

**Organic Chemistry Laboratory II**  
**Experiment 8: Synthesis of Soap: Saponification**

*Worksheet*

Name: \_\_\_\_\_

Lab Section: \_\_\_\_\_

1. Draw the structure of the polyunsaturated triacylglycerol of linoleic acid. Would you expect a fat derived from this triglycerol to have a harder or softer consistency than that derived from a triacylglycerol of stearic acid. Explain your answer. (15 points)
  
  
  
  
  
  
  
  
  
  
2. Complete the table below with data from the emulsion test with your soap, detergent and water. Based on these data, explain which of these is (are) the best emulsifier(s). (15 points)

<b>Agent</b>	<b>Oil Used</b>	<b>Did emulsion form?</b>	<b>How long was the emulsion sustained? (sec, minutes)</b>
De-ionized Water			
Soap			
Detergent			

3. Draw the reaction mechanism of saponification of the triacylglycerol containing stearic, oleic and myristic acid. (15 points)

4. The double bonds of naturally occurring polyunsaturated fatty acids usually have cis stereochemistry. Draw the structure of the polyunsaturated C<sub>20</sub> fatty acid, arachidonic acid with appropriate stereochemistry. (15 points)

5. Fill in the table below with data on emulsifying properties of your soap compared to detergent. Include observations. From these data, explain which of these is the best cleansing agent. (15 points)

<b>Agent</b>	<b>Ion Used</b>	<b>Foaming?</b>	<b>Soap scum?</b>	<b>Scum dissolved with phosphate?</b>
De-ionized Water	1% CaCl <sub>2</sub>			
Soap	1% CaCl <sub>2</sub>			
Detergent	1% CaCl <sub>2</sub>			
De-ionized Water	1% MgCl <sub>2</sub>			
Soap	1% MgCl <sub>2</sub>			
Detergent	1% MgCl <sub>2</sub>			
De-ionized Water	1% FeCl <sub>3</sub>			
Soap	1% FeCl <sub>3</sub>			
Detergent	1% FeCl <sub>3</sub>			