

Thermochemistry: an
ice calorimeter
determination of
reaction enthalpy
flashcard



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Thermochemistry: An Ice Calorimeter Determination of Reaction Enthalpy

INTRODUCTION In CHM151 you learned about the first law of thermodynamics, the statement that energy may be transferred (as heat or work) between a system and the surroundings, but energy is neither created nor destroyed. This law is the foundation for calorimetry, the technique of measuring heat effects in the surroundings to gain insight into energy transfers to or from a system of interest. In the typical calorimeter, we measure heat-induced temperature changes.

In fact, heat is sometimes defined as the type of energy transfer caused by temperature differences between system and surroundings. In today's lab, by contrast, the heat transfer takes place with no temperature change—it is an isothermal heat transfer. Consider the second law as you think about what drives this heat transfer. **PREPARING FOR THE EXPERIMENT** Background reading Read and thoroughly understand this section of the lab manual and the Thermodynamics chapters in the lecture textbook.

Preparing the lab notebook Write a brief outline of the planned experimental procedure in your notebook. Include the hazardous properties of all lab chemicals. Leave space to record significant experimental details, such as the stock reagent concentrations (taken from the stock-bottle labels), descriptions of the instruments used, and the names of your coworkers. Prepare a table that will allow you to record the required data, including the pipet readings and ice-bath temperature readings as a function of time.

Read the pipet to 0.001-mL precision, read the thermometer to 0.1 °C precision, and record time to the nearest second. **PROCEDURE I.** Test the

calorimeter apparatus set-up before running the experiment. A. B. C. D. E. F. Fill the beaker to the top with water. (Don't use ice yet.) Check the stopcock valve. It should turn easily. If the valve binds up, loosen the plastic nut, turn the valve, and then retighten the nut with just enough force to prevent leaks.

Don't over-tighten. Open the stopcock valve. Insert the stopper assembly firmly but not aggressively to seat it in the beaker. Water will rise in both the fill tube and the 1.00-mL pipet. Insure that no air remains in the beaker. Press down on the stopper to assist in air removal. Add more water to the fill tube from a wash bottle, and repeat step D. if needed. Add water from a wash bottle to the fill tube until the water level rises to the top of the