Thrown Away Insulation

This project is to reuse commonly thrown away materials as insulation.

My target audience is anybody who needs insulation.

Background Information

In a previous experiment called Insulastic, I reused plastic, plastic bags, and a mix of the two as insulation. The plastic bags worked the best. I would like to expand on that project to see if any other commonly thrown-away materials are better than the plastic bags. I will use rubber tire bits, foam and polyfill as Thrown Away Insulation. I am also improving Insulastic by using a plexiglass box to test instead of a wooden one. The wood for the box was at least ¾ in. wide, and I think the wood helped the insulation keep the heat trapped.

The purpose of this experiment is to test these other materials (rubber, foam and polyfill) as possible Thrown Away Insulation. The most common material used right now as insulation is fiberglass. Fiberglass is almost impossible to recycle and can't decompose. This material is also very dangerous to the lungs, eyes, and skin. The reason is because the fiberglass particles (small pieces of glass) can be inhaled and cause respiratory ailments. It will also cause your eyes and skin to itch.

Problem and Hypothesis

Landfills are all over the world. There are over 1,250 landfill facilities in the U.S. alone. They release CO2 and methane gas which are both greenhouse gases. These greenhouse gases contribute to global warming. Landfills also take up lots of valuable space. For example, the size of an average landfill is 600 acres. Trash also ends up in the oceans and kills marine life. It is estimated by the Sea Turtle Conservancy that over one million marine animals die per year from trash in the ocean.

A variety of materials and garbage can be found in landfills. Aside from plastic, the most commonly thrown-away material, rubber, foam and polyfill also contribute to landfills and trashcans.

Hypothesis: The hypothesis for this current experiment is that the polyfill Thrown Away Insulation will do better than the other materials, including the plastic bags.

Independent and Dependent Variables, Control and Constants

Independent Variable: Type of insulation.

Dependent Variables: The temperature in the testing box.

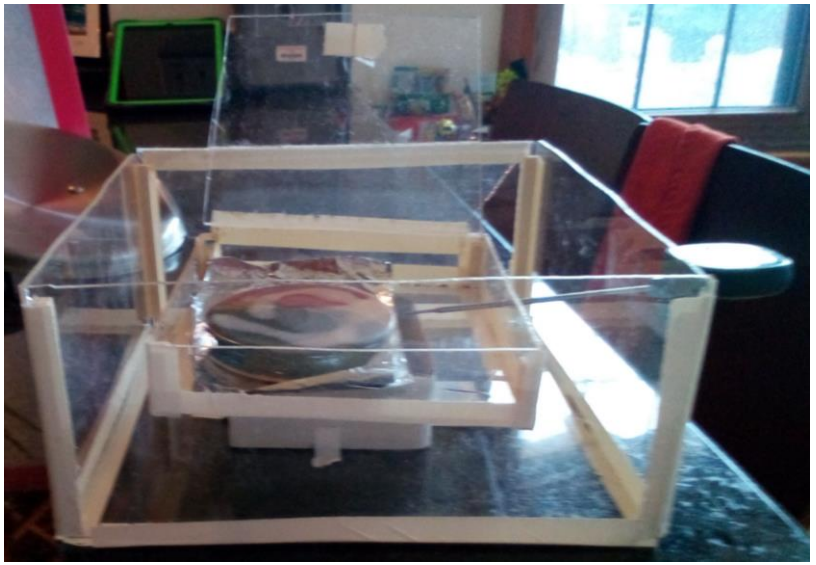
Constants:

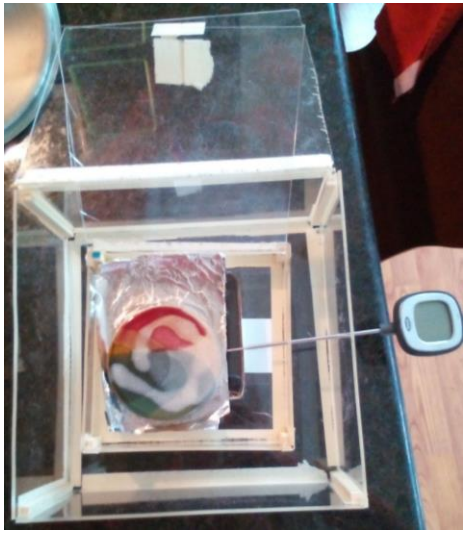
- Heat of the bread warmer
- Amount of insulation
- The testing box
- The thermometer

Controls: The negative control was no insulation to see how the temperature in the box decreases without insulation. The positive control was fiberglass insulation to see how the temperature in box decreases with real insulation.

