

*Director's  
Digest*

WERNER R. BOEHME  
Technical Director

2720 DES PLAINES AVENUE  
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### Removal of Polyethylene from Tallow in the Rendering Plant

In recent months a survey was conducted among rendering plants utilizing bleaching to reduce the polyethylene content of tallow. This survey was undertaken to obtain a consensus of satisfactory processing techniques in daily use. The subject of polyethylene removal has been discussed before in The Director's Digest (No. 90, December 22, 1971; No. 100, October 18, 1972; No. 110, August 31, 1973) and this report will serve to amplify and update the earlier studies. Alternate methods of polyethylene removal such as treatment with aluminum hydroxide gel, caustic or activated carbon, while effective in the laboratory, do not appear to have been evaluated widely on a plant scale.

This report outlines a proforma procedure that should be applicable in most rendering plants to remove the major portion of the polyethylene present. The amount removed is dependent upon a number of factors including temperature, percentage and nature of the bleaching earth, as well as the amount of other impurities and moisture in the tallow.

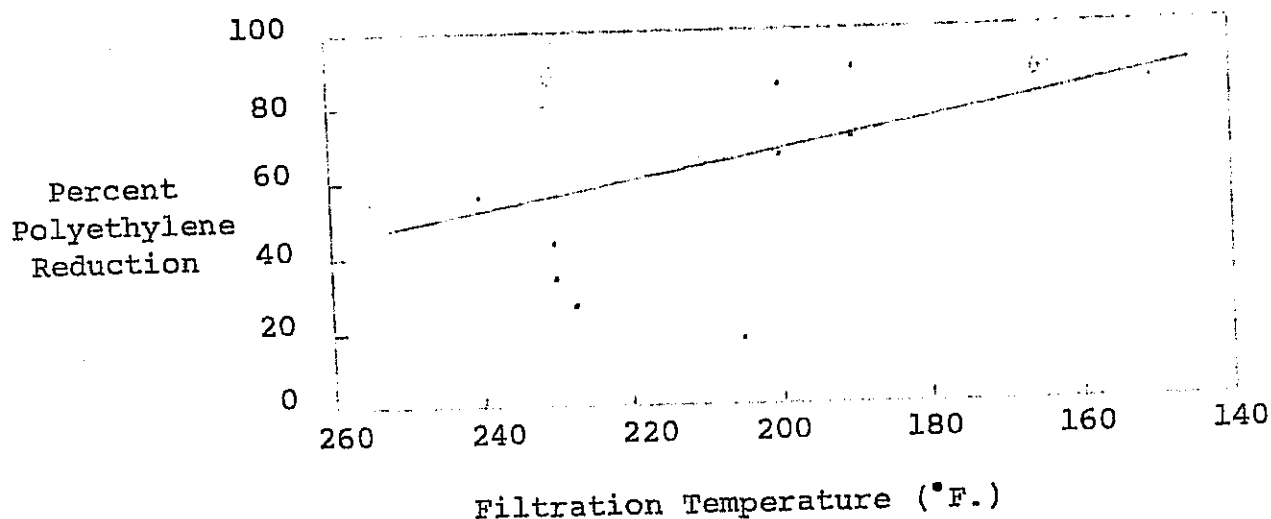
A batch of crude tallow weighing 60,000-75,000 lb. as obtained from the centrifuge or perk pans is pumped to the bleaching tank. This vessel is a vertical open head carbon steel tank with either a side entry or vertical agitator and internal steam coils. Filter aid <sup>1)</sup> (0.33-0.55%) and activated bleaching earth <sup>2)</sup> (0.17-1.25%) are added with constant agitation. The tallow is then brought up to bleaching temperature (200-250°F.) if necessary and agitated 10-30 minutes longer. The higher temperature is desirable to remove as much moisture as possible. During this time the precoat dispersion is prepared in an agitated carbon steel tank of 500-1,000 gal. capacity using 50-100 lb. of filter aid in several thousand pounds of tallow and circulated through the filter until a clear effluent is visible in the pipeline sight

- 1) Celite 545, Hyflo Super Cel (Johns Manville, Celite Division);  
Celatom (Eagle-Picher Industries, Inc.);  
Sil-Flow 443 (Sil-Flow, Inc.)
- 2) Super Filtrol Grade 1 (Filtrol Corp.); Tonsil Optimum FF  
(L. A. Salomon & Bro., Inc.).

glass. The filter is a plate and frame or pressure leaf filter of 200-500 ft.<sup>2</sup> area. The screen may be a stainless steel Dutch twill weave which effectively retains the precoat and bleaching earth.

Filtration temperature is quite variable (from 190-250°F.). Filtration time at the higher temperatures is 26,000-30,000 lb/hour unless clogging of the filter takes place due to excessive M.I.U. levels in the tallow. Higher bleaching temperatures with lower filtration temperatures favor a maximum removal of polyethylene, as does a higher percentage of bleaching earth. The inverse relationship of filtration temperature to percentage of polyethylene removal can be seen from the scatterplot based on a number of analyses performed by different methods over a period of several years (Fig. 1). The linear regression equation  $y = 142 - 0.37x$  expresses approximately the relationship between filtration temperatures (x) and percent reduction in polyethylene (y).

FIGURE 1.  
Filtration Temperature vs. Efficiency of Polyethylene Removal<sup>1</sup>



- 1) The majority of experimental points were obtained at levels of 0.17-0.25% bleaching earth. Circled points used 1-1.25% bleaching earth.

Insufficient data are at hand to analyze the effect of the raw materials rendered. Restaurant grease and shop fat and bone, however, were the predominant raw materials encountered. The table below compares analyses of batches of tallow before and after treatment.

Tallow Analysis

	Before Treatment	After Treatment
Moisture	0.01 - 0.16%	0.01 - 0.07%
Insolubles	0.22 - 0.48%	0.02%
FFA	0.70 - 1.40%	0.60 - 1.51%
Polyethylene (tentative AOCS method)	74 - 626 ppm	29 - 192

Although the foregoing should be considered a preliminary report it may be used as a guideline for the removal of most of the polyethylene from tallow. It must, however, be emphasized that best results can be anticipated if a bleaching operation is conducted in conjunction with removal of polymeric wrapping materials before rendering.