Chapter 9: Fats & Oils

FATTY DISTINCTION

Fat and oils, also known as lipids, are an important macronutrient that is found in the body and in many foods. The body uses fat for energy, nerve and brain function, and growth. Everyone needs some fat in their diet. Unfortunately, many Americans eat too much dietary fat. Fats are high in calories and can be unhealthy when eaten in excess. For this reason, it is important to learn about the science and nutrition of dietary fats and oils. In this chapter, students will explore dietary fat and oils by learning about how they vary at different temperatures (saturated versus unsaturated fats), the role of emulsifiers in lipid solubility, and the health benefits associated with eating healthy lipids in moderation.

FOOD EXPLORATION LABS

Lab I: Lipid Language

- Teacher Preparation
- Teacher Lab Answer Key
- Student Lab

Lab II: Examining Emulsions

- Teacher Preparation
- Teacher Lab Answer Key
- Student Lab

INVESTIGATING YOUR HEALTH

Fascinating Fats

- Teacher Answer Key

Try This At Home: Mustard Vinaigrette

SUPPLEMENTAL MATERIALS

Teacher Preparation Slides

Student Pre-Lab Slides & Videos

Food Explorations Lab I:
Lipid Language

TEACHER LESSON PREPARATION

Lesson Focus

Understand how lipid properties vary with temperature changes and the role different dietary lipids play in human health.

Lesson Description

Students will observe physical properties of lipids (margarine, butter, and vegetable oil) including their melting and solidifying temperatures. They will use their data to distinguish between saturated and unsaturated fat content.

Academic Content Standards

ELA Common Core Standards for Literacy in Science and Technical Subjects (R-reading, W-writing, SL-speaking and listening, L-language) Grades 6-8

R-1 Cite specific textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

R-3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

R-4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical content relevant to grade (6-8) text and topics.

R-7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g. in a flowchart, diagram, model, graph or table).

R-10 Read and comprehend complex literary and informational texts independently and proficiently.

W-2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

SL-1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade (6-8) topics, texts, and issues, building on others' ideas and expressing their own clearly.

L-1 Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Next Generation Science Standards

Performance Expectations

MS-PS1-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

MS-PS1-4 Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

MS-LS1-7 Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

Disciplinary Core Ideas

PS1.A Structure and Properties of Matter

- Each substance has characteristic physical and chemical properties that can be used to identify it.
- In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations.
- The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter.

LS1.C Organization for Matter and Energy Flow in Organisms: Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, support growth, or release energy.

Science and Engineering Practices

- Analyze and interpret data to determine similarities and differences in the findings.
- Develop a model to predict and/or describe phenomena.
- Scientific knowledge is based on logical and conceptual connections between evidence and explanation.

Crosscutting Concepts

Macroscopic patterns are related to the nature of microscopic and atomic-level structure.

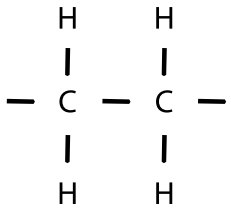
Background Information

There are different types of fat including saturated, unsaturated, and trans (hydrogenated) fat. **Unsaturated** fats contain one or more double bonds. **Saturated** fats have no double bonds and are saturated with hydrogen. In excess, fats lead to many health problems like high blood pressure and stroke. Although **trans** fats can occur naturally in some products like butter, they are typically unsaturated fats that have been chemically altered (partially hydrogenated). When unsaturated fat is partially hydrogenated, a geometric isometric form of an unsaturated double bond is formed, resulting in trans fat. Margarine is an example of a partially hydrogenated fat. Because trans fats are typically not natural and are high in saturated fat, we should limit them in our diets. However, it is important to consume adequate amounts of fat in our diet because it is needed for energy, nerve and brain function, and growth. We should choose foods that are high in unsaturated fats, moderate in saturated fatty acids, and free of trans fats. Avoiding overconsumption of these foods will help decrease the risk for diet-related diseases such as heart disease, stroke, overweight/obesity, and Type 2 Diabetes.

