

# Physical properties and chemical composition of biofuels

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**Mohd Hafizil Mat Yasin<sup>1,2</sup>, Mohd Affandi Ali<sup>1,2</sup>, Rizalman Mamat<sup>1,2</sup>,  
Ahmad Fitri Yusop<sup>1,2</sup> and Mohd Hafiz Ali<sup>1,2</sup>**

<sup>1</sup>*Department of Mechanical Engineering, Politeknik Kota Kinabalu, Sabah, Malaysia* <sup>2</sup>*Faculty of Mechanical Engineering, University of Malaysia Pahang, Pahang, Malaysia*

## 11.1 INTRODUCTION

Biofuels are among the most promising fuels of renewable energy with various forms of possible applications. Most applications of biofuels are mainly based on the use of products in internal combustion engines and power generation industrial sectors. These biofuels are organic products which can be derived from oil-producing crops, to produce vegetable oils either pure or transesterified into biodiesel, or from sugary and starchy feedstock crops to produce alcohol forms of ethanol. This chapter focuses in detail on some aspects of biofuel characteristics regarding their physical and chemical characteristics as well as the chemical composition of biofuels. A few critical positive elements are described regarding these biofuels, including being self-sustainable in contrast to fossil fuels, the entrepreneurial system of cultivation, and higher yields in agricultural production outcomes, the absence of sulfur, biodegradability, lower carbon monoxide emissions, as well as particulate matters (PMs) and unburnt products. However, there are a few limitations connected to these biofuel utilizations, including higher production costs, which is not competitive when compared to fossil fuels, and secondly, the chemical and physical properties of biofuels, which have less equivalence to engine specifications and standards. Therefore, it is necessary to consider the high variability of chemical and physical characteristics of different biofuels and their blends. These biofuels are made up of 98% triglycerides, and the remaining 2% consists of phospholipids with different types of hydrocarbons. A molecule of esterified glycerol bonds with molecules of fatty acids with a range from one to three to form glycerides, dependent on the different number of carbon atoms and the configuration of variable chemicals. The differences in chemical structure contribute to the variations of the different oil characteristics, which strongly