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**A novel solid base catalyst for transesterification of triglycerides toward biodiesel production:
carbon nanohorn dispersed with calcium ferrite**

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Abstract: Carbon nanohorn (CNH) dispersed with a calcium ferrite $\text{Ca}_2\text{Fe}_2\text{O}_5$ ($\text{Ca}_2\text{Fe}_2\text{O}_5\text{-CNH}$) was synthesized as a new catalyst, and its superior catalytic activity to convert a triglyceride to a fatty acid methyl ester via transesterification reaction was demonstrated. The process to prepare this catalyst has three steps as follows. For the first step, Fe-dispersed CNH (Fe-CNH) was synthesized by a gas-injected arc-in-water method. For the second step, the oxidation treatment in diluted CO_2 or in air was performed on Fe-CNH to transform Fe nanoparticles dispersed in Fe-CNH to Fe_3O_4 or Fe_2O_3 , respectively. For third step, Fe_3O_4 -dispersed CNH ($\text{Fe}_3\text{O}_4\text{-CNH}$) or Fe_2O_3 -dispersed CNH ($\text{Fe}_2\text{O}_3\text{-CNH}$) was co-calcined with $\text{Ca}(\text{NO}_3)_2$, resulting to the formation of $\text{Ca}_2\text{Fe}_2\text{O}_5\text{-CNH}$. The powdery catalysts of $\text{Ca}_2\text{Fe}_2\text{O}_5\text{-CNH}$ can be recovered by magnetic field for recycled use. In the transesterification experiment, tricaprylin was converted to methyl caprylate. The reaction rate of this transesterification using $\text{Ca}_2\text{Fe}_2\text{O}_5\text{-CNH}$ catalysts was obviously higher than using conventional CaO

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