

PALM-BASED POWDER AND LIQUID LAUNDRY DETERGENT

Alpha sulphonated methyl ester (SME) or commonly known to the industry as methyl ester sulphonates (MES), is an oleochemical-based surfactant that can be obtained by direct sulphonation of palm methyl esters. Palm SME can be used to formulate detergent and cleaning products as an active ingredient. Thorough and dedicated research were conducted in order to study the performance of detergents formulated with SME and also to overcome some of the negative properties such as its rate of hydrolysis which is pH dependent and the effect of disalts in detergency. The research team has formulated three types of laundry detergents being powder, liquid and tablet (*Figure 1*).



Figure 1. Palm-based powder and liquid detergents formulated with SME.

Liquid detergents are produced by dissolving SME flakes (above 70°C) with other solid and liquid raw materials through fine pH control in order to prevent hydrolysis. The liquid detergents are best formulated at pH below 9 (Zahariah, 2003). Liquid detergents are produced using a batch process in liquid detergent pilot plant (*Figure 2*). This pilot plant is equipped with two mixing tanks with a capacity of 50 litres and 120 litres. The pilot plant can also be used to produce

other household cleaning and personal care products such as:

- Shampoo;
- dishwashing liquids;
- shower bath; and
- fabric softeners.



Figure 2. Liquid detergent pilot plant at MPOB.

SME flakes also can be directly agglomerated and admixed with other dry materials and liquid additives to form compact powder detergent without spray drying. The ability of this technology is an advantage because it allows production of finished laundry detergents using low cost equipment. In MPOB, the Marion mixer (120 kg batch⁻¹) is used not only to agglomerate powdered materials but also to produce the powder detergents (*Figure 3*).



Figure 3. Powder detergent pilot plant at MPOB.

Sequence of adding ingredients, rate of mixing and the technology of the production are important to optimize both production of powder and liquid laundry detergents.

PERFORMANCES OF PALM-BASED POWDER AND LIQUID LAUNDRY DETERGENT

The performance of formulated palm-based powder and liquid laundry detergent were evaluated based on their detergency, foaming power and stability, wetting characteristic, pH and physical properties such as density, particle size (for powder) and viscosity (for

liquid). These properties were compared with the commercial detergent available in Malaysia, which used as a benchmark in order to improve the performance and properties of formulated detergents.

Washing performance of formulated detergent was evaluated via detergency test on 10 stain cloths under ordinary washing condition in Malaysia using top loading washing machine (6 kg capacity). The detergency tests have indicated that the palm-based powder and liquid detergents exhibit good washing performance and comparable to the commercial detergents (Figures 4 and 5).

