Chem 109 C
Bioorganic Compounds

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HFH1104

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Lipids are naturally occurring organic compounds that are not soluble in water, but soluble in non-polar solvents.
<table>
<thead>
<tr>
<th>Number of carbons</th>
<th>Common name</th>
<th>Systematic name</th>
<th>Structure</th>
<th>Melting point (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Saturated</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>lauric acid</td>
<td>dodecanoic acid</td>
<td>COOH</td>
<td>44</td>
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<tr>
<td>14</td>
<td>myristic acid</td>
<td>tetradecanoic acid</td>
<td>COOH</td>
<td>58</td>
</tr>
<tr>
<td>16</td>
<td>palmitic acid</td>
<td>hexadecanoic acid</td>
<td>COOH</td>
<td>63</td>
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<tr>
<td>18</td>
<td>stearic acid</td>
<td>octadecanoic acid</td>
<td>COOH</td>
<td>69</td>
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<tr>
<td>20</td>
<td>arachidic acid</td>
<td>eicosanoic acid</td>
<td>COOH</td>
<td>77</td>
</tr>
<tr>
<td><strong>Unsaturated</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>palmitoleic acid</td>
<td>(9Z)-hexadecenoic acid</td>
<td>COOH</td>
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<tr>
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<td>(9Z)-octadecenoic acid</td>
<td>COOH</td>
<td>13</td>
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<tr>
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<td>-5</td>
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<tr>
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<td>EPA</td>
<td>(5Z,8Z,11Z,14Z,17Z)-eicosapentaenoic acid</td>
<td>COOH</td>
<td>-50</td>
</tr>
</tbody>
</table>
Compounds containing fatty acids

- **Waxes**: (beewax, leaf and feather coatings etc.)

- **Animal and plant triglycerides**: (oils and fats)

- **Phospholipids**: components of cell membranes
Esters of fatty acids and glycerol are triglycerides [components of fats and oils]
Solid triglycerides [fats] have mostly saturated carbon chains.

Liquid triglycerides [oils], higher content of unsaturated carbon chains.

Problem 3. Draw a structure of an optically inactive fat that, when hydrolyzed, gives glycerol, one equivalent of lauric acid, and two equivalents of stearic acid.
Converting oils to fats found in margarine and shortening

**Chapter 25**

- Converting oils to fats found in margarine and shortening

![Chemical structures](image)

- **oil**
- **margarine/shortening**
- **“trans fat”**

\[ \text{H}_2, \text{Pd/C} \]
Sodium or potassium salts of fatty acids are soaps.
- Sodium or potassium salts of fatty acids are soaps
- Soaps form micelles in water, which trap non-polar contaminants
Detergents are [potassium] salts of benzenesulfonic acids
Chapter 25: Phospholipids

- Phospholipids: cell membranes and lipid bilayers

- Enlargement of a phosphoglyceride

- Polar head

- Nonpolar fatty acid chains

- Cholesterol molecule

- A lipid bilayer

- 50 Å
Chapter 25: Phospholipids

- Phospholipids: cell membranes and lipid bilayers

Diagram showing a phosphoglyceride and its components, including polar heads, nonpolar fatty acid chains, and cholesterol molecules within a lipid bilayer.
Chapter 25: Phospholipids

Phosphoglycerides: derived from glycerol

- Phosphatidylethanolamine: $R = \text{CH}_2\text{CH}_2\text{NH}_3^+$
- Phosphatidylcholine: $R = \text{CH}_2\text{CH}_2\text{NMe}_3^+$
- Phosphatidylserine: $R = \text{CO}_2$ \text{NH}_3^+$
Sphingolipids: cell membranes in the brain

sphingosine

both stereocenters have S configuration
Sphingolipids: cell membranes in the brain

- Sphingosine: both stereocenters have S configuration

- Sphingomyelins
  - With phosphoethanolamine
  - With phosphocholine