

DETERMINATION OF FAT IN POTATO CHIPS

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Recently, there has been a lot discussion of calories and fats in our foods in the news media. Most food labels list recommended serving sizes, sometimes with unrealistic quantities, of the food product and then lists the nutritional information based on that serving, assuming a 2,000 calorie per day diet. Nutritional information usually includes calories, total fat, saturated fat, cholesterol, sodium, total carbohydrate (with separate listing of dietary fiber and sugars), and protein. The label information may also include vitamins and minerals.

Nutritionists recommend that no more than 30% of our daily 2000 calories come from fat. However, in our snack food and fast food world, we often eat a diet that contains a larger percentage of fat. So, the question arises, how much fat is in a snack bag of a food such as potato chips, or a standard serving of French fries?

In this experiment, you will determine the fat content of several different brands of potato chips. (Note: This procedure can also be used for determination of the fat in French fries.)

Safety Precautions

Wear safety goggles at all times in the laboratory.

Hexane is flammable. Keep it away from flames or devices that may spark.

Disposal

Dispose of all waste material in the proper waste containers.

Materials Needed

Potato chips. An assortment of brands, including regular, low fat, baked, potato crisps (Pringles, Stax), corn chips, and tortilla chips.

Hexane, C_6H_{14}

Graduated cylinder, 10 mL

Erlenmeyer flask, 250 mL

Beaker, 600 mL

Small plastic bag, quart size

Hot plate

Ring stand

Utility clamp

Procedure

Obtain between 5 and 10 g of potato chips. Place them in a small plastic bag and crush them.

Determine the mass of a clean, dry 250 mL Erlenmeyer flask.

Add 5 g of crushed potato chips to the flask and determine the mass of the flask and crushed chips.

Measure 10 mL of hexane and add it to the flask containing the crushed chips.

Mix the hexane with the crushed chips by gently swirling the flask for about 1 minute.

Carefully, pour off the hexane into a waste container, without pouring any pieces of the crushed chips. A small amount of hexane will remain in the flask.

Measure 5 mL of hexane and add it to the flask containing the crushed chips.

Mix the hexane with the crushed chips by gently swirling the flask for about 1 minute.

Carefully, pour off the hexane into a waste container, without pouring any pieces of the crushed chips. A small amount of hexane will remain in the flask.

Measure another 5 mL of hexane and add it to the flask containing the crushed chips.

Mix the hexane with the crushed chips by gently swirling the flask for about 1 minute.

Carefully, pour off the hexane into a waste container, without pouring any pieces of the crushed chips. A small amount of hexane will remain in the flask.

Set up a water bath under a hood using a 600 mL beaker on a hot plate. Heat the water to boiling.

Using a ring stand and utility clamp to hold the flask, heat the flask, with the crushed chips, in the hot water bath for about 5 minutes to evaporate any residual hexane.

Remove the flask from the water bath, allow it to cool and wipe any drops of water from its outer surface.

Determine the mass of the flask and the rinsed crushed chips.

Calculate the amount of fat in your sample of chips.

Share your results with your class.

Optional: You may repeat the procedure with another brand of chips or French fries.

Questions

1. How much fat is in one recommended serving of the chips you tested.
2. How do your results compare with the fat content as listed on the label of the chips?
3. What sources of error may have occurred in this experiment. (Do not include calculation error.)
4. Why is hexane used to extract the fat from the chips? Why was water not used?
5. Why was the hexane added in three separate portions and not in one portion?

6. How does the fat content compare between the different kinds of chips tested?