



Application Note AN-T-247

根据EN 14104准采用光度滴定法定生物柴油酸

Fast and reliable determination of acid value in fatty acid methyl ester (FAME) with the Optrode following EN 14104

Biodiesel, also known chemically as Fatty Acid Methyl Ester or FAME, is a fuel that is used just like mineral diesel. Biodiesel quality needs to be monitored for many reasons.

The acid value (or acid number) is a measurable quality parameter linked to a fuel's purity and stability. A high acid value suggests either prolonged storage or poor biodiesel production quality, both of which can lead to corrosion of engine parts. A low acid value indicates pure,

stable biodiesel.

In this Application Note, an acid value determination of biodiesel was photometrically titrated with the Optrode. The method was performed according to EN 14104. The standard specifies the titrimetric determination of the acid value in lightly colored fatty acid methyl esters (FAME) in the range of 0.10 mg KOH/g sample to 1.00 mg KOH/g sample

INTRODUCTION

FAME (biodiesel) is a type of fuel produced by transesterification of glycerides present in vegetable or animal fats and oils, as well as in organic waste with monohydric alcohols like methanol or ethanol. In simplified terms, the production process is based on the following reaction:

Oils/Fats + Alcohol → Biodiesel + Glycerine

Compared to petroleum-based diesel, biodiesel produces fewer emissions and is considered

sustainable and climate-friendly. It is primarily made from renewable resources, is biodegradable, and has good lubricating properties.

The acid value in biodiesel should be determined as a quality control measure. Low values are associated with good quality biodiesel, while high values indicate poor quality and a higher likelihood of corrosion from the fuel.

SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on 100% biodiesel (made from organic waste, e.g., waste

cooking oil).

No sample preparation is required.

EXPERIMENTAL

The determinations are carried out on an OMNIS Professional Titrator equipped with OMNIS Dosing Modules (**Figure 1**) as well as an Optrode M2.

An appropriate amount of sample is weighed into the titration beaker, and pre-neutralized 2-propanol as well as phenolphthalein solution are added. The solution is titrated until after the first break point with standardized potassium hydroxide in 2-propanol.



Figure 1. When equipped with an Optrode M2, the OMNIS Professional Titrator with OMNIS Dosing Modules (shown here) are ideal for acid number determination in biodiesel.

RESULTS

This method offers reliable results that meet the standard's requirements for repeatability and reproducibility within the measurement series, as displayed in **Table 1**. An exemplary titration curve of acid number in biodiesel is given in **Figure 2**.

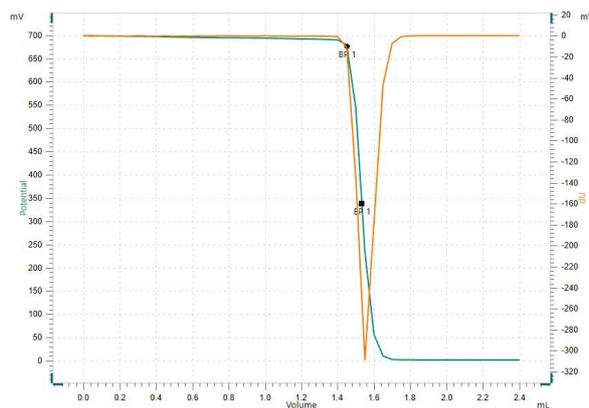


Figure 2. Biodiesel titration for acid value with potassium hydroxide in 2-propanol using the Optrode M2.

Table 1. Results of the photometric titration of acid number in biodiesel (n = 6).

Sample (n = 6)	Acid value in mg KOH/g sample
Mean value	0.41
SD(abs)	0.01
SD(rel) in %	1.8

Photometric titration is a fast and reliable test method for determining the acid value of fatty acid methyl ester (FAME). The glass coating of the Optrode is insensitive to chemicals and raw materials (e.g., biodiesel itself), making it ideal for this purpose.

Thanks to the individually adjustable wavelength of the Optrode and the reliable OMNIS Software, acid value determination according to EN 14104 can be achieved even in very low measuring ranges.

CONTACT

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CONFIGURATION



OMNIS Professional Titrator

新型、模式位分析 OMNIS Titrator,用于行点和等当点滴定(一/)。由于采用 3S OMNIS Liquid Adapter 技,理化学品从未像在一安全。可以使用量模和量管元自由配置滴定,并在需要展一台拌器。包括用于使用其他滴定或加液模平行滴定的“Professional”功能可。

- 通算机或本地网控制
- 可以其他用或助溶液外接最多四个滴定模或加液模
- 可以展磁力拌器和/或棒式拌器
- 可提供不同大小的量管:5、10、20 或 50 mL
- 采用 3S 技的 OMNIS Liquid Adapter:安全理化学品,自生厂家的原始数据

量模式和件:

- 点定滴定:“Basic” 功能可
- 点和等当点滴定(一/):“Advanced” 功能可
- 点和等当点滴定(一/),包括 5 路平行滴定:“Professional” 功能可



OMNIS Dosing Module

用于与 OMNIS Titrator 滴定相的加液模,以展外用于滴定/加液的滴定管。可以展磁力拌器和/或螺旋拌器,以作独的滴定台使用。可自由 5、10、20 或 50 mL 量管元。



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Optrode M2

有 8 可用波的光度滴定法用光学传感器。可以通件控制 (tiamo 2.5 及以上版本)或通磁来行波切。玻璃鞘溶完全耐受,并且易于清。省空的传感器用于例如:

- 按照 USP 或 EP 的非水溶性滴定
- 基端基的定
- TAN/TBN 根据 ASTM D974
- 硫酸定
- 混凝土中的 Fe、Al、Ca
- 水硬度
- 根据 USP 的硫酸骨素

传感器不合通量色度(比色法)来定度。