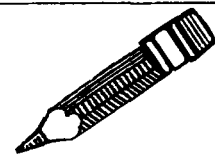


Technical News Feature



Palm Oil Processing

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ABSTRACT

Palm oil utilization is contingent on three key factors—economic advantage, standards of quality, and customer acceptance. In order to provide acceptable quality palm oil for direct use or as a portion of a formulation, the oil is pretreated, steam refined, bleached, and deodorized. A Parkson stripper is employed for steam refining which, with the pretreatment described, results in yields of the weight of crude oil minus 1.19 x the free fatty acid expressed as oleic and finished oil colors ranging from 1.0-2.5 Red Lovibond. Potential color problems can be avoided by ensuring that all storage and processing conditions are controlled.

INTRODUCTION

Palm oil utilization in North America has increased during the past few years and is anticipated to do so in the future. This expansion is contingent upon three key factors — economic advantage, product acceptability, and standards of quality.

The economic advantage for the use of palm oil arises from lower crude costs and elimination of hydrogenation.

Further savings accrue through the application of steam refining which reduces losses vis-a-vis alkali refining and eliminates the downstream costs and problems associated with acidulation.

Customer acceptance of palm oil products is of critical importance since no technological activity will overcome rejection of its use. Examples of this situation currently are salad oils and high PUFA formulae.

In meeting quality standards, the most common problem encountered is dark color. For new applications of palm oil, standards have generally been established which accommodate deodorized palm oil colors of 2.0-3.0R Lovibond. However, where an existing product is reformulated to include palm oil, product colors tend to approach specification thereby reducing the manufacturing "safety" margin.

PROCEDURE AND RESULTS

Crude oil of normal quality is held in mild steel, insulated storage tanks (capacity 2.5×10^6 lb), saturated with nitrogen and kept dry (<0.1% moisture) at 52 C. After 4 months' storage, the oil quality has deteriorated slightly as shown in Table I.

Crude palm oil is pretreated with 0.15% phosphoric acid

TABLE I

Crude Palm Oil

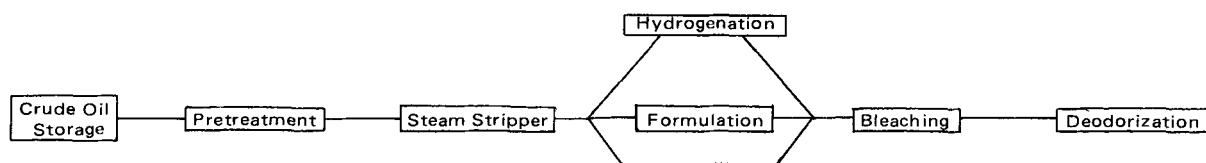
Analysis	At receipt	After 4 months
Color (1" Lovibond)	20R	18R
Free fatty acid (% as oleic)	4.0	5.0
Peroxide value (meq/kg)	5	10
Anisidine value	2	10
Iron	5 ppm	10 ppm
Copper	<0.2 ppm	<0.2 ppm

TABLE II

Processed Palm Oil

Analysis	Refined	Deodorized
Color Lovibond 5 1/2"	8	2.0
Free fatty acid (% as oleic)	0.1	0.03
Peroxide value (meq/kg)	NIL	NIL
Anisidine value	6	6
Iron	<1 ppm	<1 ppm
Copper	<.05 ppm	<.05 ppm

OVERALL FLOW SHEET



STEAM STRIPPER

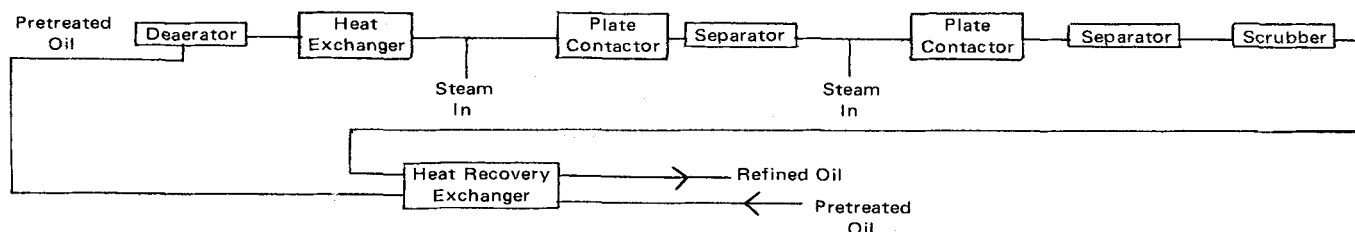


FIG. 1. Parkson Vacuum Steam Stripper.

