



DATA SHEET 5.2

Name _____

Section _____ Date _____

Data Analysis and Calculations

- 1 Create a data table to collect the measurements you will make during your procedure.

5

2 Calculate the change in enthalpy for all of your trials.



DATA SHEET 5.2

(continued)

Name _____

Section _____ Date _____

3 Create a data table that summarizes your results. Discuss how your results do/do not support Hess' law.

4 Using the *CRC Handbook of Chemistry and Physics*, show how the literature values that you find for each reaction add up to the equation of interest.

5 Compare your results to the literature values you found in question 4.

Post-Lab Questions

1 For this lab activity the assumption is made that the heat lost to the calorimeter, thermometer, and surrounding environment can be ignored. Based on your results discuss the validity of this assumption.

2 A 2.00 g sample of solid NaOH is dropped into a mixture of 90.0 g of water and 25.0 g of ice (at 0°C).

a Do you expect the ice to melt or more ice to form? Why?

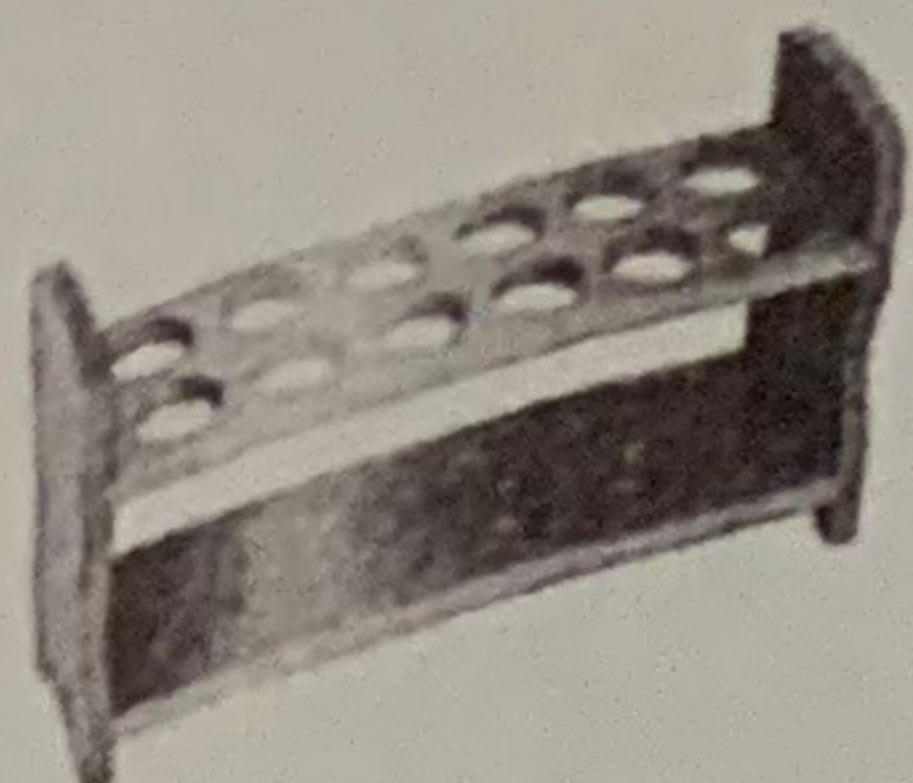
b What will the final temperature of the solution be? (Use your values for the enthalpy of dissociation of NaOH. The ΔH_{fus} for water is 6.02 kJ/mol.)

Trial 1

	Mass of NaOH	Initial Temp of H ₂ O	Final Temp of H ₂ O	ΔT
1	4g	25°C	28.3°C	3.3°C
2	3.9g	25°C	30°C	5°C
3	4.0g	24°C	32°C	8°C

Trial 2

	Mass of NaOH	Initial Temp of	Final Temp	ΔT
1	4g	26°C	43°C	17°C
2	4g	26°C	46°C	20°C
3	4g	26°C	45°C	19°C



