World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

Near-Infrared Spectrometry as an Alternative Method for Determination of Oxidation Stability for Biodiesel

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Abstract : Near-infrared spectrometry (NIR) was tested as a rapid and alternative tool for determination of biodiesel oxidation stability. A PetroOxy method is standardly used for the determination, but this method is hazardous due to the possibility of explosion and ignition of flammable fuels. The second disadvantage is time consuming. The near-infrared spectrometry served for the development of the calibration model which was composed of 133 real samples (calibration standards). The reference values of these standards were obtained by PetroOxy method. Many chemometric diagnostics were used for the development of the final NIR model with the aim to have accurate prediction of the oxidation stability. The final NIR model was validated by 30 validation standards. The repeatability was determined as well with the acceptable residual standard deviation (8.59 %). The NIR spectrometry has proved to be an accurate alternative method for the determination of biodiesel oxidation stability with advantages as the time and cost saving, non-destructive character of analyzing and the possibility of online monitoring in safe mode.

Keywords : biodiesel, fatty acid methyl ester, NIR, oxidation stability
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020