Imagine and Plan

- Design #1- Rubber mulch
- Design #2- Foam
- Design #3- Polyester Polyfill
- Design #4- No insulation
- Design #5- Fiberglass insulation
- Design #6- Plastic Bags

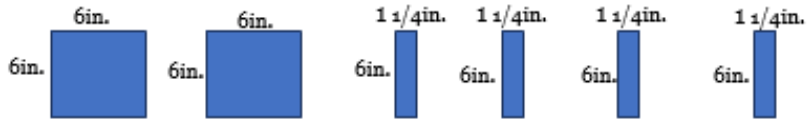




The Thrown Away Insulation will be tested in the new testing box (See side picture). The Thrown Away Insulation will be put in between the two boxes and then closed with the lid of the larger box. The testing box is made out of plexiglass.

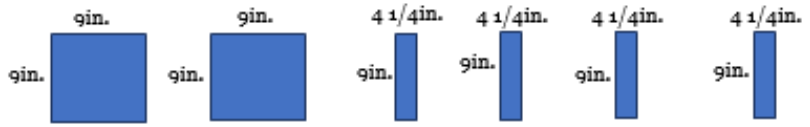
Procedures: Building the Boxes

Step 1) Small Box



The plexiglass was cut to the sizes above.

Step 2) Big Box



The plexiglass was cut to the sizes above.

Step 3) The boxes were assembled by putting the smaller pieces of plexiglass around the bigger one. Then hot glue and duct tape was used to hold it together. Then wooden strips were used to reinforce the plexiglass.

Step 4) A tape handle was created and put on the top of the box to open it.

Step 5) Using a drill, drill a hole in each box so that the thermometer can reach into the small box and stick out of the big box. This is so you could see the temperature in the small box.

Create

Materials needed to make the testing boxes are plexiglass, duct tape, small wooden strips, drill, hot glue and cardboard.

I used the cardboard as a stand to hold the small box up.

The materials for testing are, the testing boxes, digital thermometer, timer, notebook, pencil, a bread warmer and the Thrown Away Insulation.

Steps to prepare the Thrown Away Insulation:

Step 1. The rubber mulch was gathered.

Step 2. The foam was gathered and cut up into rectangle shapes.

Step 3. The polyfill was gathered.

