

AQUACOUNTER Application Sheet	COM series	DATA No. A9	1st edition
Food and Beverage	Measurement of saponification value in edible oil		

1. Measurement outline

When oil/fat is heated with ethanol solution of potassium hydroxide addition, glyceride is saponified and decomposed into potassium salt of fatty acid and glycerin (Formula 1). KOH also reacts with free fatty acids (Formula 2) to form potassium salts of fatty acid. "Saponification value" is the mg value of KOH required for saponification of glyceride and neutralization of the free fatty acids in 1g of the sample.

1 – 2g of sample is collected to be added with 25mL of 0.5mol/L KOH-ethanol solution and is heated for 30 minutes in water bath with reflux cooler.



Excessive KOH is titrated with 0.5mol/L HCl after addition of 100mL purified water.



2. Reagents and Electrodes

(1) Reagents	Titrant	0.5mol/L Hydrochloric acid
	Loading buffer	0.5mol/L Potassium hydroxide-ethanolic solution
(2) Electrodes	Glass reference electrode GR-522B to IE jack. (P/N D252334-1)	

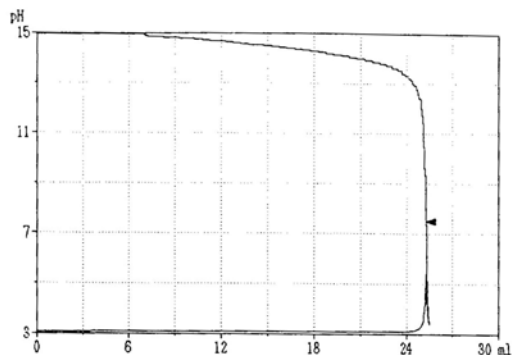
3. Measurement conditions example (for COM-1600S)

Master File No.1	
Condition file: 1	
Parameters for Condition file 1	
Method	AUTO
Buret No.	1
Meas Unit	mV
S-Timer	10 sec
CP,DP Unit	mL
CP	0 mL
DP	0 mL
Direction	N/A
End Sens	200
Over mL	0 mL
Max Vol	20 mL
Mode No.	8 (Pulse = 8, Min Feed = 0.01)
Unit	g/100g
Formula	$(B \cdot D) \times K \times F \times M / (S \times 10)$
Blank	0
Molarity	0.1
Factor	Titre of the titrant
K	56.1

4. Measurement Procedure

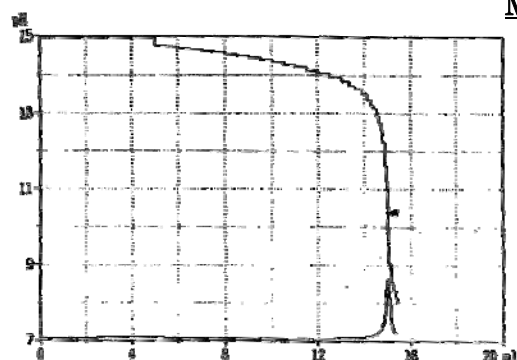
- 1) Accurately weigh the sample into 200mL flask with ground joint.
- 2) Pipette 25mL of 0.5mol/L KOH-ethanol solution into the flask.
- 3) Connect the reflux condenser and heat on a water bath for 30 minutes.
- 4) Add approx. 100mL of deionized water.
- 5) Titrate with 0.5mol/L HCl titrant.
- 6) Perform at least two blank determinations.

5. Measurement example



Blank measurement results

Sample No.	Titration value (mL)
1	25.003
2	25.272
3	25.297
Avg.	25.191 mL
Std. Dev.	0.163 mL
C.V.	0.647 %



Measurement results on saponification value of the sample

Sample No.	Sample size (g)	Titration value (mL)	Saponification value (g/100g)
1	1.0030	15.086	286.1
2	1.0130	15.010	285.4
3	1.0180	14.970	285.1
Avg.			285.5 g/100g
Std. Dev.			0.51 g/100g
C.V.			0.18 %

6. Notes

- (1) The sample pretreatment process greatly affects the measurement results.
- (2) Figure 1 shows the electrode assembly for this measurement.
- (3) Relationship between acid value, saponification value and ester value.
 - Saponification value is the value for calculating the ester value.

$$\text{Ester value} = \text{saponification value} - \text{acid value}$$
 - In general, the acid value of oil/fat is much smaller than the saponification value.

$$\text{Acid value} \ll \text{saponification value}$$
 - Saponification value and ester value do not vary greatly.
 Saponification value has been adopted as the index for assuming the quantity of fatty acids in oils and fats (JAS).

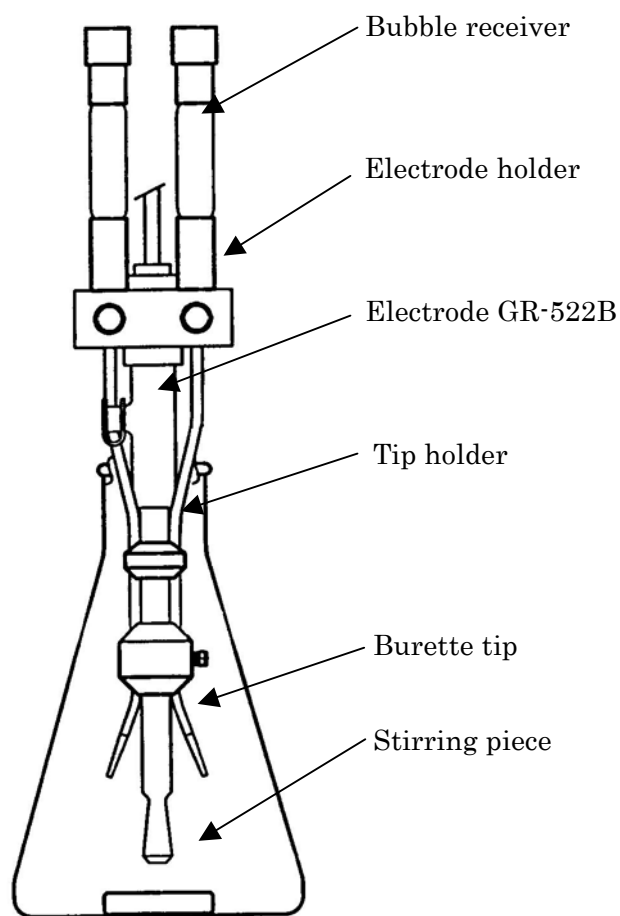


Figure 1. Example of electrode assembly used in titration

Key words

Saponification value, edible oil, composite electrode, ester value, acid value

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