Name: _____ Period: _____ Date: _____

Designing an Experiment Laboratory Activity – Teacher Edition

Investigating Effervescent Tablets

Background Information:

Humans are innately curious. This curiosity allows us to observe, explore, question, and experiment to understand our environment. This curiosity begins when you start "why" and "how" questions which shows the systematic process of thought and investigation referred to as scientific method. In this simple activity, you will learn the steps of the scientific method as they investigate the reaction of effervescent tablets dissolving in water.

Learning Objectives:

At the end of this laboratory activity, students are expected to:

- Be familiar with the steps of the scientific method.
- Plan an investigation on the reaction of effervescent tablets dissolving in water.

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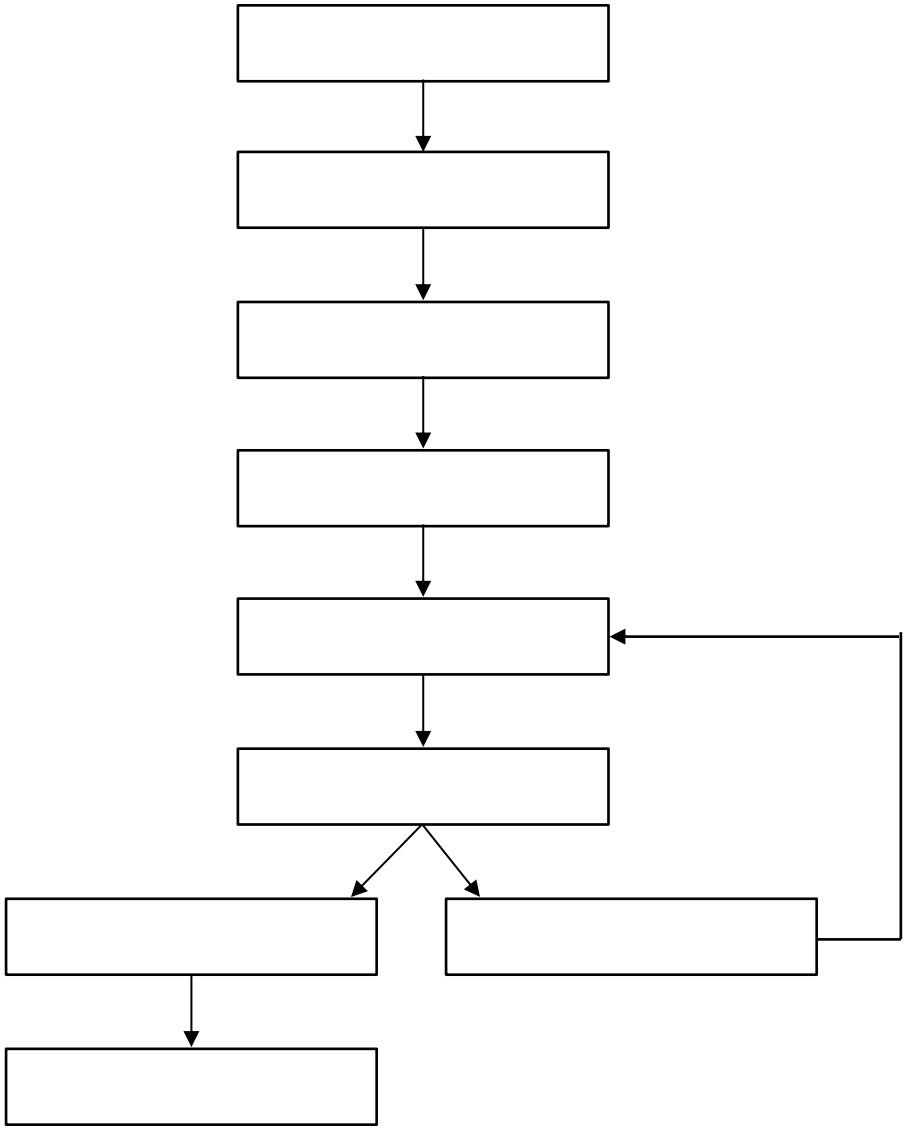
Pre-lab Question:

Complete the flowchart to show the steps of the scientific method.



