

<i>Section</i>	<i>+/-</i>	<i>Reason</i>
10pts) introduction		
10pts) materials methods		
10pts) results		
10pts) conclusion		
10pts) table		

Name:

Observing the Heats of Solutions of Endothermic and Exothermic Ionic Compounds in Water

INTRODUCTION

Paragraph 1 - Enthalpy, Exothermic, Endothermic,

Paragraph 2 - Figure 1, Figure 2, Figure 3

Paragraph 3 - In this study we determined _____. We hypothesized that _____ would be the best handwarmer. However it was determined that _____ is the best choice producing _____ joules of energy at the cheapest cost. This data (confirms or rejects) our hypothesis.

MATERIALS AND METHODS

Determining the C_{cal} To determine the constant of the calorimeter,

Determining the enthalpy of the salt solution To determine the enthalpy of the salt solution $MgCl_2$ will be described in detailed, the remaining salts enthalpies were determined in the same manner.

RESULTS

Trial 1: Heats of solution and costs for the ionic compounds tested.

Trial 1	Class	mandy givas leo	charlotte megan	jack jamison	heesoo daniel	mandy givas leo	charlotte megan
Compound	MgSO ₄	NH ₄ NO ₃	CaCl ₂	NaCH ₃ CO ₂	NaCl	LiCl	Na ₂ CO ₃
H ₂ O Volume (mL)	45	45	45	45	45	45	45
Mass (g)	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Tempinitial (°C)	22.8	22.1	21.9	22.2	22.5	21.8	22.0
Tempfinal (°C)	38.8	14.2	34.9	26.5	21.2	40.0	27.9
T (°C)	16.0	-7.9	13.0	4.3	-1.3	18.2	5.9
q-aqueous (J)							
q-calorimeter (J)							
q-solution (J)							
FW	120.37	80.04	110.98	82.03	58.44	42.39	105.99
moles							
joules/moles							
Cost (\$/kg)							
Cost per mole							
cost per joule per mole							

***BOLD** = endothermic

Trial 2: Heats of solution and costs for the ionic compounds tested.

Trial 2	Class	mandy givas leo	charlotte megan	jack jamison	heesoo daniel	mandy givas leo	charlotte megan
Compound	MgSO ₄	NH ₄ NO ₃	CaCl ₂	NaCH ₃ CO ₂	NaCl	LiCl	Na ₂ CO ₃
H ₂ O Volume (mL)	45	45	45	45	45	45	45
Mass (g)	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Tempinitial (°C)	22.8	22.1	21.9	22.2	22.5	21.8	22.0
Tempfinal (°C)	38.8	14.2	34.9	26.5	21.2	40.0	27.9
T (°C)	16.0	-7.9	13.0	4.3	-1.3	18.2	5.9
q-aqueous (J)							
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FW	120.37	80.04	110.98	82.03	58.44	42.39	105.99
moles							
joules/moles							
Cost (\$/kg)							
Cost per mole							
cost per joule per mole							

***BOLD** = endothermic

CONCLUSION

$$E = q + w$$

Figure 1. The equation for the change in energy of a system

$$H_{\text{soln}} = H_{\text{bond}} + H_{\text{lattice}} + H_{\text{dipole}}$$

Figure 2. The formula for the change in enthalpy for a reaction involving H₂O and an ionic compound

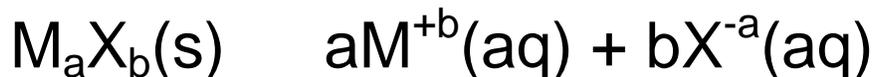


Figure 3. The general reaction for the disassociation of a salt into its cation and anion

$$T_{\text{Avg}} = (T_{\text{Hot}} + T_{\text{Cold}}) / 2$$

Figure 4. The equation for determining the average temperature (predicted mix temperature)

$$q_{\text{water}} = m \times c \times (T_{\text{mix}} - T_{\text{Avg}})$$

Figure 5. The formula for heat of the water surrounding, assuming that 1 mL H₂O is equivalent to 1 gram H₂O and the specific heat of water, c, is 4.184 J/g-°C.

$$q_{\text{aqueous}} = m \times c \times (T_{\text{Final}} - T_{\text{Initial}})$$

Figure 6. The formula for heat of the water surrounding, assuming that 1 mL H₂O is equivalent to 1 gram H₂O and the specific heat of water, c, is 4.184 J/g-°C.

$$q_{\text{calorimeter}} = C_{\text{calorimeter}} \times (T_{\text{Final}} - T_{\text{Initial}})$$

Figure 7. The formula for heat lost to the calorimeter in a reaction resulting in a certain change in temperature.

$$q_{\text{solution}} = -(q_{\text{aqueous}} + q_{\text{calorimeter}})$$

Figure 8. The formula for the heat of a solution of water and an salt contained in a calorimeter.