Many students misunderstand chemical and physical changes. Students may think a change of state is chemical, when it is truly physical. You can use the concepts of **melting point** and **solidification** to correct these misconceptions in a hands-on, visual manner. Melting point is the point at which a solid fat turns to liquid. It varies from food to food. Solidification, or freezing, is the point at which a liquid turns to a solid. Butter melts at 90-95°F; however, there is no set point for butter to solidify because of its complexity. The exact fat/fatty acid composition is not the same from product to product. Butter will usually solidify around 60-65°F. The melting point of margarine is slightly higher than butter because of the presence of hydrogenated fats. It melts at 94-98 °F. Like butter, there is no set point at which it will solidify; it will usually solidify around 65-70°F. Solid fats have different melting points because they are not pure substances, but rather combinations of mixed **triglycerides**. Triglycerides are considered the major form of fat and is the storage form of fat in our bodies. Triglycerides are made up of 3 fatty acid chains attached to a glycerol backbone.

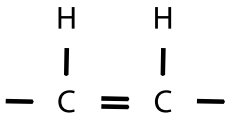
Fats in the form of oil also have melting points; however, they are much lower than fats that are solid at room temperature. The melting points of oils vary based on their fat content. For example, the melting point of olive oil is 21°F, but peanut oil is much higher at 28°F. In general, the lower the melting point, the healthier the oil. Based on this information, olive oil would be the better choice. Oils can be converted to solids through a process call hydrogenation, in which all or some (partial hydrogenation) are converted to saturated bonds by the addition of hydrogen. **Hydrogenation** is a chemical process in which hydrogen atoms are added to the unsaturated carbons, making them saturated. The process occurs only at very high temperatures and results in the production of **trans fatty acids** (cis converted to trans configuration) among remaining unsaturated bonds in partially hydrogenated oils. Foods higher in hydrogenated fats, or trans fats, have higher melting points. Some factors that influence melting points include the number of carbons in the molecule, the degree of unsaturation, and the molecular configuration (cis versus trans). Fats with longer carbon chains have higher melting points.

Saturated Fat



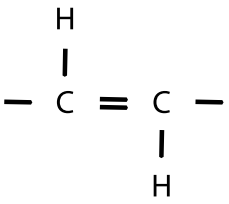
No double bond indicates the carbon is fully saturated with hydrogen.

Unsaturated Fat
(cis configuration)



Double bond indicates the carbon is not fully saturated with hydrogen.

Trans Fat
(trans configuration)



Unsatruated fat converted to saturated fat through hydrogenation. The molecular shape of the molecule changes.

Materials

Teacher Materials

NOTE: Teacher material list is based on 6 groups of 4-5 students (24-30 students total).

Demonstration *(see Suggested Instructional Plan step 6)*

safety goggles
apron (optional)
kitchen timer or stopwatch
4 small, clear plastic cups
½ cup cold butter
½ cup cold margarine (partially hydrogenated)
2 hot plates or 1 double burner
2 saucepans
2 thermometers
2 wooden spoons

Lab Investigation

1 liquid measuring cup
ice cooler
½ cup vegetable oil
12 of cups ice
2 small, plastic cups

Student Materials

NOTE: Student material list is based on 1 group of 4-5 students. Refer to the FoodMASTER Middle "Equipment and Material Lists by Chapter" for whole class estimates (24-30 students divided into 6 groups) on perishable and nonperishable materials.

safety goggles
apron (optional)
1 small bowl
1 kitchen timer or stopwatch
2 cups ice
1 small, clear, plastic cup containing ¼ cup assigned fat type
1 thermometer

Teacher Pre-Lab Preparation

1. Review teacher background information, teacher preparation slides, student pre-lab slides/videos, student introduction, suggested instructional plan, and the student *Food Exploration* lab investigation procedures.

2. **IMPORTANT:** If possible, when purchasing margarine, choose a brand that contains the words "partially hydrogenated" within the ingredients list.

3. Assign each student group 1 fat type (butter, margarine, or oil).

4. The teacher demonstration will show students the temperature and time it takes for two types of solid fat (i.e. butter, margarine) to melt. After melting the solid fats, you will divide each liquid fat evenly between two small, clear plastic cups.

5. Distribute assigned liquid fats to student groups. Student groups will need to observe the liquid fats as part of the "cold treatment" procedure.