Laboratory Proper:

Materials:

- 4 disposable cups or beakers (250 mL)
- 10 effervescent tablets
- 1 laboratory thermometer
- water

Safety Alert! *Use safety goggles when conducting this investigation.*

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Procedure:

1. Place 50 mL of water from the same source in each of 4 cups or beakers.
2. Stir the water in each with the thermometer and ensure that the water in each cup or beaker is the same temperature. Record this as the temperature with 0 tablet.
3. Place a thermometer in the water of the first container, add 1 effervescent tablet. Stir until the solution temperature remains with 0 tablet.
4. Record the temperature with 1 tablet.
5. Ask a question: ***Why did the temperature of the water decrease when an effervescent tablet was added?***
6. Conduct research: If you were to do research, you would find that dissolving certain substances in water may release heat or absorb heat. ***What indicates the release or absorption of heat energy in a reaction?***

   _____

   _____

   _____
7. Since the temperature of water drops after an effervescent tablet dissolved in it, the reaction must be endothermic. ***What hypothesis can you formulate based on the question?***

   _____

   _____

   _____
8. Experiment: Following the process you used with 1 tablet in the first container, you will add tablets to a container. Stir while measuring the temperature until it remains constant, and then record the reading.
   a. First, verify that the temperature of your remaining 3 water samples has not changed.
   b. Add 2 tablets to the second container. Stir. Monitor the temperature until it stabilizes, then record it.
   c. Likewise, add 3 tablets to the third container and follow the steps.
   d. Add 4 tablets to the last container and follow the steps.

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9. Record your observations.

Number of Tablets	Temperature (^{0}C)
0	
1	
2	
3	
4	

10. Once you obtained your data, make a graph to show the trend of your results.

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Post-lab Questions:

1. What are the variables in your experiment?
    a. Independent variable

    _____

    _____

    b. Dependent variable

    _____

    _____

    c. Controlled variables

    _____

    _____

2. How did the dependent variable respond to the independent variable?

    _____

    _____

    _____

3. Based upon the trend of your graph, what would you predict as the final temperature if 5 tablets were dissolved in 50 mL of water at room temperature?

    _____

    _____

    _____

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Answers:

Investigating Effervescent Tablets

Background Information:

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At the end of this laboratory activity, students are expected to:

- Be familiar with the steps of the scientific method.
- Plan an investigation on the reaction of effervescent tablets dissolving in water.

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Pre-lab Question:

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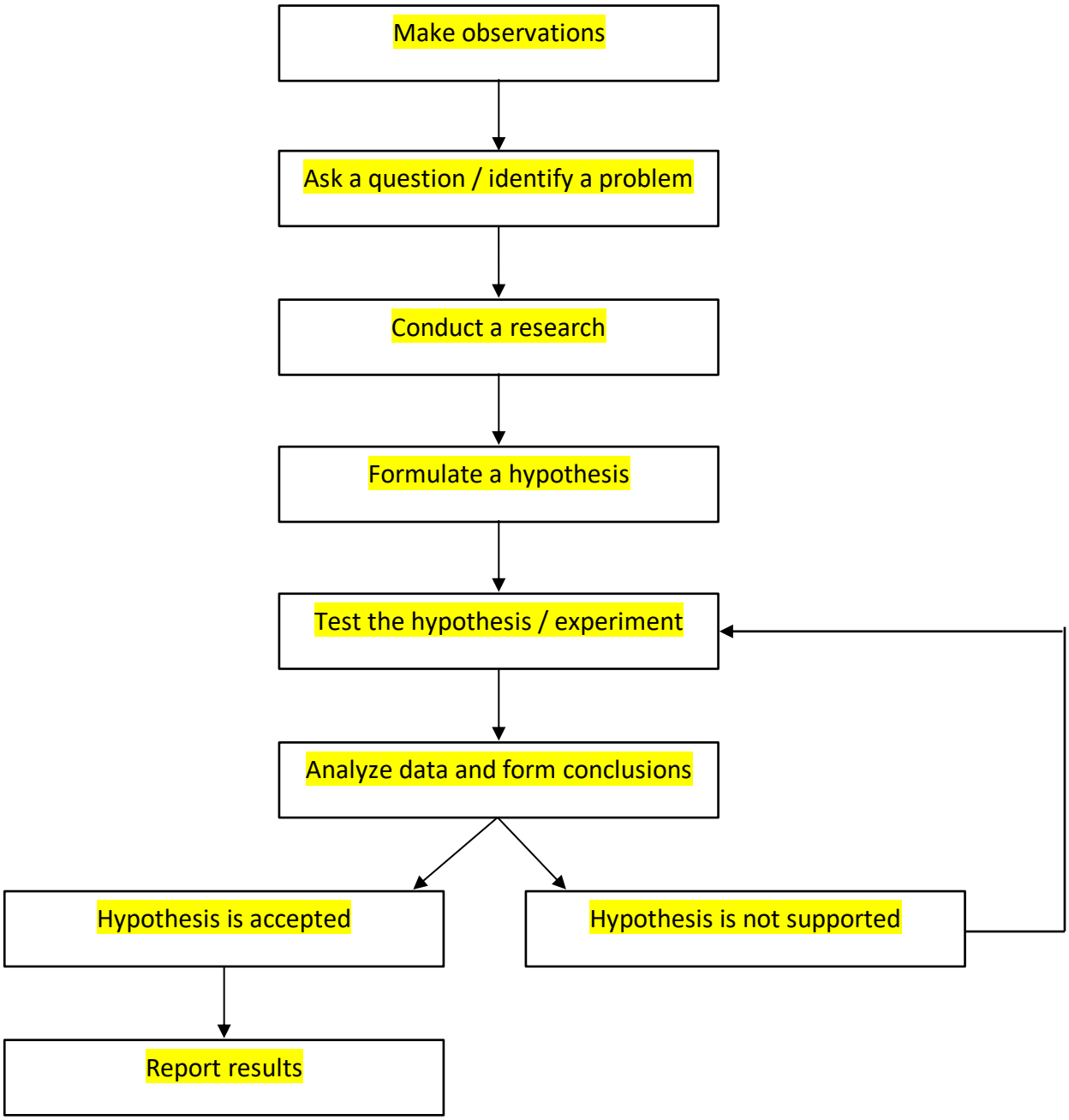

