Determination of iodine number of palm oil (Wijs-Cyclohexane method)

Sheet №	**GT200-OF032E**	Oils and fats

Method	Oxidation-reduction titration
Apparatus	Automatic Titrator model GT-200 (GT0EF) Electrodes: Combined platinum electrode (GTPR1B) *Inner solution:3.3mol/l Potassium chloride
Related standard	Japan Oil Chemists' Society "JOCS Standard Methods for the Analysis of Fats, Oils and Related Materials," "Iodine Numbers (Wijs-Cyclohexane Method)"
Titration mode	INF, Detection: pH / mV

*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. Iodine numbers are measured to confirm the number of carbon-carbon double bonds (C=C) contained in a sample, and expressed by converting the halogen content which reacts with 100g sample into the number of grams of iodine.

Reagents

[Titrant]	■ 0.1mol/L-sodium thiosulfate in water (Volumetric analysis grade)
[Reagents]	■ Cyclohexane (Special grade)
	■ Wijs solution (0.1mol/L-iodine chloride solution in acetic acid (For measurement of iodine numbers))
[Adjustment reagents]	■ 10g/100ml potassium iodide solution … Dissolve 10g potassium iodide in pure water to 100ml total.

Analytical procedure

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

(Measurement)
(1) Add 2g melted sample into a 200ml beaker.
(2) Collect 10ml cyclohexane using a Komagome pipette and add it into the above-mentioned beaker to dissolve the sample.
(3) Collect 25ml Wijs solution using a whole pipette and add it into the beaker.
(4) Leave the beaker still in a dark place for 30 minutes shaking it occasionally.
(5) After leaving it still, collect 20ml of 10g/100ml potassium iodide solution using a whole pipette and add it into the beaker.
(6) Collect 100ml pure water using a measuring cylinder and add it into the beaker. Titrate with 0.1mol/L-sodium thiosulfate solution while agitating strongly.

(7) Perform blank measurements in the same way.

[Calculation]

Iodine number (g/100g) = (BL – A1) × f × 1.269/S

BL: Titration volume of 0.1mol/L-sodium thiosulfate solution at blank measurement (ml)

A1:   Titration volume of 0.1mol/L-sodium thiosulfate solution at sample titration (ml)

f: Factor of 0.1mol/L-sodium thiosulfate solution

1.269:   0.01269 (The number of grams of iodine corresponding to 1ml of 0.1mol/L-sodium thiosulfate solution) × 100. (Converted into the value per 100g)

S: Sample volume (g)

Other requirement

■ 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

	Sample size (g)	Titration volume (ml)	Blank (ml)	Results (g/100g)
1	2.0174	1.3199	46.0716	28.89
2	2.0221	1.3691	46.0224	28.80
3	2.0038	1.3367	46.0548	29.08

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Nos. of data	(n)	3
Average		28.92
Standard deviation	(SD)	0.14
Relative standard deviation	(RSD%)	0.50

Blank   47.3915 ml

Iodine numbers of palm oil were measured using GT-200. The average of three measurements was 28.9g/100g and the relative standard deviation (RSD %) was 0.50%. GT-200 can measure iodine numbers with good repeatability.

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ID No. : 8   GT No.1   User : GT-200

Measurement : 2015/02/25 17:31   Type : Sample Titr
Sample name : BLANK   Sample size (S) : 155 [ml]
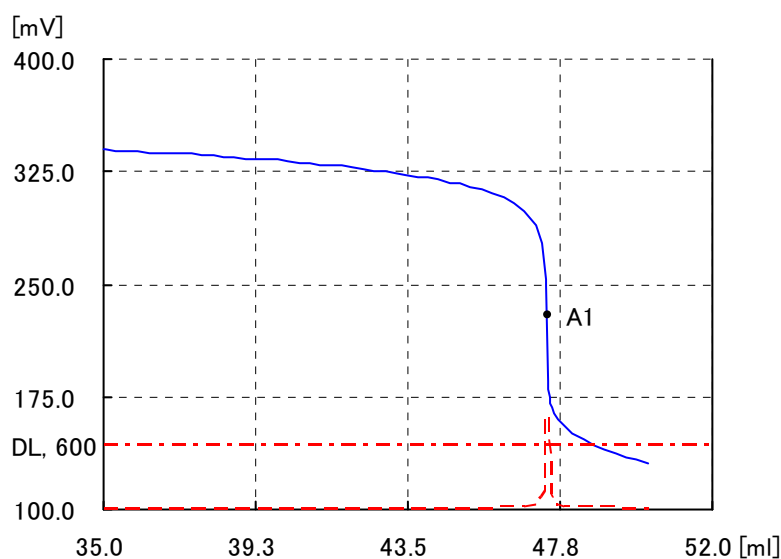
C1 : 47.3915 [ml]

