I. Common Saturated Fatty Acids

<table>
<thead>
<tr>
<th>NO. OF CARBONS</th>
<th>COMMON NAME</th>
<th>GENEVA NAME</th>
<th>STRUCTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Butyric</td>
<td>Tetanoic</td>
<td>CH₃(CH₂)₂COOH</td>
</tr>
<tr>
<td>6</td>
<td>Caproic</td>
<td>Hexanoic</td>
<td>CH₃(CH₂)₄COOH</td>
</tr>
<tr>
<td>8</td>
<td>Caprylic</td>
<td>Octanoic</td>
<td>CH₃(CH₂)₆COOH</td>
</tr>
<tr>
<td>10</td>
<td>Capric</td>
<td>Decanoic</td>
<td>CH₃(CH₂)₈COOH</td>
</tr>
<tr>
<td>12</td>
<td>Lauric</td>
<td>Dodecanoic</td>
<td>CH₃(CH₂)₁₀COOH</td>
</tr>
<tr>
<td>14</td>
<td>Myristic</td>
<td>Tetradecanoic</td>
<td>CH₃(CH₂)₁₂COOH</td>
</tr>
<tr>
<td>16</td>
<td>Palmitic</td>
<td>Hexadecanoic</td>
<td>CH₃(CH₂)₁₄COOH</td>
</tr>
<tr>
<td>18</td>
<td>Stearic</td>
<td>Octadecanoic</td>
<td>CH₃(CH₂)₁₆COOH</td>
</tr>
<tr>
<td>20</td>
<td>Arachidic</td>
<td>Eicosanoic</td>
<td>CH₃(CH₂)₁₈COOH</td>
</tr>
</tbody>
</table>

(You will need to know the common names for fatty acids.)

II. Common Dietary Unsaturated Fatty Acids

One Double Bond - monounsaturated

16C  Palmitoleic acid  cis-9-Hexadecenoic
     CH₃(CH₂)₅CH=CH(CH₂)₇COOH

18C  Oleic acid      cis-9-Octadecenoic
     CH₃(CH₂)₇CH=CH(CH₂)₇COOH

Two cis-Double Bonds - polyunsaturated

18C  Linoleic acid   cis-9,12-Octadecadienoic
     CH₃(CH₂)₄CH=CH-CH₂-CH=CH(CH₂)₇COOH

Two Conjugated Double Bonds

18C  Conjugated linoleic acid  cis-9,trans-11-Octadecadienoic
     CH₃(CH₂)₄CH₂-CH=CH-CH=CH(CH₂)₇COOH

Three Double Bonds

18C  α-Linolenic acid  cis-9,12,15-Octadecatrienoic
     CH₃CH₂-CH=CH-CH₂-CH=CH-CH₂-CH=CH(CH₂)₇COOH
Some important structures

\[
\text{CH}_3-\text{CH}-(\text{CH}_2)_n-\text{CH}_2-\text{COOH}
\]

Fatty acid (general)

COOH  Palmitic acid (C 16:0)

COOH  Stearic acid (C 18:0)

COOH  Oleic acid (C 18:1)

COOH  Arachidonic acid (C 20:4)
trans-10, cis-12 conjugated linoleic acid (A), cis-9, trans-11 conjugated linoleic acid (B), and cis-9, cis-12 linoleic acid (C).

III. Melting points
   A. Increased chain length
      1. Acetic acid (smallest fatty acid) is anomalous because of polarity.
      2. With increased chain length (> 3 carbons), melting point increases.

   B. Increased double bonds
      1. As cis-double bonds increase, melting point decreases.
      2. trans-double bonds do not cause a kink in the molecule, so have less effect on melting point.
C. Fatty Acid Crystals

1. Crystals of oleic acid (at right) have a highly ordered structure.
2. The cis double bonds are tilted in opposite directions to the plane of the molecules.
3. This configuration provides maximum van der Waals forces.