



## **BURNED GAS AND UNBURNED MIXTURE COMPOSITION PREDICTION IN BIODIESEL-FUELLED COMPRESSION IGNITION ENGINE**

Author(s): **Sathaporn Chuepeng, Cholada Komintarachat**

Volume: **VI No: 2**

Pages: **77-88**

Date: **December 2009**

**Abstract:** A prediction of burned gas and unburned mixture composition from a variety of methyl ester based biodiesel combustion in compression ignition engine, in comparison with conventional diesel fuel is presented. A free-energy minimisation scheme was used to determine mixture composition. Firstly, effects of biodiesel type were studied without exhaust gas recirculation (EGR). The combustion of the higher hydrogen-to-carbon molar ratio (H/C) biodiesel resulted in lower carbon dioxide and oxygen emissions but higher water vapour in the exhaust gases, compared to those of lower H/C ratios. At the same results also show that relative air-to-fuel ratio, that biodiesel combustion gases contain a higher amount of water vapour and a higher level of carbon dioxide compared to those of diesel. Secondly, influences of EGR (burned gas fraction) addition to biodiesel-fuelled engine on unburned mixture were simulated. For both diesel and biodiesel, the increased burned gas fraction addition to the fresh charge increased carbon dioxide and water vapour emissions while lowering oxygen content, especially for the biodiesel case. The prediction was compared with experimental results from literatures; good agreement was found. This can be considered to be a means for explaining some phenomenon occurring in biodiesel-fuelled engines.

**For full paper, contact:**

**Prof Muhammad Masood Rafi**

Editor, NED University Journal of Research

Ph: +92(0)21 992611261-8 Ext. 2413

Fax: +92 (0)21 99261255

Email: [NED-Journal@neduet.edu.pk](mailto:NED-Journal@neduet.edu.pk)

Website: <http://www.neduet.edu.pk/NED-Journal>