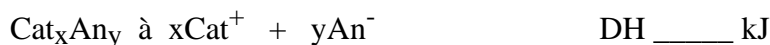


CHEM EVENT (FEB)

Background

Many ionic materials exchange energy with their surroundings when they dissolve in water. Some release energy, some absorb it. When ionic substances dissolve in water they dissociate according to the general equation



The value for ΔH_{sol} can be determined from the table of standard heats of formation (ΔH_f°) by locating the value for the compound that is being dissolved, and the values for the aqueous ions that are formed. The overall Heat of solution (Enthalpy of solution) is then calculated in the standard fashion

$$\Delta H_{\text{sol}} = \sum \Delta H_f^\circ \text{ prod} - \sum \Delta H_f^\circ \text{ react}$$

Problem

Students will identify an unknown *Ionic Solid* based on its heat of solution.

Strategy

*Students will *calculate and report an enthalpy of solution in kJ/mol* for a selected group of compounds from a table of standard enthalpies of formation which will be provided.

*Students will *convert the value of each compound from kJ/mol values to J/gram*

*Students will use a Styrofoam coffee cup calorimeter to *measure the quantity of heat exchanged* when a pre-measured mass of an unknown ionic solid (provided by the supervisor) is dissolved in water.

*Students will identify their unknown solid based on the result of their calorimetric experiment compared to their set of calculated value.

Equipment (*ANZI approved goggles and aprons required for participation*)

Students may bring the components of a standard coffee cup calorimeter

Cup(s), lid, stirring bar, *non-mercury-spirit* filled thermometer

Graduated cylinder, a bottled of distilled water

Students may bring a calculator, pencils/pen (paper will be provided)

Students may write on their calorimeter its heat capacitance if they choose to

Nothing else is allowed (a pre formatted answer sheet will be provided)

Scoring

Winners will be based on the time taken to finish

Students who identify their compound will be scored ahead of all who do not.

Ties will be broken based on the results of the needed calculations

Students will show the result for all the requested heats of solution

Students will correctly convert from kJ/mol to J/g

Students will show the result for the calculation of energy exchanged in their calorimeter

Notes: the activity assumes that the heat capacitance of the ionic solids is minimal.

The graduated cylinder may be marked to indicate a known mass of water although it is assumed the density of water will be essentially 1 g/cm^3 .