PALM ESTERAMOL TECHNOLOGY

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810

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Technology for transesterification reactions between methyl esters and alcohols is well established using classical homogeneous alkaline catalysts which provides high conversion of methyl esters to the specialty esters. However, in certain products where purity of the esters is of concern, removal of the homogeneous catalysts after the completion of the reaction is a challenge in terms of production costs and water footprint. Due to these limitations, the Palm Esteramol technology using MPOB proprietary catalyst (AOTD-MOCAT) was developed for the reactions between palm-based methyl ester and triethanolamine to produce mixtures of triethanolamine esters. This Palm Esteramol technology offers a more environmental friendly process as compared to the conventional homogenous catalysis and simplifies the downstream separation process for catalyst reuse. The Palm Esteramol technology is a green technology suitable for the production of palm esteramine from palm methyl ester and amino alcohol, an intermediate used in the production of biodegradable cationic surfactant from renewable resources. Other potential applications include bactericide and surface conditioners in cosmetics, personal care and fabric care products (Shanklin *et al.*, 2006), as adjuvants for pesticides and fertilisers (Gustavsson *et al.*, 2004), as detergent in fuel composition (Farmer *et al.*, 1999), as oil and gas well stimulation materials (Stains *et al.*, 1991) and metalworking fluids (Kodali, 2001).

METHODOLOGY

Palm Esteramol technology employed MPOB proprietary catalyst (AOTD-MOCAT) as shown in *Figure 1.* The removal of the by-product was performed by using a vacuum system. Upon completion of the reaction, AOTD-MOCAT was separated from the product mixtures via filtration. The palm esteramine produced using the Esteramol technology is shown in *Figure 2,* yielding 99% methyl ester conversion.

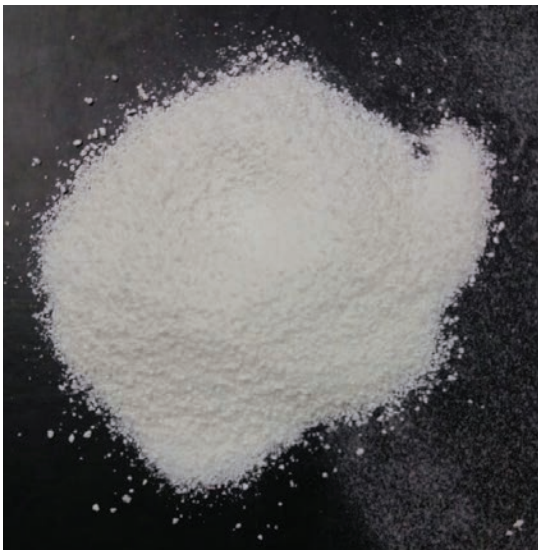

Figure 1. MPOB proprietary catalyst (AOTD-MOCAT).

Figure 2. Palm-based esteramine using Palm Esteramol technology.

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NOVELTY OF THE TECHNOLOGY

Palm Esteramol technology is a process to produce an ester from the reaction between palm methyl ester and tertiary amino alcohol using MPOB proprietary catalyst (AOTD-MOCAT).

BENEFITS AND ADVANTAGES

- Simpler separation process
- Catalyst can be reused
- Non-toxic
- Non-corrosive
- No water footprint

ECONOMIC ANALYSIS

The estimated investment cost for the production of Palm Esteramol technology is given below, based on a plant capacity of 432 t yr^{-1} with capital investment of RM 1.9 million and RM 1.2 million per year average operating expenditure (OPEX):

TABLE 1. ECONOMIC ANALYSIS OF PALM ESTERAMOL TECHNOLOGY

Economic analysis	Value
Net present value (NPV), RM	2.2 million
Internal rate of return (IRR), %	27
Payback period, years	1.3
Benefit cost ratio (B:C)	1.14

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