

Blending methanol as renewable fuel in vehicles towards environment protection

Dr. Ashok G. Matani

Associate Professor - Department of Mechanical Engineering,
Government College of Engineering, Amravati – 444604 [M.S.] India,
Email: dragmatani@gmail.com, ashokgm333@rediffmail.com

Abstract

Now-a-days, global concerns have been rising on finding solutions to the rapid depletion of petroleum reserves, environmental pollution and the current increase in petroleum fuel prices. Adding alcohols into gasoline or diesel allows the fuel to have a complete combustion with the present of oxygen which increases its combustion efficiency and reduces greenhouse gas emission. The interest on alcohol as an alternative fuel in the automotive fuel market is expected to grow rapidly in the next decades. In terms of application, Brazil has successfully and widely used ethanol as a fuel for spark ignition engine operation. In the United States, 10% ethanol blended with gasoline known as gasohol is available at thousands of petrol service stations as an automobile fuel. By the year 2022, the country is expected to have 36 billion gallons of advanced bio-fuels and ethanol which have been given order by the US Renewable Fuel Standard. Alternative fuels on internal combustion engine (ICE) recently has become an attention due to the concern for environmental protection, and needs on reducing dependency on fossil fuels and meeting the current stringent regulation. Alcohol fuel is one of the attractive alternative fuels as it can be produced from renewable resources and is oxygenated. Methanol fuel is a well-known alcohol fuel that can be blended at the lower blending ratio with gasoline and produce better engine operation in spark ignition engine. However, there is a problem related to its methanol properties, especially on its energy content and vapor lock characteristics. Alcohol with higher carbon number such as iso-butanol has high energy content and is able to displace more petroleum gasoline compared to the methanol-gasoline blended fuel. India needs around 2900 Crores liters of petrol and 9000 Crores liters of diesel per year currently, the 6th highest consumer in the world and will double consumption and become 3rd largest consumer by 2030. Import bill on account of crude stands at almost 6 Lakh Crores.

World scenario of blending methanol and ethanol

The use of alternative fuels has been promoted in the EU as a measure to decrease greenhouse gases (GHG) emissions and also to meet what at the time was a growing demand of energy for transport use. Biofuels have been seen as a measure to reduce emissions of GHGs from road transport because they were considered CO₂ neutral fuels. The EU has set a 10% renewable energy requirement for the

transport sector, to be complied with by 2020. In 2010, the use of renewable energy by the transport sector was 4.70%, 91% of which was covered by biofuels. In the United States, the Environmental Protection Agency (EPA) has implemented a series of initiatives to promote the introduction of renewable fuels, with a target of 136 billion liters of renewable fuel to be blended with gasoline by 2022. So far, ethanol is the main renewable fuel used for transportation in the U.S. Blending mandates exist in 52 countries around the world having such requirements. China has a biofuels mandate of 10% by 2020. India, expects to cover 20% of its fuel demand with ethanol by 2018. Brazil, where ethanol has been used in different fuel blends since the mid-70s, mandates that 20% of the gasoline demand has to be supplied by ethanol by 2022. This target has already been reached. In Europe, the latest version of the principle European gasoline (EN228) standards allows blending up to E10 (gasoline containing up to 10% of ethanol). Hydrous ethanol containing fuel blends have been proposed as an alternative to the anhydrous ethanol blends. By skipping the drying step after distillation of the fuel ethanol one can avoid the capital and energy cost associated with these drying units, which makes hydrous ethanol cheaper than anhydrous ethanol. Brazil uses hydrous ethanol (ethanol with up to 4.9% volume / volume of water) in E100 for flex-fuel vehicles.

Conclusions

Worldwide due to emission regulations being implemented stringently by International Maritime Organization, marine sector is shifting to Methanol as fuel of choice. Being a very efficient in liquid form and practically generating no SO_x or NO_x , methanol is much cheaper than LNG and bunker / heavy oil. Government is planning to convert 500 barges into methanol within 12 months. Sweden has already about 17 boats, ferries, barges and a 1500 passengers cruise ship running on methanol. India plans to convert nearly 50 numbers of vessels in the port sector and various vessels owned by Government entities to operate on methanol by adopting technology in India, resulting in a massive modernization and transformation of the sector. This opportunity will also be used to standardize all the marine regulations both sea and inland in parity with International Maritime Organization rules and with global standards.

Keywords: Starch and sugar cane, gas synthesis, molecular mass alcohols, methanol-gasoline blended fuel.