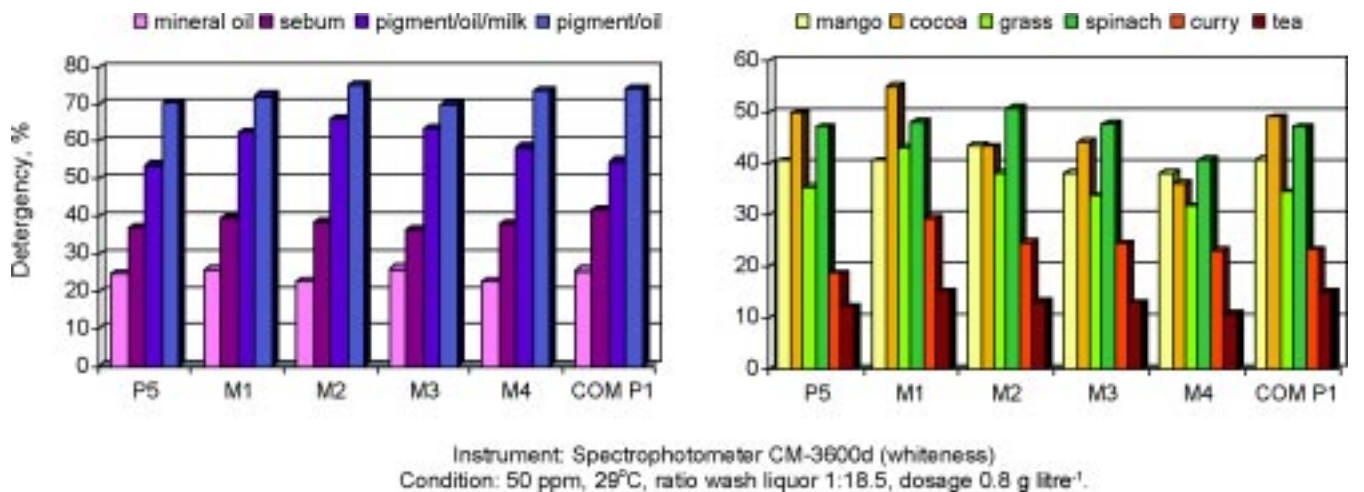


Figure 4. Detergency of formulated powder detergents (P5, M1-M4) in comparison with commercial detergents (COM P1).

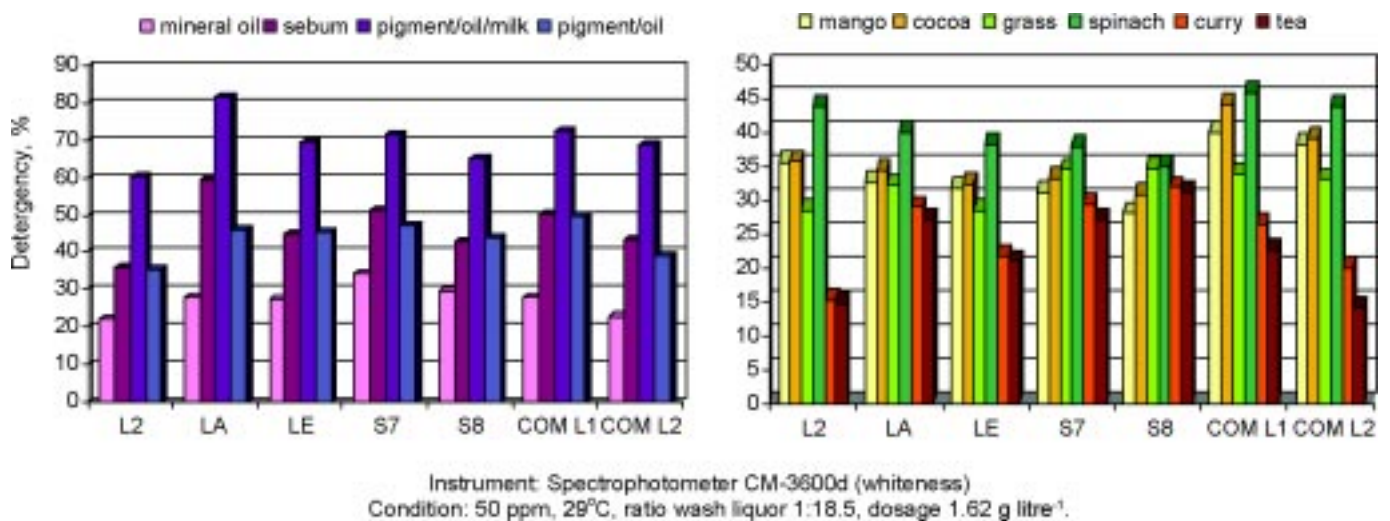


Figure 5. Detergency of formulated liquid detergents (L2, LA, LE, S7 and S8) in comparison with commercial detergents (COM L1 and COM L2).

Psychologically, foam was understood as an important measure for washing power that provides evidence of detergent activity and hiding the soil. Foaming test of palm-based powder and liquid laundry detergent in comparison with the commercial detergent was carried out at 0.1% concentration with deionized water at room temperature. The foaming power and stability of the palm-based powder and liquid laundry detergent were found to be comparable to the commercial detergents (Figure 6).

detergent was carried out in 0.1% detergent solution at room temperature (Figure 7).

