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## Advances in the Use of Ethers and Alcohols as Additives for Improving Biofuel Properties for SI Engines

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### Abstract

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Commercialization of biofuels as alternative fuels to conventional diesel fuel for application as transport-fuels for diesel engines is fast becoming attainable owing to the merits offered by the inclusion of significant quantities of an alcohol (ethanol) and a member of the “ether” group (dimethyl ether) as additives or property-improvers for biofuels obtained from biomass. These additives are fuels in kind, but have lower viscosities, flash points, flammability etc., hence they infuse some measures of atomization and moderation in the densities and viscosities of biofuels towards ensuring their suitability for use in Internal Combustion Engines (ICEs). Biofuels need be improved in terms of fuel quality such as performance, emission and combustion characteristics to meet

market specification. This then informs the need for suitable fuel-modifiers which must be tested for their compatibilities with different biofuel-sources before they are used as fuels in ICEs. The mixing ratio of the added components with the biofuels is also to be given utmost attention as an alcohol such as ethanol and an ether (dimethyl ether), are known for their high volatilities which in turn regulate the BTEs and combustion potentials of the fuels, all aimed at improving the cetane numbers or indices of the blended fuels. Owing to the relative abundance of bioresources as precursors for biofuels relative to other sources of ethers and alcohols, literature has it that some prospective alcohols and ethers have been admixed with biofuels as means of upgrading their properties towards ensuring their high suitability for diesel engines with little or no modifications; this then implies that there might be need to begin to look into reconfiguring some diesel engines in order to abate engine wear, fuel degradation as well as catalyst-poisoning towards ensuring/maintaining high engine-compatibilities with these fuels. Therefore, this chapter is proposed for inclusion in Book 1 "Engine and fuels for future transport", and its focus will be on the effects of using lone ethanol, dimethyl ether or biofuels as well as their blends for use as future transport fuels.

#### Keywords

- **Biofuel**
- **Dimethyl ether**
- **Ethanol**
- **Diesel Engine**
- **Engine-fuel compatibility**
- **Transport fuel**

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