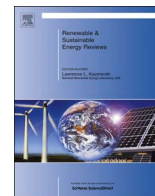


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Using fusel oil as a blend in gasoline to improve SI engine efficiencies: A comprehensive review



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ABSTRACT

Alternative fuels are becoming important due to higher energy demands but with limited fuel supplies. Fusel oil is a by-product obtained through the fermentation of some agricultural products such as beets, cones, grains, potatoes, sweet potatoes, rice and wheat. Fusel oil can be used as a clean and high-efficiency spark ignition fuel with a reduced NO_x. The energy value of fusel oil is near to other alternative combustible types and the limited number of researches on the use of fusel oil as an alcohol derivative in spark ignition engines constitute to the base of this research. The literature relevant to fusel oil use was reviewed and summarized to demonstrate the viability of fusel oil as an alternative fuel from renewable energy source. The aim of this paper was to review the potential for the utilization of fusel oil as a candidate for an alternative fuel for spark-ignition engine, while also describing the production and utilization of fusel oil generally. The octane number and density of fusel oil present the most important properties that make fusel oil a candidate for an alternative fuel for SI fuel engines. It was observed that the octane number increased with the increase in percentage of fusel oil in the blend tests. It was also noted that when the fusel oil was used as a blend with gasoline, the engine torque was slightly increased and the volumetric efficiency and specific fuel consumption also increased. The hydro-carbon (HC) and carbon monoxide (CO) emissions were averagely increased. Furthermore, knocking and nitrogen oxides (NO_x) were observed to decrease when fusel oil was used. On the other hand, negative effects occurred in the engine performance caused by the higher water content in fusel oil.