Discussion

Samples of peanuts are currently graded as sound and mature if they contain less than 2% damaged kernels, including discolored, broken, insect-infested or mold-damaged kernels. Both of the samples described are well within these grading requirements.

In the first type of contamination where the incidence of contaminated kernels is high but the level of toxin within the kernels comparatively low, it was possible to consign the contaminated kernels to a category that represented 5% of the sample, and was characterized by a physical appearance designated as wrinkling. This wrinkling differed from the shrivelled appearance of immature peanuts that fall through the screens during sorting, and could have been associated with dampening of the kernels during storage. Even in this category, some of the wrinkled kernels were positive and some were negative, but *none* of the kernels other than the wrinkled ones contained appreciable amounts of aflatoxin.

In the second type of contamination where the incidence of kernels containing toxin was low but the level of toxin in those kernels was high, these contaminated kernels represented only 0.24% of the sample. Of the 20 "suspect" kernels only a few were dark or discolored; in fact, 11 appeared normal before cutting (Table III). These kernels were segregated as "suspect" *only* after the inside was examined.

ACKNOWLEDGMENTS

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LAS Removal Across an Institutional Trickling Filter

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Abstract

Field studies with a low-rate trickling filter have shown a paraffin-derived LAS surfactant to be removed nearly as efficiently as the rest of the organics contained in an institutional sewage. A nondomestic cracked-wax-derived LAS surfactant, which was fed over a second two-month period for reference purposes, was removed at a somewhat lower rate. These tests were conducted at the New Jersey Colony at New Lisbon during the period April to August, 1965.

Introduction

A SIX-MONTH EVALUATION of the amenability of two linear alkylate sulfonate (LAS) surfactants to biodegradation by the trickling filtration process has been completed. These tests were conducted by Union Carbide Corporation at the New Jersey Colony at New Lisbon primarily to determine the removals of paraffin-derived LAS by this somewhat inefficient process. A nondomestic cracked-wax-derived LAS was also tested to provide a point of reference to a prior study at the institution (1).

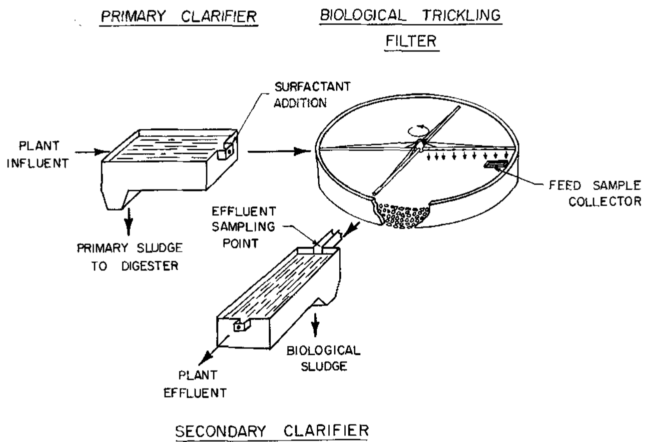

FIG. 1. State Colony at New Lisbon sewage treatment plant.

Various surfactants, shown to be degradable by laboratory testing, have established themselves as replacements for the relatively nondegradable branched-chain alkylbenzenesulfonates. As is often the case, questions have developed regarding the ability of laboratory tests to predict adequately the behavior of the new surfactants under actual treatment conditions. To this end, studies involving full-scale sewage treatment plants have established that paraffin-derived LAS removals by activated sludge average about 95% (2,3); however, ample degradability data from full-scale trickling filter studies have not been available. Added emphasis regarding trickling filter data have developed because of a recent report that a cracked-wax-derived LAS was removed quite inefficiently with this process (1).

Test Site

The trickling filter facilities at the State Colony in New Lisbon, New Jersey, were selected for conducting these LAS field tests for several reasons. Close control over all process variables could be maintained. The influent had a very low background surfactant content, which made feasible the addition of surfactant at the treatment facilities. Also, data obtained during a prior study at this plant were available (1).

The State Colony at New Lisbon is an institutional home operated by the State of New Jersey for about 1250 men and boys with a daytime staff of approximately 250. The sewage treatment plant influent consists essentially of domestic waste, since all laundry is contracted out and the kitchen wastes are treated separately. The methylene-blue-active-surfactant (MBAS) background averaged only 0.6 mg/liter.

A partial schematic drawing of the treatment facilities is shown in Figure 1. The sewage is screened, comminuted, and collected in wet wells, from which it passes consecutively through a surge tank, a primary clarifier, a biological trickling filter, and a secondary clarifier. The clarified sewage is added uniformly to the trickling filter through an electrically driven rotary distributor. The primary clarifier sludge is pumped daily into an anaerobic digester. The digester supernatant is normally recirculated to the surge tank; however, during this study the supernatant was routed directly to drying beds. Filter slough collected in the secondary clarifier is recycled to the surge tank. The daily hydraulic flow to the treatment plant averaged about 125,000 gal/day, with the major portion of this flow occurring during a 13-hr period.

