

Mapping Coffee Waste in Oman and its Potential Application as Biodiesel

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Abstract

Fatty acid alkyl esters, also known as biodiesel, have received a lot of interest as an eco-friendly substitute for diesel fuel because of its many benefits as a renewable, biodegradable, and nontoxic fuel. Recently, in Oman the consumption of the coffee has dramatically increase with increasing number of specialty coffee shops across the country. Moreover, this results in significant amount of spent coffee waste that can be viewed as a resource. Spent coffee oil has been extracted from spent coffee waste using different solvents including heptane and methanol with yield ranging from 14-19%. The oil was characterized using GC/MS and it has been found that the oil was rich in fatty acids based on C₁₈. Biodiesel was prepared in two-step acid-base catalyst transesterification method as the crude oil's acid value was higher (25.8 mgKOH/g). The ratio of the transesterification reaction were 12/1 (v/v) methanol in the presence of 1% sulfuric acid. The resulted biodiesel was characterized by GC/MS with fatty acid methyl esters content was more than 50%. The volume of spent coffee waste in Oman was estimated to be 30 ton per year and hence the volume of biodiesel that can be potently harnessed from waste summing up to 1 million liter.