A1 : 47.3915 [ml]   229 [mV]

Initial potential (Pi) :   366   [mV]
Start   :   35   [ml]   340   [mV]
End   :   50.202   [ml]   131   [mV]   Time : 11' 3"

Run file No. : 17
Titration file No. : 58 palm oil   Iodine blank   *Run file and Titration file parameters are set for each analysis item
Mode   : INF   End1, End1 Width : 500 [mV] ± 1500 [mV]
Detect   : mV1
BRT No.   : 1   Preset 1   Mode : V   BRT : 1
Reagent   : 32   Volume   : 35   [ml]
WTint   : 0   [sec]   Position   : Titration
Vup   : 300   [μl]
Vlow   : 20   [μl]
dE   : 5   [mV]
dT   : 5   [sec]
DL   : 600   [mV/ml]
DetCnt   : 10
Vmax   : 50   [ml]   C1 : A1
Vover   : 1   [ml]   [ml]
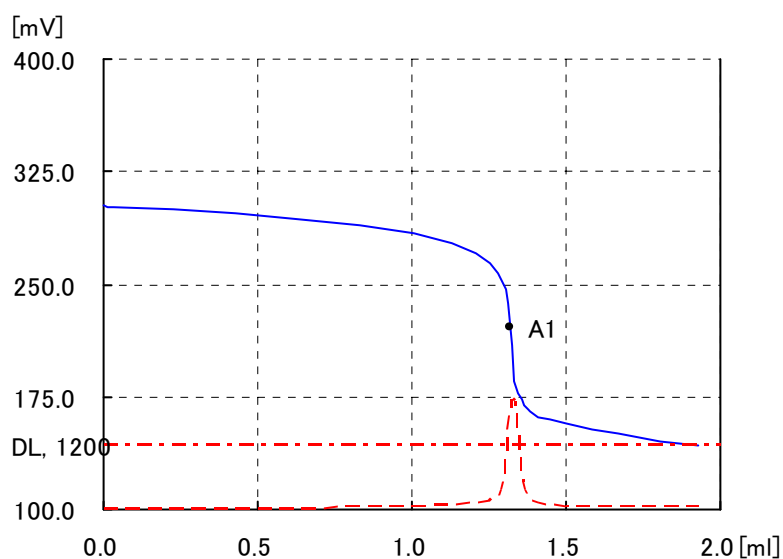
Reagent name (Reag)   : Na2S2O3   Equivalent (E)   : 1   Molarity(M)   : 0.1 [Mol/l]
Factor (f)   : 0.997

Buret Injection Speed : 500 [ul/sec]

ID No. : 5   GT No.1   User : GT-200

Measurement: 2015/02/25 16:33   Type : Sample Titr
Sample name : Palm oil   Sample size (S) : 2.0174 [g]

C1 : 28.89 [g/100g]

A1 : 1.3199 [ml]   221 [mV]

Initial potential (Pi) :   303   [mV]
Start   :   0   [ml]   303   [mV]
End   :   1.926   [ml]   143   [mV]   Time : 3' 0"

Run file No. : 17
Titration file No.:59 Iodine number of palm oil   *Run file and Titration file parameters are set for each analysis item
Mode   : INF   End1, End1 Width: 500 [mV] ± 1500 [mV]
Detect   : mV1
BRT No.   : 1
Reagent   : 32
WTint   : 0   [sec]
Vup   : 200   [µl]
Vlow   : 10   [µl]
dE   : 5   [mV]
dT   : 5   [sec]
DL   : 1200 [mV/ml]
DetCnt   : 10   C1 : (BL-A1)*f*1.269/S
Vmax   : 50   [ml]   [g/100g]
Vover   : 1   [ml]

Reagent name (Reag)   : Na2S2O3   Equivalent (E)   : 1   Molarity (M)   : 0.1 [Mol/l]
Factor (f)   : 0.997   Blank   (BL)   : 47.3915 [ml]

Buret Injection Speed : 500 [ul/sec]