**Thermal Energy Name: Loz**

**Introduction & Data Collection**

*You will be mixing hot and cold water in different ratios. We will analyze data in more detail at a later date. Complete the following tasks:*

1. Drawing
2. Data Collection

Drawing:



**Data Collection**

1. Measure the temperature of the hot and cold water
2. Make a guess about the temperature when the two are mixed. Put guess in "predicted equilibrium temperature" column
3. Pour the water together and measure the temperature
4. Record data in "actual equilibrium temperature"

| **Mixture** | **Amount of Hot Water** | **Start Temp. of Hot Water** | **Amount of Cold Water** | **Start Temp. of Cold Water** | **Predicted equilibrium temperature** | **Measured equilibrium temperature** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 50 mL | 65 | 50 mL | 15 | 40 | 35 |
| 2 | 100 mL | 70 | 50 mL | 13 | 41 | 43 |
| 3 | 50 mL | 63 | 100mL | 15 | 39 | 25 |

Describe how you made your predictions. Did you change your strategy after the first mixture? Explain.

| We did the average and didn’t try a new strat. |
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**Analyzing Data**

-Record data again to save flipping the page back and forth

**Table 1. Data**

| **Mixture** | **Amount of Hot Water** | **Start Temp. of Hot Water** | **Amount of Cold Water** | **Start Temp. of Cold Water** | **Measured equilibrium temperature** |
| --- | --- | --- | --- | --- | --- |
| 1 | 50 mL | 65 | 50 mL | 15 | 35 |
| 2 | 100 mL | 70 | 50 mL | 13 | 43 |
| 3 | 50 mL | 63 | 100mL | 15 | 25 |

**Calculations**

**Heat Gain or Loss = mass x specific heat x change in temperature**

**Q = mC**ΔT unit will be Calories (we are using calories because it is easier than using 4.184

**Table 2. How much heat was gained?**

| **Mixture** | **Mass of Cold Water (m)** | **Specific Heat of Water (c)** | **Equilibrium Temperature (final)** | **Start Temp. of Cold Water** | **Change in Temperature**  **(ΔT)** | **Heat Gain (Q)** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 50 g | 1 | 35 | 15 | 20 | 1000 |
| 2 | 50 g | 1 | 43 | 13 | 30 | 1500 |
| 3 | 100 g | 1 | 25 | 15 | 10 | 1000 |

**Table 3. How much heat was lost?**

| **Mixture** | **Mass of Hot Water (m)** | **Specific Heat of Water (c)** | **Equilibrium Temperature (final)** | **Start Temp. of Hot Water** | **Change in Temperature**  **(ΔT)** | **Heat Loss (Q)** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 50 g | 1 | 35 | 65 | -30 | -1500 |
| 2 | 100 g | 1 | 43 | 70 | -27 | -2700 |
| 3 | 50 g | 1 | 25 | 63 | -38 | -1900 |

**Analysis Questions**

**-answer using complete and detailed sentences.**

**-If the question asks you to EXPLAIN, then use actual numbers from your data to support answers.**

**-answer in the space below the questions, on a separate sheet of paper, or in a google document**

1. How did your predicted equilibrium temperatures compare to the measured temperatures in each mixture? Explain- were they too high, too low, etc.
2. What can you conclude about the equilibrium temperature based on your results? Explain- average of the two temperatures, somewhere in the middle, closer to one, etc.
3. How does the CHANGE in temperature of the cold water compare to the change in temperature of the warm water in each mixture? Explain.
4. How does the CHANGE in ENERGY (heat gain/loss) of the cold water compare to the change in temperature of the warm water in each mixture? Explain.
5. According to the law of conservation of energy,the amount of heat/energy gained by the cold water should be equal to the amount of heat/energy lost by the hot water. Compare the heat gained by the cold water to the heat lost by the hot water in each mixture. Calculate any differences and complete the table as your answer:

| **Mixture** | **Heat Gain** | **Heat Loss** | **Difference** |
| --- | --- | --- | --- |
| 1 | 1000 | -1500 | -500 |
| 2 | 1500 | -2700 | -1200 |
| 3 | 1000 | -1900 | -900 |

1. If the heat gains are not equal to the heat loss, what do you think happened to the "missing" heat? Remember it was neither created nor destroyed. Where did it go?
2. **The equilibrium temperatures were not that high and I think they were lower. It is because when combined with hot water they only got to the thousands range and the cold water got -1000 to -2700.**
3. **The temperatures were kind of close because one was in the 20 range, the other was in the 30 range and the final one was in the 40 range and that's not that much of a big difference.**
4. **In cold water not that much is changed while going up and down. Cold is more durable while heat the slightest air change can cause the water to significantly drop.**
5. **The heat gain will cause the cold water to become cooler while the heat will drop pretty quickly and become colder.**
6. **The heat gained by the cold water was around 5 to 17 going up while the heat lost went down by 60 to 90 and into the negatives. Judging by both of them, the heat lost by the hot water was better than the heat gained by the cold water.**
7. **Since energy can neither be created nor destroyed its still there but transformed into particles or gas.**