Test Operations

The high-rate trickling filters which are quite common in the United States are not widely used in other countries. Most high-rate filters utilize recirculation of filter effluent and generally have a hydraulic loading greater than 200 gal/sq ft/day and an organic loading of at least 25 lb of biochemical oxygen demand (BOD) per 1000 cu ft/day. In the United States there are also many small treatment plants using low-rate filters loaded at rates common in other countries. The plant at New Lisbon is such a case, since it operates at an over-all hydraulic loading of about 60 gal/sq ft/day, with about a 5% recycle rate and an organic loading of about 10 lb BOD/1000-cu ft/day. These values were estimated for the period during which surfactants were fed and samples collected.

The surfactants selected for study were an Iso-Siv paraffin-derived LAS (UCANE Alkylate 13 LAS) and a nondomestic cracked-wax-derived LAS (Dobane JNX). Test surfactants were added to the sewage flow following primary clarification. The surfactant solutions were metered into the sewage each day between 7 AM and 11 PM. The samplers operated continuously between 8 AM and 4 PM daily. Dual sampling pumps were set up to collect sewage both as it flowed from the electrically operated rotary distributor to the filter bed and just prior to flow of the sewage into the secondary clarifier. At each sampling location, one of the samples was preserved with sulfuric acid for BOD analysis and the other with formalin for MBAS analysis. The BOD and MBAS analyses were conducted on the unclarified samples according to the general procedures outlined in *Standard Methods* (5).

Surfactants adsorbed onto the solids were measured by the MBAS procedure after a methanol extraction step. Paraffin-derived LAS was fed over the 10-week period from April 5 to June 13, 1965. The cracked-wax-derived LAS was added over the 7-week period between July 11 and Sept. 5, 1965. Feed rates of the surfactants were initially adjusted to give approximately 10 mg/liter MBAS in the trickling filter feed. Due to varying sewage and surfactant flows, this concentration rate was not maintained during all of the test period, but comparable feed concentrations for the two materials were obtained.

Results

Biochemical-oxygen-demand removals across the trickling filter were determined daily during each of

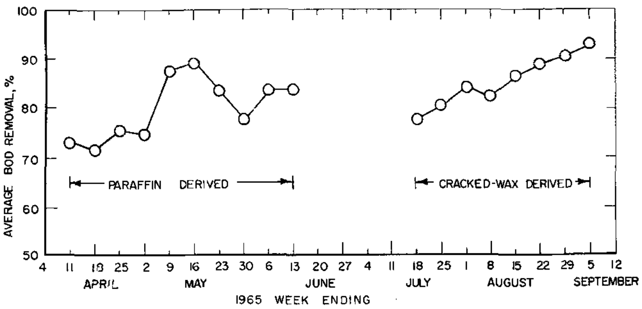

Fig. 2. BOD removals across filter.

the periods of surfactant addition. These data are summarized in Figure 2. The average primary-clarifier-effluent BOD during the paraffin-derived LAS test was about 135 mg/liter, whereas the BOD during cracked-wax-derived LAS addition was about 115 mg/liter. The average daily removals were 81% and 86%, respectively.

The increase in filter efficiency shown in Figure 2 is attributed primarily to the seasonal increase in temperature. During the period between additions of the two LAS materials, the filter was first flooded and then allowed to equalize itself over a 3-week period.

The efficiencies of LAS removal expressed in absolute terms as well as in per cent of BOD removal are presented in Figures 3 and 4 for the paraffin-derived and cracked-wax-derived LAS, respectively. The feed ranges and average values of feed concentration, surfactant reduction, and BOD reduction for both of the LAS materials are summarized in Table I. In addition, the ratios of the surfactant removal to BOD removal are presented for the various surfactant feed ranges. All of the included values of MBAS concentrations have been corrected for the background material measured prior to the surfactant addition.

The average removal of the paraffin-derived LAS was 78%, as compared with an average BOD removal of 82%. The lower ranges of daily values experienced during this period were generally accompanied by feed concentrations less than 3.5 mg/liter. Additional

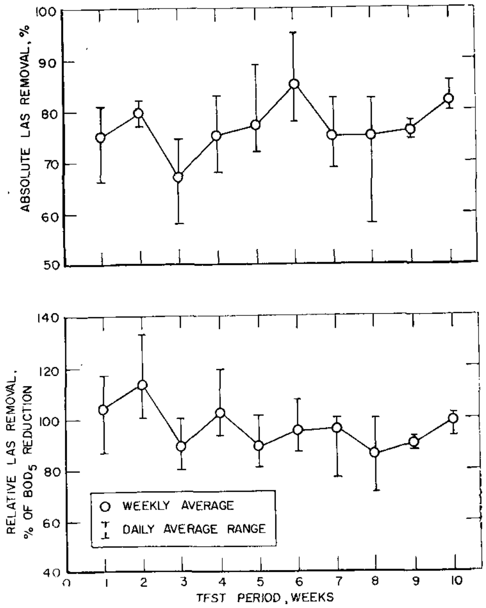

Fig. 3. Removal of a paraffin-derived LAS across filter.

