

EN 14105 Determination of Free and Total Glycerol and mono-, di-, triglycerides in Fatty Acid Methyl Esters (FAME)

- **Compliant to EN 14105:2011**
- **Included QC materials**
- **Dedicated Software for Biodiesel specific reporting**

Keywords:

FAME, EN14105, All-in-one Biodiesel, Free and Total Glycerol, mono-, di-, and triglycerides.

INTRODUCTION

Biodiesel is the “green” equivalent for petroleum diesel or petrodiesel. Biodiesel is a renewable fuel derived from algae, vegetable oils, animal fats or cooking oils. The most important environmental benefit of biodiesel is that it is biological degradable, less poisonous and does not contain aromatics and very low sulfur. Therefore, burning biofuels release less sulfur oxide and carbon monoxide.

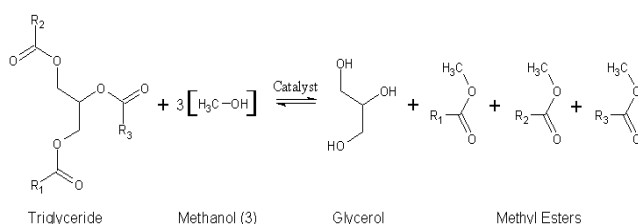


Figure 1: Trans esterification of triglyceride to FAME.

Quality requirements of biodiesel for use as pure biofuel or blending stock for diesel fuel are defined in ASTM D6751 and EN 14214 specification. The standards ensure that among others the following important factors in the fuel production process are satisfied: complete reaction, removal of glycerin, absence of Poly Unsaturated Fatty Acids, removal of alcohol and absence of free fatty acids. Method EN 14105 is prescribed for the determination of Free and Total Glycerol and mono-, di-, triglycerides in Fatty Acid Methyl Esters.

SOLUTION

The AC Biodiesel All in One fully complies with the latest version of EN 14105. It combines all major Biodiesel methods in one complete solution.

After derivatisation with MSTFA, the sample is introduced into the Temperature Programmable Inlet (TPI), where it is mixed with clean carrier gas and directed to the analytical PDMS column. The capillary column separates the individual components in a temperature programmed oven after which they are detected by the FID. Instrumental conditions are inserted in Fig 2.

Quantification of glycerol is carried against the internal standard 1,2,4-butanetriol (figure 2 and 3). Mono-, di- and triglycerides are directly evaluated using different internal standard for each glyceride category (figure 4).

The output of glycerides is given in (m/m) %. Average conversion factors are applied to the mono-, di- and triglycerides to calculate the bonded glycerin content of the sample

