

Name: _____

Date: _____

[2 pt] 1. What characteristic(s) are the same for all lipids?

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1. Lipids are insoluble in water (soluble in nonpolar solvents).
2. Lipids share no common chemical structure.

[5 pt] 2. Define the terms "Hydrophilic" and "Hydrophobic." For each list which functional groups (name or draw pictures) are fall into which category.

(a) Hydrophilic:

Water loving. Molecules that are polar and will dissolve in water due to being able to form DD, HB, or ID interactions. FG's - alcohol, amine, Carboxylic Acid, Amides. Also don't forget size matters, if the nonpolar part is much larger than the polar part the molecule is likely to be hydrophobic/insoluble

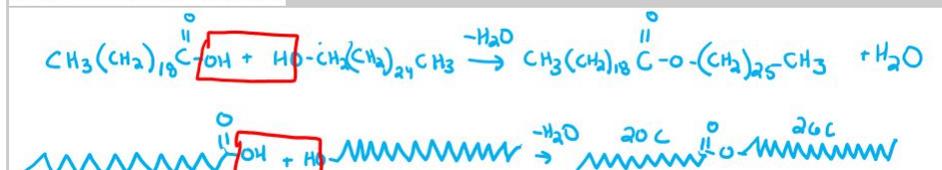
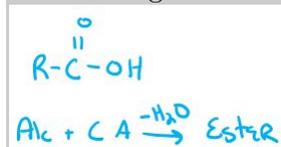
(b) Hydrophobic:

Water fearing. Molecules that are nonpolar and will **NOT** dissolve in water generally due to primarily having LDF. FG's - alkane, alkene, alkyne, aromatic, ether, aldehyde, ketone.

[3 pt] 3. Write a general formula for waxes. Draw the structure of the wax that would be produced when a 26-carbon straight chain alcohol reacts with stearic acid.

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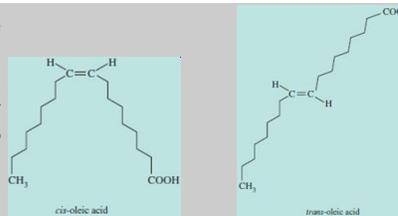
Waxes are giant esters. The formation reaction is one we have seen before $CA + Alc \rightarrow Ester$



[6 pt] 4. Draw an example of a cis and trans fatty acid (label which is which). What chemical/biological property(s) are different for cis and trans fatty acids? Which is recommended as being healthier for you? Explain.

p. 766 Cis - bent, don't stack well or solidify, more common in nature, healthier

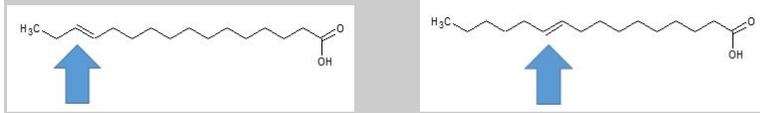
Trans -linear, stack, higher mp, not common in nature, not healthy (humans lack the enzyme to convert the trans isomer to the cis isomer)



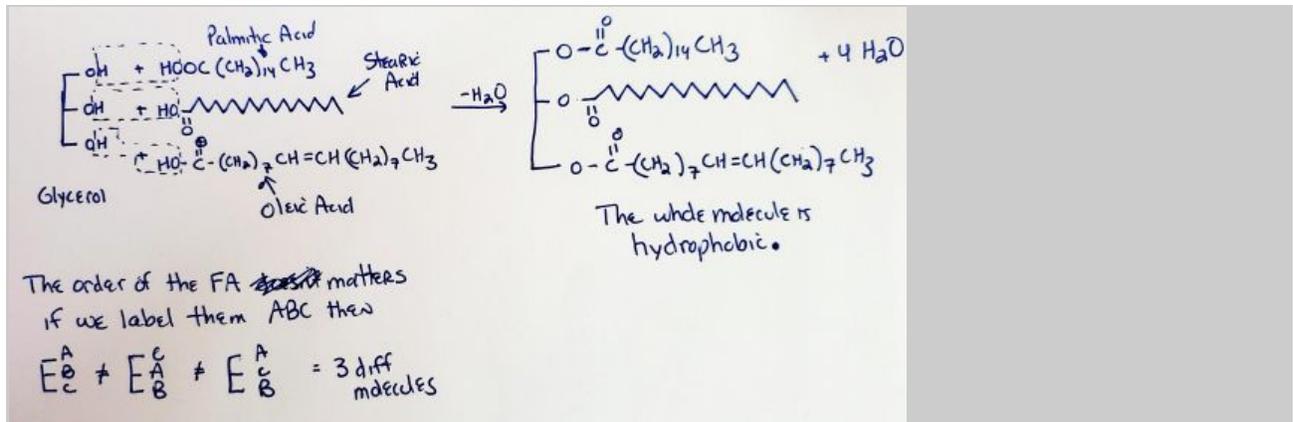
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- [4 pt] 5. Draw an example of an $\omega-3$ and a $\omega-6$ fatty acid (label which is which). What is the main structural difference between the fatty acids? Which is recommended as being healthier for you? Explain.

p. 766 - The location of the C=C in the fatty acid. $\omega-3$ FA are healthier because the $\omega-6$ FA are more potent and cause abnormal responses such as allergic reactions and asthma.



- [5 pt] 6. Draw the formation reaction for a triacylglycerol that contains one unit each of palmitic, stearic, and oleic acids. How many different triacylglycerols could you have drawn? Circle the hydrophobic part of the triacylglycerol.



- [3 pt] 7. Which triacylglycerol would be more hydrophobic, (a) contains three units of lauric acid, or (b) contains three units of stearic acid. Explain.

7. _____

(B) - They are both very hydrophobic, but stearic acid will be more hydrophobic because it has a larger alkane part than lauric acid. Size matters.

- [4 pt] 8. List two reasons why fats contain more biochemical energy than carbohydrates.

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1. They are more reduced (fat oxidation number = +2, carbohydrate = 0).
2. They are more C-H bonds than in carbohydrates. Fats are 70% carbon by mass and Carbohydrates are 40% carbon by mass.

- [3 pt] 9. What is meant by the term "essential" fatty acid.

Fatty acids that humans and other animals must ingest because the body requires them for good health but cannot synthesize them.