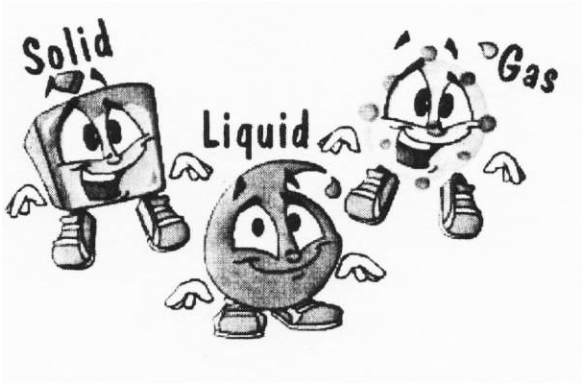
FOSS NOTEBOOK

CHEMICAL INTERACTIONS



Investigation #7: Phase Change

BIG QUESTION: What conditions induce substances to change from one phase to another?

Is It Melting?

The list below involves situations that cause changes in materials. The materials are *italicized.* Put an **X** next to the situations in which the *italicized* materials undergo melting.

_____ A. Putting a bowl of frozen *ice cream* in the sun.

_____ B. Sawing *wood* to make sawdust.

_____ C. Dissolving *salt* in water.

_____ D. Adding a *LifeSaver* candy to a glass of warm water.

_____ E. *Water* evaporating from a pan.

_____ F. Dissolving a *sugar cube* in a cup of hot tea.

_____ G. Pouring vinegar on *baking soda.*

_____ H. Sucking on a *lollipop* or other *hard candy.*

_____ I. Holding an *ice cube* in your hand.

Explain your thinking. Describe the "rule" or reasoning you used to decide if something melts.

_____

_____

_____

_____

_____

_____

_____

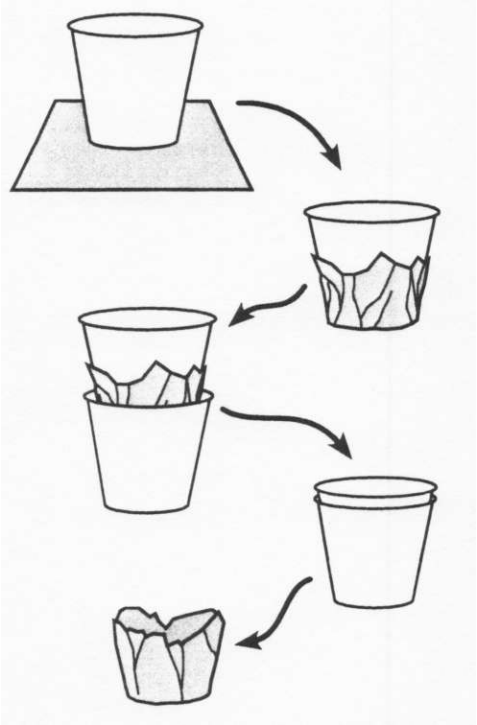
_____

_____

DISSOLVE OR MELT? A

Materials

2 Plastic cups
2 Aluminum foil squares
2 Paper cups
4 Candies, all one color
- Hot water
- Cold water



Prepare foil cups

a. Place a paper cup in the center of a foil square. Bring the foil up around the edges of the cup.

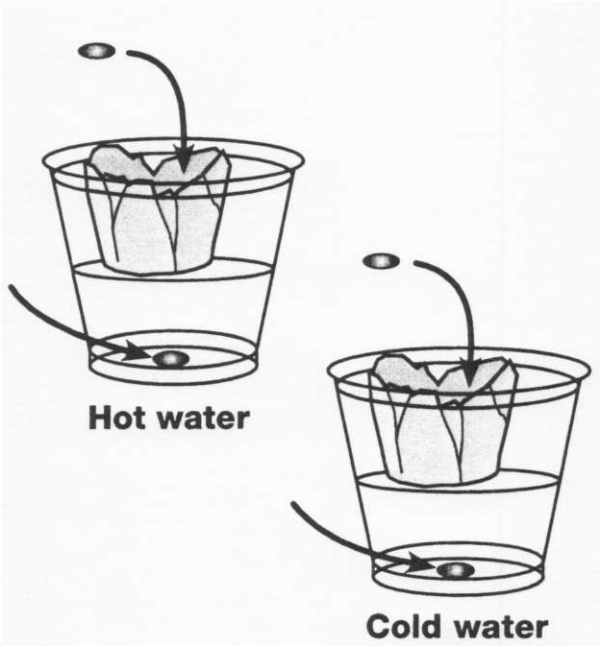
b. Place the foil-wrapped cup inside a second cup. Push gently but firmly all the way down.

c. Remove the foil cup. The foil cup will float on the water in a plastic cup.

d. Repeat the procedure to make a second aluminum foil cup.