Potential pollution to the environment is normally measured in terms of biodegradation characteristics. The biodegradability of palm-based powder and liquid laundry detergents in comparison with commercial detergents were determined using Method OECD 301D tested at 22°C – 25°C and test duration of 28 days. The study has showed that palm-based powder and liquid laundry

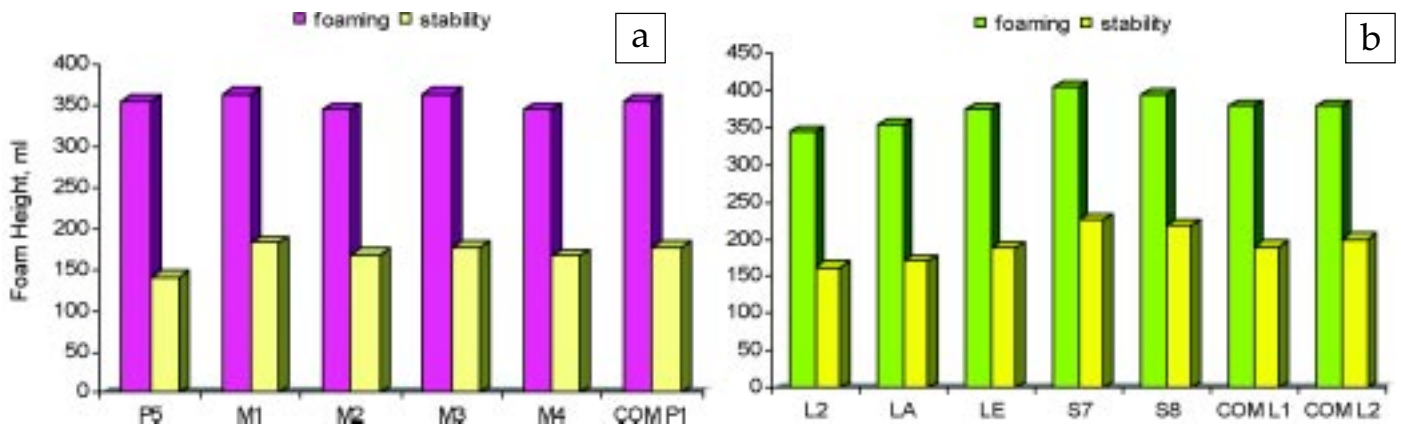


Figure 6. (a) Foaming power and stability of the palm-based powder and (b) liquid in comparison with commercial detergents (COM P1, COM L1 and L2).

Besides good washing performance and foaming power, laundry detergent also requires good wetting power, which is important in the first phase of washing. Good wetting characteristics can shorten the time taken to wet the fabrics and elongate the washing time. Wetting characteristic of palm-based powder and liquid laundry detergents in comparison with the commercial

detergent biodegraded faster than the commercial detergents (Razmah, 2004). Palm-based powder (M2) was readily biodegradable with more than 80% biodegradability in 16 days. Palm-based liquid detergent (LA) biodegraded 100% only in 17 days. Biodegradability of commercial powder and liquid detergent (COM P1 and COM L1) reached the pass level after 24 days (Figure 8).

