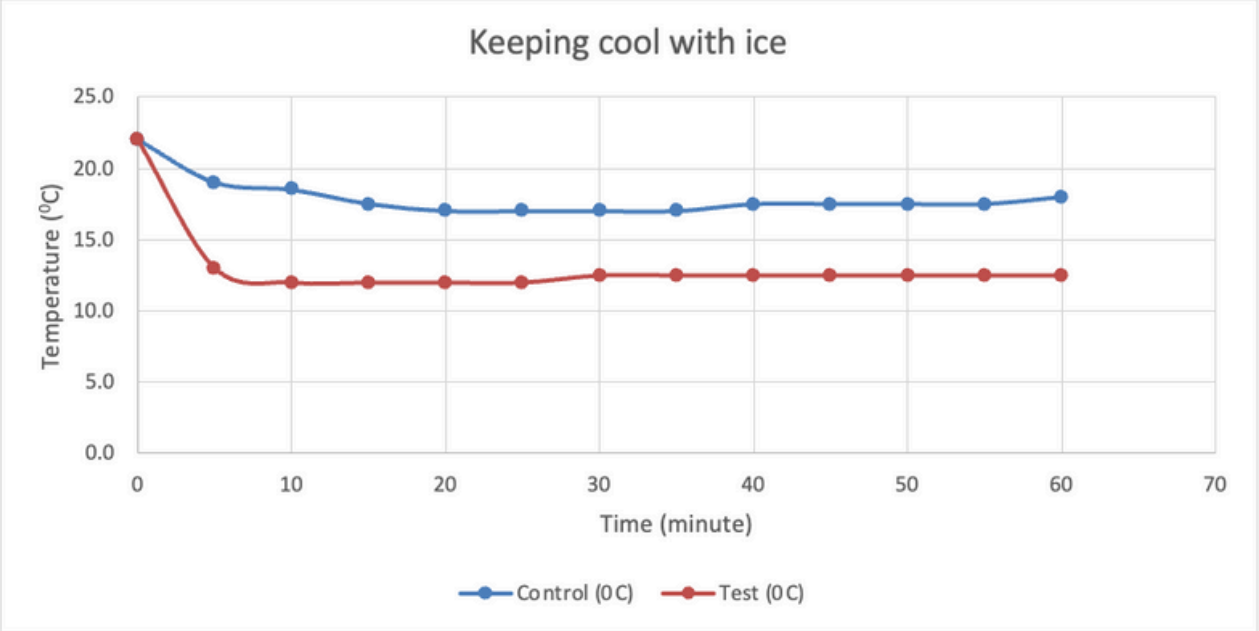
Although there is sharp decrease in temperature in both boxes we still have saved energy by proving that we have higher temperature, at the end of 10 minutes, in the test group.

3.3. SEASONAL CHANGE

After placing 2 liter ice into each boxes we measured change in temperature in both boxes. Result of change in temperature is shown below:

Time (minute)	Control (^{0}C)	Test (^{0}C)
0	22	22
5	19	13
10	18,5	12
15	17,5	12
20	17	12
25	17	12
30	17	12,5
35	17	12,5
40	17,5	12,5
45	17,5	12,5
50	17,5	12,5
55	17,5	12,5
60	18	12,5

Table 3: Temperature change in control and test after placing ice



Graph 7: Change in keeping cool in control and test

When we placed ice in boxes we observed sharper decrease in temperature in the test group than in the control group. This proves that aluminum foil not only helps for heating but it also plays role in cooling the boxes.

4. CONCLUSION

In conclusion, we have found another way of effectively heating and cooling homes.

By covering the walls of a box with aluminum, we have proven the hypothesis that: "Aluminum saves energy require in heating or cooling homes".

We are squandering our energy sources such as electricity, natural gas or coal for heating in winter. We also use too much electricity for cooling with conditioner at summer. If we cover the inner walls of houses with aluminum foil we can save the energy required to heat the house in winter or cool the house in summer.

Not only houses but also other types of shelter such as stables can be covered with aluminum foil to save energy.