

Automated experimental setup for measuring heat conductivity

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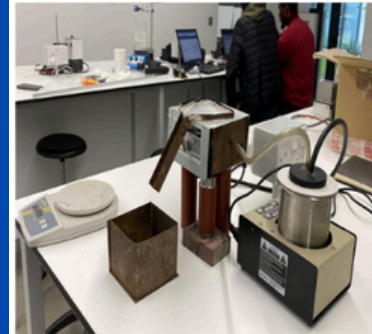
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- Thermal conductivity is the ability of a material to transfer heat.
- The thermal conductivity of a material refers to its ability to allow heat to pass through or to insulate it. The higher the conductivity, the more heat the material allows and the lower the conductivity, the more insulating the material.
- Our project is to design a mechanical machine which will aim to realize the physical states of water (liquid, solid, gaseous) which will lead to measure the conductivity of metals.
- During the experiment, we will observe the material which will have a rapid conductivity,
- The goal of this project is to improve our knowledge and skills in engineering as the project is not familiar to our departments and to explore ways in which we can contribute to a future in versatility and teamwork.

MACHINE



MATERIALS USED IN CONSTRUCTION Re-used/Recycled Materials

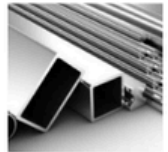
-Iron



-Copper



-Aluminium



-Scale



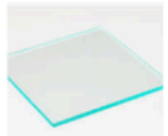
-Glue



-Pipe



-Glass pane



RESULTS AND DISCUSSION

•For the experiment we use;

- Mass of ice=188g
- Mass of the box without water=255g
- Steel thickness=0,001m
- Air of the ice=6,8*5,8=0,003944m²

$$\lambda = Q \cdot \Delta x / \Delta T \cdot A$$

We know that the temperature of boiling water is 100 c

-Qf=334 kj/kg (melting ice)

We timed the time before the ice melted (t1=1min=60sec) and the time during which the ice melted(t2=1min28sec=88sec)

So $\Delta t = 88 - 60 = 28 \text{sec}$

We melted half of the ice cream;

-Mass(box+water)=283g ;so the mass of liquid water=28g for 88sec

$Q = Q_f \cdot m$ of liquid/t=334kj/s

$$\lambda = 0,847 \text{w/C}^\circ \text{m}$$

- After carrying out the experiment, we saw how the fusion of ice and copper is more thermally conductive than aluminum and iron.
- This experiment is also possible with physical formulas.

REFERENCES

- <https://www.tec-science.com/thermodynamics/heat/thermal-conductivity-fouriers-law/>
- <https://www.tec-science.com/thermodynamics/heat/experimental-setup-for-determining-the-thermal-conductivity/>

