Sheet No. GT200-OF030E Oil

# Determination of acid number of palm oil 1/4

Application Sheet

Method	: Non-aqueous acid-base titration
Apparatus	: Automatic Titrator model GT-200 (GT0EF)
	Electrodes: Reference electrode, sleeve type (GTRS10B) *
	Inner solution: 3.3mol/l Potassium chloride
	Glass electrode (GTPH1B)
Titration mode	: INF, Detection: pH and mV
Related standard	: 1) Japan Agricultural Standards "Japanese Agricultural Standards for Edible Vegetable
	Oils and Fats," "Acid Numbers"
	2) Japan Oil Chemists' Society. "JOCS Standard Methods for the Analysis of Fats, Oils
	and Related Materials," "Acid Numbers"

\*This application sheet is provided as reference, and does not assure the measurement results. Please consider analysis environment, external factors and sample nature for optimal conditions before the measurement.

## Outline

Palm oil is a vegetable oil obtained from the fruit of an oil palm. In addition to the use as cooking oil, it is used as raw materials for soap, detergent and biodiesel.

### Reagents

[Titrant]

■0.1mol/L-potassium hydroxide solution in ethanol (Volumetric analysis grade)

[Adjustment reagents]

Titration solvent ... Diethyl ether: Ethanol (1:1)

## **Analytical Procedure**

[Pretreatment]

As palm oil is solid at room temperature, melt it down in a water bath before the determination.

- (1) Add a sample in a quantity determined according to the acid number of the sample (10g±0.05g for this sample) into a 100ml beaker.
- (2) Collect 50ml titration solvent using a measuring cylinder and add it into the above-mentioned beaker.
- (3) Titrate with 0.1mol/L-potassium hydroxide solution in ethanol.

## [Calculation]

## Acid number ( mg KOH/g ) = 5.611 x A1 x f/S

5.611: Content of potassium hydroxide in 1ml of 0.1mol/L-potassium hydroxide solution in ethanol (mg)

- A1 : Titration volume of 0.1mol/L-potassium hydroxide solution in ethanol at sample titration (ml)
- f : Factor of 0.1mol/L-potassium hydroxide solution in ethanol
- S : Sample volume (g)



Sheet No.

## GT200-OF030E Determination of acid number of palm oil

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#### **Other Requirements**

■Make sure to confirm labels and safety data sheets of reagents and gases used for the measurement and handle them with enough care.

■Wear protective equipment (eye protector, gloves and others) when handling reagents.

## Measurement Results

Acid number of palm oil

#### Detection : pH

	Sample size (g)	Titration volu	ume (ml)	Results (mgKOH/g)
1	10.0438	10.212	23	5.71
2	10.0044	10.163	36	5.70
3	10.0101	10.078	32	5.65
Ave	s. of data erage ndard deviation	(n) (SD)	3 5.7 0.03	

Relative standard deviation (RSD%) 0.22

Acid number of palm oil

## Detection : mV

	Sample size (g)	Titration vol	ume (ml)	Results (mgKOH/g)
1	10.0198	10.10	53	5.66
2	10.0194	10.07	50	5.64
3	10.0248	10.12	35	5.66
Ave	s. of data erage ndard deviation	(n) (SD)	3 5.7 0.01	

Relative standard deviation (RSD%) 0.22

Acid numbers of palm oil were measured using GT-200. The average of three measurements was 5.7 mg KOH/g. GT-200 can measure acid numbers with good repeatability in both pH detection and mV detection.



