

An acceleration of microwave-assisted transesterification of palm oil-based methyl ester into trimethylolpropane ester

ABSTRACT

Microwave-assisted synthesis is known to accelerate the transesterification process and address the issues associated with the conventional thermal process, such as the processing time and the energy input requirement. Herein, the effect of microwave irradiation on the transesterification of palm oil methyl ester (PME) with trimethylolpropane (TMP) was evaluated. The reaction system was investigated through five process parameters, which were reaction temperature, catalyst, time, molar ratio of TMP to PME and vacuum pressure. The yield of TMP triester at 66.9 wt.% and undesirable fatty soap at 17.4% were obtained at 130 °C, 10 mbar, sodium methoxide solution at 0.6 wt.%, 10 min reaction time and molar ratio of TMP to PME at 1:4. The transesterification of palm oil-based methyl ester to trimethylolpropane ester was 3.1 folds faster in the presence of microwave irradiation. The total energy requirement was markedly reduced as compared to the conventional heating method. The findings indicate that microwave-assisted transesterification could probably be an answer to the quest for a cheaper biodegradable biolubricant.