Procedure

a. Put about 150 mL of hot water in one plastic cup; put about 150 mL of cold water in the other plastic cup.
b. Put an aluminum foil cup in each cup of water.
c. Get four candies, all one color. Put one candy in each aluminum foil cup and one in the bottom of each of the cups of water.
d. **Don't stir, poke, or shake the candies or the cups.** Observe to see if anything melts and if anything dissolves.



DISSOLVE OR MELT? B

Results

Record your observations in the table.

Material	Hot water	Cold water	Hot air	Cold air
Candy coating				
Chocolate				

Conclusions

1. a. What melted? _____

   b. Under what conditions? _____

   c. What happened at the **particle level** when it melted?

   _____

   _____

   _____

   _____

2. a. What dissolved? _____

   b. Under what conditions? _____

   c. What happened at the **particle level** when it dissolved?

   _____

   _____

   _____

   _____

T-Chart Compare and Contrast

Similarities

WORD 1:	WORD 2:

Differences

FOCUS QUESTION:

Prediction:

Plan	**Data**

EXPLANATION:

FOCUS QUESTION:

Prediction

Plan	**Data**

EXPLANATION:

FOCUS QUESTION:	
Prediction:	
Plan	Data
EXPLANATION:	
EXTENSION:	

ROCK SOLID QUESTIONS

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1. What causes a substance to change from one phase to another?

2. What are the three important things to know about freezing and melting?

3. Why does liquid water form on the bottom of a cup of ice placed over warm water?

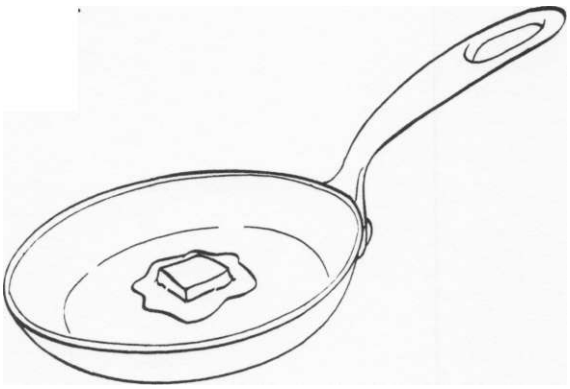
4. What happens to water particles as a cup of ice melts and then evaporates?

RESPONSE SHEET—PHASE CHANGE

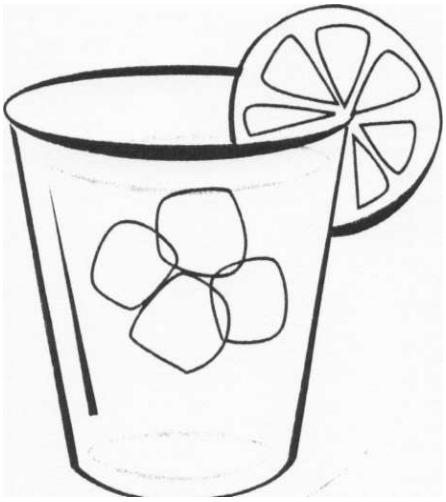
Randy watched his mom put a piece of wax in a pan. She put the pan on the stove. A minute later, Randy looked in the pan and said,

Look, the wax is turning into water.

What would you tell Randy to help him understand what happened in the pan?



Ice-Cold Lemonade



It was a hot summer day. Mattie poured herself a glass of lemonade. The lemonade was warm, so Mattie put some ice in the glass. After 10 minutes, Mattie noticed that the ice was melting and the lemonade was cold. Mattie wondered what made the lemonade get cold. She had three different ideas. Which idea do you think best explains why the lemonade got cold?

Circle your answer.

A The coldness from the ice moved into the lemonade.

B The heat from the lemonade moved into the ice.

C The coldness and the heat moved back and forth until the lemonade cooled off.