No. : 4 GT N	o.1				User : GT-
Measuremer	nt : 2014	4/12/16 12:19		Туре	: Sample Titr
Sample nam	ie : Paln	n oil		Sample size(S	S) : 10.0438 [g]
[pH]					
<sup>14.0</sup>			7	C1 : 5.705 [mgKOH/g]	
12.0			A1		
12.0				A1 : 10.2123 [ml] 12.	155 [pH]
10.0					
8.0					
DL, 10					
6.0 <b>5.0</b> 3.0	5.3	7.5	9.8 12.0 [n		
Start :	ial (Pi) : 6 3 10.892		7.374 [pH] 14 [pH]	Time : 10'51"	
Start : End : Run file No. Titration file	3 10.892 : 20 Acid No.: 55 A	[ml] [ml] number of Pa Acid number of	14 [pH] Im oil f Palm oil		
Start : End : Run file No. Titration file *Run file and	3 10.892 : 20 Acid No.: 55 A I Titratior	[ml] [ml] number of Pa Acid number of	14 [pH] Im oil f Palm oil rs are set for each a	analysis item	
Start : End : Run file No. Titration file	3 10.892 : 20 Acid No.: 55 A	[ml] [ml] number of Pa Acid number of	14 [pH] Im oil f Palm oil rs are set for each a		
Start : End : Run file No. Titration file *Run file and Mode Detect BRT No.	3 10.892 : 20 Acid No.: 55 A I Titration : INF : pH : 1	[ml] [ml] number of Pa Acid number of	14 [pH] Im oil f Palm oil rs are set for each a End1, End1 W Preset 1	analysis item /idth : 11 [pH] ± 2 [pH] Mode : V	BRT : 1
Start : End : Run file No. Titration file *Run file and Mode Detect BRT No. Reagent	3 10.892 : 20 Acid No.: 55 A I Titration : INF : pH : 1 : 18	[ml] [ml] number of Pa Acid number of file paramete	14 [pH] Ilm oil f Palm oil rs are set for each a End1, End1 W Preset 1 Volume	analysis item /idth : 11 [pH] ± 2 [pH] Mode : V : 3 [ml]	BRT : 1
Start : End : Run file No. Titration file *Run file and Mode Detect BRT No. Reagent WTint	3 10.892 : 20 Acid No.: 55 A I Titration : INF : pH : 1 : 18 : 30	[ml] [ml] number of Pa Acid number of file parameter [sec]	14 [pH] Im oil f Palm oil rs are set for each a End1, End1 W Preset 1	analysis item /idth : 11 [pH] ± 2 [pH] Mode : V	BRT : 1
Start : End : Run file No. Titration file *Run file and Mode Detect BRT No. Reagent WTint Vup	3 10.892 : 20 Acid No.: 55 A I Titration : INF : pH : 1 : 18 : 30 : 100	[ml] [ml] number of Pa Acid number of file parameter [sec] [µl]	14 [pH] Ilm oil f Palm oil rs are set for each a End1, End1 W Preset 1 Volume	analysis item /idth : 11 [pH] ± 2 [pH] Mode : V : 3 [ml]	BRT : 1
Start : End : Run file No. Titration file *Run file and Mode Detect BRT No. Reagent WTint Vup Vlow	3 10.892 : 20 Acid No.: 55 A I Titration : INF : pH : 1 : 18 : 30 : 100 : 50	[ml] [ml] number of Pa Acid number of file parameter [sec] [µl] [µl]	14 [pH] Ilm oil f Palm oil rs are set for each a End1, End1 W Preset 1 Volume	analysis item /idth : 11 [pH] ± 2 [pH] Mode : V : 3 [ml]	BRT : 1
Start : End : Run file No. Titration file *Run file and Mode Detect BRT No. Reagent WTint Vup Vlow dE	3 10.892 : 20 Acid No.: 55 A I Titration : INF : pH : 1 : 18 : 30 : 100 : 50 : 0.1	[ml] [ml] number of Pa Acid number of file parameter [sec] [μl] [μl] [pH]	14 [pH] Ilm oil f Palm oil rs are set for each a End1, End1 W Preset 1 Volume	analysis item /idth : 11 [pH] ± 2 [pH] Mode : V : 3 [ml]	BRT : 1
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Start : End : Run file No. Titration file *Run file and Mode Detect BRT No. Reagent WTint Vup Vlow dE dT DL DetCnt Vmax Vover	3 10.892 : 20 Acid No.: 55 A I Titration : INF : pH : 1 : 18 : 30 : 100 : 50 : 0.1 : 5 : 10 : 10 : 20 : 0.2	[ml] [ml] number of Pa Acid number of file parameter [μl] [μl] [pH] [sec] [pH/ml] [ml]	14 [pH] Ilm oil f Palm oil rs are set for each a End1, End1 W Preset 1 Volume Position	analysis item /idth : 11 [pH] ± 2 [pH] Mode : V : 3 [ml] : Titration	[mgKOH/g]



No. : 7 GT N	No.1							User : GT-
Measureme Sample nan		4/12/16 14:2 n oil	20			Type Sample s	ize	: Sample Titr : 10.0198 [g]
[mV]								
-100.0					C1 :	: 5.659 [mgKOł	H/g]	
-200.0			<b>.</b>					
					A1 :	10.1053 [ml]	-313 [mV]	
-300.0			A1					
-400.0								
DL, 500								
-500.0			$\Delta M$					
Initial poten	itial (Pi) : 1	4 [mV]						
	itial (Pi) : 1 : 6 : 10.756	4 [mV] [ml] [ml]	-115 -445	[mV] [mV]	Time :	: 16'48"		
Start : End : Run file No. Titration file *Run file and Mode	: 6 : 10.756 . : 20 A 9 No. : 56 /	[ml] [ml] Acid number Acid numbe file parame	-445 of Palm oi r of Palm C eters are se	[mV] I Dil mV t for each a	analysis		[mV]	
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Start : End : Run file No. Titration file *Run file and Mode Detect BRT No. Reagent WTint Vup Vlow dE dT DL DetCnt	: 6 : 10.756 No. : 20 A No. : 56 A d Titration : INF : mV1 : 1 : 18 : 30 : 100 : 50 : 0.1 : 3 : 500 : 10	[ml] [ml] Acid number Acid numbe file parame [sec] [μl] [mV] [sec] [mV/ml]	-445 of Palm oi r of Palm C eters are se End Pre Vol Pos	[mV] Jil mV It for each a d1, End1 W Isset1 Mode ume : 6 [ml sition : Titra	analysis idth): 50 : V BR1 ] ttion	item 00 [mV] ± 1500	[mV]	[mgKOH/g]

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