TIMESAVER: Use the demonstration video in the student pre-lab materials in place of the in-class teacher-led demonstration. Provide students with the data found in Tables A and B on page 233 of the Teacher Edition after your class has viewed the video.

NOTE: The temperatures below are higher than the melting points described in the background. The temperature of the melted butter and margarine were measured after the products had completely melted, resulting in an overall higher temperature.

Suggested Instructional Plan

1. Review scientific vocabulary and knowledge prerequisites:

Unsaturated Fat	**Saturated Fat**
Melting Point	**Solidification**

2. Consider having your students research the types of lipids (fat), their role in the body, their dietary sources, and the health benefits/consequences of consuming them prior to beginning the lab investigation.

3. Distribute Materials:

   It is recommended that materials are organized into stations for easier distribution. Materials are recommended based on the amount needed for 1 class of 30 students. Students should be arranged in small groups of 4-5.

   Each group should receive:

   - Student Lab Investigation Worksheets (1 per student)
   - Student Lab Materials

4. Ask students to read *Fatty Distinction* and complete the focus questions for this lab investigation.

5. Before beginning the lab investigation:

   a. Require students to wash their hands.

   b. DO NOT allow students to taste the lipids featured in this lesson. Students will be given the opportunity to taste a healthy fat (olive oil) in *Food Explorations Lab II: Lipid Language*.

   c. Emphasize the importance of practicing good food safety behaviors by not consuming substances used as part of the lab investigation.

6. Begin the student lab investigation by asking students to make a prediction about the rate different fat types melt and solidify. You may also choose to show the provided video lab demonstration, *Food Explorations Lab I: Lipid Language*. The video will help students understand the procedures and visual observations.

7. Launch the **teacher demonstration**. The demonstration will show students how to find the melting points of butter and margarine.

   a. Demonstrate for students how to find the melting points of butter and margarine. Vegetable oil will not undergo heat treatment because it is already a liquid at room temperature.

   b. Add ½ cup of cold butter to a saucepan and ½ cup of cold margarine to a second saucepan. You may choose to heat one fat type at a time or ask for student assistance. The solid fats may take slightly longer to melt due to the use of a double burner versus conventional stovetop.

   c. Once each solid fat is added to the saucepans, the stopwatch should be started to ensure accurate recording of the amount of time it takes each fat to turn into a liquid.

   d. Continue to heat each fat type on medium heat until it is completely melted. Once each fat has completely melted, the time and temperature should be taken.

   e. Record the time it took to melt each fat type in a place visible to students. Students should record this data in Table B under the column labeled "Heat Treatment."

   f. Measure the temperature of each melted fat type and record the data in a place visible to students. Students should record this data in Table B under the column labeled "Heat Treatment."

   g. Pour ¼ cup of each melted fat type into a separate plastic cup to be used for student observation later in the lab investigation.

8. After the teacher demonstration, students will complete the procedures for "cold treatment" with their assigned fat type.

9. Once the fats have been submerged in ice, the solidification process takes approximately 10 minutes.

10. Students should find the following results:

    a. *Butter:* Butter represents a saturated fat. During heat treatment, the butter will melt more slowly compared to margarine; however, it will be completely melted at a lower temperature. During cold treatment, the butter will solidify at a lower temperature compared to the margarine.

    b. *Margarine:* Margarine represents a trans fat. During heat treatment, the margarine will melt and reach a higher temperature more quickly compared the butter. During cold treatment, the margarine will solidify at a higher temperature compared to butter and oil. When a cis fatty acid is converted to a trans fatty acid, the carbon chain is lengthened. Therefore, solid fats that contain trans fatty acids will have higher melting points. These fats also tend to be more solid at room temperature compared to their cis counterparts (e.g. olive oil, vegetable oil). Newer food technologies have been implemented that reduce or remove the production of trans fatty acids in food products such as margarine; however, it is important to look at the food label to determine if a food contains trans fat (see Investigating Your Health).

    c. *Oil:* Vegetable oil contains unsaturated fat and has a lower melting point. The oil is already liquid at room temperature. Additionally, the oil will not solidify during cold treatment, but rather take on a cloudy appearance. Oils are unsaturated fats, meaning the carbons within the fatty acids are not completely saturated with hydrogen.

