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.

Effect of Carbon Bonds on Melting Point			
Fatty Acid	Number of Carbons	Number of Double Bonds	Melting Point (℃)
Stearic acid	18	0	69.6
Oleic acid	18	1	14
Linoleic acid	18	2	-5
Linolenic acid	18	3	-11

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.

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.*

