Heat Transfer: Counting Calories Activity – Evaluation and Improvement Worksheet – Answers

Calorimeter Performance

Okay, now you have conducted the experiments, observed the reaction, and collected the data. The question still remains: did your calorimeter do the job well? The enthalpy of solution of Potassium Chloride at 25° Celsius (roughly room temperature) is 17.22 kJ/mol. To determine how well your calorimeter performed, convert the value you observed into the proper units, using the following formula. This will give you the deviation from the ideal, accepted value.

$$\% \; Error = \frac{|Q_{ideal} - Q_{exp}|}{Q_{ideal}}$$

Where:

$Q_{ideal} =$ the ideal heat of solution expected from the accepted value, and

$Q_{exp} =$ the heat of solution you derived from your experiment.

Calculation

Room for Improvement

One of the most important aspects of engineering is to redesign and improve your project, whether it be a chemical process, an airplane wing, or an engine based on the following critique.

1. What do you think caused the error in you measurements?

   Error could have been caused by a variety of factors, including, but not limited to, heat loss to the air in the cup, to the cup itself, to the air outside the cup, to the thermometer, inaccuracy in the thermometer, inaccuracies in measurement, incomplete dissolution of KCl.

2. What would you do differently if you had more resources at your disposal?

   With more resources, I would have chosen more insulating materials to hold the reaction, and a more closed system with remote sensors, and perhaps an internally contained stirring device.

3. Draw a modified design on the back of this sheet. All designs should be encouraged and accepted.