Energy Changes

Oct 10, 2022

Conservation of Energy

1) We submerge a silver block, initially at 58.5°C, into 100.0 g of water at 24.8°C, in an insulated container. The final temperature of the mixture upon reaching thermal equilibrium is 26.2°C. What is the mass of the silver block?

Bomb Calorimetry

2) When 0.514 g of biphenyl ($C_{12}H_{10}$) undergoes combustion in a bomb calorimeter, the temperature rises from 25.8°C to 29.4°C. Write the balanced combustion reaction equation of biphenyl. Find the amount of heat released from the combustion of biphenyl. The heat capacity of the bomb calorimeter, determined in a separate experiment, is 5.86 kJ/°C.

3) When 1.010g sucrose ($C_{12}H_{22}O_{11}$) undergoes combustion in a bomb calorimeter, the temperature rises from 24.92°C to 28.33°C. Write the balanced combustion reaction equation of sucrose. Find ΔE_{rxn} for the combustion of sucrose in kJ/mol sucrose. The heat capacity of the bomb calorimeter, determined in a separate experiment, is 4.90 kJ/°C. (You can ignore the heat capacity of the small sample of sucrose because it is negligible compared to the heat capacity of the calorimeter.)

Bring It Together

4) A 25.5g aluminum block is warmed to 65.4°C and plunged into an insulated beaker containing 55.2g water initially at 22.2°C. The aluminum and the water are allowed to come to thermal equilibrium. Assuming that no heat is lost, what is the final temperature of the water and aluminum?