Student Name:_____

Course:____CHM 151____

Before you begin, Go to File \rightarrow **Make a Copy** and Save in your personal Google Drive

Brainstorm what you experienced in the lab to select a Main Claim:





Pick one bubble to focus on for this lab write-up

Main Claim: _A reaction is exothermic or endothermic determines its suitability for hot or cold packs, as the type of salt used affects how heat is absorbed or released, influencing the pack's effectiveness._____ Develop an <u>outline</u> for your Lab Write-up:

Flow Map Outline

Double click on the map below and fill in <u>briefly</u> based on your lab experience



Class data (Group 1)

	*		6	Ð	6		6	14	1	4	16	
					Group 1: Team	1		Group 2: Tears	1		Group 3 Te	
1	Data Collection		Team 1	Water Temperature Change (LT)	Reaction Type	Sign of q	Water Temperature Change (LT)	Reaction Type	Sign of q	Water Temperature Change (LT)	Reaction Ty	
5	Key			(Increase, Decrease, or Neither)	(andsthermic, exothermic, or solthermic)	0.500	(Increase, Decrease, or Neither)	(andathermic, ar exothermic, ar isothermic)	0.500	(Increase, Decrease, or Neither)	(andstherm) exofluencia isothermic)	
8	More intense change		NHIG	Decrease	Endathermic	NP	decrease	endothermic	N2.	Decrease	endotheensi	
5	Less intense change		10440920	Decrease	Endathermic	141	decrease	endothermic	141	Decrease	endothermic	
6		But the Bally	BaCIE	Decrease	Endathermic	142	decrease	endothermic	141	neither	isothermic	
T.		Potential Salts	MgSO4	Increase	Exothermic	v .	increase	exothermic	v .	increase	exothermic	
8			19903	Decrease	Endethermic	141	decrease	endothermic	141	decrease	endothermic	
Ð.			NeCl	Neither	Isothermic	10	decrease	endothermic	141	decrease	endothermic	
10												
11	Class Interpretation from Part 1	Sat	Justification ((DUALAstive)								
11	Best for Hat Pack #1	Mg804	"pretty hof" a	coarding to Group	1, and the only end	hor Tears 1						
3	Best for Hat Pack #2	MyC2	The most into	maa exa far 'baan.	2							
14	Best for Hat Pack #3											
6												
4	Beat for Cold Pack #1	NHHPUCO	The most inte	inee "cold" for Gro	ap 2 in Team 1							
1	Beat for Cold Pack #2	NeNCO	NaNC0 and R	NaNO3 and KDI were similarly colder when dissolved than the other eno in Team 2								
18	Beet for Cold Pack #5	NO.	NaNC0 and R	KEI were similarly a	oider when dissol	ed than the of	her eno in Tiesm 2					
0												
11												
2												

+ 🗮 Stoichiometry Lab Part 2 + Soda (Acid) Titration Lab + Beer's Law Lab + Energy (Hot & Cold Packs) Lab + Molar Vo < >

												h								
12						Gree			Gra	ngo 2										
28	Part 2			Beni	for Cold Pack #3	KDI	Besi h	Cold Pack #1 M	HANGS .	Best for Hel Pack #1 Mg8O6										
28	Data Collection			Trial 1: 4g	Trial 2-8g	Trial 2:8p	Trial 1: 4g	Trial 2: 6p	Tel: 5: 8g	Trial 1: 4p	Trial 2:6g	Trial 3: 8p	Trial 1:4							
28	Mees of Galt	100 C		4.087	6.054	8.044	4,895	6.05	8.841		6,895		()							
21	Average Naxa of Salt	Aveg				6-051000887			6.065			6-000								
28	Water Temperature-Change (3T)	(Final - Initial)		-0.1	-4.4	-6.4	-4.1	-0.3	-4.9	6.4	< s	11.5	5							
20	Average Temperature Change of Water	Ave ST	-			-4.3			-5.7000689067			0.9	1							
10	Water Temperature-Change given Mass of Balt	419		-0.78	-8.73	-0.87	-1	-1.04	-0.80	1.0	1.5	1.4								
10	Average Temp Change of Water given Mass of Salt	Ave AT ip				-0.72			-6.97			1.1	1							
18			-																	
10	Calculations																			
54	Ameruga Water Heat mechanged (g) g = totar maximit is in press train quests (or is in press train quests (or -4.14 JpC), is that of liquid water. g = 10 for all presting quests, of contact pressure.	4		.45.27							225.295									
16	Average Water Heat exchanged	0.4	-			-0.11527			-0.15144	6.2250										
14	Average Moles of Salt	(mat)				0.081			8.070	E.0498										
10	Water Change in Internal Energy (Enthalpy 304)	(kJmd)				-1.42			-1.99	4.524805451										
18	Sall Charge is Internal Energy (Entholity: 24)	(Automation)				1.42			1.99	-4.824806481										
19	Average Ball Change in Enthality					1.018			0.376			-6.008								
40	% Difference		-			27.4			429.0			12.0								
41																				
42	Class Interpretation Inst. Part 2	Sak	Justification (O)	(avis/Tailve)																
42	Ranked #1 for Hot Pack	Mg504	125. diference	and higher avenag	pe than MgCI2					1										
11	Ranked #2 for Hot Pack																			
44.	Ranked #3 for Hot Pack																			
46																				
47	Rankel #1 Call Park	NH49023	Best (highest a	wage) and lawes	d percent different															
48	Rathed RI Call Park		1									A construction of the second								

