

Specific Heat of Aluminum Lab

Theory- heat = MTS

Purpose – To determine the specific heat of aluminum

Materials-

Goggles	Al Sample
400mL Beaker	Thermometer
Ring Stand	Wire Gauze
Balance	Gas Burner
Ring Support	Calorimeter
Grad Cylinder	

Prelab

In this lab,

1 - Explain what is losing heat and what is gaining heat? How can they be equal?

2- What is the system and what is the surroundings?

Assumption

In this lab you determine the specific heat of Al by using a calorimeter to measure the amount of heat that is transferred from a known mass of Al. **Assume the heat gained by the water in the calorimeter comes from the hot Al and that the Al loses no heat elsewhere.**

1. The amount of heat energy gained by the water:
Heat Gained (water) = Specific Heat (H₂O) x mass of H₂O X ΔT H₂O
2. The Amount of heat lost by Al:
Heat Lost Al = Specific Heat Al x Mass Al x ΔT Al
3. Heat lost by one part of the system = heat gained by another part of the system:
Spec. Heat H₂O x Mass H₂O X T H₂O = Spec. Heat Al x Mass Al x ΔT Al

Procedure

1. Determine the mass of your sample (80-120g) of Al to the nearest .01 g and record.
2. Place your sample into a 400mL beaker and add enough water to cover it.
3. Place the beaker on a wire gauze on a ring support and heat the water with the sample of Al to the boiling point. Continue boiling for several minutes.
4. While you are waiting for the water to boil, determine the mass of the calorimeter to the nearest 0.1g and record. Your calorimeter has 2 holes in the lid. The center is for your thermometer and the other smaller hole is for the spatula.
5. Add 100mL of tap water to the calorimeter and mass to the nearest 0.1g. Record.
6. Determine the temperature of the water in the calorimeter immediately before the Al is transferred. Record Temp. Assume Al has the same temp as the boiling water.
7. When the Al sample is ready (approx. 5 min), place the sample into the calorimeter as quickly as possible. You can use the spatula to stir your mixture.
8. Determine the highest temp of the mixture and record.

9. When all data is filled in, determine the specific heat of Al.
10. Find the accepted specific heat of Al (in the appendix) and calculate % error.

Data Table: appearance of metal

Mass of Sample	
Mass of Calorimeter	
Mass of Calorimeter + Water	
Mass of Water in Calorimeter	
Initial Temp of water in cup	
Initial temp of metal	
Final temp of mixture	
Change of water temp	
1-Change of metal temp	
Specific heat of water	
2- Heat gained by water	
3-Heat lost by metal	
4-Specific heat of metal	
Known specific heat of metal (from appendix)	
5-Percent Error	

Calculations:

Show calculations NEATLY here.

1, 2, 3, 4, 5 (from data table)

Discussion:

1. List 2 reasons why the assumption that heat lost = heat gained can introduce error into your lab results.
2. How much heat is needed to raise the temp of 125g of water from 23.2C to 85.4C?
3. If your sample of Al is at 95C and is dropped into 200g of water at 8.5C, the final temperature of the mixture is _____ C? Use your mass as well as your specific heat.
4. If we used a Styrofoam cup as our calorimeter, would it have made a difference in our results? Why or why not?

Conclusion:

Write a short paragraph comparing the significance of the specific heat of water as compared to the specific heat of other substances.