



Application Note AN-NIR-126

近外光技定柴油中生物柴油含量

Monitor the fuel blending process within seconds

SUMMARY

The properties of biodiesel fuel, which is produced from vegetable oils or animal fat, are very similar to petroleum-derived diesel, but biodiesel pollutes less. In most countries the common biodiesel blend is B20, which ranges from 6% to 20% biodiesel content. Measuring the biodiesel content in diesel is important, as higher levels can cause deposits in older diesel engines, clogging the fuel filters and pumps. Fuels with high levels of biodiesel also tend to

absorb more moisture compared to petroleum-derived fuels. With near-infrared spectroscopy (NIRS), the biodiesel content is determined in seconds without any sample preparation. Compared to other test methods like those used in ASTM D7467, biodiesel content analysis with NIR spectroscopy saves time and enables the implementation of online process monitoring with fiber optics.

EXPERIMENTAL EQUIPMENT

Twenty-one diesel samples with varying biodiesel content from 0% to 20% were measured on the OMNIS NIR Analyzer Liquid (Figure 1) in transmission mode (1000–2250 nm) using 8 mm disposable vials. The vial temperature was set and monitored at 30 ° C with the built-in vial sensor to ensure consistent measurement performance.

OMNIS Software was used for all data acquisition and prediction model development.

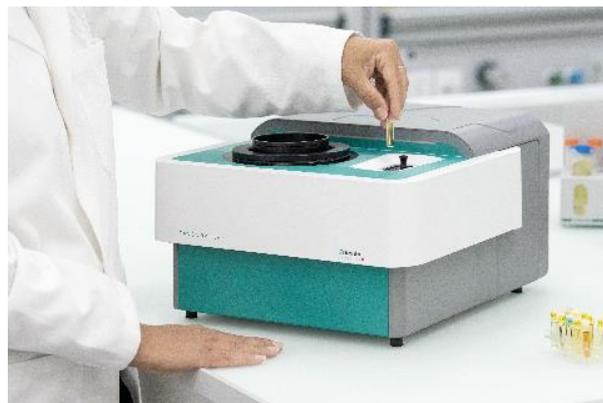


Figure 1. OMNIS NIR Analyzer and a sample filled in a disposable vial.

Table 1. Hardware and software equipment overview.

Equipment	Article number
OMNIS NIR Analyzer Liquid	2.1070.0010
Holder OMNIS NIR, vial, 8 mm	6.07401.070
Disposable vial, 8mm, transmission	6.7402.240
OMNIS Stand-Alone license	6.06003.010
Software license Quant Development	6.06008.002

RESULT

The obtained NIR spectra (Figure 2) were used to create a prediction model for quantification of biodiesel content in diesel. The quality of the prediction model was evaluated using a correlation

diagram (Figure 3) which displays a high correlation between the NIR prediction and the lab method. The respective figures of merit (FOM) confirm the feasibility during routine analysis.

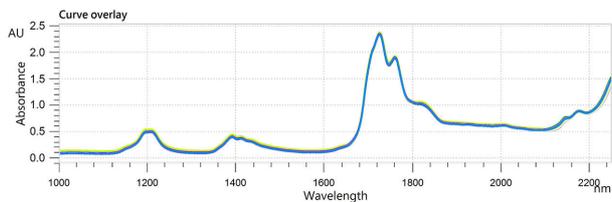


Figure 2. NIR spectra of biodiesel blends analyzed on an OMNIS NIR Analyzer Liquid with 8 mm vials.

Result biodiesel content

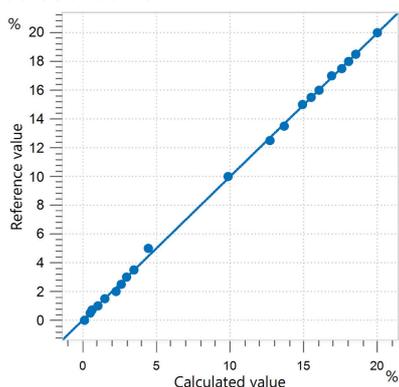


Figure 3. Correlation diagram and the respective FOMs for the prediction of biodiesel content in diesel. The reference value was determined by volumetric mixing of biodiesel and petroleum-derived diesel.

SEC (%)	SECV (%)	R ² CV
0.14	0.16	1.000

CONCLUSION

This Application Note shows the results of a biodiesel content analysis test without the need for any sample preparation, using near-infrared spectroscopy in place of other more time-intensive analytical techniques. This ultimately leads to a

reduction in workload and the related costs. Alongside the biodiesel content test, additional fuel quality parameters like cetane number, moisture, or flash point can be determined with NIRS.

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CONFIGURATION



OMNIS NIR Analyzer Liquid 合液体品的近外光。

OMNIS NIR Analyzer 是一按照瑞士量准和生的近外光 (NIRS) 解决方案,用于整个生的常分析。使用新技和嵌入先 OMNIS Software 反在 NIR 光的速度、可操作性和活使用上。

OMNIS NIR Analyzer Liquid 的点概:

- 可在 10 秒以内量液体品
- 25° C – 80° C 的品行温度控制
- 自品容器的插入和取出
- 方便地嵌入自系,或者与其它分析技(滴定)
- 支持大量不同路径度的品容器



OMNIS NIR8 mm

合 8 mm 一次性小管的 OMNIS NIR Analyzer 的小管支架 (6.7402.240)。



8 mm 100

100 个玻璃(硼硅)一次性品瓶,具有 8 mm 的光路度,用于分析透射中的液体。一次性品瓶交付有所属的螺旋塞(件数 = 100)。

兼容:

- 支架 OMNIS NIR,小管,8 mm (6.07401.070)
- DS2500 支架用于 8 mm 一次性品瓶 (6.7492.020)

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Quant Development

OMNIS Software