**Organic Compounds For Lunch?**

**Summary:**

After a PowerPoint presentation on organic compounds students will fill out the “Organic Compounds” student worksheet. The following class period students will learn practical applications through an “Organic Compounds for lunch?” lab activity.

**Subject:**

* Science:
	+ TEKS: 7.1 A- Demonstrate safe practices during laboratory and field investigations as outlined in the Texas Safety Standards.
	+ TEKS: 7.1 B- Practice appropriate use and conservation of resources, including disposal, reuse, or recycling of materials.
	+ TEKS: 7.2 A- Plan and implement comparative and descriptive investigations by making observations, asking well defined questions, formulating testable hypotheses, and using appropriate equipment and technology.
	+ TEKS: 7.2 E- Analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.
	+ TEKS: 7.3 A- In all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student.
	+ TEKS: 7.6 A- identify that organic compounds contain carbon and other elements such as hydrogen, oxygen, phosphorus, nitrogen, or sulfur.

**Grade Level:**

* Target Grade: 7
* Upper Bound: 8
* Lower Bound: 6

**Time Required:** Two class periods of about an hour each.

**Activity Team/Group Size:**

* Day 1: No groups, PowerPoint should be shown to the entire class, and the activity worksheet should be completed individually.
* Day 2: Groups of 2-3 for experiment.

**Materials:**

* Day 1
	+ Pencil/Pen
	+ Organic compounds student worksheet
* Day 2 (Per group)
	+ Pencil/pen
	+ 1 gram cornstarch
	+ Plastic stirrers
	+ Plastic graduated cylinder
	+ Vegetable oil (5 mL)
	+ Iodine solution in dropper bottle
	+ 5 cm squares of brown paper
	+ Water
	+ Plastic cups
	+ Plastic dropper
	+ 4 other food samples to test (ex: bread, butter, potato, potato chips, peanut butter, cooked pasta, onion, rice)
	+ Data table and Procedure

**Reusable Activity Cost Per Group [in dollars]:** All materials $20 total; cut all ingredients into small portions and place in plastic cups for groups prior to lab to avoid wasting materials.

**Learning Objectives:**

* To teach students about organic compounds in a lecture, followed by a lab the next class period to apply their new knowledge. The lab allows students to discover and apply knowledge of organic compounds in a “hands on” approach. Additionally during lab students are improving their scientific method and drawing conclusions skills.

**Lesson Introduction / Motivation:**

* Day 1:
	+ Introduce the lesson with the “Organic Compounds” PowerPoint. Ask students if they know what the word “Organic” means. Have they heard it being used in the media?
* Day 2:
	+ Address the most commonly asked questions from the Day 1 exit activity. Then grab students’ attention by having a demonstration of the lab at the front of the room. Explain the lab, and perform the cornstarch and vegetable oil tests with the class as a whole. Ask students to tell you which are a positive and negative result for the starch and lipid tests. Explain they will be testing the four other foods that are in their “Lunch” for starches and lipids. Then distribute the experiment materials to each group and begin the lab.

