

# Investigation of Emissions Characteristics of Secondary Butyl Alcohol-Gasoline Blends in a Port Fuel Spark Ignition Engines

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## ABSTRACT

Exhaust emissions especially from light duty gasoline engine are a major contributor to air pollution due to the large number of vehicles on the road. The purpose of this study is to experimentally analyse the exhaust pollutant emissions of a four-stroke port fuel spark ignition engines operating using secondary butyl alcohol–gasoline blends by percentage volume of 5% (GBu5), 10% (GBu10) and 15% (GBu15) of secondary butyl-alcohol (2-butanol) additives in gasoline fuels at 50% of wide throttle open. The exhaust emissions characteristics of the engine using blended fuels was compared to the exhaust emissions of the engine with gasoline fuels (G100) as a reference fuels. Exhaust emissions analysis results show that all of the blended fuels produced lower CO by 8.6%, 11.6% and 24.8% for GBu5, GBu10 and GBu15 respectively from 2500 to 4000 RPM, while for HC, both GBu10 and GBu15 were lower than that G100 fuels at all engine speeds.

Keywords: 2-butanol; gasoline; emissions;

## INTRODUCTION

Climatic change of the earth have triggered a global warning to each corner of this earth due to its adverse effects to each living creatures. Based on the estimation done by International Energy Agency (IEA), a rose by 53% in global energy consumption is foreseen by the year of 2030 [1]. Malaysia alone estimated to have an increment of gross domestic product (GDP) by 4.6% in between 2004 to 2030, which indicate that increased of GDP by 1% approximately resulted to growth of energy demand by 1% [2]. Transportation sector are one of the major contributor in rise of energy demand mainly from gasoline and diesel engine vehicles which consumed depleted fossilized fuels [3-5]. Perhaps one of the potential solution that could possibly bring back the balanced in energy consumption and the climatic change in this world is by introducing the biofuel in the transportation areas[6-7].

The use of alternative clean biofuels such as methanol, ethanol and butanol is one of the method to reduce the dependency on the energy demand for fossilized fuels in spark ignition engine [8-10]. However for the past few years the investigation of methanol and ethanol have received considerable critical attention with less attention