

DETERMINATION OF FAT IN POTATO CHIPS and FRENCH FRIED POTATOES

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Recently, there has been a lot of 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 list 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 and/or French fried potatoes.

Safety Precautions

Wear safety goggles at all times in the laboratory.

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

Heating of hexane soaked potato chips and French fried potatoes must be carried out using a water bath on a hot plate in a fume hood.

Disposal

Dispose of all waste material in the proper waste containers.

Materials Needed

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

French fries from local restaurants and fast food restaurants

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

Determination of Fat in Potato Chips

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.

Repeat the heating of the flask with the crushed chips for an additional 5 minutes. Allow the flask to cool and determine the mass of the flask and crushed chips.

If there is more than 0.1 g change in mass, heat the flask and chips for a third 5 minute time period.

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.

Determination of Fat in French Fried Potatoes

Obtain about 10 to 15 g of French fried potatoes. Break them into small pieces.

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

Add 10 g of French fry pieces to the flask and determine the mass of the flask and potato pieces.

Measure 10 mL of hexane and add it to the flask containing the potato pieces.

Mix the hexane with the potato pieces by gently swirling the flask for about 1 minute.

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

Measure 10 mL of hexane and add it to the flask containing the potato pieces.

Mix the hexane with the potato pieces by gently swirling the flask for about 1 minute.

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

Measure another 5 mL of hexane and add it to the flask containing the potato pieces. (This is your 3rd rinse.)

Mix the hexane with the potato pieces by gently swirling the flask for about 1 minute.

Carefully, pour off the hexane into a waste container, without pouring any pieces of the potato.

Measure an additional 5 mL of hexane and rinse the potato pieces for another minute. (This is your 4th rinse.)

Carefully, pour off the hexane into a waste container, without pouring any pieces of the potato. 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 potato pieces, 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 potato pieces.

Repeat the heating of the flask with the crushed chips for an additional 5 minutes. Allow the flask to cool and determine the mass of the flask and potato pieces.

If there is more than 0.1 g change in mass, heat the flask and potato pieces for a third 5 minute time period.

Calculate the amount of fat in your sample of French fried potatoes .

Share your results with your class.

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

Questions

1. How much fat is in one recommended serving of the chips or French fries you tested.
2. How do your results compare with the fat content as listed on the label of the chips or on an Internet posting for the French fried potatoes? (Note: If there is no posting of the brand of French fries, use a fast food restaurant such as McDonalds for comparison.)
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 or French fries tested?