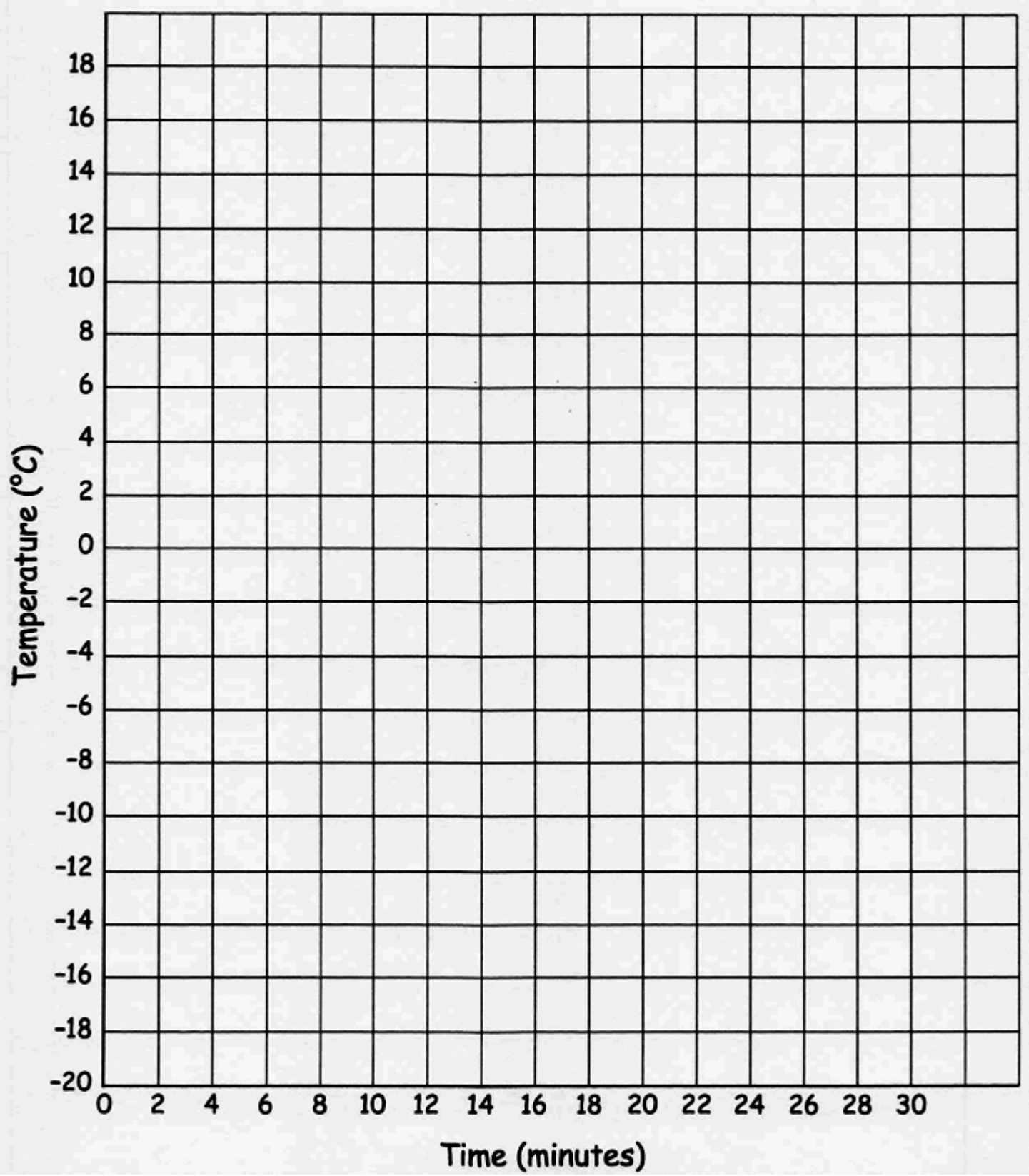
Explain your thinking. Describe the "rule" or reasoning you used for your answer.

FOCUS QUESTION:

Observations:

Explanation:

FREEZE WATER B



Conclusions

1. Describe what happened to the ice /salt mixture as the investigation progressed.

2. Describe what happened to the vial of water as the investigation progressed.

3. What happened to the temperature of the water in the vial as the water was freezing?

4. Why do you think the vial of water in plain ice didn't freeze, but the vial of water in salted ice did freeze?

5. People put salt on ice when they make ice cream. Why do they do that?

HOW COLD IS COLD?

Kristin filled her glass with ice cubes from the freezer, all the way up to the top. She then filled the glass with lemonade and sat down to drink it. The day was hot and muggy and Kristin did not take long to finish her drink. When she was finished she dumped almost a full glass of ice cubes into the sink.

Kristin's father had been watching the entire scene.

"You know, Krissy," he said, "You don't have to waste all of that ice. Why do you put so much ice into your glass?"

"I like my lemonade really cold," she responded, "and the more ice I put in, the colder the lemonade gets."

"Are you sure about that?" asked her dad.

“Of course," answered Kristin. "It makes sense. More cold ice makes a cold drink, well... colder."

"Maybe," said her dad "more ice might make it cool down faster, but would it really make it colder? Look! You threw away almost all of the ice!"

"It was cold enough, so I drank it all down. I can’t help it if all of the ice didn't melt. Besides, if I let all of the ice melt, the lemonade would have gotten colder and colder and maybe too cold to drink. There was a lot of cold in the ice that had to go into the drink and the more ice, the more cold there was to cool the drink."

