

Name: _____ Class: _____ Date: _____

The Heat Conduction Apparatus

Learner Outcomes:

- Compare heat transmission in different materials (e.g., compare conduction of heat in different solids)
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Key terms:

Heat	Conduction	Heat transfer
Energy	Thermal energy	Particle theory

Background Information:

Thermal conduction is the process of transferring thermal energy through direct collisions between particles. Particles near the heat source become excited and move more energetically (rapidly). This energy is then transferred to the next particle. Every particle in the chain will eventually come to a maximum quantity of thermal energy for the thermal energy for the particular set-up.

One property of metals, in general, is that they are good conductors of heat. Their atomic structures allow them to transfer energy from one particle to another with great ease, without causing the pure metal to decompose (break into smaller parts), combine with other chemicals too easily, or turn into its liquid state too easily.

Purpose: To observe the different rates of conduction in various metals using a heat conduction apparatus and approximately equal portions of wax.

Hypothesis: If different metals are heated at the same rate, then the metals will conduct heat energy at different rates, resulting in the wax melting at different rates.

Materials:

methanol burner	metal pan	wooden splints
wax	candle	heat conduction apparatus

Procedure:

1. Set up the Heat Conduction Apparatus by melting small amounts of wax onto each of the dimples on the metal rods.
2. Set the alcohol burner the Heat Conduction Apparatus and start the timer upon ignition.
3. Record the time, in SECONDS, that it takes for wax to melt off of each of the 5 metal rods.
4. Graph the results.

****Safety Precautions:** Care must be exercised with an open flame. Methanol burns with a nearly invisible flame. Therefore, the lights must be turned down so as to better be able to view the flame.

Observations:

Draw a diagram of the laboratory set-up:

<u>Metal</u>	<u>Time to Wax Separation (s)</u>
Al	
Zn	
Cu	
Brass	
Steel	

Analysis:

1. Which metal proved to be the best conductor of heat?
2. Which metal proved to be the worst conductor of heat?
3. What does the graph show?
4. Was there a particular trend that was evidenced by Brass and Steel, the only two alloys ... blends of different metals?

Conclusion:

Extension:

1. How is the conduction of heat related to the conduction of electricity?
2. What metal would you use to create an insulating surface, i.e. one that keeps heat in?

References:

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