Chapter 2: **Comparing Fatty Acids**

**Goal**
Analyze data to understand properties of fatty acids.

**Build Connections**

*To stay healthy, you need some fat in your diet, but not too much. Fat is a good source of energy, acts as a shock absorber for your organs, and helps your body retain heat. Many parts of your body, such as your brain, are rich in fat.*

*The type of fat you eat is as important as the amount of fat you eat. Fish, nuts, vegetable oils, and seeds tend to be high in unsaturated fats. A molecule of unsaturated fat has at least some double bonds between its carbon atoms. Animal products, such as butter, tend to be higher in saturated fats. A molecule of saturated fat has only single bonds between its carbon atoms.*

*Fats are formed from glycerol and fatty acids. The table compares some properties of fatty acids with 18 carbon atoms. Use the table to explore those properties.*

<table>
<thead>
<tr>
<th>Fatty Acid</th>
<th>Number of Carbons</th>
<th>Number of Double Bonds</th>
<th>Melting Point (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stearic acid</td>
<td>18</td>
<td>0</td>
<td>69.6</td>
</tr>
<tr>
<td>Oleic acid</td>
<td>18</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Linoleic acid</td>
<td>18</td>
<td>2</td>
<td>–5</td>
</tr>
<tr>
<td>Linolenic acid</td>
<td>18</td>
<td>3</td>
<td>–11</td>
</tr>
</tbody>
</table>

**Analyze and Conclude**

1. **Read Tables** What properties of fatty acids does the table provide data on?

2. **Interpret Tables** Which property was used to organize the list of fatty acids? Explain.

3. **Classify** One of the fatty acids is saturated. Which one is it? How do you know?
4. **Relate Cause and Effect** A melting point is the temperature at which a substance changes from a solid to a liquid. As the number of carbon-carbon double bonds increases, what happens to the melting point of the fatty acids?

5. **Analyze Data** The oils and fats that people cook with usually have a combination of fatty acids. Human body temperature is about 37°C. Fatty acids with a melting point higher than 37°C are less healthy than other fatty acids for most people. Which of the four fatty acids have a melting point lower than 37°C?

6. **Apply Concepts** Safflower oil is about 78 percent linoleic acid. Butter fat melts at 35°C (95°F). Shortening is 100 percent saturated fat. For health reasons, which of these items should you avoid when possible? Explain your reasoning.

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**Build Science Skills**

Suppose you get a job as a cook at a science research base in Antarctica. It’s −9°C outside, and you’re bored. You want to show a fellow kitchen worker the difference between the linoleic acid in safflower oil and the linolenic acid in fish oil. **Design a simple experiment that will show how their properties differ. What are your variables, what would your design be, etc.**