"I don't know," mumbled her dad. "Something doesn't quite make sense here. Could the lemonade get colder than the ice that’s in it?"

"Well, I think so," Kristin replied cautiously. "Or maybe not. I don't really know. More ice would keep on making it colder as long as there was still ice, wouldn't it?"

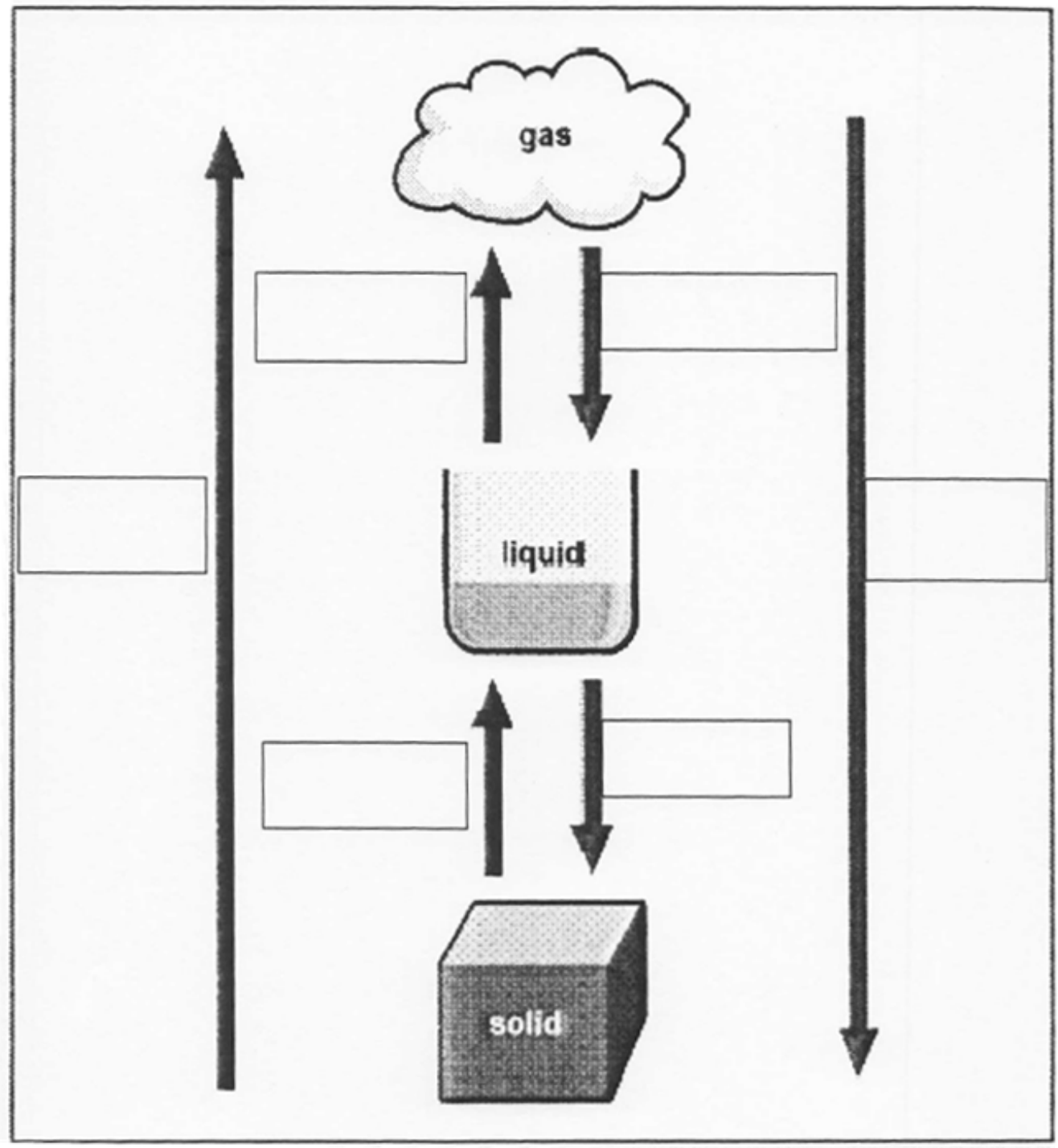
"We need to do some experimenting," said her dad. "We need a hypothesis or two. It looks like we have a least a couple of questions here."

FOCUS QUESTION:

Observations:

Explanation:

Extension:



Describe what is happening at a particle level as you move from solid to liquid, and then liquid to gas.

BIG QUESTION:	
Claim	**Evidence**
I claim	I know this because
I claim	I know this because
I claim	I know this because