11. Allow students to work in small groups on the Student Lab Investigation worksheet to further explore the topic and respond to lab questions.

12. Follow-up with a class discussion about sources of different types of dietary fat in real life, and the relevance to overall health and energy balance. Follow-up this lesson with the *Investigating Your Health*. See *Teacher Bites* for ideas on how to further extend this lesson.

Teacher Bites: Lesson Extension

- Make a lava lamp! Use an empty plastic liter bottle. Add water dyed with food coloring and oil.
- Discuss the insoluble properties of lipids and describe this characteristic's importance to cell membrane function (e.g. phospholipids).

Food Explorations Lab II:
Examining Emulsions

TEACHER LESSON PREPARATION

Lesson Focus

Understand the concept of lipid solubility by observing the action of emulsifiers and heterogeneous/homogenous mixtures.

Lesson Description

Students will add substances to oil/vinegar mixtures to determine if any act as an emulsifier. Their mixtures will then be combined to form a vinaigrette.

Academic Content Standards

ELA Common Core Standards for Literacy in Science and Technical Subjects (R-reading, W-writing, SL-speaking and listening, L-language) Grades 6-8

R-1 Cite specific textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

R-3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

R-4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical content relevant to grade (6-8) text and topics.

R-7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g. in a flowchart, diagram, model, graph or table).

R-10 Read and comprehend complex literary and informational texts independently and proficiently.

W-2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

SL-1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade (6-8) topics, texts, and issues, building on others' ideas and expressing their own clearly.

L-1 Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Next Generation Science Standards

Performance Expectations

MS-PS1-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

MS-LS1-2 Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

MS-LS1-7 Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

Disciplinary Core Ideas

PS1.A Structure and Properties of Matter: Each substance has characteristic physical and chemical properties that can be used to identify it.

LS1.A Structure and Function: Within cells, special structures are responsible for particular functions, and the cell membrane forms a boundary that controls what enters and leaves the cell.

LS1.C Organization for Matter and Energy Flow in Organisms: Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, support growth, or release energy.

Science and Engineering Practices

- Analyze and interpret data to determine similarities and differences in the findings.
- Develop and use a model to describe phenomena.
- Scientific knowledge is based on logical and conceptual connections between evidence and explanation.

Crosscutting Concepts

- Macroscopic patterns are related to the nature of microscopic and atomic-level structure.
- Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts; therefore, complex natural and designed structures/systems can be analyzed to determine how they function.

