HIRANUMA APPLICATION DATA	Automatic Titrator	Data No	A7	Apr. 19, 2018
FOOD	**Acid value of cooking oil**			

1. Abstract

Acid value of oils and fats is defined as "amount (mg) of potassium hydroxide required to neutralize fatty acid in 1 g of sample" (Formula (1)).

$$R\text{-}COOH + KOH \rightarrow R\text{-}COOK + H_2O \quad \cdots (1)$$

It is used for evaluation of free fatty acid content as quality index of oils and fats. This method is described in a variety of official standards such as "*Japan Agricultural Standards*" and *Pharmacopoeias*. Example of titration for acid value in cooking oil is introduced here.

Reference

1) Japanese Pharmacopoeia Seventeenth Edition

2. Configuration of instruments and Reagents

(1) Instruments

Main unit	:	Hiranuma Automatic Titrator	COM series
Electrodes	:	Glass reference combination electrode	GR-522BZ, Connect to IE-1
Components	:	Buret tip (Tube Type), tubing accessories	

(2) Reagents

Titrant	:	0.1 mol/L Pottasium hydroxide ethanolic standard solution
Titration solvent	:	Mixed solvent of ethanol and diethyl ether with 1 : 1 ratio [v/v]

3. Measurement procedure

(1) Take 20 g* of sample into 200 ml Erlenmeyer flask and weigh it exactly.
(2) Add 100 ml of titration solvent and dissolve the sample.
(3) Immerse the electrode and start titration.
(4) Blank measurement is also performed with procedure (2) – (3).
(5) After titration finished, wash electrode with solvent and then immersed into DI water for 5 minutes to maintain response of glass electrode.

※ Sample size depends on expected value, and it's described in a standard method.

4. Measurement conditions and results

Examples of titration conditions

Measurement of blank

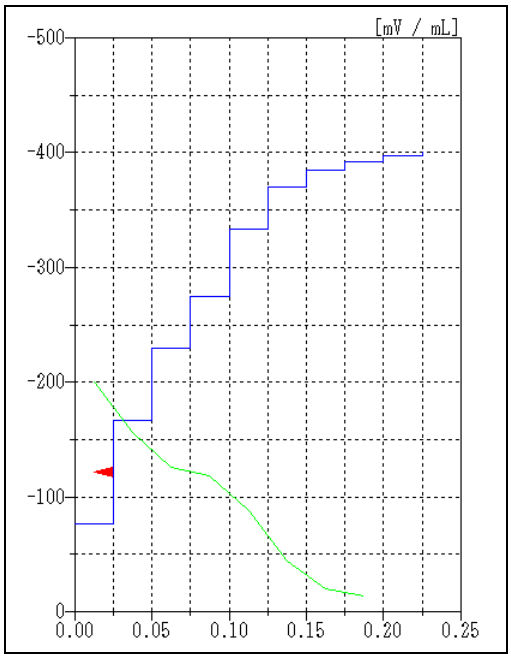
Condition No. 1								
Method	Auto		Constant No.	1		Mode No.	15	
Buret No.	1		Size	0	g	Pre Int	5	sec
Amp No.	1		Blank	0	mL	Del K	0	
D.Unit	mV		Molality	0.1	mol/L	Del Sens	0	mV
S-Timer	180	sec	Factor	0		Int time	3	sec
CP mV	300	mV	K	0		Int Sens	3	mV
Direction	↑		L	0		Buret Speed	2	
D.P. mV	-100	mV	Unit	mL		Pulse	20	
End Sens	500		Formula	D			0.025	mL
Over mL	0.1	mL	Digits	3				
Max. Vol.	1	mL	Auto input Parameter		None			

Measurement of sample

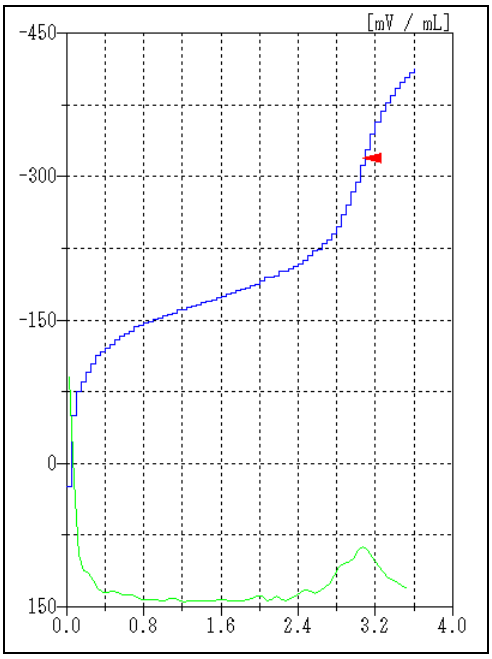
Condition No. 2								
Method	Auto		Constant No.	2		Mode No.	20	
Buret No.	1		Size	0	g	Pre Int	5	sec
Amp No.	1		Blank	0.013	mL	Del K	0	
D.Unit	mV		Molality	0.1	mol/L	Del Sens	0	mV
S-Timer	180	sec	Factor	0.9999		Int time	3	sec
CP mV	300	mV	K	56.11		Int Sens	3	mV
Direction	↑		L	0		Buret Speed	2	
D.P. mV	-100	mV	Unit	mg/g		Pulse	40	
End Sens	200		Formula	(D-B)*K*F*M/S			0.050	mL
Over mL	0.5	mL	Digits	3				
Max. Vol.	20	mL	Auto input Parameter		None			

Measurement results

Sample	Measurement No.	Size (g)	Titrant volume (mL)	Acid Value (mgKOH/g)	Statistical result		
BLANK	1	-	0.013	-	Avg.	0.013	mL
	2	-	0.013	-			
SAMPLE	1	20.2103	3.075	0.850	Avg.	0.839	mgKOH/g
	2	20.0897	3.051	0.848	SD	0.017	mgKOH/g
	3	20.0007	2.936	0.820	RSD	2.00	%



Measurement of blank



Measurement of sample

Examples of measurement curves

5. Note

(1) Maintenance of electrode

As glass electrodes continue to be used in nonaqueous solvents, sensitivity decreases. To recover the sensitivity of glass electrode, immerse the electrode into DI water for 5 minutes after each measurement. Similarly, when reference electrode is used in a nonaqueous solvent, KCl tend to crystallize on the sleeve part of reference electrode. Crystals of KCl can be easily washed off with water.

(2) Method of endpoint detection

In this report, titration curve shows clear inflection point as endpoint. When the sample is used oil, inflection points may be unclear and cannot be detected. In that case, endpoint could be defined as fixed pH value within indicator range for pH indicator reagent. Parameters “Method” could be set to “SET” to detect endpoint with fixed pH. And parameter “Endpoint pH” also could be set to defined pH value.

Keywords : Cooking oil, Acid value, Pharmacopoeia

* Some measurement would not be possible depending on optional configuration of system.