NUTRITION: Fat Content of Foods

Fat Content of Meat Products

Procedure

1. Assemble the chemicals and equipment you will need for this experiment:

   **Equipment**
   - Hot plate
   - 2 test tubes (15 x 125 mm)
   - 2 beakers (250 mL)
   - 2 small vials or other containers
   - 2 glass Pasteur pipettes (7 inch)
   - Pipette bulb
   - Thermometer

   **Chemicals**
   - 4 grams of ground or finely chopped meat
   - 10 mL of protein liquifying reagent

2. Put approximately 75 mL of water in the 250 mL beaker. Place the beaker on a hot plate and heat the water to between 80°C and 90°C.

3. While the water is heating, clean two 15 x 125 mm test tubes and label them sample 1A and sample 2A. Put the labels near the top of each test tube. Weigh each test tube to the nearest 0.01 gram, and record the weights.

4. Put between 2 and 2.5 grams of ground hot dog meat in each test tube and determine the weight of each hot dog sample to the nearest 0.01 gram.

SAFETY NOTE: Check to be sure there are no open flames near where you are working. The protein liquifying reagent is caustic and contains a flammable alcohol (isopropyl alcohol). The vapors from the liquifying reagent are also flammable. Use a hot plate, DO NOT use an open flame for this experiment.

5. Add about 5mL of the protein liquifying reagent to each meat sample.

6. Put the test tubes containing the meat in the beaker of water and heat the beaker until the reagent in each test tube starts to boil. The reagent boils when the temperature inside the test tube reaches about 80°C. Maintain the temperature of the water so that the contents of the test tubes boil for 10 minutes. Do NOT leave the beaker and test tubes unattended; the contents could boil out of the test tube.

7. After the mixture has boiled for 10 minutes, it should be dark brown with some yellow fat floating at the top. Remove the test tubes from the hot water, stand them in a 250mL beaker, and let them stand until they are cool enough to handle. They should not be cold.

8. Label two small containers (vials, beakers, watch glasses, test tubes) sample 1B and sample 2B. Weigh the two containers and record the weights to the nearest 0.01 gram.

9. Put the two cool test tubes containing the fat mixture in opposing arms of a centrifuge. Centrifuge the mixtures to completely separate the fat from the rest of the solution.

10. Use a Pasteur pipette to transfer the top fat layer from one test tube, to one of the pre-weighed containers. Repeat the procedure for the second sample. Make sure that the sample 1A goes into the test tube labeled 1B and the sample labeled 2A goes into the test tube labeled 2B.

11. Take care to remove all of the fat, and none of the brown liquid. Work slowly; careful work is required to separate the fat from the brown liquid. If you accidentally draw some brown liquid into the pipette, allow the layers to separate in the pipette, and drain the brown liquid back into its original container. If you have brown liquid in your container of fat, you can then remove it with the pipette.

12. Weigh the containers of fat to the nearest 0.01 gram. Record the weights in the data table.

13. Determine the weight of fat in each sample.
14. Compare the weight of fat to the total weight of the sample, and express it as a percentage.

15. The remaining brown liquid can be washed down the drain with plenty of water.

**Fat Content of Chips and Snack foods**

**Procedure**

1. Assemble the chemicals and equipment you will need for this experiment:

   **Equipment**
   - Hot plate
   - 2 test tubes (medium size)
   - 2 beakers or flasks (50 or 100 mL)
   - 2 small vials or other containers
   - Filter paper

   **Chemicals**
   - 4 grams of ground or finely chopped chips or crackers
   - 20 mL of petroleum ether

2. Label two medium sized test tubes or small flasks, sample 1A and sample 2A. Weigh each to the nearest 0.01 gram.

3. Put about two grams of ground chips into each container.

4. Determine the weight of the ground material to the nearest 0.01 gram.

   **SAFETY NOTE:** Petroleum ether is very flammable. Check your area to be sure that no flames are present.

5. Add about 4 mL of petroleum ether (pet. ether) to each test tube. Stopper each with a cork and mix well.

6. Label two small beakers sample 1b and sample 2b. Weigh each beaker to the nearest 0.01 gram.

7. In the fume hood, use a funnel and filter paper to filter off the potato chip residue from each sample. Catch the petroleum ether from sample 1A in beaker 1A; catch the petroleum ether from sample 2A in beaker 2B.

8. Rinse the solid residue with a few milliliters of petroleum ether, again catching the pet. ether in the pre-weighed beaker.

9. Leave the containers uncovered in your hood. The petroleum ether will evaporate overnight, leaving the fat residue.

10. After the pet. ether has evaporated, weigh the containers to the nearest 0.01 gram and record the weights in the data table.

11. Determine the weight of the fat residue in each sample of potato chips or snack crackers.

12. Compare the weight of fat with the weight of the original sample, and express it as a percentage. Record this information in the data table.
## DETERMINATION OF FAT CONTENT OF FOODS

**NAME** _____________________________________________________________ **DATE** __________

**SECTION** ___________________ **PARTNER** __________________________________________

### DATA TABLES

#### Percent Fat in Meat

<table>
<thead>
<tr>
<th></th>
<th>Sample 1</th>
<th>Sample 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of test tube + hot dog</td>
<td></td>
<td></td>
</tr>
<tr>
<td>weight of empty test tube</td>
<td></td>
<td></td>
</tr>
<tr>
<td>weight of hot dog</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Container + fat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empty container</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight of fat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of fat in hot dog</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Percent Fat in Snack Chips/Crackers

<table>
<thead>
<tr>
<th></th>
<th>Sample 1</th>
<th>Sample 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of test tube + chips</td>
<td></td>
<td></td>
</tr>
<tr>
<td>weight of empty test tube</td>
<td></td>
<td></td>
</tr>
<tr>
<td>weight of chips</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Container + fat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empty container</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight of fat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of fat in chips</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
QUESTIONS FOR DISCUSSION
1. Using your two determinations for fat content of a meat sample, and two determinations of fat content of a snack chip sample, come up with an average percent of fat in each type of food. (an average for meat, and a separate average for snack chips)

2. Using the average percentage of fat in your meat sample, determine the weight of fat you would expect to find in a 50.0 gram sample of meat.

3. If hotdogs sell for $2.59 per pound, what is the cost per pound of protein in a hot dog? A 45 gram hot dog typically has 27 grams of water, 11 grams of fat and 7 grams of protein. (Remember: 1 kg = 2.2 pounds; 1000 g = 2.2 pounds)

4. Examine the labels of several hot dog brands on your next visit to the grocery store. Which brands did you examine? Can you think of any new regulations that you would like to see for hot dogs, perhaps for labelling, or allowable contents?

5. In what types of foods and products do we typically find high percentages of fats? The fat substitute Olestra has been approved by the FDA for use in some snack foods, in spite of controversy over reports of bowel problems, ranging from mild discomfort to severe (bloody stools). Tests required for FDA approval of this product revealed that these possible side effects were not experienced by all of the people who volunteered to test this product, but were experienced by a statistically significant number of volunteers. This means that enough people had problems to establish that the problems were most likely due to the Olestra. Fat substitutes such as Olestra are promoted as a health and dieting breakthrough, since they impart desirable flavor and texture to foods (as do the fats found in foods) but the fat substitutes are not absorbed or digested by our bodies. Would you purchase (or have you purchased already) a product containing Olestra? Why or why not?