**Lesson Plan:**

* Day 1:
	+ After introducing the lesson as stated above begin the “Organic Compounds” PowerPoint presentation. Keep students attention throughout the presentation by clicking through slides and pausing between the appearance of the title on the slide and its explanation text. Take time to ask the students what they know about the title on the slide, can they teach you anything? Be sure that there is class participation during the presentation.
	+ After the presentation distribute the “Organic Compounds Student Worksheet”, have students try to fill it out individually. Allow 10-15 minutes for students to work individually, then collect the worksheets and begin the exit activity.
* Day 2:
	+ Safety First: Instruct students on safety practices in the laboratory. Be sure that they are aware of where the sink is located in the classroom/laboratory. Instruct them on the correct use of the iodine, and be sure that they know it will stain their hands and clothing. No student should eat any of the laboratory food samples at any time during lab, additionally students should not bring their own food or drink to the lab or chew gum during the experiment.
	+ After the attention grabbing demonstration and lesson introduction distribute materials to each group of 2-3 students and pass out the a copy of the lab procedure to each group, or save paper by putting it at the front of the class on the projector. Also, although working in groups each student should individually fill out a data table and conclusions handout.
	+ Procedure:
		- Demonstration/ attention grabber procedure:
			1. Show students the cornstarch and vegetable oil; ask them to write their predictions of which is a starch and a lipid on their lab sheet.
			2. Obtain plastic cups containing samples of cornstarch and vegetable oil.
			3. Ask for two volunteers from the class to come and take a pinch of the cornstarch to describe the texture, and have the class record the observation in their lab data table. (Be sure students wash their hands to remove the cornstarch).
			4. Ask for two more volunteers to do the same with the vegetable oil, again have the class write the results in their data table.
			5. Pour 5 mL of water into a plastic cup, and add the cornstarch. Use a plastic stirrer to blend the starch-water mixture.
			6. Obtain a brown paper square and write “S” for starch in the corner. Place 3 drops of the starch mixture on the square. Have two volunteers come to the front and state their observations, then have the class record them in their data tables.
			7. Obtain a fresh brown paper square and write “L” for lipid in the corner. Place 3 drops of vegetable oil on the square. Have two volunteers come to the front and state their observations, the class should record them in their data tables.
			8. Add 4 drops of iodine to the remaining corn starch mixture. Use a clean plastic stirrer to mix contents well. Ask for more volunteers to observe the results, and have the class record this in their data tables. \*CAUTION\*- Handle iodine carefully, it can stain hands and clothing. Instruct students as well to respect laboratory protocol.
			9. Add 4 drops of iodine to the remaining vegetable oil. Use a clean plastic stirrer to mix the contents well. Have volunteers read results and class write down the observations in their data tables.
		- Class/Group Procedure
			1. Each group should have 4 plastic cups, each with a sample of the food they will be testing. Make sure these are made before lab begins so that no materials will be wasted.
			2. Before beginning any further tests, predict what the results will be, and write a reason for each prediction. Remember- Some foods may be both starches and lipids.
			3. Carry out the two tests for each food the same way as in the Demonstration, remember to record your observations in the data table. \*\*CAUTION\*\*- DO NOT put ANY of the food samples or iodine in your mouth. WASH YOUR HANDS after handling food samples.
			4. Clean up your workstation by discarding all plastic cups, stirrers, food samples, and trash. Wipe down your workstation with a paper towel.
			5. Answer all conclusion questions.

**Lesson Closure:**

* Day 1:
	+ For students to leave class at the end of the period there will be a 3-2-1 activity. Ask each student to use a sheet of notebook or scratch paper and pen or pencil. Write down 3 things they learned, 2 things they have a question about, and 1 thing they want the (you) the instructor to know. Collect these as students leave class, and before introducing the Day 2 lesson address the most frequently asked questions from this activity with the class.
* Day 2:
	+ The exit activity will be “Numbered Heads Together”, where you will number students sequentially up to five. As a group they will create a list of 3-5 things that they learned from the lesson. Then call one number from each group to report to the class something that they learned.

**Assessment:**

* Day 1:
	+ Grade all student worksheets for accuracy, and assess the students’ ability to grasp the information based on completeness of their answer.
* Day 2:
	+ Grade labs for completion, but lab conclusion questions for correctness. Asses the students’ ability to grasp the information based on the correctness of their conclusion questions. Give bonus points for student participation during the demonstration of the lab experiment.

**Vocabulary / Definitions:**

* Element- An element is any substance that cannot be broken down into simpler substances. The smallest unit of an element is an atom.
* Compound- A compound is any chemical that is made of two or more different elements.
* Organic Compounds- Contain carbon and hydrogen and are usually associated with living things.

**Background and Concepts for Teachers:**

* Read over the definitions above, and click through the PowerPoint presentation alone before presenting it in class.

**Lesson Scaling:**

* To modify the lesson to be more cost effective, the lab can be eliminated. Also, plastic stirrers could be replaced with toothpicks, and plastic cups could be replaced with small paper Dixie cups.

**Safety Issues:**

* Iodine can stain the hands and clothing.
* Students must wash hands after handling all food products.

**Multimedia Support and Attachments:**

* There is a PowerPoint attached for the lesson presentation.

**References:**

* http://www.easthampton.k12.ma.us/webpages/jbucs/files/Lab%20-%20What's%20In%20Your%20Lunch.pdf
* http://www.rcmahar.org/kdarling/files/2010/09/Organic-Compound-worksheet.pdf
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* Nucleic Acids

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Please email us your comments on this lesson:
E-mail to ljohnson@cvm.tamu.edu
Please include the title of the lesson, whether you are a teacher, resident scientist or college faculty and what grade you used it for.

**Teacher’s Comments:**