

Exercise 6.2b

Calorimetry

Name: _____

Date: _____ Per: _____

6. A 46.2 g sample of copper is heated to 95.4°C and then placed in a calorimeter containing 70.0 g water at 19.6°C. After the metal cools, the final temperature of metal and water is 21.8°C. Calculate the specific heat capacity of copper, assuming that all the heat lost by the copper is gained by the water.
7. A coffee-cup calorimeter initially contains 125 g water at 24.2°C. Potassium bromide (10.5 g) also at 24.2°C, is added to the water, and after the KBr dissolves the final temperature is 21.1°C. Calculate the enthalpy change for dissolving the salt in J/g and kJ/mol. Assume that the specific heat capacity of the solution is 4.18 J/g·°C and that no heat is transferred to the surroundings or to the calorimeter.
8. Camphor (C₁₀H₁₆O) has a heat of combustion of 5903.6 kJ/mol. When a sample of camphor with mass 0.1204 g is burned in a bomb calorimeter, the temperature increases by 2.28°C. Calculate the heat capacity of the calorimeter in J/°C.
9. Consider the reaction
- $$2\text{HCl}(aq) + \text{Ba}(\text{OH})_2(aq) \rightarrow \text{BaCl}_2(aq) + 2\text{H}_2\text{O}(l) \quad \Delta H = -118 \text{ kJ}$$
- Calculate the heat when 100.0 mL of 0.500 M HCl is mixed with 300.0 mL of 0.500 M Ba(OH)₂. Assuming that the temperature of both solutions was initially 25.0°C and that the final mixture has a mass of 400.0 g and a specific heat capacity of 4.18 J/g·°C, calculate the final temperature of the mixture.
10. A 30.0 g sample of water at 280 K is mixed with 50.0 g of water at 330 K. Calculate the final temperature of the mixture assuming no heat loss to the surroundings.

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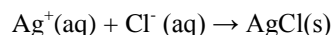
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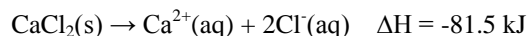
11. A 5.00 g sample of aluminum pellets (specific heat capacity = $0.89 \text{ J/}^\circ\text{C}\cdot\text{g}$) and 10.00 sample of iron pellets (specific heat capacity = $0.45 \text{ J/}^\circ\text{C}\cdot\text{g}$) are heated to 100.0°C . The mixture of hot iron and aluminum is then dropped into 97.3 g of water at 22.0°C . Calculate the final temperature of the metal and water mixture, assuming no heat loss to the surroundings.

12. In a coffee-cup calorimeter, 50.0 mL of 0.100 M AgNO_3 and 50.0 mL of 0.100 M HCl are mixed to yield the following reaction:



The two solutions were initially at 22.60°C , and the final temperature is 23.40°C . Calculate the heat that accompanies this reaction in kJ/mol of AgCl formed. Assume that the combined solution has a mass of 100.0 g and a specific heat capacity of $4.18 \text{ J/}^\circ\text{C}\cdot\text{g}$.

13. Consider the dissolution of CaCl_2 :



An 11.0 g sample of CaCl_2 is dissolved in 125 g water, with both substances at 25.0°C . Calculate the final temperature of the solution assuming no heat loss to the surroundings and assuming the solution has a specific heat capacity of $4.18 \text{ J/}^\circ\text{C}\cdot\text{g}$.

14. If a student performs an endothermic reaction in a calorimeter, how does the calculated value of ΔH differ from the actual value if the heat exchanged with the calorimeter is not taken into account? _____