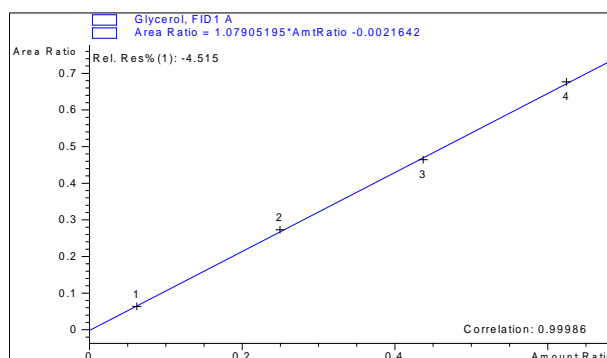


Figure 2: Glycerol calibration curve

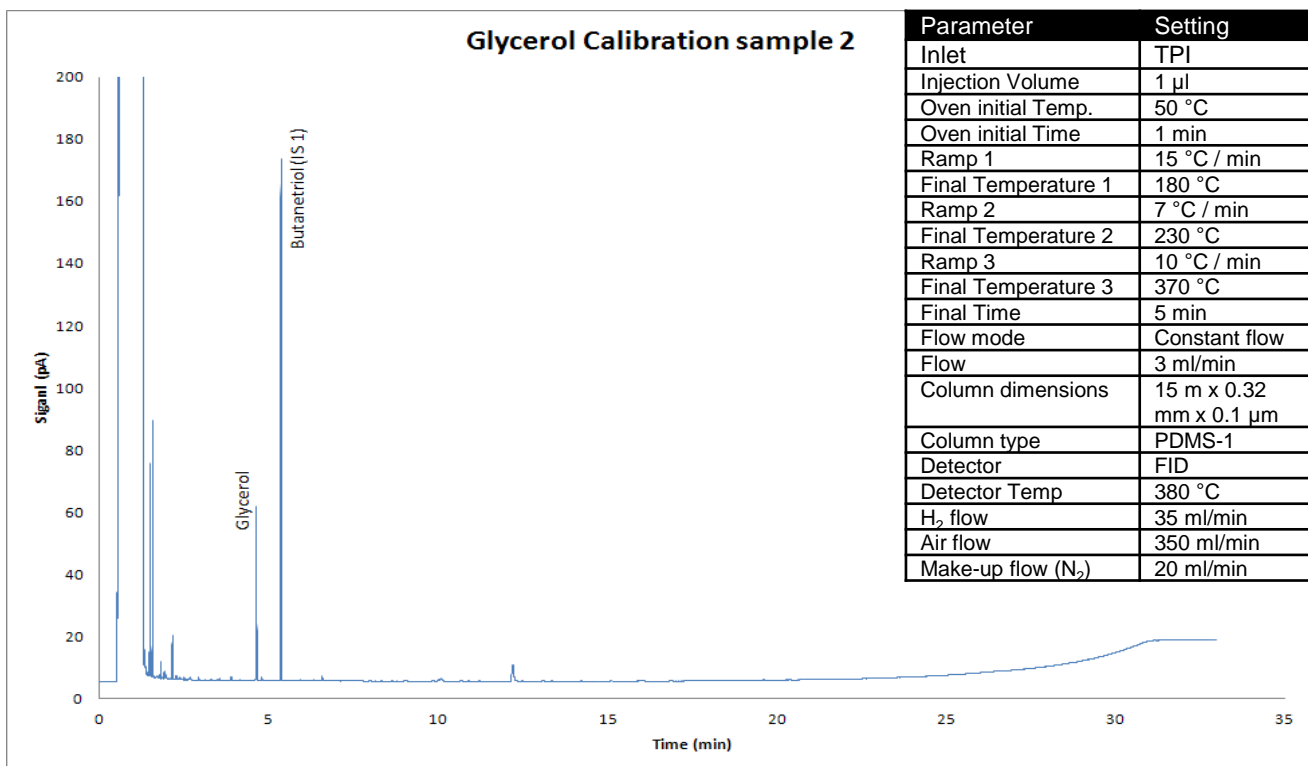


Figure 3: Calibration sample Glycerol with Internal standard (butanetriol)

