**Macromolecules for Energy in Cell**

**Introduction**

Carbohydrates, lipids, and proteins can all serve as energy sources for cells. However, each provides different amounts of energy and in a different way.

Carbohydrates and proteins yield four grams of usable energy per gram. Lipids are more complex and provide more energy than carbohydrates or proteins: nine calories per gram. Proteins are broken down much more slowly than carbohydrates. This makes proteins a longer-lasting source of energy. Organisms often convert carbohydrates and proteins that are not needed for energy into lipids. Fat cells store energy in these lipids.

Fats, Oils, and waxes are types of lipids. Most lipids in animals are fats. Lipids in plants are usually oils. Waxes are made up of long-chain fatty acids attached to an alcohol. Lipids have two main functions: Long-term energy storage, and insulating and waterproofing an organism.

In this activity, you will burn a marshmallow and a peanut to observe the differences in the energy released by carbohydrates, lipids, and proteins in a cell.

**Materials**

Candle Marshmallow

Unsalted peanut Dissection probe

Timer

**Procedure**

1. Skewer the marshmallow onto the end of the dissection probe.
2. Hold the marshmallow in the flame. Time how many seconds it takes to burn the entire marshmallow to a black, charred crisp. Repeat this three times and record your results in the data table.
3. Repeat with the peanut. Be careful not to let dripping fat from the peanut put out the flame. If the flame is put out, stop the timer, relight the candle, and then continue timing. Repeat three times and record your results in the data table.

**Results**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Food** | **Macromolecule** | **Trial 1 time** | **Trial 2 time** | **Trial 3 time** |
| Marshmallow |  |  |  |  |
| Peanut |  |  |  |  |

**Analysis**

1. Which food burned faster? What does that tell you about the energy released for the macromolecule in this food? Explain.
2. Which food burned slowly? What does that tell you about the energy released from the macromolecule in this food? Explain.
3. Based on your results, which type of macromolecule is best for “quick” energy? Explain.
4. What does the amount of time it takes to burn mean about the amount of energy released and how it is released in a cell? Explain.