+ 🔲 Stoichiometry Lab Part 2 × Soda (Acid) Titration Lab × Beer's Law Lab × Energy (Hot & Cold Packs) Lab × Molar Vo 🤇 >

Lab Write-Up Format (for reference ONLY)



Lab Write-Up Copy your outline information above and thenat

Introduction: <u>The purpose of this lab is to identify salts that can be used in cold or</u> <u>hot packs. A reaction is exothermic or endothermic determines its suitability for</u> <u>hot or cold packs, as the type of salt used affects how heat is absorbed or</u> <u>released, influencing the pack's effectiveness.</u> <u>Results:</u>

			1	D.			6	14					
1	-	-	-		frame 1: June 1		frame 3 Team 1				Group 2 Tes		
1	Data Collection		Tears 1	Water Temperature Change (LT)	Reaction Type	Sign of q	Water Temporature Change (ET)	Reaction Type	Sign of q	Water Temperature Change (LT)	Reaction Typ		
	Key			(Increase, Decrease, ar Neither)	(andathermic, ar exothermic, ar isothermic)	0.597.0	(Increase, Decrease, or Neither)	(andathermic, exathermic, or southermic)	(5.5.0° D	(Increase, Decrease, or Neither)	(andsthermi- exafluermic, isothermic)		
4	More intense change		NHIECT	Decrease	Endathemic	NP	decrease	endothermic	N2.	Decrease	endotheensic		
. 6	Less intense change		10448900	Decrease	Endathermic	141	decrease	endothermic	141	Decrease	endotheemic		
6		Potential Salts	BaC12	Decrease	Enduthermic	141	decrease	endothermic	141	neither	isothermic.		
π.			MgSO4	Increase	Exothermic	V	increase	exofhermic	V	increase	exothermic		
			H9903	Decrease	Endethermic	141	decrease	endothermic	141	decrease	endothermic		
			NeCl	Neither	keothermic	147	decrease	andothermic	147	decrease	andothermic		
10													
11	Class Interpretation from Part 1	Set	Justification ()	(ULALAstve)				_					
11	Besi for Hel Pack #1	Mg804	"pretty hol" as	coarding to Group 1	, and the only esc	tor Tears 1							
13	Best for Hat Pack #2	MyC2	The must inte	maa exa far 'Yeam'	2								
14	Best for Hat Pack #3												
15			1										
16	Best for Cold Pack #1	10040923	The most inte	mee "sold" for Grov	ap 2 in Team 1								
11	Best for Cold Pack #2	NaNCO	NeNCO and R	NaNO3 and KCI were similarly colder when dissolved than the other erro in Team 2									
18	Beet for Cold Pack #5	NO .	NaNO3 and R	(D) were similarly o	older when dissol	ed than the of	her eno in Team 2						
10													
30													
31													
33						_			_				

+ = Stoichiometry Lab Part 2 + Soda (Acid) Titration Lab + Beer's Law Lab + Energy (Hot & Cold Packs) Lab + Molar Vo < >

