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Effects of biodiesel-ethanol and biodiesel-butanol blends on the combustion, performance and emissions of a diesel engine

L. Wei, C.S. Cheung, Z. Ning

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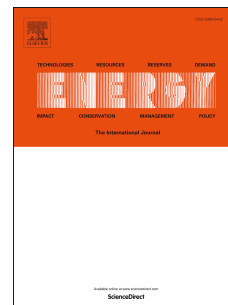
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1 **Effects of biodiesel-ethanol and biodiesel-butanol blends on**
2 **the combustion, performance and emissions of a diesel**
3 **engine**

4 L. Wei¹, C.S. Cheung^{1*}, Z. Ning²

5 ¹Department of Mechanical Engineering, The Hong Kong Polytechnic University,
6 Hung Hom, Kowloon, Hong Kong

7 ²School of Energy and Environment, City University of Hong Kong, Tat Chee Avenue,
8 Kowloon, Hong Kong

9
10 *Corresponding author.

11 Tel: +852 2766 7819; Fax: +852 2365 4703

12 Email: chun.shun.cheung@polyu.edu.hk

13 **Abstract**

14 The present study is aimed to investigate and compare effects of biodiesel-ethanol
15 (BE) and biodiesel-n-butanol (BBu) blends on combustion, performance and
16 emissions of a direct-injection diesel engine. Experiments were conducted on BE5 (5%
17 ethanol and 95% biodiesel, v/v), BE10, BE15, BBu5, BBu10 and BBu15, at five
18 engine loads and at 1800 rpm. In regard to combustion characteristics, effects on
19 maximum heat release rate, maximum in-cylinder pressure, start of combustion,
20 combustion duration and coefficients of variations (COVs) of IMEP and maximum
21 increase rate of in-cylinder pressure were investigated. In regard to engine
22 performance, effects on BSFC and BTE were investigated. The blended fuels have
23 adverse effects on engine performance especially at low load, with the BE blends
24 having more adverse effects than the BBu blends. Moreover, on average of the five
25 engine loads, the BBu and BE blends increase CO emission by 13.7% and 22.8% and
26 HC emission by 5.6% and 29.2%, respectively; but reduce NO_x emission by 6.5% and
27 28.0%, particle mass concentration by 20.7% and 20.6% and particle number
28 concentration by 22% and 21%, respectively. Overall, the BE blends are more
29 effective in reducing particulate and NO_x emissions but the BBu blends would lead to
30 less increase in CO and HC emissions.

31
32 **Key words:** diesel engine; biodiesel; butanol; ethanol; emissions.

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