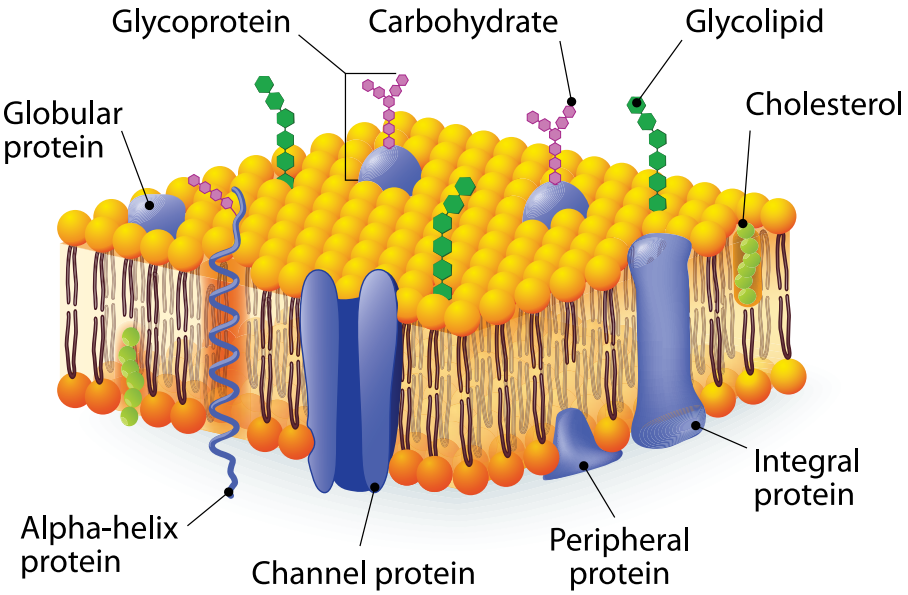
Background Information

Heterogeneous mixtures have more than one color, substance, or texture visible. **Homogeneous** mixtures are the same throughout with a uniform appearance. An emulsion is a mixture of two **immiscible** liquids, like water and oil or vinegar and oil, where one is dispersed in small globules throughout the other. Immiscible liquids are not able to mix without an emulsifier that will create an emulsion. **Emulsions** are considered a heterogeneous mixture. Two liquids that are immiscible

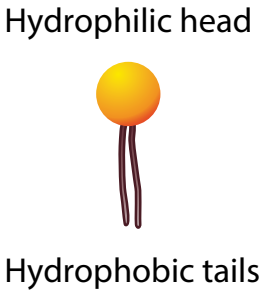
have opposite polarity. A liquid is either polar or non-polar. Polar liquids are **miscible** in other polar liquids and non-polar liquids are miscible in other non-polar liquids. In other words, miscible liquids will readily mix with each other without the help of an emulsifier. On the other hand, polar and non-polar liquids do not mix together without an emulsifier. When fats, typically oils, are mixed with an emulsifier, such as eggs, they form an emulsion.

The concept of fat and oil polarity can be used to teach students about the cell membrane. A major component of a cell's membrane is phospholipids. A **phospholipid** molecule has one end that is **hydrophilic** (water-loving). The other end is **hydrophobic** (water-fearing). The cell membrane has two phospholipid layers known as the **phospholipid bi-layer**. The hydrophilic heads of one layer face outward toward the extracellular environment and, in the other layer, they face inward toward the cytoplasm. This double layer is semi-permeable and only certain types of molecules can diffuse across the membrane.

Phospholipid bilayer



Phospholipid Molecule



Materials

Teacher Materials

NOTE: Teacher material list is based on 6 groups of 4-5 students (24-30 students total).

12 plastic or Styrofoam cups
3 3/4 cups olive oil
2 Tbsp. salt
2 Tbsp. ground mustard
3 bags of romaine lettuce
1 bottle dish detergent
2 Tbsp. honey
3 3/4 cups white vinegar
2 Tbsp. paprika
napkins
1 dishtowel

Student Materials

NOTE: Student material list is based on 1 group of 4-5 students. Refer to the FoodMASTER Middle "Equipment and Material Lists by Chapter" for whole class estimates (24-30 students divided into 6 groups) on perishable and nonperishable materials.

safety goggles
5 medium mason jars
1 teaspoon ground mustard
1 teaspoon honey
1 teaspoon salt
1 teaspoon measuring spoon
1 black maker
1 kitchen timer or stopwatch
1 whisk
6 plastic forks
aprons (optional)
5/8 cups vinegar in plastic or Styrofoam cup
5/8 cups olive oil in plastic or Styrofoam cup
1 teaspoon paprika
1 large bowl (diameter = 8" or larger)
1 liquid measuring cup (1 cup or larger)
5 sticky labels
6 paper plates (any size)
½ bag or head of fresh romaine lettuce

Optional Lab Extension

emulsion droplet
1 microscope
1 medicine dropper
1 microscope slide and cover slip
1 small cup of water

Teacher Pre-Lab Preparation

1. Review teacher background information, teacher preparation slides, student pre-lab slides/videos, student introduction, suggested instructional plan, and the student *Food Exploration* lab investigation procedures.

2. Prepare materials for each group.

3. To prepare mixtures, each group will need 5/8 cup of vinegar and 5/8 cup of olive oil.

4. Each student group will also need 1 teaspoon of each treatment (ground mustard, honey, paprika, and salt).

5. Consider placing materials in organized stations around your classroom. Allow students to visit organized stations to retrieve needed lab materials.