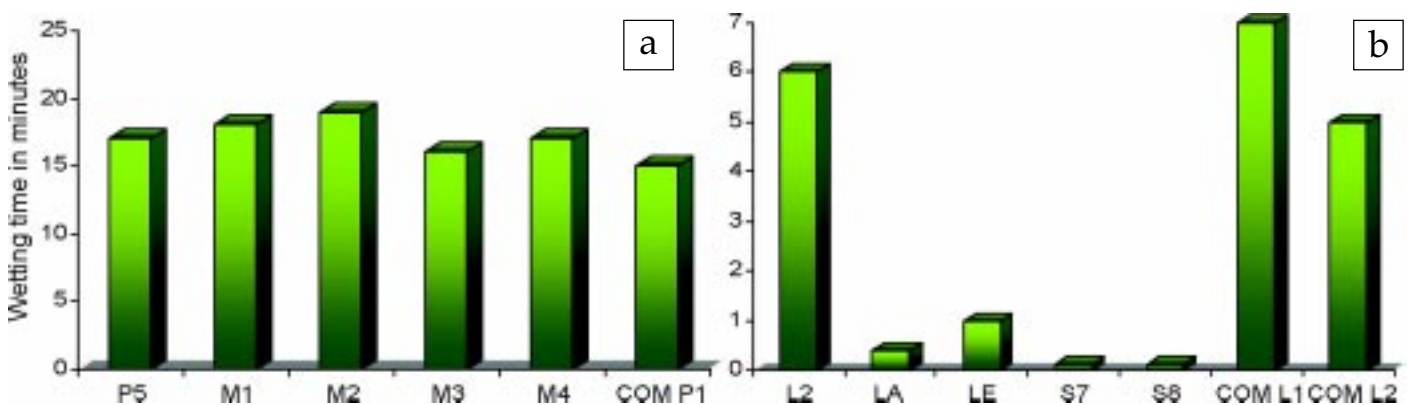


Figure 7. (a) Wetting characteristics of palm-based powder detergent is comparable to commercial detergent; COM P1 and (b) palm-based liquid detergent is superior to commercial detergents; COM L1 and COM L2.

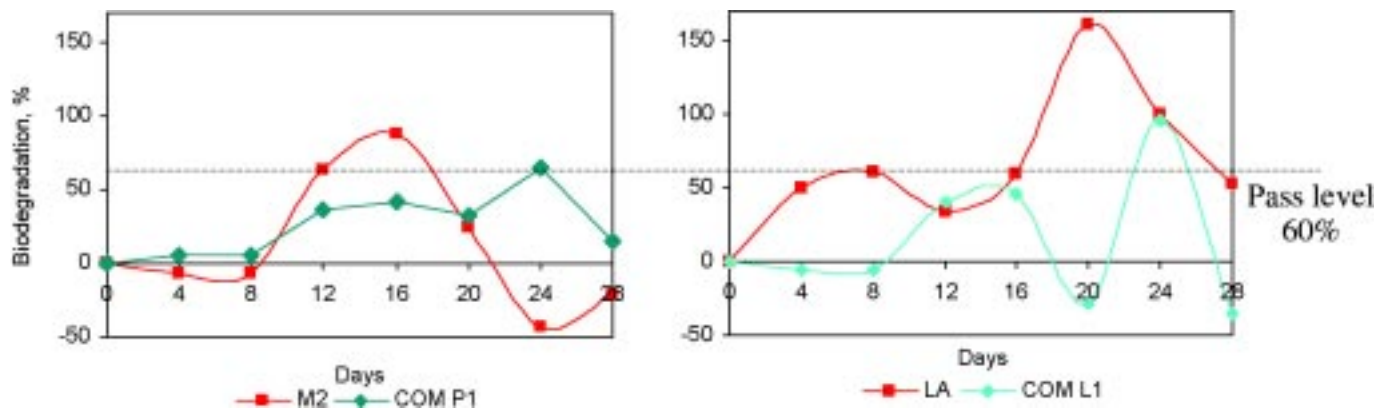


Figure 8. Biodegradability of palm-based powder and liquid laundry detergent in comparison with commercial detergents.

Density of the formulated powder detergent is in the range of 0.7 to 0.9 g ml⁻¹, which indicate a concentrated product with high active level. The particle size distribution of powder detergent is marginal at 500 microns, which is similar to the commercial detergents. Palm-based liquid detergents were formulated with various viscosity in the range of 2500 – 12 000 cP in order to offer the flexibility to consumer.

CONCLUSION

The palm SME as an active ingredient can be formulated into detergents either as liquid or powder. These products exhibit good properties and washing performance. SME is the only oleochemical-based surfactant that has the potential to compete with LAS in terms of price

and performance. Therefore, oleochemical-based surfactant such as SME may soon surface their way into the surfactants and detergent industries.

AWARDS

This technology bagged a gold award and special prize KIPA (Korean Invention Promotion Association) Award in I-TEX 2004.

REFERENCES

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