LAB: Enthalpy Change of a Chemical Reaction

A simple experiment was performed in the previous lab to determine the enthalpy change of dissolving ionic compounds. The determination was subject to a number of possible errors, most of which are summarized in the following points:

1) Not all heat produced by the reaction was measured as a temperature change, since some of the heat escaped to the surroundings and some was absorbed by the calorimeter. This loss was increased by the slow response of the thermometer.

2) The precision of the temperature measurements could be improved.

3) Approximations and assumptions were made in calculations.

In this Lab you must devise and carry out suitable experiments to find out the enthalpy change for ***two*** of the following chemical reactions. Take account of the sources of error summarized above to modify the procedure aiming to increase both accuracy and precision. You should develop procedures to deal with each of the following points:

1) Determine more accurately the maximum temperature reached by the solution. This should take into account the fact that the thermometer takes some time, perhaps as much as 30 seconds, to respond to a change in temperature. During this time a significant amount of heat might be lost.

2) Reduce the amount of heat lost to the surroundings and the calorimeter.

Objectives To measure experimentally the enthalpy change for any **two of the following** chemical reactions.

1) Heat of precipitation of Calcium Carbonate
2) Neutralization of an Acid with a Carbonate
3) Neutralization of a Strong Acid with a Strong Base
4) Comparing the enthalpy of a Hydrated and an Anhydrous compound

Planning

Design a procedure using appropriate apparatus and materials. Your procedure must take into account of suitable quantities, concentrations and safety concerns. You ***must write*** your procedures in your lab book and obtain my approval before starting the experiment. I will prohibit any procedure I deem to be dangerous. Time will be saved if you show me your procedure ***before*** you come to the lab. Your procedure must allow you to collect sufficient relevant data to calculate the molar enthalpy of the chemical reaction. Design a suitable data table to include units and uncertainties.

Planning, Data Collection and Data Analysis should be important aspects of your report.