

## Curriculum Expectations

**A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating)**

**D2. investigate and analyse energy changes and rates of reaction in physical and chemical processes, and solve related problems**

### Unit 1: LAB 3 - Summative. HESS'S LAW

The following three reactions are chemically related to each other. Exp A is the dissociation of NaOH, Exp B just involves the neutralization of HCl whereas Exp C involves both the dissociation of NaOH and then the subsequent neutralization of HCl. Since the sum of 2 of these reactions –chemically is equivalent to the third reaction their thermochemical values should also be so related. Your goal is to prove they are using Hess's law

**EXP A.** Reaction of NaOH (s) with water :  $\text{NaOH (s)} \rightarrow \text{Na}^+ \text{(aq)} + \text{OH}^- \text{(aq)}$

**EXP B:** Reaction of NaOH(aq) with HCl (aq):  $\text{Na}^+ + \text{OH}^- + \text{H}^+ + \text{Cl}^- \rightarrow \text{Na}^+ + \text{Cl}^- + \text{H}_2\text{O(l)}$

**EXP C.** Reaction of solid NaOH (s) with HCl (aq) :  $\text{NaOH (s)} + \text{H}^+ + \text{Cl}^- \rightarrow \text{Na}^+ + \text{Cl}^- + \text{H}_2\text{O (l)}$

Carefully examine all 3 equations as to what is happening ( chemically) and then plan your experiments with the use of the PASCO probes to determine if Hess's Law applies in these experiments ( within acceptable experimental error )