Procedure

Materials

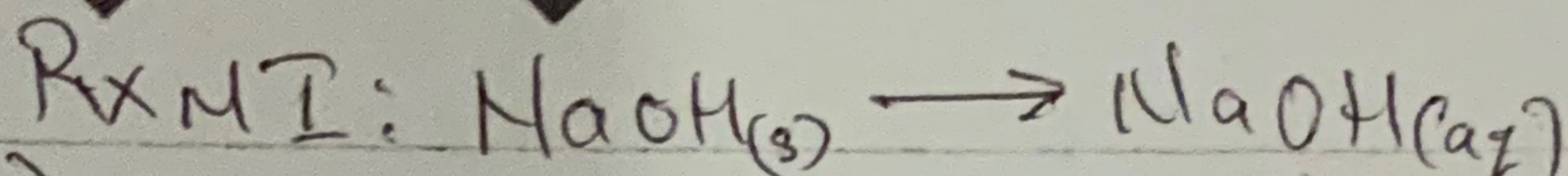
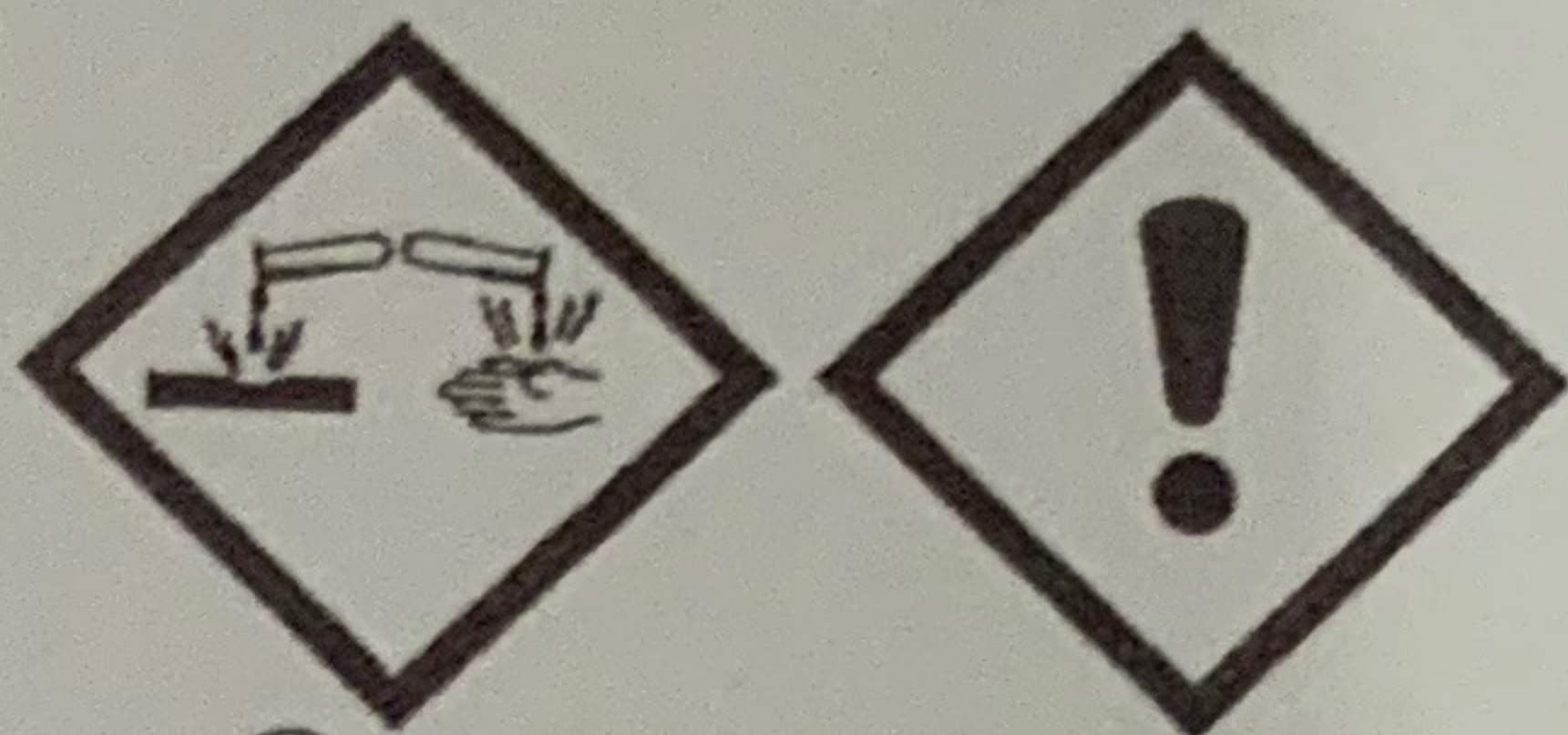
Chemicals

