

Ester analysis in Biodiesel

1. Experiment

1. Methyl Heptadecanoate(C17:0) 10mg/ml solution(I-STD) : Place 500mg of Methyl heptadecanoate in a flask then add Heptane up to 50ml totally – solution 1
2. Place [Biodiesel 250mg] in 10ml Vial, add 5ml of solution 1 then use it as test solution.

2. Analytical condition

Capillary Column : HP-Innowax(30m*0.32mm*0.25um) or another column of similar specification

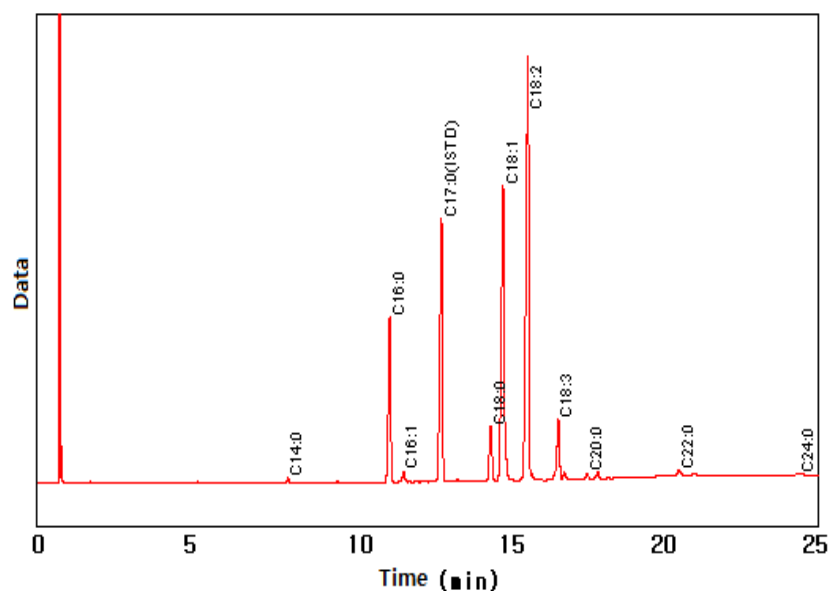
Injector : Capillary 250 °C Column flow 1-3ml/min

Detector : FID 250°C

Oven program : 200 °C (8min)->10 °C/min ->230 °C(10min)

Split ratio 10:1-50:1

3. Chromatogram



C16:0 *Palmitic acid*
 C16:1 *Palmitoleic acid*
 C18:0 *Stearic acid*
 C18:1 *Oleic acid*
 C18:2 *Linoleic acid*
 C18:3 *Linolenic acid*
 C20:0 *Arachidic acid*
 C20:1 *Gadoleic acid*
 C22:0 *Behenic acid*
 C22:1 *Erucic acid*
 C24:0 *Lignoceric acid*
 C24:1 *Nervonic acid*



Ester analysis in Biodiesel by GC

<Result analysis>

Quantification : calculate the value of area with intergrated from C14:0 to C24:1 in Biodiesel.

$$\text{Ester content(\%)} = \frac{[\sum A] - A_{EI}}{A_{EI}} \times \frac{C_{EI} \times V_{EI}}{m} \times 100\%$$

$$\text{Linolenic acid methyl ester content(\%)} = \frac{A_L}{[\sum A] - A_{EI}} \times 100\%$$

$\sum A$: all the peaks area of C14:0-C24:1

A_{EI} : Methyl heptadecanoate(ISTD) area

C_{EI} : Methyl heptadecanoate(ISTD) concentration (mg/ml)

V_{EI} : Methyl heptadecanoate(ISTD) volume (ml)

m : sample amount (mg)

A_L : Linolenic acid methyl ester(C18:2) peak area

<Example>

Total area value of C14-C24 : 58300, C17:0(ISTD) area value : 10000,

If the area of C18:3(Linolenic acid) is 2900, The result is as in the following.

$$\text{Ester content(\%)} = (58300 - 10000) / 10000 \times 10 \times 5 / 250 \times 100\% = 96.6\%$$

$$\text{Linolenic acid ME content(\%)} = 2900 / (58300 - 10000) \times 100\% = 6\%$$

