

Malaysia is currently the world's second largest exporter of palm oil with 15.8 million tonnes of palm oil exported in 2009. Crude palm oil (CPO) and refined palm oil are among the most traded commodities. Extraction of CPO from fresh fruit bunches require steam for sterilization and water for dilution, which finally contribute to substantial amounts of water being discharged in the palm oil mill effluent (POME). The small amount of oil that failed to be extracted and had leached out from the various stages of the milling process will end up in the ponds as poor quality sludge oil. This technology aims to upgrade the palm sludge oil (PSO) recovered from ponds through a refining technology and add value to the process by recovering value-added products from PSO.

In 2009, Malaysian mills produced 27 000 t of PSO. The PSO collected from local palm oil mills has a high free fatty acid (FFA) content of up to 80% wt. PSO is normally sold at a discounted price relative to CPO and is exported to Third World countries for making soap. The typical properties of PSO are its dark colour, bad odour and solid form at 25°C. MPOB has developed a refining technology to deodorize and decolourize PSO in order to upgrade this material. *Figure 1* shows a sample of the (a) crude sludge oil, (b) refined sludge oil and (c) PSO distillate. The refined PSO can potentially replace palm fatty acid distillate (PFAD) in the soap-making industry. The refined PSO can also be used as an alternative boiler fuel and as a cheaper raw material for biodiesel production. The very short-chain acids recovered from the refining process of PSO can even be esterified to produce high-grade perfume.

TECHNOLOGY

PSO is refined using processes including degumming, decolourization and deodorization.

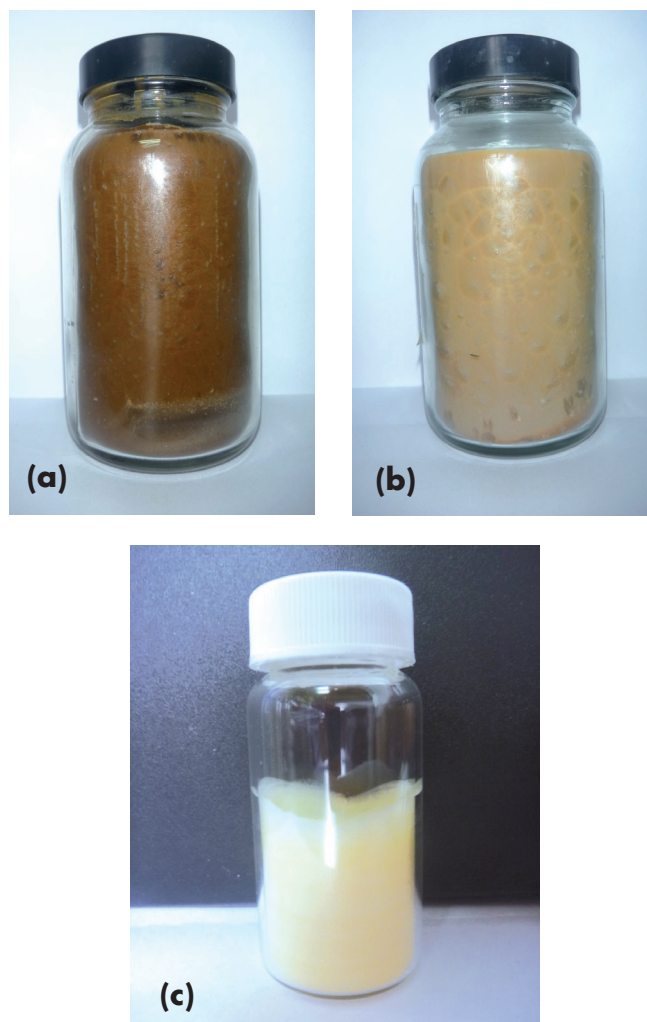


Figure 1. (a) Crude sludge palm oil, (b) refined sludge palm oil and (c) PSO distillate containing very short-chain fatty acids.

Strong bleaching agents, *e.g.* hydrogen peroxide and sodium hypochlorite, are introduced to enhance the decolourization process. The bleached PSO is subjected to deodorization for the removal of short-chain acids. The distillate containing short-chain acids is recovered as a value-added product. The process flow diagram for the refining technology is shown in *Figure 2*.

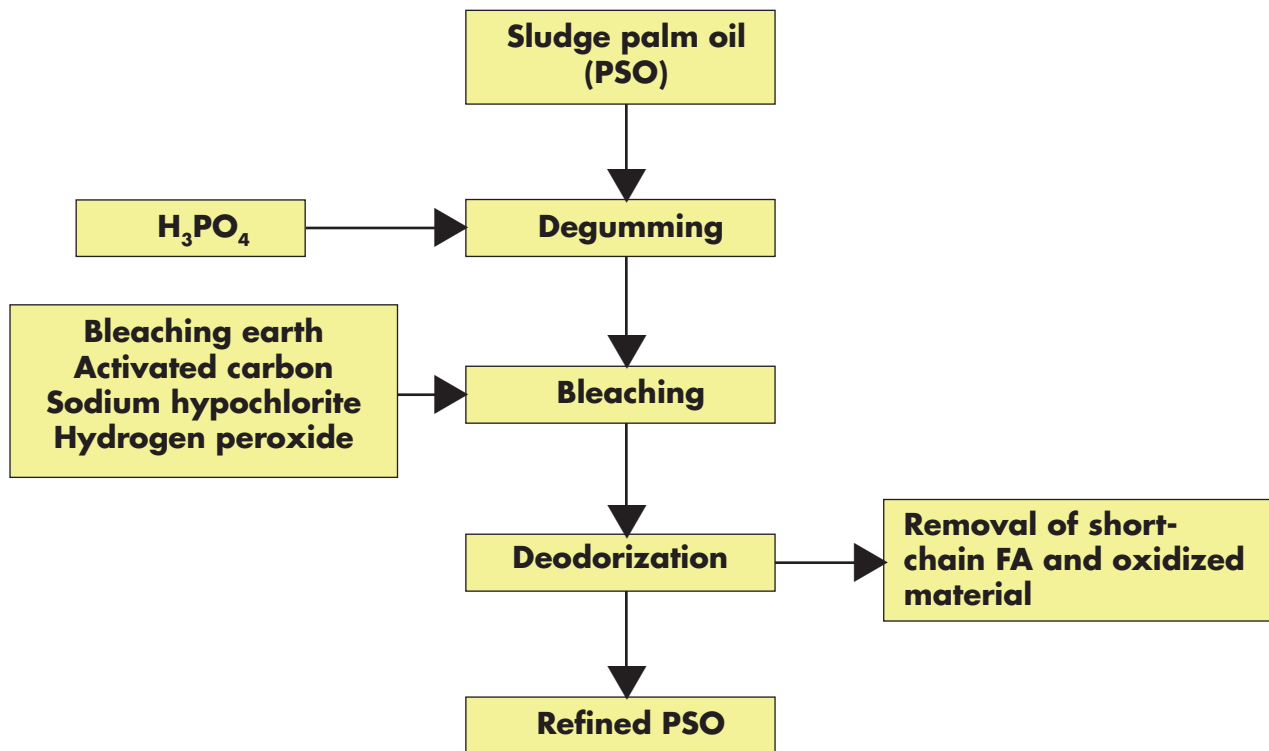


Figure 2. Process flow diagram for the refining technology of sludge palm oil.

COST ESTIMATE

Sufficient PSO should be collected and centralized in one location for refining. The estimated processing cost should be lower than RM 150 t⁻¹. The processing cost can be recovered through the sale of the short-chain acids.

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