PALM OLEOCHEMICALS FOR COSMETICS AND TOILETRIES

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The global market for cosmetics and toiletries ingredients was an estimated USD 14.7 billion in 2005, and is expected to grow 5% a year to 2010. The factors contributing to this steady growth are the improving global economy, particularly in developing countries, and the introduction of new consumer-friendly products. The majority of cosmetics and toiletries in the market today have been around for a long time, and most of them are made from petroleum or animals products. However, oleochemicals are increasingly used, particularly palm-based ones, both for their greater eco-friendliness and religious neutrality. To add value to palm-based oleochemicals, MPOB has produced dihydroxystearic acid (DHSA) from palm fatty acids.

DHSA has two active sites - two hydroxyls and a carboxylic group – allowing it to undergo a variety of reactions to produce different chemicals for cosmetics and toiletries use, *e.g.* dihydroxystearates, glyceryl monodihydroxystearate and PEG dihydroxystearates.

OLEOCHEMICALS FROM DHSA

A series of dihydroxystearates (DHSA-esters) was produced enzymatically. The esterification process is reproducible and easily scaled-up (Awang *et al.*, 2001; 2003; 2005; 2007). The chemicals are non-irritants to the skin, and can therefore be used as cosmetics and toiletries ingredients (*Tables 1* and *2*).

Glyceryl monodihydroxystearates (MGDHSA) is prepared by reacting DHSA with glycerol in the presence of a catalyst (*Tables 1* and *2*). The reaction product containing ~45% MGDHSA has better emulsifying properties in oil-in-water systems with high water content than glyceryl monostearate and glyceryl monohydroxystearate (Awang *et al.*, 2004).

Reacting polyethylene glycol with DHSA will give PEG esters (*Tables 1* and *2*), surface-active agents with progressive changes in their properties as the average molecular weight of the glycol goes up/down. In aqueous systems, PEG esters with molecular weights of 200 to 1450 are the most versatile for emulsification, while the larger molecules are excellent thickening agents (Awang *et al.*, 2008).

ADVANTAGES OF THE CHEMICALS

- Palm oleochemicals are biodegradable and environmental-friendly as they are made from renewable resources;
- Non-irritating to the skin; and
- Add value to a palm oil product.

TABLE 1. DERMAL IRRITECTION ASSAY OF OLEOCHEMICALS DERIVED FROM DHSA

Concentration	Oleochemical			Irritancy classification
(μl)	DHSA-ester	MGDHSA	PEG-ester	
50	0.00	0.12	0.82	Non-irritant
75	0.05	0.19	0.76	Non-irritant
100	0.16	0.18	0.90	Non-irritant
125	0.25	0.31	0.82	Non-irritant

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TABLE 2. PROPERTIES OF OLEOCHEMICALS DERIVED FROM DHSA

Property	DHSA-ester	MGDHSA	PEG-ester
Appearance	Solid	Semi-solid	Semi-solid / wax
Acid value (mg KOH g^{-1})	1.8	53.7	46.2
OHV (mg KOH g^{-1})	246.1	322.7	166.01
Sap. Value (mg KOH g^{-1})	138.5	141.2	130.0
Iodine Value (g I_2 / 100 g)	0.3	ND	ND
Melting point (^oC)	69.8	67.5	ND

Note: ND-not determined.

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