

SI Chemistry - Full Discipline Demo

Macromolecules of Life - Lipids

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI Chemistry - Full Discipline Demo
Course	SI Chemistry - Full Discipline Demo
Instructor	Sales SI Demo

Test Your Knowledge

Categorize the following as relating to a lipid or an amino acid.

⌘ Classified as essential or nonessential	⌘ Contain a carboxyl and amino group	
⌘ Involved in growth and repair of organisms	⌘ Linolenic acid	⌘ Methionine
⌘ Natural steroids	⌘ Promote brain function	⌘ Provide insulation for organs
Lipid		Amino Acid
1		2

Correct answers:

- 1 Promote brain function Provide insulation for organs Natural steroids
Linolenic acid
- 2 Involved in growth and repair of organisms Methionine
Contain a carboxyl and amino group Classified as essential or nonessential

Match each term with the best description.

⚡ Dehydration	Single unit bound through dehydration reactions	1	
⚡ Linolenic acid	Red-brown colored, fat-soluble stain	2	
⚡ Lipid	Omega-3 fatty acid found in fish, shellfish, seeds, and canola oil	3	
⚡ Monomer	Reaction that connects two molecules and releases a water molecule	4	
⚡ Sudan III	Member of a family of biological compounds that do not dissolve in water	5	

Correct answers:

- 1 Monomer 2 Sudan III 3 Linolenic acid 4 Dehydration
5 Lipid

Categorize each statement as true or false.

True	False
1	2

⚡ Biuret agent detects the presence of lipids.

⚡ Lipids are small inorganic compounds that are oily to the touch.

⚡ Lipids include both saturated and unsaturated fats, cholesterol, and linolenic acid.

⚡ Sudan III detects the presence of lipids.

Correct answers:

1

Lipids include both saturated and unsaturated fats, cholesterol, and linolenic acid.

Sudan III detects the presence of lipids.

2

Biuret agent detects the presence of lipids.

Lipids are small inorganic compounds that are oily to the touch.

Exploration

A ___ reaction releases a water molecule from two monomers creating a bond.

- ☐ hydration
- ☒ dehydration
- ☐ combination
- ☐ carboxylation



Lipids, amino acids, monomers, and carbohydrates are the four classes of macromolecules.

- ☐ True
 - ☒ False
- ✓

Lipids include ____.

- ☐ waxes
 - ☐ fat-soluble vitamins
 - ☐ steroids
 - ☐ triglycerides
 - ☒ All of the above
- ✓

Lipids are ____.

- ☐ composed of nucleic acids
 - ☐ formed from ionic reactions
 - ☒ involved in human body function
 - ☐ All of the above
- ✓

Sudan III indicates the presence of lipids by ____.

- ☒ bleeding across the filter paper
 - ☐ not bleeding across the filter paper
 - ☐ None of the above
- ✓

Exercise 1

Eggs are known to contain cholesterol which is a lipid. Did your experiment results indicate a presence of lipids in the egg white? Think about this result and where cholesterol is present in eggs to explain how your results support or reject the cholesterol content in eggs. How could you test this? Explain the experiment that you would perform to test this.

Eggs are known to contain cholesterol, yet the experiment results for albumen suggest that the egg white (albumen) does not contain lipids. The cholesterol in eggs is found primarily, if not entirely, in the egg yolk and not the egg white. To test this further, one would perform the Sudan III test with egg yolk, to determine if the cholesterol in the egg yolk is able to dissolve the Sudan III, allowing it to bleed outside of the pencil line.

Which of the substances tested positive for lipids? Are you surprised by the results? Explain your answer.

The oil and mayonnaise tested positive for lipids. Student answers will vary, but they should use their results and predictions to explain their answers.

Data Table 1: Lipid Tests with Sudan III
(SAMPLE ANSWER BELOW)

Substance	Lipid Prediction (Yes or No)	Distance Sudan III Traveled Outside of Circle after 1 hr (mm)	Distance Sudan III Traveled Outside of Circle after 24 hrs (mm)	Test Results for Lipids
Distilled Water	Student answers will vary	0	0	Negative
Vegetable Oil	Student answers will vary	6	12	Positive
Beaten Egg White	Student answers will vary	0	0	Negative
Mayonnaise	Student answers will vary	0	3	Positive
Liquid Coffee Creamer	Student answers will vary	0	0	Negative

Competency Review

A macromolecule is ____.

- ☒ a large molecule composed of smaller molecules ✓
 - ☐ similar to a monomer
 - ☐ an organic compound with an amino group and carboxyl group
 - ☐ an essential amino acid
-

Macromolecules include lipids, proteins, carbohydrates, and nucleic acids.

- ☒ True ✓
 - ☐ False
-

Lipids promote brain function.

- ☒ True ✓
 - ☐ False
-

Lipids ____.

- ☐ are monomers
 - ☐ are composed of amino acids
 - ☒ aid reproductive functions ✓
 - ☐ All of the above
-

Sudan III is able to detect certain chemicals due to its ____.

- ☐ ability to break bonds
 - ☒ properties of solubility ✓
-

_____ causes Sudan III to travel the greatest distance across filter paper.

- ☐ Distilled water
- ☒ Oil
- ☐ Beaten egg white
- ☐ Coffee Mate®

✓

Mayonnaise causes Sudan III to bleed across filter paper because mayo _____.

- ☐ contains proteins
- ☐ does not contain proteins
- ☒ contains lipids
- ☐ does not contain lipids

✓

What observation could be expected when testing distilled water for the presence lipids?

- ☐ Sudan III bleeds across the filter paper.
- ☒ Sudan III does not bleed across the filter paper.
- ☐ None of the above

✓

Extension Questions

Jan hears about a new diet plan that she is very excited about as it promises that she will lose weight very quickly. The plan excludes almost all fat from the diet. Based on what you have learned about lipids, what advice would you give to Jan concerning this diet?

(SAMPLE ANSWER BELOW)

This diet is likely to have effects beyond losing weight as the extremely low fat content will probably not provide sufficient essential lipids to be healthy. Lack of essential lipids could disrupt the immune system, brain function, etc.

Chad is looking for a snack that would contain lipids. He went to the market and was debating between a snack of peanut butter, orange juice, celery, or an apple. What snack should Chad purchase to meet his nutritional needs? Explain your answer using your experience with the exercises performed in this experiment. (SAMPLE ANSWER BELOW)

Chad should choose the peanut butter as it contains lipids in the peanut oil. The peanut butter would cause the Sudan III to solubilize.