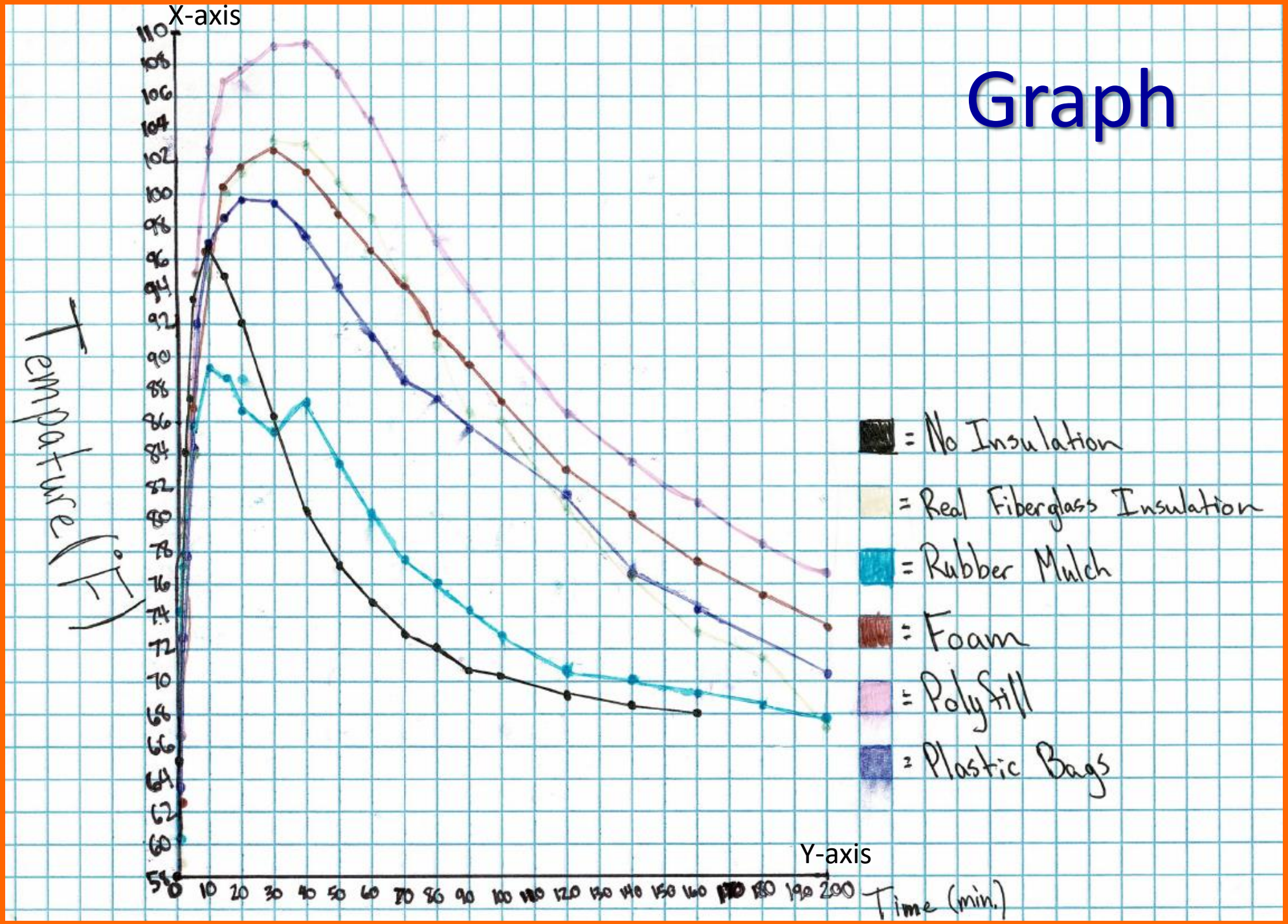
Data Table

	Temperature (°F)					
Time (min.)	No Insulation	Fiberglass Insulation	Rubber Mulch	Foam	Polyfill	Plastic Bags
0	65.3	58.8	60.4	60.8	66.7	63.5
0.5	83.9		74.2		77.6	72.7
1	84.2	77.9	77.1		79.8	77.9
2	87.5	79	85.7		85.7	84.5
5	93.6	84.1	87.7	87	95.3	91.9
10	96.5	95.2	89.3	96.5	102.8	96.8
15	94.9	100.1	88.4	100.5	106.9	98.5
20	92	101.7	86.5	101.9	107.7	99.8
30	86.2	103.1	85.6	102.7	108.9	99.5
40	80.5	102.9	87.5	101.4	109	97.3
50	77.4	100.7	83.4	98.8	107.5	94.2
60	75.1	98.4	80.3	96.5	104.3	91.4
70	73.1	94.6	77.6	94.2	100.4	88.3
80	72.1	90.8	76	91.5	97.1	87.4
90	70.7	86.5	74.4	89.5		85.7
100	70.2	86	72.9	87.2	91.2	
120	69.3	80.4	71.3	83.1	86.3	81.5
140	68.5	76.5	70	80.1	83.6	76.6
160	68	73.3	69.2	77.5	81	74.5
180		71.5	68.6	75.3	78.3	
200		69.6	67.9	73.5	76.6	

Calculations:

No insulation- Start: 65.3 Highest point: 96.5 Temperature difference: 31.2
Fiberglass insulation- Start: 58.8 Highest point: 103.1 Temperature difference: 44.3
Rubber mulch- Start: 60.4 Highest point: 89.3 Temperature difference: 28.9
Foam- Start: 60.8 Highest point: 102.7 Temperature difference: 41.9
Polyfill- Start: 66.7 Highest point: 109 Temperature difference: 42.3
Plastic Bags- Start: 63.5 Highest point: 99.8 Temperature difference: 36.3

Graph


X-axis
Temperature (F°)
110
108
106
104
102
100
98
96
94
92
90
88
86
84
82
80
78
76
74
72
70
68
66
64
62
60
58
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200
Y-axis
Time (min.)
= No Insulation
= Real Fiberglass Insulation
= Rubber Mulch
= Foam
= PolyFill
= Plastic Bags

Results and Conclusion

Results: The polyfill Thrown Away Insulation was always about 3°F below the real fiberglass insulation. So, the polyfill did the best out of all of the Thrown Away Insulation. It also did better than the plastic bags as well which was the best insulation in the previous project. The worst insulation was rubber mulch which only went up to 89°F.

Conclusion: In conclusion, Thrown Away Insulation solves the problem of common materials ending up in landfills. Its purpose was to reuse some of the most commonly thrown away materials and reuse them as insulation. The polyfill also did better than the plastic bags from the recent project. So, there fore the polyfill insulation is a successful insulation and can be used as an alternative to fiberglass insulation as insulation. I could improve this project by testing other polyfill types.

Sites:

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