TIMESAVERS:

- You are encouraged to allow students to measure out their own treatments; but if time is a concern, pre-measuring treatments is recommended.
- Another option is to have each group make 5 jars of the same treatment. Jars can then be exchanged among groups. Another option is to assign four students to rotate around the room delivering each of the four treatments to student groups.
- If you chose to allow students to participate in the optional lesson extension, pre-focus the microscopes to save time.
- If limited sink space is available, place pans or buckets of warm, soapy water and rinse water around the classroom so jars can be sufficiently cleaned for another class. Another option is to consider using disposable containers so that you can easily discard the mixtures after completing the lab.

Suggested Instructional Plan

1. Review scientific vocabulary and knowledge prerequisites:

Heterogeneous Mixtures	**Homogenous Mixtures**
Emulsions	**Immiscible**

2. Consider having your student's research common mixtures (e.g. homogeneous, heterogeneous) that can be eaten prior to beginning the lab investigation.

3. Distribute Materials:

   It is recommended that materials are organized into stations for easier distribution. Materials are recommended based on the amount needed for 1 class of 30 students. Students should be arranged in small groups of 4-5.

   Each group should receive:

   - Student Lab Investigation Worksheets (1 per student)
   - Student Lab Materials

4. If applicable, ask students to read *Fatty Distinction* and complete the focus questions for this lab investigation.

5. Before beginning the lab investigation:

    a. Require students to wash their hands.

    b. Emphasize the importance of practicing good food safety behaviors by not consuming substances used as part of the lab investigation.

    c. In this investigation, students should be allowed to taste their final product as part of the lab investigation.

6. Launch the student lab investigation by asking students to make a prediction about the emulsification abilities of common household ingredients.

7. Show students the provided video lab demonstration, *Food Explorations Lab II: Examining Emulsions*. The video will help students understand the procedures and visual observations.

    a. The ground mustard should serve to emulsify the vinegar and oil. Ground mustard serves as an emulsifier because it contains protein, carbohydrate, and lipid in its seed. The protein and carbohydrate molecules are hydrophilic (water soluble), while the lipid molecules are hydrophobic (fat soluble). This unique combination of molecules enables ground mustard to aid in the creation of a homogenous vinegar and oil mixture. Egg yolks are another common food-based emulsifier.

    b. Honey, paprika, and salt are not emulsifiers. None of these ingredients will prevent the oil and vinegar from separating (heterogeneous mixtures). However, when the students combine the mixtures, the vinaigrette should create a homogeneous mixture due to the presence of the ground mustard.

8. Allow students to work in small groups on the Student Lab Investigation worksheet to further explore the topic and respond to lab questions.

9. (Optional) Launch the lab extension by allowing students time to observe a fat emulsion under the microscope.

10. Follow-up with a class discussion about unsaturated dietary fats (e.g. olive oil) and their health benefits. See *Teacher Bites* for ideas on how to further extend this lesson.

Teacher Bites: Lesson Extension

- Build a 3D model of the cell membrane.

Investigating Your Health:
Fascinating Fats

STUDENT HEALTH INVESTIGATION

Lesson Focus

Explore the fat content of commonly consumed foods

Lesson Description

Students will research a meal at a fast food restaurant and compare the fat content to a healthier meal combination. Students will also identify other common sources of dietary fat and evaluate their own consumption of dietary fats.

Academic Content Standards

ELA Common Core Standards for Literacy in Science and Technical Subjects (R-reading, W-writing, SL-speaking and listening, L-language) Grades 6-8

R-1 Cite specific textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

R-4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical content relevant to grade (6-8) text and topics.

R-10 Read and comprehend science/technical texts in the grades 6-8 text.

W-2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

W-7 Conduct short research projects to answer a question (including a self-generated question) drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

W-9 Draw evidence from informational texts to support analysis, reflection, and research.

Next Generation Science Standards

Performance Expectations

MS-LS1-7 Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

Disciplinary Core Idea

LS1.C Organization for Matter and Energy Flow in Organisms: Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, support growth, or release energy.

Science and Engineering Practices

Analyzing and Interpreting Data: Analyze and interpret data to determine similarities and differences in the findings.

Suggested Instructional Plan

1. Review Scientific Vocabulary and Knowledge Prerequisites:

   Saturated Fat **Unsaturated Fat** **Trans Fat**

2. Students can find Nutrition Facts for most popular fast food restaurants on their websites. If the student is unable to find the Nutrition Facts, they should be directed to USDA's nutrient database (http://ndb.nal.usda.gov/ndb/search/list), or the labels provided.

