Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Curds and Whey

**Purpose**

The purpose of this exercise is to demonstrate knowledge of pH while observing what happens when different substances are added to milk. In addition, students will determine how to create curds as a common agricultural product. [[1]](#endnote-1)

**Background**

The pH scale is a measure of how acidic or basic a substance is. The pH value can determine whether a chemical reaction will occur. For example, the pH of milk determines whether curds will form, as in the production of cottage cheese.

The pH of a substance can be measured with pH paper. This method can determine whether a solution is acidic or basic. Acids have a pH of less than 7, and bases have a pH of more than 7. Pure water is neutral and has a pH of 7. Milk curdles when the pH approaches 4.6. The remaining liquid is called whey.

1 2 3 4 5 6 **7** 8 9 10 11 12 13 10 11

 **More Acidic Neutral More Basic**

**Procedure:**

 **Materials**

1. pH paper 6. Vinegar
2. Lemon juice 7. Tea
3. Diluted chocolate syrup 8. Milk (whole or cream)
4. Graduated cylinder 9. Plastic cups (4)
5. Stirring rod

**Sequence of Steps**![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()

1. Read the problem under “observations” and form your hypothesis.
2. **![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Safety:** Use care when handling vinegar and lemon juice. Don’t get it in your eyes!! Do not eat or drink any of the materials. Wash your hands as necessary.
3. Develop a step-by-step procedure to test your hypothesis using the materials given to you in this lab*.* Write the steps you will follow in your procedure clearly under “observations”.
4. Gather your supplies from the front of the classroom.
5. Using the pH paper, determine pH of the vinegar, lemon juice, tea and diluted chocolate syrup.
6. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Record the results in the Data table.
7. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]() Add the vinegar to one cup of milk and stir.
8. Observe and record your observations.
9. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]() Add the lemon juice to another cup of milk and stir.
10. Observe and record your observations.
11. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]() Add the tea to another cup of milk and stir.
12. Observe and record your observations.
13. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]() Add the diluted chocolate syrup to the last cup of milk and stir.
14. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]() Observe and record your observations.
15. Answer the questions below.

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**Observations**

1. Problem: Which of the following substances will cause milk to curdle?

\_\_Lemon juice \_\_ Tea \_\_ Vinegar \_\_ Chocolate syrup

2. Hypothesis: Form a hypothesis below to answer your problem.

3. Describe the procedure, step-by-step, you will use to test each substance in milk:

**Data/Results:**

|  |  |  |
| --- | --- | --- |
| **SUBSTANCE** | **pH** | **OBSERVATIONS**(when added to milk) |
| *Vinegar* |  |  |
| *Lemon juice* |  |  |
| *Tea* |  |  |
| *Chocolate syrup* |  |  |

**Conclusion:**

1. Which substance had the greatest effect on the milk? Why?
2. Which substance had the least effect on the milk? Why?

3.What was the common factor that caused some solutions to curdle? How do you know?

4. Define the term “enzyme” and predict how enzymes can be used to impact the process of curdling milk.

5. Was your hypothesis supported? Why or Why not?

6. What might have been a source of error in your experiment?

1. (2008).Curds and Whey. *Atwater High School Ag Department*. [↑](#endnote-ref-1)