LUMEX INSTRUMENTS

Analytical Equipment

INFRARED FOURIER SPECTROMETER

InfraLUM FT-08

DETERMINATION OF FATTY ACID METHYL ESTER (FAME) CONTENT IN DIESEL FUEL OR DOMESTIC HEATING FUEL BY mid-IR SPECTROSCOPY

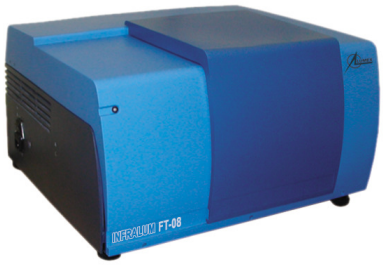
EN 14078:2014

INTRODUCTION

Presence of fatty acid ethyl esters (FAME) in diesel fuel or domestic heating fuel (both hereinafter referred to as diesel fuel) is a signal of blending with biodiesel. The control of FAME content in diesel fuel is an essential and actual task because of the need of the right fuel identification and registration of possible FAME impact on engines and fuel systems. To control the compliance one of the most accurate, rapid and simple methods is EN 14078:2014.

Lumex Instruments provides user-friendly analytical solution for EN 14078:2014 implementation using FTIR spectrometer InfraLUM FT-08 and powerful SpectraLUM software package.

FAME content can also be measured by InfraLUM FT-08 in accordance with other standard methods (ASTM D7371-14 etc). These measurement procedures are not given in the application.



MEASUREMENT METHOD

The method is based on measuring the transmission spectra of a sample of diesel fuel in the mid-IR spectral range. Consequent calculation of the FAME concentration is performed by InfraLUM software automatically by comparison of peak height against a calibration curve.

MEASUREMENT RANGE

Measurement range, % (*V*/*V*)	Directives & standards for fuels	Max. FAME value, % (*V*/*V*)
0.05 – 50	Worldwide Fuel Charter (5th ed., 2013)	<5
	ISO 8217:2017 Petroleum products – Fuels (class F) – Specifications of marine fuels	<7
	ASTM D975-17a Standard specification for diesel fuel oils	<5
	Directive 2009/30/EC Fuel Quality Directive	<7
	EN 590:2013 Automotive fuels. Diesel. Requirements and test methods	<7
	CAN/CGSB-3.517-2017 Diesel fuel	<1
	GB 19147-2016 Automobile diesel fuels	<1

MEASUREMENT PROCEDURES

The sample of diesel fuel is injected into the cell and the IR transmission spectrum of the solution is measured at around between 1670 cm^{-1} and 1820 cm^{-1}, where FAME has strong absorption at 1745±5 cm^{-1} due to the ester carbonyl bond and where fossil diesel is transparent. Then the volume content of FAME in the sample is calculated using the preliminary prepared calibration. EN 590 compatible analysis protocol could be printed in one click.

ADVANTAGES

Using this measuring method with InfraLUM FT-08 provides the following advantages:

- Higher accuracy and sensitivity of analysis compared to other IR-techniques
- Much simpler calibration procedure
- Time of analysis (without sample preparation) is only 1 minute
- Ease of use

Distinctive features of the InfraLUM FT-08:

- Outstanding technical specifications
- Hermetically sealed optical compartment with the automated moisture monitoring system
- Enlarged cell compartment
- Wide variety of accessories from Lumex Instruments & PIKE Technologies
- Automatic validation system of the spectrometer, IQ/OQ protocols
- Remote diagnostics of the spectrometer
- User-friendly software with integrated calibration module

EQUIPMENT AND REAGENTS

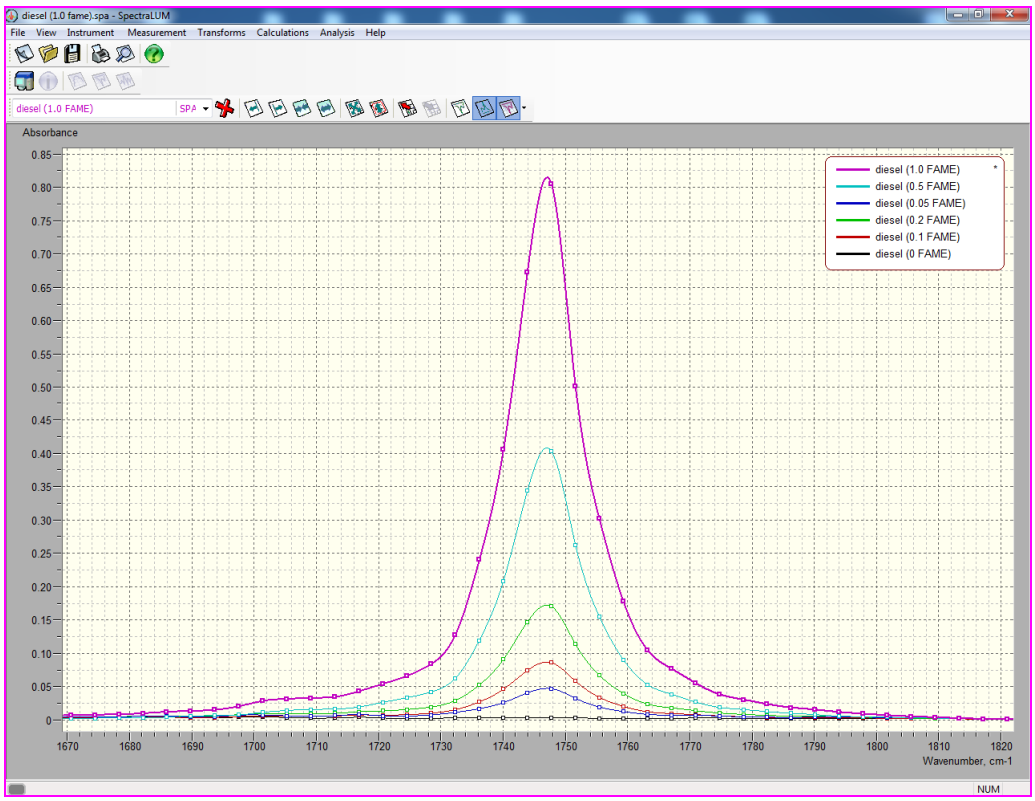
The following equipment and reagents are used in measurements:

- FTIR spectrometer InfraLUM FT-08[1] (with dedicated software SpectraLUM[2])
- Cell holder and liquid cells[1]
- Syringe for cell filling[1]
- Certified reference material of FAME (as specified in EN 14214)
- FAME free middle distillate
- Cyclohexane

[1]— Supplied by Lumex Instruments [2]— Windows® only compatible.

EXAMPLES OF FAME ANALYSIS IN DIESEL FUEL

Examples of FAME absorption peaks: standard solutions with the FAME content of 0.05–1% (*V*/*V*)



Analysis protocol of a real sample.

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InfraLUM FT-08 No 18442	SpectraLUM v 2. 0.1.278
Results	
Sample	**FAME, % (v/v).**
biodiesel No 154	2.4
Applied calibrations	
Calibration name	**Component**
FAME new	FAME
Operator XXX	**Laboratory** XXX

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To get more specific information, please contact the representative by **sales@lumexinstruments.com**