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Laboratory Proper:

Materials:

- 4 disposable cups or beakers (250 mL)
- 10 effervescent tablets
- 1 laboratory thermometer
- water

Safety Alert! *Use safety goggles when conducting this investigation.*

Procedure:

1. Place 50 mL of water from the same source in each of 4 cups or beakers.
2. Stir the water in each with the thermometer and ensure that the water in each cup or beaker is the same temperature. Record this as the temperature with 0 tablet.
3. Place a thermometer in the water of the first container, add 1 effervescent tablet. Stir until the solution temperature remains with 0 tablet.
4. Record the temperature with 1 tablet.
5. Ask a question: ***Why did the temperature of the water decrease when an effervescent tablet was added?***
6. Conduct research: If you were to do research, you would find that dissolving certain substances in water may release heat or absorb heat. ***What indicates the release or absorption of heat energy in a reaction?***
   The increase or drop in temperature of water shows the release or absorption of heat energy in a reaction.
7. Since the temperature of water drops after an effervescent tablet dissolved in it, the reaction must be endothermic. ***What hypothesis can you formulate based on the question?***
   If the number of effervescent tablet in a 50-mL water is increased, then the temperature of the solution will decrease.

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8. Experiment: Following the process you used with 1 tablet in the first container, you will add tablets to a container. Stir while measuring the temperature until it remains constant, and then record the reading.
    a. First, verify that the temperature of your remaining 3 water samples has not changed.
    b. Add 2 tablets to the second container. Stir. Monitor the temperature until it stabilizes, then record it.
    c. Likewise, add 3 tablets to the third container and follow the steps.
    d. Add 4 tablets to the last container and follow the steps.
9. Record your observations.

Number of Tablets	Temperature (^{0}C)
0	Answers may vary but the trend should show
1	decreasing temperature
2	
3	
4	

10. Once you obtained your data, make a graph to show the trend of your results. Answers may vary but the trend should show decreasing temperature

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Post-lab Questions:

1. What are the variables in your experiment?
    a. Independent variable

    The number of tablets

    b. Dependent variable

    The water temperature

    c. Controlled variables

    The water volume which is 50-mL, the kind of water use, and the kind of effervescent tablet used

2. How did the dependent variable respond to the independent variable?

    Water temperature decreased proportionally as more tablets were added

3. Based upon the trend of your graph, what would you predict as the final temperature if 5 tablets were dissolved in 50 mL of water at room temperature?

    Answer may vary but it should be lower than the temperature obtained in the water with 4 effervescent tablet.

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