

Name: _____ **Date:** _____

Exothermic and Endothermic Reactions

Question to Investigate

Does the temperature increase, decrease, or stay the same in the reaction between baking soda and vinegar?

Materials

- 50 ml of vinegar
- 1 teaspoon of baking soda
- Thermometer

Procedure

1. Place the thermometer in vinegar. Record the temperature on the activity sheet
2. While the thermometer is in the cup, add all of the baking soda from your cup.
3. Watch the thermometer to observe any change in temperature. Record the temperature after it has stopped changing.

Question to Investigate

Does the temperature increase, decrease, or stay the same in the reaction between baking soda solution and calcium chloride?

Materials

- Baking soda solution (Dissolve a teaspoon of baking soda in 50ml of water)
- 1 teaspoon of Calcium chloride
- Thermometer

Procedure

1. Place the thermometer in the baking soda solution. Read the thermometer and record the temperature on the activity sheet.
2. While the thermometer is in the cup, add all of the calcium chloride from the cup.
3. Watch the thermometer to observe any change in temperature. Record the temperature when it stops changing.

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Reaction A- Baking Soda and Vinegar	
Reactants	Products
Equation:	

Make a prediction. Do you think the reaction will be endothermic or exothermic? How will you know?

Original temperature of liquid: _____

Temperature after baking soda was added: _____

Change in temperature: _____

1. What happened to the temperature of the liquid in reaction A?

2. Because the temperature _____, it proves that the reaction

_____ heat and is therefore an

_____ reaction

3. Did you notice anything else that happened during the reaction? What clues tell you this was a chemical reaction? (be specific)

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Reaction B- Baking Soda and Calcium Chloride	
Reactants	Products
Equation:	

Make a prediction. Do you think the reaction will be endothermic or exothermic? How will you know?

Original temperature of liquid: _____

Temperature after calcium chloride was added: _____

Change in temperature: _____

1. What happened to the temperature of the liquid in reaction B?

2. Because the temperature _____, it proves that the reaction

_____ heat and is therefore an

_____ reaction

3. Observe the liquid after the calcium chloride was added. Is there anything different about it compared to liquid in solution A?

Precipitate-

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Reaction A- Baking Soda and Vinegar	
Reactants	Products
Baking soda (sodium bicarbonate) Vinegar (acetic acid)	Carbon dioxide (CO ₂) Water (H ₂ O) Sodium acetate
Equation: Baking Soda + Vinegar → carbon dioxide + water + sodium acetate	

Make a prediction. Do you think the reaction will be endothermic or exothermic? How will you know?

Original temperature of liquid: Room temp. approx. 20 C°

Temperature after baking soda was added: Results will vary (Temp. drops)

Change in temperature: Results will vary

1. What happened to the temperature of the liquid in reaction A?

The temperature dropped

2. Because the temperature Dropped, it proves that the reaction

absorbed heat and is therefore an

Endothermic reaction reaction

3. Did you notice anything else that happened during the reaction? What clues tell you this was a chemical reaction? (be specific)

Energy(heat) was absorbed and there was a production of a gas(CO₂ bubbles)

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Reaction B- Baking Soda and Calcium Chloride	
Reactants	Products
Baking Soda (sodium bicarbonate) Calcium chloride	Carbon dioxide (CO ₂) Water (H ₂ O) Sodium chloride (table salt) Calcium carbonate
Equation: Baking soda + calcium chloride → CO ₂ + H ₂ O + Sodium chloride (table salt) Calcium carbonate	

Make a prediction. Do you think the reaction will be endothermic or exothermic? How will you know?

Original temperature of liquid: Room temp. approx. 20 C°

Temperature after calcium chloride was added: Results will vary (Temp. increases)

Change in temperature: Results will vary

1. What happened to the temperature of the liquid in reaction B?

The temperature increased

2. Because the temperature Increased, it proves that the reaction

Released heat and is therefore an

Exothermic reaction reaction

3. Observe the liquid after the calcium chloride was added. Is there anything different about it compared to liquid in solution A?

The liquid in reaction B will appear milky and opaque, as compared to reaction A which should appear clear after bubbles have stopped forming. This is due to the production of a precipitate (calcium carbonate) in reaction B

Precipitate-

A solid which is produced in a liquid as a result of a chemical reaction

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This lesson might also be a good time to talk about the different laws of conservation. Both reactions are great examples to show that matter is not being created or destroyed but just changing forms. The same atoms which make up the baking soda and vinegar are being used to form carbon dioxide, water, and sodium acetate molecules. They are just rearranged differently!

