

Fat Chance

There has been considerable concern lately about the amount of fat in the foods that we eat. Manufacturers are now required to provide fat content information on food packaging. A simple way for you to determine if any fat is present in the foods you eat is shown by the following activity.

Materials

- brown paper bag
- pencil
- toothpicks or forks
- bright light
- needle or pin
- several of the following:
 - milk
 - butter
 - peanut butter
 - vegetable oil
 - potato chips
 - buttered popcorn
- at least 2 of the following:
 - water
 - orange juice
 - unbuttered popcorn
- 1 of the following:
 - vitamin E liquid gels
 - vitamin A liquid gels
 - vitamin K liquid gels
 - vitamin D liquid gels
- 1 of the following:
 - vitamin C tablet (crushed and dissolved in 1/4 cup of water)
 - vitamin B tablet (crushed and dissolved in 1/4 cup of water)
- (optional) stove, hot plate, or microwave
- (optional) heat-safe container
- (optional) envelope

Exploration

Step 1 Cut a 12-inch x 12-inch piece out of the brown paper bag. With a pencil, divide the piece of brown paper into the same number of sections as the number of foods you are testing. Label each section with the name of one of the foods. Predict whether or not each food contains a fat or fat-like substance. Hold the piece of brown paper up to a bright light (writing side away from you). Record what you observe. What general science term describes this attribute of the paper with regard to light?

- Step 2 Smear a small amount of each food on its labeled section of the brown paper and allow it to sit for approximately 1/2 hour. If the food is a liquid, use several drops from a toothpick or fork. If the food is a soft solid (such as butter or peanut butter), soften it further or melt it by heating on a stove, hot plate, or in a microwave. Crush the hard snacks (such as potato chips or popcorn) before smearing. Puncture the vitamin liquid gel with a needle or pin and smear a small amount of the liquid. After 1/2 hour remove the solid foods from the paper. Hold the piece of paper up to the bright light and look at each section. What do you observe where the food was smeared on the paper? What general science term describes this attribute of those places on the paper with regard to light?
- Step 3 After the paper has thoroughly dried, hold it up to the light and record what you see at each section. What differences, if any, are there from Step 2 and what is their significance?
- Step 4 Is this test really an indication of whether or not a food is “bad” for you? Explain.
- Step 5 Use a variation of this activity to perform a magic trick to impress your friends. Have someone write a number with a pencil on the inside of an envelope flap and then seal the envelope. Tell them that you can determine the number without opening the envelope. How can you do it using what you have learned in this activity?

Challenge

How well can you predict the presence of fat in common foods?

Fat Chance

Concepts

fat, translucence

Expected Student Responses to Exploration

- Step 1 (a) Student should have a prediction for each food about whether or not it contains fat.
 (b) None of the writing is visible through the brown paper.
 (c) The paper is opaque.

- Step 2 (a) At each place where a food was placed, light shines through, but not clearly.
 (b) The regions of paper are said to be translucent (partly transparent).

Step 3 (a) Food	Observation
milk	translucent
butter	translucent
peanut butter	translucent
vegetable oil	translucent
buttered popcorn	translucent
water	opaque
orange juice	opaque
unbuttered popcorn	opaque
vitamin E	translucent
vitamin A	translucent
vitamin K	translucent
vitamin D	translucent
vitamin C	opaque
vitamin B	opaque

- (b) The paper is translucent only for some of the foods. Fat is present only in those foods for which the paper remains translucent after a period of time.

Step 4 Although this test indicates whether or not fat is in a food, it does not indicate the amount of fat present. Some dietary fat is necessary for good health.

Step 5 One of the fat-containing foods can be placed on the envelope to make it translucent and the number visible through the envelope.

Expected Student Answer to Challenge

Students should compare predictions and results.

Reference

“Seeing Through Paper”; *Fun with Chemistry: A Guidebook of K–12 Activities*; Sarquis, M., Sarquis, J., Eds.; Institute for Chemical Education: Madison, WI, 1993; Vol. 2, pp. 195–200.

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