

- 1) A calorimeter has a heat capacity of $3150 \text{ J/}^\circ\text{C}$. If the temperature of the calorimeter changes from 23.0°C to 34.3°C , how much heat was transferred?
- 2) A reaction ($\Delta H^\circ = 105 \text{ kJ/mol}$) is run in a calorimeter. 25.0 millimoles of reaction resulted in a temperature change of the calorimeter of 4.08°C . Did the calorimeter temperature go up or down? What is the heat capacity of the calorimeter?
- 3) A calorimeter has a heat capacity of $618 \text{ J/}^\circ\text{C}$. 1.05 mmoles of reaction changes the temperature of the calorimeter from 22.2°C to 27.3°C . What is the enthalpy of the reaction?
- 4) $\Delta H^\circ = 43.5 \text{ kJ/mol}$ for the vaporization of ethanol. How much heat is required to evaporate 20.0 grams of ethanol?
- 5) $\Delta H^\circ = 6.01 \text{ kJ/mol}$ for the fusion reaction of water. How much heat must be removed to make a tray of ice cubes? (12 cubes/tray ; 60.0 g water/cube)
- 6) The refrigerant F-21 (dichloromonofluoromethane) has $\Delta H^\circ_{\text{vap}} = 24.4 \text{ kJ/mol}$. How many grams of F-21 would condense to release 100.0 kcal of heat at the back of a refrigerator?
- 7) A 25.00 g cylinder of stainless steel at 200.0°C is added to 100.0 mL of water at 22.0°C in an insulated cup. The final temperature is 27.3°C . What is the specific heat capacity of stainless steel?
- 8) The air (density = 1.20 g/L) in a 4 ft^3 (113 L) cooler has its temperature lowered from 22°C to 0°C by melting 9.0 grams of ice. Calculate the specific heat capacity of air.
- 9) Use standard enthalpies of formation to calculate the enthalpy changes for the following reactions:
 - (a) combustion of butane gas
 - (b) combustion of hexadecanoic acid
 - (c) glutamic acid and oxygen gas reacting to form carbon dioxide, water, and ammonia
 - (d) ethene reacting with hydrogen gas to produce ethane
 - (e) propene reacting with chlorine gas to produce dichloropropane
 - (f) propene reacting with hydrogen bromide to produce bromopropane
 - (g) carbon dioxide gas plus sodium hydroxide producing sodium bicarbonate
 - (h) carbon dioxide gas plus potassium superoxide producing potassium carbonate and oxygen gas