



FATS AND PROTEINS RESEARCH FOUNDATION, INC.

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THE DIRECTOR'S DIGEST
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REMOVAL OF POLYETHYLENE AND OTHER POLYMERIC MATERIALS FROM RENDERED ANIMAL FAT

Rendered animal fats frequently contain small amounts of polyethylene and other polymeric materials that were unavoidably present in the raw material prior to rendering. These polymeric materials create operational problems in the fat-splitting process and in other processes that use rendered animal fat as the starting material.

These polymeric materials are not readily separated from tallow by the filtration and refining techniques commonly used for inedible tallow. Consequently, Dr. L. R. Dugan and his associates at Michigan State University, with grant support from FPRF, developed a number of systems that were found to remove polymeric materials (primarily polyethylene) from tallow. Based on this research, directions for using four systems of polyethylene removal are presented below.

Methods for Removing Polyethylene from Tallow

1. Treatment with Aluminum Hydroxide Gel
Adjust the temperature of the tallow to 140°-160°F. With constant stirring add 0.1% aluminum sulfate in a saturated water solution (0.1 pound of aluminum sulfate per 100 pounds of tallow). With continued stirring add 0.03% sodium hydroxide in a saturated solution (0.03 pound of sodium hydroxide per 100 pounds of tallow). Stir until the material is uniformly dispersed in the tallow and filter. To assure proper pre-coating of the filter with aluminum hydroxide, the first portions of the filtered tallow should be returned to the unfiltered tallow storage tank.

2. Treatment with Sodium Hydroxide

Adjust the temperature of the tallow to 150°F. With constant stirring add 0.03% sodium hydroxide in a saturated water solution (0.03 pounds of sodium hydroxide per 100 pounds of tallow). Stir until the sodium hydroxide is uniformly dispersed in the tallow and filter. To assure proper pre-coating of the filter with soap, the first portions of the filtered tallow should be returned to the unfiltered tallow storage tank.

3. Treatment with TONSIL (L. A. Solomon and Bros.)

ACTIVATED BLEACHING EARTH (Bennett-Clark Co.) or Other Similar Bleaching Earth

Adjust the temperature of the tallow to 165°-190°F. Add 2% TONSIL, ABE, or other similar bleaching earth. Stir for 10-20 minutes and filter. To assure proper pre-coating of the filter with bleaching earth, the first portions of the filtered tallow should be returned to the unfiltered tallow storage tank.

4. Combined Treatment with Activated Carbon and Filtration

The addition of 0.1% activated carbon to melted tallow followed by filtration effectively removes polyethylene, but carbon particles pass through filters that give satisfactory flow rates. Consequently the following procedure is recommended. Adjust the temperature of the tallow to 165°F. Filter through a three stage press filter consisting of a pre-filter, a Carbac Extra filter (a "carbon impregnated" asbestos filter described by the Cellulo Company) and a post-filter. CW-50 filters with a "sandwiched" ED-50 filter (all from the Cellulo Company) were found effective in the laboratory. Filtration rates with a commercial filter press are not known. Suitable plain and carbon impregnated filters may also be available from other companies.

These systems have not been thoroughly evaluated commercially. The types of filters that may be used, flow rates and costs are not known. In one commercial trial, using a bleaching earth according to the directions given above, a Niagara filter with 33 stainless steel screens with a mesh of 100x24 per inch was used. Approximately 90% of the polyethylene was removed at a cost of approximately ten cents per 100 pounds of tallow. In all systems temperature control and proper pre-coating of the filter used are critical.

If your company is having a problem with excessive amounts of polyethylene in rendered animal fat we hope that you will test one or more of the removal procedures outlined above. Please report the results of any tests you make to the Foundation office. This will help us to evaluate the commercial feasibility of the procedures and ultimately result in the solution of a very critical industry problem.

Method for the Analytical Determination
of Polyethylene in Tallow

There is no official, standardized method for the determination of polyethylene in tallow. The following method is a modification of the procedure developed by Emery Industries and has been found to yield satisfactory results by the researchers at Michigan State University. It may be recommended to laboratories who request it.

1. Weigh 100 g tallow sample into a 400 ml beaker and heat to 50-60C.
2. Dilute the tallow with an equal amount of hexane, stir, and filter through a Whatman No. 5 filter paper (dia. 5.5 cm) on a Buchner funnel with moderate suction.
3. Rinse the paper with 10-20 ml hexane and let it dry in air.
4. Weigh after drying in a warm cabinet.
5. Cut this paper into pieces and re-extract by boiling with 50-100 ml benzene, depending on the polymer present.
6. Filter the hot benzene solution through a Whatman No. 4 paper with strong suction and rinse with hot benzene twice.
7. Concentrate the filtrate to 25 ml in a 250 ml beaker and add an equal amount of absolute methanol for precipitation of PE.
8. Collect the PE by centrifugation at 2000 rpm for 10 minutes.
9. Wash the precipitate with a small amount of 1:1 mixture of methanol and benzene, recentrifuge.

10. Transfer the precipitate into a tared aluminum weighing dish with the aid of hexane and obtain the dry weight of the precipitate.

Note: Step 4. can be omitted if the total weight retained by the first filter paper is not needed.

PROTEIN OF HIGH NUTRITIONAL QUALITY
FROM MEAT AND BONE MEAL

The enclosed reprint reports the results of research, sponsored by FPRF, to separate a high quality protein fraction from meat and bone meal. As indicated in the reprint, this type of low ash, low fat, bland product can be obtained. The economics of the process are currently being investigated.

SEASON'S GREETINGS

We wish to extend to you our heartiest Season's Greetings and very best wishes for your happiness and prosperity in the coming year.