ABSTRACT

Rapid depletion of the world's crude oil reserves with increasing fuel consumption, resulting in higher fuel prices and imposition of stringent environmental legislations have generated worldwide interest in alternative, renewable fuels, which are easily available, environment friendly and economical as compared to conventional fuels. Alternative to petroleum fuel is a great concern because of ever-increasing usage of automobiles and resulting environmental pollution. Amongst primary alcohols, butanol is being considered as most promising alternative fuel candidate. This is because of its chemical and physical properties, which are very similar to gasoline and it can be produced from various biomass feed-stocks such as corn, grain, potatoes, sugar beet, grass, leaves, trees or agricultural waste. In present research, experiments have been conducted on butanol-gasoline blends for evaluating its performance, emission and combustion characteristics in a medium duty transportation spark ignition engine. The bsfc of butanol-gasoline blends is slightly higher, because of lower calorific value of butanol, which means more fuel quantity is required to produce same power at identical engine operating conditions. BTE of butanol-gasoline blends is reduced, however butanol 50 is observed to deliver higher BTE. Butanol-gasoline blends produce lower BSHC, BSNO, BSCO emissions and smoke opacity because of relatively higher latent heat of vaporization, higher oxygen content and lower C/H ratio for butanol vis-a-vis gasoline. Combustion characteristics of butanol-gasoline blends are almost similar to gasoline. Combustion duration of butanol-gasoline blends is slightly higher than gasoline, suggesting slower combustion and lower flame speeds for butanol-gasoline blends. Ignition delay (10% MBF) for higher concentration butanol-gasoline blends is also slightly higher than gasoline. Overall, butanol has performance, emission and combustion characteristics similar to gasoline with minor variations.