

DETERMINATION OF BIODIESEL IN DIESEL BLENDS USING PORTABLE INFRARED (IR) ANALYSER

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Biodiesel has been widely used as diesel substitute in Europe and the United States since 2000. The permissible limit of biodiesel in diesel fuel is subjected to the engine warranty extension given by the original equipment manufacturers (OEM). Currently, up to 5% (vol/vol) of biodiesel in diesel is allowed in all diesel engines. Malaysian standard of diesel fuel (MS 123:2005) has been revised for diesel fuel to accommodate up to 5% (vol/vol) of palm methyl esters (biodiesel) complying with MS 2008 – Automotive Fuels: Palm Methyl Esters (PME) for Diesel Engines – Requirements and Test Methods. As a measure to ascertain the percentage of biodiesel in the blended fuel, a rapid and robust test method has been established to determine the percentage of biodiesel using portable Infrared (IR) analyser.

BASIC PRINCIPLE OF BIODIESEL DETERMINATION

The analysis is conducted based on the ASTM D7371-07- Standard Test Method for Determination of Biodiesel (Fatty Acid Methyl Esters) Content in Diesel Fuel Oil using Mid Infrared Spectroscopy (FIR-ATR-PLS Method) (Figure 1).

This analyser is self contained with an internal calibration program and a direct readout display. Biodiesel has its characteristic absorbance in the mid-infrared range. The increase and decrease of infrared absorbance correlates directly to the amount of biofuel present in the sample. It can be measured independently from diesel at $5.73 \mu\text{m}$ (1745 cm^{-1}).

ACCURACY OF TEST METHOD

Almost perfect linearity of calibration curve with R square values more than 0.9995 has been demonstrated. Standard deviation of the analysis based on 150 samples is less than 0.2%.



Figure 1. Equipment used for measuring biodiesel content in diesel.

ADVANTAGES OF RAPID IR METHOD

This analysis has several advantages:

- Direct reading of percentage biodiesel down to 0.5%;
- Easy clean Attenuated Total Reflectance (ATR) plate;
- Rapid results (approximate 30 s);
- Simple to operate and fully portable; and
- No moving parts.

ANALYTICAL AND CONSULTANCY SERVICES

MPOB offers an analytical service for biodiesel determination under the following terms:

- Cost of analysis is RM 50.00 per sample (subject to change);
- The client to deliver samples with a written request for the test required;
- The results of analysis to be ready in one day; and
- Invoice will be sent together with the results.

For more information, kindly contact:

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