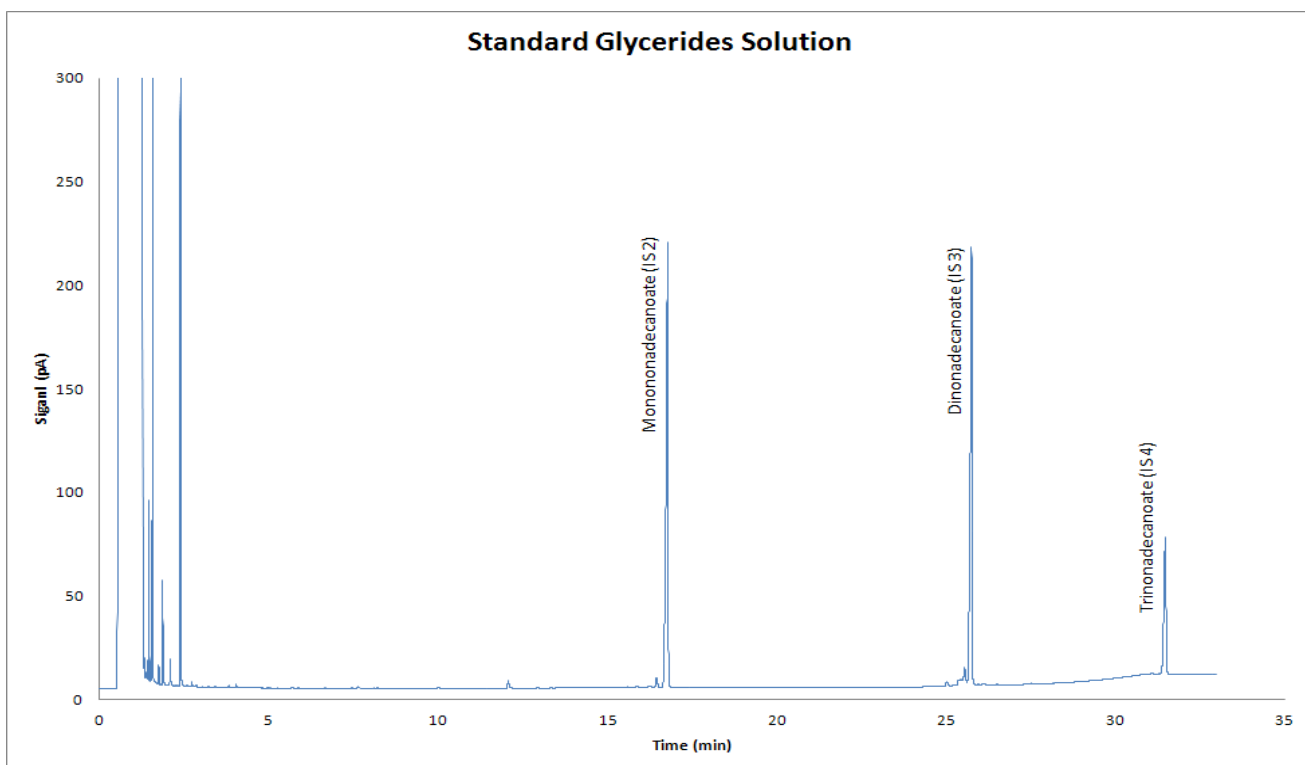


Figure 4: Standard glycerides solution

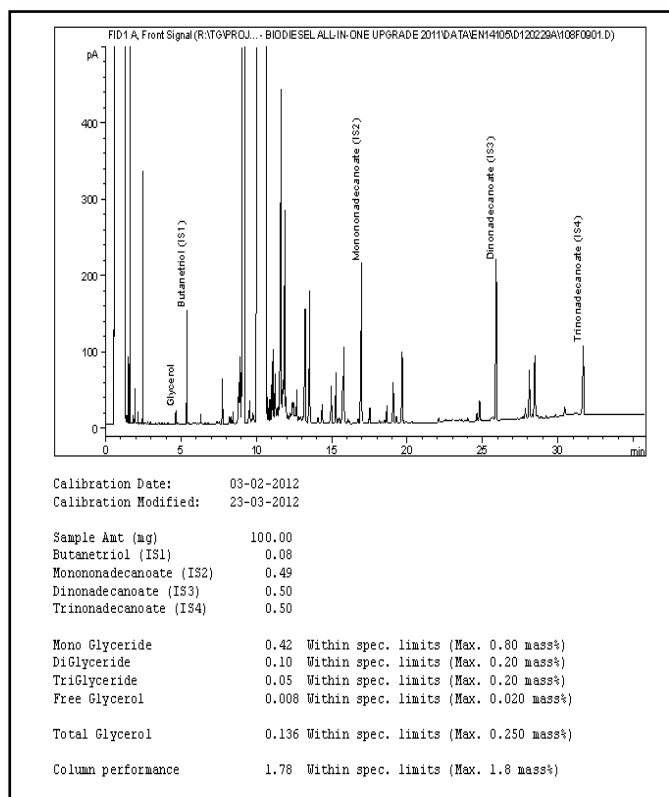


Figure 5: Sample report

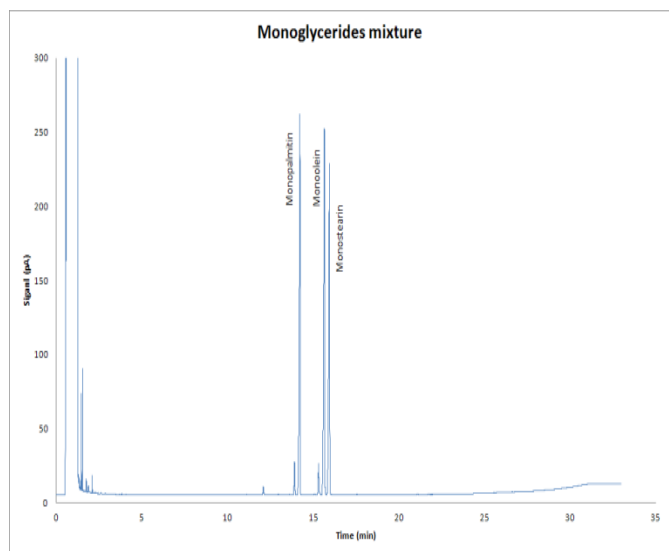


Figure 6: Mixture of monoglycerides (used to locate relevant peaks).

Column Performance

According to method EN 14105:2011, the relative response factor for glyceryl dinonadecanoate (Di C38) versus glyceryl trimonadecanoate (Tri C57) is calculated and reported for every single analysis according:

$$RRF = \frac{A_{DiC38}}{M_{DiC38}} / \frac{A_{TriC57}}{M_{TriC57}}$$

A_{DiC38} = peak area of internal standard Di C38
 M_{DiC38} = weight of internal standard Di C38 (mg)
 A_{TriC57} = peak area of internal standard Tri C57
 M_{TriC57} = weight of internal standard Tri C57 (mg)

Specification Check

Results are checked against specifications and reported with pass or fail result (figure 5).

CONCLUSION

The performance of the AC Biodiesel All in One is demonstrated for EN 14105:2011. Requirements as stated in method are all met.

The AC Biodiesel All in One is also an excellent choice to analyze FAME feedstock according to ASTM D6584, EN 14103, EN 14110, prEN 16300 and EN 15779.

Its innovative dual programmable oven design ensures optimal availability and flexibility towards various methods as no column changes are required when switching applications and the system is 'always ready', regardless the method that's needed for the sample.

The included reference materials & chemicals and the dedicated reporting makes the AC Biodiesel All in One very user friendly and easy to use for fastest adoption in any biodiesel lab.

AC Analytical Controls® has been the recognized leader in chromatography analyzers for gas, naphtha and gasoline streams in crude oil refining since 1981. AC also provides technology for residuals analysis for the hydrocarbon processing industry. Applications cover the entire spectrum of petroleum, petrochemical and refinery, gas and natural gas analysis; ACs Turn-Key Application solutions include the AC Reformulyzer®, DHA, SimDis, NGA, Hi-Speed RGA and Customized instruments.