Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pd.\_\_\_\_\_\_\_\_\_ Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**A Meal and Murder**

**The Case**

pizza

A murder has occurred here in [insert your school here]. As top-notch [insert your school here]biology students you have been asked to assist in the investigation of this most unfortunate incident. Central to identifying the individual who committed this crime is establishing where the victim was the day of the crime so that detectives can question the individuals with whom the victim came into contact. An autopsy performed on the victim has revealed that the victim ate a meal just prior to the time of death. Upon questioning the victim’s friends and family, detectives working the case have learned that the victim enjoyed eating at the following places.

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C:\Documents and Settings\lthornton\Local Settings\Temporary Internet Files\Content.IE5\AQG1IBWB\MCj02958120000[1].wmf

***[insert your local place] Pizza***

The victim would never eat thin crust pizza from anywhere else! The victim would typically order a pizza with sausage, pepperoni, and bacon.

*What macromolecules would you expect to find in the stomach contents of the victim if the victim’s final meal was eaten here?*

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***[insert your local place] Wings***

The victim would hang out here to watch sporting events while feasting on Blazin’ wings and celery.

*What macromolecule would you expect to find in the stomach contents of the victim if the victim’s final meal was eaten here?*

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***[insert your local place] Restaurant***

The victim loved to go here for a night of bread, olive oil, and his favorite protein free pasta.

*What macromolecules would you expect to find in the stomach contents of the victim if the victim’s final meal was eaten here?*

The forensic pathologist has removed the contents of the victim’s stomach for you to analyze in order to determine where the victim had his last meal.

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour\_\_\_\_\_\_\_\_\_ Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Procedure**

Before analyzing the stomach contents of the deceased, you must determine the procedure to be used to test for each organic macromolecule. Using information provided in class, write the procedure for testing for each of the macromolecules listed below. For each macromolecule you must (1) describe the procedure (in enough detail so that others can repeat your work) to perform each test, (2) describe how a positive result for the macromolecule will look and record this information in Table 1, and (3) describe how a negative result for the presence of the macromolecule will look and record this information in Table 1.

**NOTE: Before you begin your investigation, you must obtain approval from your teacher.**

**Lipid Test**

**Protein Test**

**Carbohydrate – Glucose Test**

**Carbohydrate – Starch Test**

**Salt –Test**

**Vitamin C- Test**

Teacher Approval\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour\_\_\_\_\_\_\_\_\_ Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Table 1. Positive and Negative Results for the Presence of Organic Macromolecules**

|  |  |  |  |
| --- | --- | --- | --- |
| **Macromolecule** | **Chemical Test** | **Positive Test Result** | **Negative Test Result** |
| Lipids | Paper Bag test | Clear/ Translucent | Not translucent |
| Proteins | Biuret soln. | Violet/black | Dark Blue |
| Carbohydrates, simple – Glucose | Benedict’s soln. | Orange | Blue |
| Carbohydrates, complex–  Starch | Lugol’s soln. | Black | Dark red |
| Salt | Silver Nitrate | White | Clear/silver |
| Vitamin C | Indophenol | Pink | Blue |

**Table 2.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Lipids Test** | **Proteins Test** | **Glucose Test** | **Starch Test** | **Salt Test** | **Vitamin Test** |
| Observations: | Observations: | Observations: | Observations: | Observations: | Observations: |
| Present? \_\_\_\_\_\_\_\_ | Present? \_\_\_\_\_\_\_\_ | Present? \_\_\_\_\_\_\_\_ | Present? \_\_\_\_\_\_\_\_ | Present?  \_\_\_\_\_\_\_\_ | Present?  \_\_\_\_\_\_\_\_ |
| Not Present? \_\_\_\_\_\_\_\_ | Not Present? \_\_\_\_\_\_\_\_ | Not Present? \_\_\_\_\_\_\_\_ | Not Present? \_\_\_\_\_\_\_\_ | Not Present?  \_\_\_\_\_\_\_\_ | Not Present?  \_\_\_\_\_\_\_\_\_ |

**Lab Analysis**

1. Write a descriptive title for Table 2, and fill in the table with your results.
2. Report your findings in discussion format. Open the discussion with a statement regarding which restaurant the victim visited for his last meal **(1 point)**. Provide a logical explanation, using data from the tests on the stomach contents, that explains how you reached your conclusion **(4 points)**. The discussion should explain the results of the investigation in regard to the scientific concepts that are being applied in the investigation. In this case, the scientific concepts being applied are macromolecules and the specific chemical tests used to determine their presence **(5 points)**.

Teacher Notes:

I recommend having students test foods of their choice or at least have examples set up so students can a positive and a negative result. Check out the PPT I have included on

Some instructions for other versions of the lab include the addition of noodles and potato, however, most noodle do contain protein. With some research I have found that there are some (very few) pastas that do not contain protein i.e Miracle Noodles. I have found with this recipe I get the best results for the lab. Students can even omit the salt test and vitamin-c test and still get the correct restaurant.

To make the last meal, blend the following materials:

* Corn starch
* Vegetable oil
* Red/yellow food coloring

Use red and yellow food coloring only if using the “brown bag test” for lipids, and not using Sudan.

Test the mixture before students begin the activity. It should contain only starches and lipids.

Students should discover that the last meal was eaten at “***[insert your local place]*** Restaurant.”

Need more information? Visit these sites for ideas.

Food Chemistry

<http://www.sciencecompany.com/sci-exper/food_chemistry.htm>

Testing for Lipids, Proteins, & Carbohydrates

<http://seplessons.ucsf.edu/node/362>

Food Chemistry Testing

<http://www.scribd.com/doc/3371524/Food-Chemistry-Testing-SUGAR-STARCH-ETC>

Einstein Project – Food Chemistry

<http://www.einsteinproject.org/einstein/for+educators/unit+offerings/food+chemistry/default.asp>