Heat Loss through a Wall Made with Optimum Insulating Bricks

Mohapatra, Isha (School: Moravian Academy)

Imagine a world where our coastal cities are drowning and pollution is the norm. This could very well be our reality if the use of fossil fuels is not decreased. One of the ways fossil fuels can be conserved is by reducing the amount heat energy loss in buildings by creating and implementing a new type of insulation -- a brick for construction that is 50% more insulating, yet stronger than the common brick. Utilizing standard methods for brick-making, a control and 3 optimum brick recipes called Experiment 1, 2, and 5 were mixed, fired, stacked together into 3 X 3 brick arrays, and finally surrounded by insulation. They were made with clay, sand, and additives of sawdust, which burns away leaving pores for insulation, and limestone for strength. To test the heat transfer property of the brick, all sides of the wall, except one, had to be enclosed by insulation. The wall was laid sideways and three heaters were placed underneath between the wall and insulation. Three thermocouples were placed on the bottom of the bricks to record the temperature directly from the heaters and three were placed on the top to record the temperature on the other side. The heaters, connected to a rheostat set at a certain voltage, heated the bricks from underneath while the thermocouples, connected to a data acquisition system, recorded the temperatures for 2 hours. It was found that the Experiment-5 brick had a lower thermal conductivity (more insulating) due to a higher temperature difference between the bottom and the top thermocouples. The Experiment 1 and 2 bricks were similar in thermal conductivity and had similar temperature differences. However, all three of these bricks had higher temperature differences than the control brick, confirming that they were more insulating.

Awards Won: