

Name _____ Block _____ Date _____

The Vomit Lab

Background

Patients “John Doe” and “Jane Doe” arrived at the VCU Medical Center Emergency Room at 10:00pm on Monday, September 10, 2018, complaining of stomach cramps, nausea, and diarrhea. Both their stomachs were pumped and the contents were saved for testing. Doctors believe food poisoning was to blame because both patients claimed to have eaten Taco Bell earlier that day, but neither has been able to remember specifically what he/she ate.



Doctors would like to test for whether they ate the same or different menu items from the restaurant. Luckily, several tests or **indicators** have been developed by biologists to determine the presence of different macromolecules – **carbohydrates**, **lipids**, **proteins**, and **nucleic acids** - found in food.

General Question – Did John and Jane eat the same type of food that caused their illnesses, or did they eat different foods?

Specific Question – Each group will test for the presence of a specific organic macromolecule in each sample.

Your group will be responsible for testing for _____

Possible Tests/Indicators

Simple Carbohydrates (monosaccharides) – Benedict’s Solution Test

- Simple carbohydrates include simple sugars like glucose and fructose.
- Benedict’s solution changes from blue to green to yellow-orange-red in the presence of simple sugars.

Complex Carbohydrates (polysaccharides) – Iodine Test

- Complex carbohydrates include starch and cellulose and are commonly found in potatoes, beans, and grains. These are polysaccharides - long chains of simple sugars.
- Iodine turns dark blue in the presence of starch and cellulose.

Proteins – Biuret Test

- Good sources of food protein include eggs, milk, and meat.
- The biuret test solution will turn from a light blue to purple if proteins are present.

Lipids – Sudan III Test

- Lipids include fats and oils.
- When Sudan III is mixed with a substance, two layers will form in the presence of lipids. The top layer containing the lipid will be a pale pink-orange color.

Nucleic Acid – Diphenylamine Test

- Meat and fish are especially rich in nucleic acids, including DNA and RNA.
- Diphenylamine will turn purple in color if DNA is present and green if RNA is present.

Summary Chart – Complete using the information above.

Macromolecule	Test Name	Positive Color/Appearance

Identify which test/indicator your group will be using to test for the presence of your macromolecule:

Safety

1. GOGGLES MUST BE WORN AT ALL TIMES.
2. No eating, drinking, or applying cosmetics, including chapstick.
3. If you handle any chemicals, wash your hands with soap and water after class.
4. If any chemicals are spilled, notify a teacher immediately.
5. If any chemicals touch skin, immediately rinse off the affected area with plenty of water.
6. **Diphenylamine** is highly corrosive to eyes and skin, moderately flammable, and moderately toxic by ingestion and inhalation.
7. **Sudan III** is alcohol based – therefore, flammable and toxic by ingestion/inhalation.

The Vomit Lab – Experimental Design Guide

BEGINNING THE INVESTIGATION

Begin the cycle of scientific thinking by summarizing your observations, asking a testable question, suggesting the most likely answer (hypothesis), and predicting what we should observe if the hypothesis is true.

Scientific question:

Hypothesis:

Why do you believe your hypothesis will be correct? What evidence can you give to support your hypothesis?

Personal Experiences (life experiences that tell why you think your hypothesis is true):

Scientific Concepts (what we need to know about macromolecules and food):

DESIGNING A TEST

Materials

- **Indicator being used:** _____
- **Other materials**

Make a general plan for collecting data.

List the variables

- **Independent variable:**
- **Dependent variable:**

Control: What kind of test will you perform to show the difference between a positive and negative test result?

What factors (at least 3) will be kept CONSTANT (the same) in the control and experimental groups?

COLLECTING AND PRESENTING DATA

Summarize the observations your group made from your personal investigation.

Make a data table to organize the class' data for this investigation.

ANALYZING AND INTERPRETING RESULTS

Conclusion – Claim, Evidence, and Reasoning

Organize the essential parts of your conclusion into the graphic organizer below:

Claim (Did John and Jane eat the same food?)	
Evidence (What <i>results</i> support your claim?)	Reasoning (<i>Explain why</i> is your evidence supports your claim?)
Extension (Explain why you think these results make sense or are surprising.)	