

Student Guide: Greasy Spots

Lipids include fatty acids, triglycerides and cholesterol. In the body, lipids provide insulation for the skin and certain organs, act as energy reserves and are used by the body to make more lipids. We often think of lipids, or typically the triglycerides, when we are talking about food composition as it relates to our diet.

As food labels show, fats can be fully saturated or unsaturated to some degree — monounsaturated or polyunsaturated. In the United States, you will also see that the amount of trans unsaturated fat in a food is required to be listed on the label (the rest of the unsaturated fat is in the cis conformation). The suggested dietary intake of each fat type varies, because of their unique chemical structures and thus different interactions with your body.

In this experiment, you will use three different types of assays to test a variety of foods for the presence of lipids, or fats. Once the assays are complete, you should explore the types of fats that foods contain and determine, based on their health effects, how frequently you think you should eat them.

Procedure:

1. Your teacher will provide different types of foods to analyze, or will give you instructions for bringing in your own food.
2. Wear gloves and goggles during the experiment.
3. Follow instructions from your teacher to prepare your food. For solid foods, grind, mince or smash the food so you will be able to put it in a test tube and then weigh out 2 grams of the food on a balance (use special weigh paper, foil or a plastic “boat” between the food and the balance, and make sure to tare, or zero out, the balance before adding the food). Put 2 grams of that food into a test tube and label the tube. For liquid foods, add 2 ml of the food to a test tube and label the tube. According to your teacher’s specific instructions, feel free to microwave foods to melt them or extract liquid from them. However, be careful to not burn your food in the microwave.
6. Next, test the fat’s solubility in alcohol by adding 2 ml of alcohol to each food-containing test tube. Cap the tube firmly, point it away from any faces including your own, and shake the tube vigorously for 30 seconds. Then let the tube sit for 60 seconds.

7. Gently pour 2 ml of water into each food-containing test tube. **DO NOT SHAKE, RATTLE OR ROLL!**
Let the tube sit for two or three minutes.
8. Use the data table provided to record observations and data when you perform the following assays:

Assay 1. If the food contained lipids, they should form a cloudy whitish layer at or near the top of the liquid in the test tube. The more lipids there are, the thicker that layer should be. If you look closely, you may even see tiny globules of fat in the layer. If you do not see a cloudy layer, there probably was not much or any fat in the food.

Assay 2. Gently dip a clean Q-tip into the upper part of the liquid in the test tube, then rub it on paper. Write next to the spot what the food was. Let the spot dry for a while. According to your teacher's instructions, you may use a hair dryer to speed up the drying process. Fat-containing foods should dry to leave a greasy, translucent spot, just like fast food does to paper bags. Foods without fat should dry to look like normal paper, albeit possibly slightly stained or distorted.

Assay 3. **DO THIS ONLY AFTER YOU HAVE ALREADY FINISHED THE FIRST TWO ASSAYS FOR ALL TUBES.** Add two or three drops of red Sudan III stain to each tube. The stain is nonpolar and should dissolve in the lipid layer, if there is one. Observe the test tube and note where the Sudan stain goes.

Data Table for Assay Observations:

	Type of Food	Assay 1 Observations	Assay 2 Observations	Assay 3 Observations
Tube A				
Tube B				
Tube C				
Tube D				
Tube E				
Tube F				
Tube G				
Tube H				
Tube I				
Tube J				