3. If students choose to use the provided food labels, see the Teacher Edition workbook for answers to the *Investigating Your Health* lab questions. Answers to questions based on other food labels will vary.

4. If completed in-class, allow students to work in small groups on the Investigation worksheet to further explore the topic and respond to questions.

5. Follow-up with a class discussion about student findings related to sources of fat in their diets and student generated ideas for making healthier choices.

Fast Food Nutritional Facts

Cheeseburger

Nutrition Facts

Serving Size	**4 oz**
Calories	**300**
Total Fat	**12g**
Sat. Fat	**6g**
Trans Fat	**0.5g**
Sodium	**680mg**
Total Carbohydrates	**33g**
Dietary Fiber	**2g**
Sugars	**7g**
Protein	**15g**

Vitamin A 6%	Vitamin C 2%
Vitamin E 0%	Calcium 20%
Iron 15%	Thiamin 0%
Niacin 0%	Folate 0%
Vitamin B_{12} 0%	Zinc 0%
Magnesium 0%	

Medium Fries

Nutrition Facts

Serving Size	**4.1 oz**
Calories	**380**
Total Fat	**19g**
Sat. Fat	**2.5g**
Trans Fat	**0g**
Sodium	**270mg**
Total Carbohydrates	**48g**
Dietary Fiber	**5g**
Sugars	**0g**
Protein	**4g**

Vitamin A 0%	Vitamin C 15%
Vitamin E 0%	Calcium 2%
Iron 6%	Thiamin 0%
Niacin 0%	Folate 0%
Vitamin B_{12} 0%	Zinc 0%
Magnesium 0%	

Small Soda

Nutrition Facts

Serving Size	**16 fl oz**
Calories	**110**
Total Fat	**0g**
Sat. Fat	**0g**
Trans Fat	**0g**
Sodium	**30mg**
Total Carbohydrates	**37g**
Dietary Fiber	**0g**
Sugars	**38g**
Protein	**0g**

Vitamin A 0%	Vitamin C 0%
Vitamin E 0%	Calcium 0%
Iron 0%	Thiamin 0%
Niacin 0%	Folate 0%
Vitamin B_{12} 0%	Zinc 0%
Magnesium 0%	

Grilled Chicken Sandwich

Nutrition Facts

Serving Size	**7 oz**
Calories	**350**
Total Fat	**9g**
Sat. Fat	**2g**
Trans Fat	**0g**
Sodium	**820mg**
Total Carbohydrates	**42g**
Dietary Fiber	**3g**
Sugars	**8g**
Protein	**28g**

Vitamin A 4%	Vitamin C 8%
Vitamin E 0%	Calcium 15%
Iron 20%	Thiamin 0%
Niacin 0%	Folate 0%
Vitamin B_{12} 0%	Zinc 0%
Magnesium 0%	

Sliced Apples

Nutrition Facts

Serving Size	**1.2 oz**
Calories	**15**
Total Fat	**0g**
Sat. Fat	**0g**
Trans Fat	**0g**
Sodium	**0mg**
Total Carbohydrates	**4g**
Dietary Fiber	**3g**
Sugars	**20g**
Protein	**3g**

Vitamin A 9%	Vitamin C 16%
Vitamin E 0%	Calcium 2%
Iron 0%	Thiamin 0%
Niacin 0%	Folate 0%
Vitamin B_{12} 0%	Zinc 0%
Magnesium 0%	

Water

Nutrition Facts

Serving Size	**16.9 fl oz**
Calories	**0**
Total Fat	**0g**
Sat. Fat	**0g**
Trans Fat	**0g**
Sodium	**0mg**
Total Carbohydrates	**0g**
Dietary Fiber	**0g**
Sugars	**0g**
Protein	**0g**

Vitamin A 0%	Vitamin C 0%
Vitamin E 0%	Calcium 0%
Iron 0%	Thiamin 0%
Niacin 0%	Folate 0%
Vitamin B_{12} 0%	Zinc 0%
Magnesium 0%	