

**SYNTHESIS AND ACTIVITY OF MIXED OXIDES
(Cr-Mn) CATALYSTS IN ESTERIFICATION
PROCESS TO PRODUCE FAME FROM NON-
EDIBLE OIL**

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AUTHOR'S DECLARATION

I declare that the work in the thesis was carried out in accordance with the regulation of Universiti Teknologi MARA. It is original and is the results of my own, unless otherwise indicated or acknowledge as reference work.

I, hereby acknowledge that I have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Fatty acid methyl ester (FAME), a potential biodiesel is widely being highlighted for its role as an alternative source for fuel and diesel used in manufacturing industry and human activity. Producing FAME using low cost non-edible oil such as palm fatty acid distillate (PFAD) with the assistant of heterogeneous mixed oxide catalyst is able to enhance the esterification process. In this study, mixed oxide catalyst which is chromium-manganese (Cr-Mn) was synthesized by using sol-gel method and analyzed for the production of fatty acid methyl ester (FAME) from palm fatty acid distillate (PFAD) via esterification process. Two parameters were studied for catalyst preparation which are the effects of catalyst metal ratio with formula of Cr_xMnO_2 and catalyst calcination temperature. The reactions were conducted in a batch reactor with the temperature of 160°C . The catalyst that has the best performance in production of FAME (where lowest density of FAME is $0.85\text{g}/\text{cm}^3$), is catalyst with formula CrMnO_2 (best ratio at 1:1). Best calcination temperature for this CrMnO_2 catalyst is at 500°C . This shows that the formula CrMnO_2 can be a good and potential solid catalyst for enhancing FAME production.