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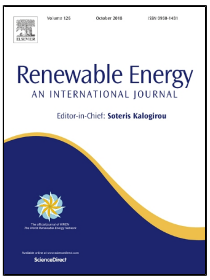

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Abstract:

This research work investigated the optimization of biodiesel production from Sweet Almond (*Prunus amygdalus*) Seed oil (SASO) using Response Surface Methodology (RSM) and Artificial Neural Networks (ANN) models through base (NaOH) transesterification. The Central Composite Design (CCD) optimization conditions were temperature (30°C to 70°C), catalyst concentration (0.5%w/w to 2.5% w/w), reaction time (45minutes to 65minutes) and oil/methanol molar ratio (1:3mol/mol to 1:7mol/mol). The physico-chemical properties of the seed oil and the methyl ester were carried out using standard methods. The fatty acids were determined using GC-MS and characterized using FT-IR techniques. An optimized biodiesel yield of 94.36% from the RSM and 95.45 % from the ANN models respectively were obtained at catalyst concentration of 1.5w/w%, reaction time of 65 minutes, oil/methanol molar ratio of 1:5mol/mol and temperature of 50°C. The quality of the RSM model was analyzed using Analysis of Variance (ANOVA). Model statistics of the ANN showed comfortable values of Mean Squared Error (MSE) of 6.005, Mean Absolute Error (MAE) of 2.786 and Mean Absolute Deviation (MAD) of 1.89306. The RSM and ANN models gave coefficient of determination (R^2) of 0.9446 and correlation coefficient (R) of 0.96637 respectively.

Keywords: Transesterification, Biodiesel, Optimization, Models, *Prunus Amygdalus*

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Abbreviations:

ANN	-	Artificial neural Network
ANOVA	-	Analysis of Variance
CCD	-	Central Composite Design
FFA	-	Free Fatty Acid
FT-IR	-	Fourier Transform Infra red
GC-MS	-	Gas Chromatography-Mass Spectroscopy