
THERMAL CONDUCTIVITY EXPERIMENT USING A BALLON

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CLASS DESCRIPTION

In this class, students will determine and see how water can conduct and absorb heat, and to investigate how heat is transferred through differing materials, in this case water and air.

TOTAL CLASS TIME: 90 minutes

CLASS OUTCOME

By the end of this class, students will identify the difference in the thermal conductivity of air and the thermal conductivity of water, or the absorption and transfer of heat in water as compared to air.

INTRODUCTION

Heat transfer in liquid and gasses is through convection and water absorbs much more heat than air. In physical science, heat transfer often refers to the the process by which matter exchanges thermal energy. As such, there are three key ways through which heat energy is transferred between matter.

- Conduction: is heat transfer through solids
- Convection: is heat transfer through gasses and liquids
- Radiation: is heat transfer without any medium(in a vacuum)



MATERIALS NEEDED

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1. Water
 2. Balloons
 3. A lit candle



PROCEDURES

Step 1: Light the stick of candle with a match or lighter.



Step 2: Blow up a balloon and hold over the lit candle. Blow it up to a decent size, not too small or large. Hold it over the lit candle. Hold the balloon an inch or two above the candle. Within ten seconds the balloon will pop. Boom! The balloon explodes!

The balloon pops because the candle heated up the balloon, which weakened the balloon.



Step 3: Fill a balloon with water. Fill it halfway with water. Hold that same balloon over the candle flame. This time the balloon does not pop. The candle flame can even touch the balloon and it won't pop.



OBSERVATION/DISCUSSION

When the balloon filled with air touches the flame, it bursts. However, the balloon that contains water does not burst upon touching the flame. This is because the candle is warming the water rather than popping the balloon. That's why water isn't going flying everywhere. The balloon conducts heat and is able to transfer it to the water without damaging the balloon.

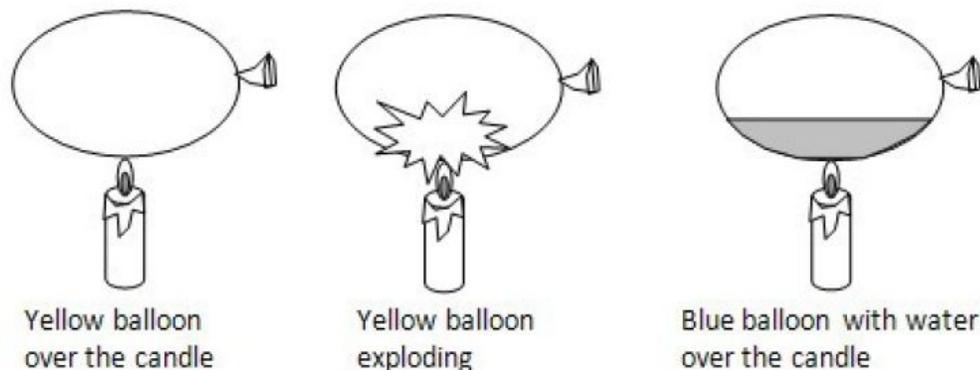


Figure 1 - Thermal conductivity experiment using balloons

The balloon filled with air bursts since the air expands quickly and does not absorb the heat from the rubber which causes the rubber ball to stretch and eventually brake to let the expanded air out. The balloon having water and air does not burst. It is because water absorbs the heat from the rubber band and through convection currents it carries the heat away from the rubber while cold water replaces the risen water.

CONCLUSION

The conclusions drawn from this experiment confirm water absorbs far more heat than air making the balloon heat proof. Hence, water can be used as a heated tank. Water and air are both heated through the candle lit, however the thermal conductivity of water is higher than the thermal conductivity of air.

REFERENCES

<https://www.wikihow.com/Do-a-Simple-Heat-Conduction-Experiment>

<https://thermtest.com/thermal-resources/thermal-conductivity-experiments/heating-water-balloon>