**Kaleidoscope Milk Lab**

**Background Information**

The role of milk in nature is to nourish and provide immunological protection for young

mammals. Milk has a very high nutritional value and is a very complex food. Milk’s general

composition consists mostly of water with equal parts of fat, protein, and sugars. Milk also

contains important vitamins and minerals. Milk is classified into different types based upon the

amount of fat. Skim milk contains 0g fat per 250mL serving; 2% milk contains 2g fat per

250mL serving, whole milk contains 8g fat per 250mL serving; half-and-half cream contains 8g

fat per 2T serving. The cream is called half-and-half because it is half cream and half milk.

If raw milk is left to stand, the fat will separate from the milk, rise, and form a cream

layer. To prevent this from happening to the milk you buy at the store, the milk goes through a

process called homogenization. Homogenization of milk breaks up the fat into small fat globules

and spreads them throughout the milk. The fat globules (0.1 to 15 μm in diameter) are basically

suspended in the milk.

Milk is a complicated substance made up of many parts that are attracted to some

substances while repelling others. These interactions cause milk to act in an interesting way

when mixed with substances such as dishwashing soap. Soap cleans dishes by breaking up fat or

grease and allowing it to flow in the water down the drain. Food coloring is mostly water with

added dye particles. We will discover an interesting property of milk by mixing milk with food coloring and dishwashing soap. We will examine the amount of movement of the milk/food coloring before and after soap is added.

**Procedure**

1. Place the petri dish on your lab table.

2. Fill the petri dish half full with the whole milk.

**3.** Equally space 4 drops of food coloring (any or all colors) in each dish. **Record your**

**observations of the movement of the food coloring in the milk. How far does the food**

**coloring spread? Do you notice any other interactions between the milk and food**

**coloring?**

**4.** Dip a toothpick into the liquid dishwashing detergent. Then, touch the toothpick into the

middle of each dish. Try again with more detergent, touching the milk in different areas.

**Record your observations of the food coloring movement when soap was added. How**

**did the food coloring move? How fast did the food coloring move? What else do you**

**notice about the interactions between the milk, soap, and food coloring?**

5. After reviewing the background information on milk, food coloring and dish soap above and on the back side, create a testable hypothesis about what you feel is causing the phenomenon.

6. Gather the ingredients you want to use to test your hypothesis (you must run 3 tests).

7. Run your tests and record your results.

5. Pour the used milk down the drain with lots of water. Clean each petri dish with lots of water

and completely dry with paper towels. Return all materials to the tray and completely clean

your lab area. ***Leave your lab area CLEANER than how you found it!*** Wash your hands

before leaving lab!!!

Chemistry I

**The Pre-Lab Questions** - Use the answers to these questions to help you write your lab report

**Purpose Statement and Background:**

What is the purpose of this lab?

**Background Information:**

1. What are the major components (ingredients) in milk?
2. What is/are the major component(s) in food coloring?
3. In your own words, explain the following processes:
   1. Homogenization
   2. Emulsion
   3. Surface Tension and Detergents
4. In your own words, explain how dishwashing soap cleans your dirty dishes.
5. What variables will you test (at least 3)? How are those variables different from each other?

6. In your own words, briefly (2-3 sentences) explain what you will do in the experiment. Include what you will test, how you will test it, and the types of observations/measurements you will make.

**Hypothesis:**

Predict what will happen (same movement, more movement, less movement) when you change your variables. Provide an explanation for your prediction. Using the if\_\_\_\_\_\_, then\_\_\_\_ format may help.

**Data Table:**

Create a blank data table on the back to record your observations for each test. You will record your actual observations *during* the lab.

**Data Analysis/Conclusion:**

1. Was your hypothesis supported or rejected by the data?
2. Describe the differences in the variables you tested. What did these tests tell you about the phenomenon?
3. Was the information from your test helpful in explaining the phenomenon? **Why or why not?**
4. What are some ideas for further testing you could do? Justify why those new ideas would be helpful in explaining the phenomenon?
5. Based on what you saw in lab (describe what you saw) and your research into Homogenization, Emulsion, Surface tension, and Detergents; what preliminary conclusions can you make about the cause of the phenomenon?