

A NEW NATURAL BASED POUR POINT DEPRESSANT FOR FATTY ALKYL ESTERS

by: OOI, T L; TEOH, C M; YEONG, S K and SALMIAH AHMAD



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High saturation of palm oil and palm oil products has restricted their use in a number of applications, both in food and non-food uses. In the non-edible areas, the use of methyl esters as alternative fuel for diesel could only be used during cooler seasons if their unfavourable low temperature properties could be improved. Normally, palm oil methyl esters have a pour point of between 12°C and 15°C. Similarly, the use of some oleochemical esters in lubricants has been restricted due to their low temperature properties. These problems are more severe particularly for palm oil and products as compared to other vegetable oil/products such as soyabean oil, sunflower, rapeseed oil since they are more unsaturated and have much lower cloud points and pour points. In view of these, it is desirable to improve the low temperature properties of palm oil and products so that the applications of

palm oil/products could be extended particularly during winter season. In this study, the synthesis of a new palm-based pour point depressant and cloud point reducer for fatty alkyl esters is described. With an addition of 3% synthesized pour point depressant, PPD18, the pour point of the palm oil methyl esters could be reduced from 15°C to -30°C as determined using ASTM D97 method (*Table 1*).

Figures 1 to 5 show the microscopic changes of the crystals without and with different percentages of PPD18 added. The microscopic studies showed that addition of the PPD18 successfully minimized the size of the crystals of palm oil methyl esters. The size of palm oil methyl esters crystals decreased and became more scattered. This could be the reason why PPD18 is particularly effective in reducing the pour point and cloud point of palm oil methyl esters.

TABLE 1. POUR POINT AND CLOUD POINT OF PALM OIL METHYL ESTERS WITH AND WITHOUT PPD18

Additive concentration (%)	Pour point of palm oil methyl esters (°C)	Cloud point of palm oil methyl esters (°C)
0	15	11.0
1	-9	9.0
2	-18	7.8
2.5	-24	7.5
3.0	-30	6.9
3.5	6	7.5

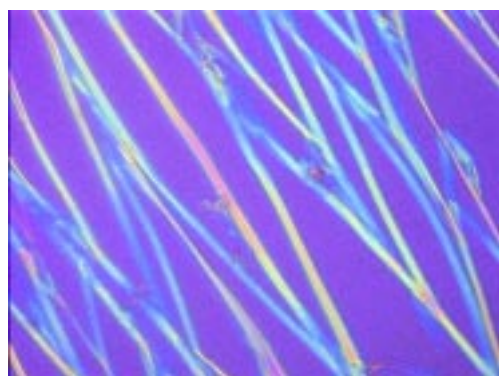


Figure 1. Microscopic photograph of palm oil methyl ester without additive PPD18.

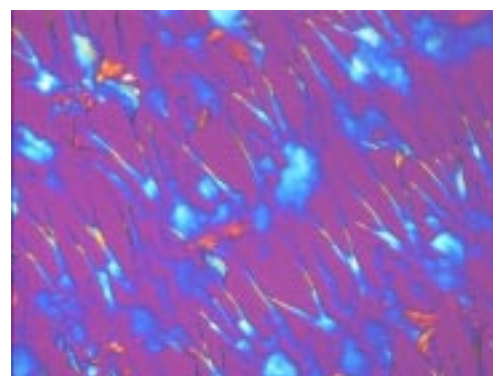


Figure 2. Microscopic photograph of palm oil methyl ester with 1% additive PPD18.

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Malaysian Palm Oil Board, Ministry of Plantation Industries and Commodities, Malaysia
P. O. Box 10620, 50720 Kuala Lumpur, Malaysia. Tel: 03-89259155, 89259775, Website: <http://mpob.gov.my> Telefax: 03-89259446



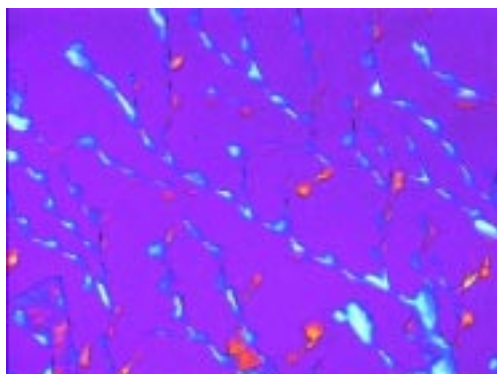


Figure 3. Microscopic photograph of palm oil methyl esters with 2% additive PPD18.

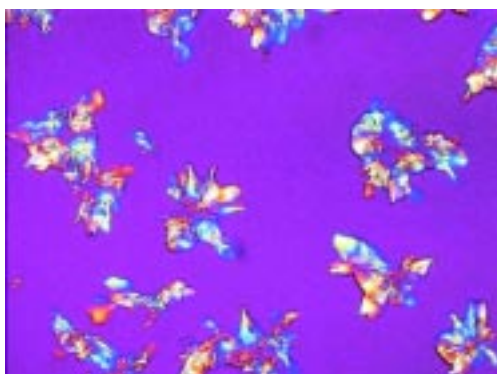


Figure 4. Microscopic photograph of palm oil methyl esters with 3% of PPD18.

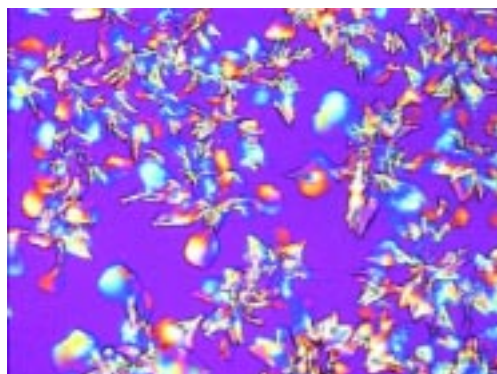


Figure 5. Microscopic photograph of palm oil methyl esters with 4% additive PPD18

MAJOR ADVANTAGES

- Is a new synthesized product from palm oil (PPD 18);
- Create another new use of palm oil;
- The additive works well particularly for palm fatty alkyl esters;
- Only small amount is required for significant effect;
- The new additive could reduce pour point and cloud point of alkyl esters;
- The additive is easily synthesized;
- The additive is environmental friendly and biodegradable;
- A 100% palm-based product could be produced – palm fatty esters and palm derived additive; and
- The additive can also be applied in other vegetable oil alkyl esters.

CONCLUSION

A new palm oil pour point depressant has been synthesized and has been found promising to reduce the pour point of palm oil methyl esters by a maximum of 45°C as determined by ASTM D 97. The amount of PPD 18 required is 3%.

For more information kindly contact:

Director-General
MPOB
P. O. Box 10620
50720 Kuala Lumpur, Malaysia.
Tel: 03-89259155, 89259775
Website: <http://mpob.gov.my>
Telefax: 03-89259446