**Equilibrium Temperature Lab**

**Purpose:**

To test and accurately predict the equilibrium temperature in different situations.

**Materials**

* 250 mL, 100 mL, and 50 mL Beakers
* Graduated Cylinder
* Hot plate
* Hot and Cold water
* Thermometer
* Scale
* Petri Dishes/Paper Towel

**Procedure:**

1. Mass your beakers to find your tare values.
2. Use a graduated cylinder to measure approximate amounts of water required (Hint: 1mL of water is roughly equal to 1g of water)
3. Bring the water close to the required temperature.

(Hint: cover the beaker when doing other measurements to reduce energy and mass loss)

1. Record the temperature and mass of your separate beakers of water.
2. Predict the equilibrium temperature.
3. Mix the water, record the equilibrium temperature.

**Data/Results:**

**Situation #1** (approx. 100g @ 100°C and 100g @ 0°C)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Beaker 1** |  |  | **Beaker 2** |  |  | **Combined** |  |
| Mass |  | Mass |  | Mass |  |
| Temperature |  | Temperature |  | Temperature |  |

Predicted Equilibrium Temperature: Show Calculations

**Situation #2** (approx. 25g @ 32°C and 120g @ 12°C)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Beaker 1** |  |  | **Beaker 2** |  |  | **Combined** |  |
| Mass |  | Mass |  | Mass |  |
| Temperature |  | Temperature |  | Temperature |  |

Predicted Equilibrium Temperature: Show Calculations

**Situation #3** (approx. 150g @ 75°C and 60g @ 20°C)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Beaker 1** |  |  | **Beaker 2** |  |  | **Combined** |  |
| Mass |  | Mass |  | Mass |  |
| Temperature |  | Temperature |  | Temperature |  |

Predicted Equilibrium Temperature: Show Calculations

**Situation #4** (approx. 50g @ 35°C and 80g @ 50°C)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Beaker 1** |  |  | **Beaker 2** |  |  | **Combined** |  |
| Mass |  | Mass |  | Mass |  |
| Temperature |  | Temperature |  | Temperature |  |

Predicted Equilibrium Temperature: Show Calculations

**Situation #5** – Find the Specific Heat Capacity

(Hint: Boiling water maintains a constant heat of 100°C, if your object is left in boiling water for some time, it will come to a temperature of 100°C)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Object** |  |  | **Water** |  |  | **Combined** |  |
| Mass |  | Mass |  | Mass |  |
| Temperature |  | Temperature |  | Temperature |  |

Calculations to find specific heat capacity:

**Analysis:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Predicted Temperature** | **Measured Temperature** | **Difference** |
| **Situation #1** |  |  |  |
| **Situation #2** |  |  |  |
| **Situation #3** |  |  |  |
| **Situation #4** |  |  |  |

1. How do your predicted temperatures compare to the measured temperatures?
2. Explain in detail what factors may contribute to these errors?
3. What would you do to attempt to reduce these errors?