Abstract

The search for alternative renewable fuels has gained more importance due to increasing fuel cost and environmental concerns because of use of fossil fuels for energy production. This has led to severe reduction in petroleum reserves globally. Petroleum fuels cause concern because of resultant environmental pollution caused by their combustion in automotive engines. Petroleum fuelled vehicles discharge significant amount of pollutants like CO, HC, NOx and soot.

Among all alternative fuels, primary alcohols are considered as a more promising fuel for the future. Methanol is extracted from sugarcane, waste and many other agricultural products (renewable sources). This resource is sparingly used worldwide as an alternative replacement fuel for gasoline. In this study, experiments have been carried out on methanol blends with gasoline (M10 & M20) for its comparative performance, emissions, combustion and particulates in a medium duty spark ignition transportation engine, typically used in mid-sized car. From the study it is concluded, that the brake thermal efficiency of methanol blends is higher than gasoline. The latent heat of vaporization of methanol is higher (about 3 times) than that of gasoline therefore methanol blends absorb higher heat from the contents of the cylinder during the vaporization in compression stroke and this decreases the necessary work for compressing the air-fuel mixture and it improves the brake thermal efficiency. The calorific value of methanol is lower therefore the consumption rate increases, which means more fuel is required to produce the same power at the same operating condition. Alcohol-gasoline blend produce lower HC, CO, NO and smoke emission because methanol blends have high latent heat of vaporization, more fuel oxygen, less C/H ratio as compare to gasoline. Combustion characteristics of methanol blends are nearly identical to gasoline. Particles emitted by gasoline showed relatively higher particle

number concentrations and higher mass distribution compared to M10 and M20 however the size distribution of gasoline was lower than methanol blends at higher engine loads.