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| CHEMISTRY | CODE: SCS21A |
| 2014-2015 SCHOOL YEAR | INSTRUCTOR: Ms. Bui |
| CLASSROOM: 510 | LAB ROOM: 506 |

**LAB 10**

**HEAT FLOW**

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| Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Subject: Chemistry |

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| **PRE-LAB:**  On February 3, 2015, the average temperature is around 38 degrees Fahrenheit (about 3.33 degrees Celsius). The “Property Maintenance Code of New York State” requires that indoor space must be at least 68 degrees F (20 degrees C).  ***AIM PROMPT: What will happen to the temperature in the classroom when the window is opened?***  **PREDICTION:**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **RATIONALE (explain your reasoning):**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |

**Materials:** Phet Simulation – Energy Forms and Changes

<https://phet.colorado.edu/en/simulation/energy-forms-and-changes>

**PROCEDURES:**

1. Click on the Intro Tab
2. Click on the Energy Symbols
3. Move the water container onto the wire stool. Attach a thermometer to the water container.
4. Increase the temperature in the bucket (under the water container) by moving the arrow upward to HEAT.

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| **Describe what happens to the energy symbols inside the water container.** |
| **Is it possible to boil the water? Explain.** |

1. Decrease the temperature in the bucket (under the water container) by moving the arrow downward to COOL.

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| **Describe what happens to the energy symbols inside the water container.** |
| **Is it possible to freeze the water? Explain.** |

1. Reset the simulation.
2. Move the Iron container onto the wire stool and attach a thermometer to the iron container.
3. Add heat and observer how much energy the iron container holds once the thermometer is at its highest point.

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| **Describe the amount of energy inside the iron container.** |

1. Move the Brick container onto the wire stool and attach a thermometer to the brick container.
2. Add heat and observer how much energy the brick container holds once the thermometer is at its highest point.

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| **Describe the amount of energy inside the brick container.** |
| **Between the brick and the iron container, which container can hold more energy? Explain.** |

1. Reset All. Place the water container on the 1st wire stool. Place the iron container on the 2nd wire stool. Add a thermometer to both containers. Only add heat to the iron container. Once the iron container has reached its maximum temperature, place the heated iron container into the room temperature water.

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| **Describe what happens to the energy and temperature of the water and iron containers.** |

1. Reset all. Place the iron container on the 1st wire stool. Place the brick container on top of the iron container. Add a thermometer to both containers (make sure you can see both thermometers). Add heat.

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| **Describe what happens to the energy in the iron and brick containers.** |

1. Decrease the temperature by moving the arrow to COOL.

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| **Describe what happens to the energy in the iron and brick containers.** |

**POST LAB:**

Specific heat capacity is the amount of heat required to raise the temperature of 1 gram of a substance by 1 Kelvin (K). 1 Kelvin is equal to Celsius + 273 or 1K = Cº + 273.

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| **Description** | **Specific Heat Capacity** |
| Water | 4.187 kJ/kg K |
| Brick | 0.9 kJ/kg K |
| Iron | 0.46 kJ/kg K |

1. Of the three containers, which container has the higher specific heat capacity?
2. Explain what does it means to have the higher specific heat capacity between the three containers.
3. Referring back to the Pre-Lab, calculate the following:

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| Temperature in Kelvin for the classroom | Temperature in Kelvin for outside |

***AIM PROMPT: What will happen to the temperature in the classroom when the window is opened? Use the RACE format (A paragraph of at least 3 sentences). Use evidence from the lab to support your claim.***

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