13 Part 3 19 Part 3 19 Data Call 19 Mass of 5	lection															
24 Part 2 28 Data Cell 24 Mass-of 5	lection			Group 1							Group 2					
20 Data Coll 20 Mass of 5	lection			Ben	I for Cold Pack #3	KIDI	Besi h	Cold Pack #1 M	enances	Best	6004	1				
21 Mass of 6				Trial 1: Ap	Trai2.6g	Trial 2: 8p	Trial 1: 4g	Trial 2: 6p	Telai 3: 8g	Trial 1: 4p	Trial 2:5g	Trial 3: 8p	Trial 1:4			
	(at	100		4.067	6.054	8.004	4,898	6.05	8.841	- 4	6,809					
27 Average?	Mass of Selt	Aveg				6-051000887			6.065			6.000				
24 Mater Ten	mperature-Dhange (37)	(Final - Initial)		-0.1	-4.4	-6.4	-4.1	-0.3	-4.9	0.4	9	11.5				
21 Amerage	Temperature Change of Water	Ave ST				-4.3			-5.7000880007			0.97				
10 Mater Ter	reperature-Change given Mass of Salt	419		-0.78	-8.73	-0.87	-1	-1.04	-0.00	1.8	1.5	1.4				
11 Average 1	Temp Change of Water given Mass of Sall	Ave All ip				-0.72	1		-6.97			1.8				
18																
10 Calculate	laws .															
Anne age 1 q - maxim arter a maxim free agent q - 30 for a	Water Heat exchanged (a) 47 a july is in pares its (a) + 4.04 JpC, is that all paid water. dip active proposes, at conduct pressure.					-115,27			-151.44			225.295				
16 Avenage V	Water Heat exchanged	9.4				-0.11527			-0.15144			6.2250				
II Average N	Moles of Salt	(mat)				0.081	1	8.69			46 F					
17 Mater Dry	ange in Internal Energy (Exthaloy 324)	(kJmd)				-1.42	1	-1.9			10 4.2					
14 Sall Char	rge in Internal Energy (Enthalpy: AH)	(Automation)				1.42	1		1.99	4.12400						
19 Average 1	Sali Change in Enthality					1.111			0.376			-6.008				
40 % Different	nue .					27.4			429.0			12.8	1			
41																
42 Class Inte	Impretation from Part 2	Sak	Justification (OU)	in/Taive)												
12 Ranked #	F1 Ror Hol Pack	Mg504	125. difference a	nd higher avena	pe than MgCi2											
14 Ranked #	R2 For Hot Pack															
+1 Rarikod #	KE for Hot Pack															
48																
47 Plathed #	FT Call Park	NH4923	Best (highest are	rage) and lower	d percent differen	08										
47 Planted R	C Call Past															

+ 🗉 Stoichiometry Lab Part 2 × Soda (Acid) Titration Lab × Beer's Law Lab × Energy (Hot & Cold Packs) Lab × Nolar Vo 🤇 🔾

General Public Source 1:

 The endothermic process...This energy is produced as a result of the reaction of reactants into the product. It occurs as a result of the dissociation of the bonds between the molecules. The energy is then released through the formation of new bonds.Heat is taken up from the surroundings in such reactions, so the temperature of the system where the reaction is taking place remains cooler. Also, at the end of the reaction, the enthalpy, which is the change in heat energy during the conversion of reactants to products, increases (Admin, 2022).

 The exothermic reaction...The energy released is caused by the formation of new bonds (products) at a higher level. While the energy required to break up the bonds (reactants) is lower. At the end of the reaction, the enthalpy change decreases as well. During chemical reactions, a great deal of energy is required. This energy was used to maintain the bond that held the molecules together. As a result of the reactions between molecules and compounds, as well as the breaking of bonds, a tremendous amount of energy is released (Admin, 2022). Scientific

Literature Source 2:

 Endothermic and exothermic processes are the result of the breaking and forming of bonds between atoms. During many reactions, bonds break, atoms rearrange, and new bonds form. To break bonds, energy is taken into the chemical reaction, known as the system, from the surrounding environment. When bonds form, energy is released into the surrounding environment. Consequently, during a reaction, there is an exchange of energy between the system and the surroundings. When more energy is taken in than released, an endothermic process occurs, causing a decrease in temperature. Evaporating liquid water is one example of an endothermic process. An exothermic process occurs when more energy is released than taken in, causing an increase in temperature. Combustion is an exothermic process (Evelyn Gray, 2018).

Discussion: The class data supports my main claim because it shows which salts produce endothermic or exothermic reactions, helping determine their suitability for hot or cold packs. Temperature changes means that the salts change the temp of the water especially with MgSO4 and NH4NO3. My calculations mean NH4NO3 came out the most endothermic because it had the biggest positive number. MgSO4 is exothermic because it was negative. This evidence summarizes the heat absorption and release patterns, which directly relate to how effective each salt would be in a thermal pack. I don't currently see any limitations in the data. Since it comes from our own experiment, it's a reliable source for this context. Additionally, other sources we used seem trustworthy as they include an author, publication dates, and appear credible, even though one summary lacked a clear author. Overall, this evidence effectively supports the claim by explaining the relationship between heat transfer and the function of hot and cold packs.

Conclusion: I learned through this experiment, we learned that each salt can be identified as causing either an exothermic or endothermic reaction. This helps us determine whether a salt is suitable for use in a hot or cold pack based on its ability to absorb or release heat, which directly affects the pack's function. This matters because... _The purpose of the lab was to identify salts that are effective for use in hot or cold packs.

References (MUST at least include the 2 outside sources in APA formatting) CHM 151 Class data

Gray, Evelyn. (2018). Students learn exothermic and endothermic - ProQuest. <u>Students Learn Exothermic and Endothermic Processes - ProQuest</u> N.m. (2022). Difference between Endothermic and Exothermic Reactions | Chemistry. BYJUS. <u>Difference between Endothermic and Exothermic Reactions | Chemistry</u>