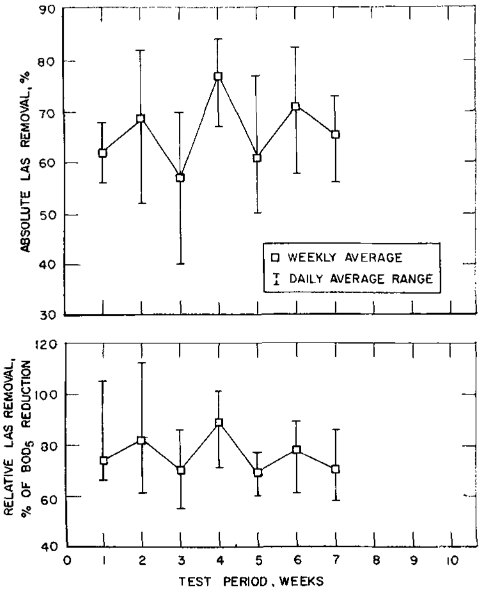

FIG. 4 Removal of a cracked-wax-derived LAS across filter.

data show that this average surfactant removal efficiency is increased by about 5 percentage points when the removals attained by clarification are added to the trickling filter reductions.

When surfactant removal is expressed as per cent of BOD removal, a value of 100% indicates that the surfactant is removed as rapidly as the naturally occurring organics. The lower curve in Figure 3 shows that the relative removal of paraffin-derived LAS was uniform and averaged about 95% of the BOD removal. This field test finding agrees with results from a laboratory-scale study in which an average of about 94% of the BOD removal was obtained (4).

The data obtained during feeding of cracked-wax-derived LAS showed more day-to-day variation as well as a lesser over-all removal of surfactant than did the paraffin-derived material. The average MBAS removal was 68%, with a daily variation of 40 to 85%. The per cent of BOD removal averaged 79.

Rotary-tube trickling filter studies conducted in the laboratory concurrently with the field tests showed

TABLE I

Average Surfactant Removals Across the New Lisbon Trickling Filter

LAS surfactant	Feed range, mg/liter	Average feed concentration, mg/liter[a]	Average surfactant reduction, %	Average BOD reduction, %	Ratio, surfactant removal to BOD removal
Iso-Siv paraffin derived	0–6	4.3	75.5	79.5	0.95
	6–15	9.4	80.0	83.0	0.96
Nondomestic cracked-wax derived	6–15	10.4	64.0	86.5	0.74
	15–20	18.0	73.0	89.0	0.82
	20–25	22.5	67.5	84.0	0.80

[a] Determined as methylene-blue-active surfactant (MBAS).

relative removals between the paraffin-derived and cracked-wax-derived materials that agreed closely with the results of the full-scale studies. These removals of cracked-wax-derived LAS were significantly higher than that achieved during the prior field test with a similar material (1).

The filter slimes were periodically tested for adsorbed surfactant using a methanol extraction procedure. The adsorbed surfactant measured during the paraffin-derived LAS and cracked-wax-derived LAS studies were 0.4 and 2.0 mg/g, respectively. These low levels of surfactant associated with the filter solids indicate that the mechanism of removal was bio-oxidation as opposed to adsorption.

In conclusion, these tests have shown that a low-rate trickling filter can remove LAS nearly as readily as it can remove the organic matter in sewage. Highly linear alkylate sources, such as those used for preparing LAS in the United States, are required to achieve the desired removal levels.

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Preparation of Vinyl Esters of Some Chlorinated New Oilseed Crops Fatty Acids

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Abstract

Several mixtures of fatty acids derived from the seed oil of plants being investigated as new crops, have been chlorinated and the chlorinated acids have been converted to the vinyl esters. These products have potential utility as comonomers in vinyl polymerizations.

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Introduction

IN THE SEARCH for new oilseed crops, one of the families of plants selected for study has been the *Umbelliferae* (carrots, fennel, parsley, etc.). The seed oils contain 30–76% petroselinic (*cis*-6-octadecenoic) acid, an isomer of oleic acid found (with very few exceptions) only in this family of plants(1).

Another plant which is being studied as a new oilseed crop is *Limnanthes douglasii*. The fatty acids