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Detail chemical kinetic for thermal decomposition of low molecular weight-methyl esters

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In the author's previous study, low molecular weight - methyl esters (LMW-ME) with carbon - carbon double bond at the end of alkyl chain [CnH2n-2O2] with n=4-9 are generated by a biodiesel utilizing diesel engine. However, the detail chemical kinetic of thermal decomposition is not clearly comprehended. This experiment study aims at better understanding a detail kinetic for thermal decomposition of LMW-ME, performed in an isothermal flow quartz tube reactor at atmospheric pressure. LMW-ME standards were constantly introduced to thermal decomposition system using pump and mass flow controller. The reactant input was fixed at each LMW-ME compound. The tubular reactor was ranged from 773 to 973 K, at residence time between 0.56 and 5.14 min. The emission gas was absorbed by Cabopack B 100 mesh, eluted by CS2 solvent and analyzed by GCMS. Assuming the decomposition reaction is first order, the activation energy of C4 to C9 was 68.51, 52.03, 50.66, 42.50, 47.83 and 32.01kJ/mole, respectively. The rate constant order of LMW-ME is C4<C5<C6<C8<C7<C9. Those results indicated that thermal decomposition of higher carbon number is easier than lower carbon number except for C8, which is consistent with the previous work; C4 was found highest concentration in diesel/biodiesel blend exhausted gas. C4 is also the most abundant product when decomposition of other LMW-ME and the mass carbon balance was evaluated and calculated

Biography

Phan Quang Thang received his BS and MS in Environmental Science from Hanoi National University, Vietnam. From 2012 to present, he is a PhD student at Osaka Prefecture University. His research interests include biodiesel's emission, renewable energy products, new toxic compound and air quality monitoring.

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