(85% Food Grade) and agitated for 30 min at a temperature of 82 C. This is followed by the addition of 0.5% activated bleaching earth and agitated for 15 min at 105 C. This pretreatment is preferably carried out under inert atmosphere or vacuum.

Following pretreatment, the oil is filtered and delivered to a steam-stripping device. In our situation, a Parkson Vacuum Steam Stripper is used (Fig. 1).

The steam stripper heats deaerated oil from 138 C (achieved from the heat recovery exchanger) to 296 C through a liquid-liquid heat exchanger. The oil then passes through a nozzle into a steam mixer and onto a plate contactor followed by a cyclone-type separator. This is repeated with a second mixer/contactor/separator with a second mixer/contactor/separator group following which the refined oil is cooled through a plate heat recovery exchanger with incoming oil.

Total stripping steam is 3% by weight of the 5,000 lb/hr oil flow.

Absolute pressure in the separators is 4 mm.

The total hold-up time within the system – from crude oil input to refined oil discharge – is 5 min (equivalent to 417 lb). Of this total time, 1½ min (209 lb) is held in the deaerator at the 60 C feed temperature. Analysis of refined oil is shown in Table II.

Refined oil is formulated, bleached for 20 min at 105 C using 2% activated bleaching clay, and deodorized at 255 C in a conventional semi-continuous deodorizer.

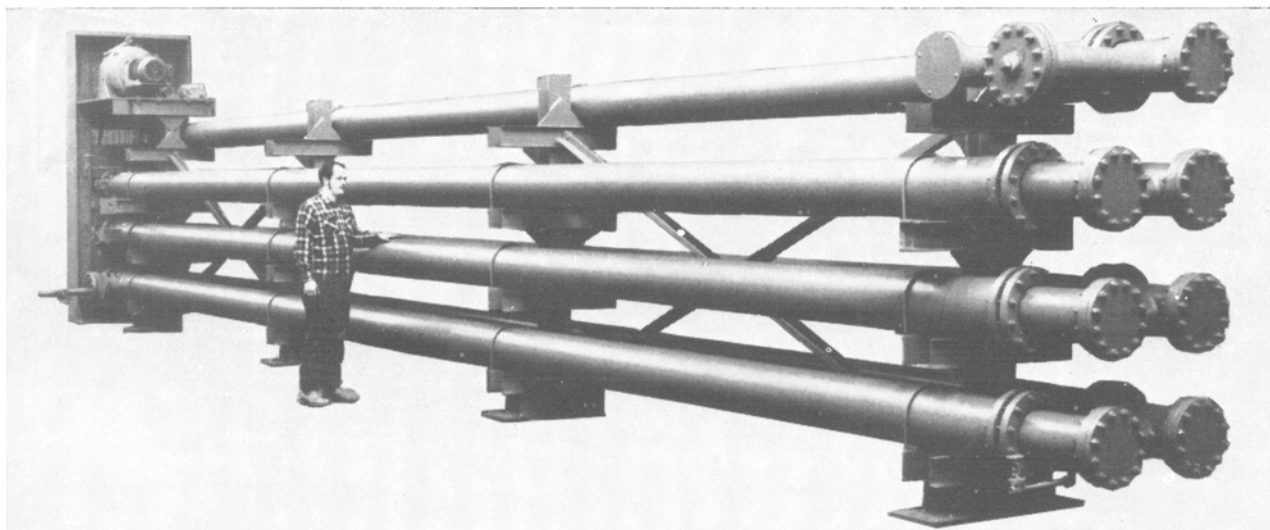
Over the 4-month period studied, 4,385,000 lb of oil with an average FFA of 4.7% was processed. The average regining loss was 5.5% ranging from 5.2 to 5.7%.

Overall yields (to deodorized oil) averaged 93.7%. Because most of the refined palm oil had been formulated with other oils, specific palm oil yields could not be measured for the total weight processed. •

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