- Solid sodium hydroxide, NaOH
- 1.0 M hydrochloric acid, HCl
- 1.0 M sodium hydroxide, NaOH

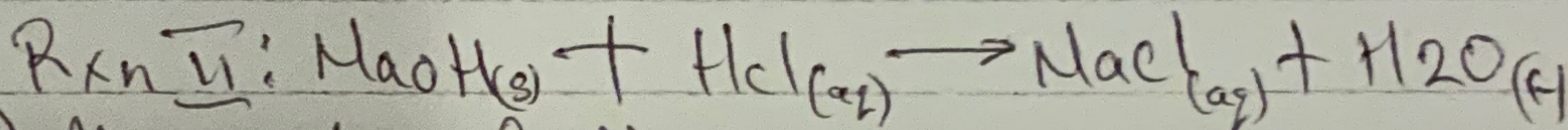
Equipment

- Small Styrofoam cup large enough to hold a 100 mL beaker
- Large Styrofoam cup large enough to hold the small cup
- Thermometer
- 100 mL beaker
- 150 mL beaker

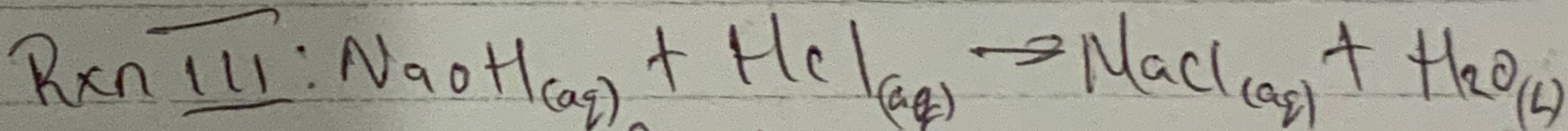
Conducting an Experiment to Verify Hess' Law



- 1) Measure some of H_2O , place into Calorimeter
- 2) Measure 4g of NaOH
- 3) Take initial Temp of H_2O
- 4) Take Final Temp.



- 1) Measure 4g of NaOH
- 2) Measure 100 ml of HCl
- 3) Take initial Temp of HCl
- 4) Run reaction
- 5) Take Final temp



- 1) Measure some of NaOH
- 2) Measure some of HCl
- 3) Initial temp of NaOH in separate beaker
- 4) Initial temp of HCl in separate beaker
- 5) Run Rxn
- 6) Take Final Temp.

PART C Determining the Heat of Solution



- 1 Prepare the calorimeter as you did in Part A, steps 1–3. Record the initial temperature of the calorimeter in Table 5.4 on the data sheet, page 143.
- 2 Weigh out 10.0 ± 0.1 g of ammonium nitrate, and record the mass in Table 5.4.
- 3 Carefully transfer the ammonium nitrate to the calorimeter.
- 4 Place the lid on the calorimeter and add a stir rod through the hole in the lid.
- 5 Gently stir the solution 2 or 3 times to ensure that the ammonium nitrate completely dissolves.
- 6 Allow the system to reach thermal equilibrium and record this final temperature in Table 5.4.
- 7 Empty the calorimeter and dry it.
- 8 Repeat steps 1–7 twice more for a total of three trials.

Trial	Initial temp of HCL	Initial of NaOH	Average Temp	Final Temp	ΔT
1	26°C	26°C	26°C	31°C	5°C
2	26°C	26°C	26°C	31°C	5°C
3	26°C	26°C	26°C	31°C	5°C