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HIRANUMA APPLICATION DATA		Automatic Titrator	Data No.	A10	May 11,2019
FOOD	Peroxide value measurement for cooking oil				

1. Abstract

Degraded fats and oils include peroxide chemical species. Therefore, determination of peroxide value is an effective analytical method to know the index of fat and oil degradation. This method is described in a variety of official standards such as Pharmacopoeias: JP, USP, and EP.

Definition of peroxide value depends on respective standard method. For example, it is expressed as “amount of active oxygen in 1 kg of sample [mg/kg]” in Pharmacopoeias. Active oxygen can oxidize potassium iodide to iodine (Formula (1)). “Method of Analysis in Health Science” in Japan defines peroxide value as “milliequivalents of iodine generated from potassium iodide in 1 kg of sample [meq/kg]”. Each titration are performed in a same procedure even if the expressions on definitions are different between these standard methods; generated iodine is finally titrated with sodium thiosulfate (Formula (2)).

Example of titration for peroxide value in cooking oil is introduced here. Experimental procedure is implemented in relation to “Methods of Analysis in Health Science” in Japan.



2. Configuration of instruments and Reagents

(1) Instruments


Main unit	: Hiranuma Automatic Titrator COM series
Electrode	: Platinum combination reference electrode PR-733BZ
Option	: Buret tip (Tube Type)

(2) Reagents

Titrant	: 0.01 mol/L Sodium thiosulfate standard solution
Additive	: Saturated potassium iodide solution Dissolve 80 g of potassium iodide in 50 mL of DI water.
Solvent	: Mixed solvent of acetic acid and chloroform with 3 : 2 ratio [v/v]
Purge gas	: Nitrogen gas

3. Measurement procedure

- (1) Take about 1 g of the sample into 200 mL Erlenmeyer flask with stopper and weigh it accurately.
- (2) Add 35 mL of mixed solvent to dissolve sample.
- (3) The solution in flask is purged with nitrogen gas for 3 minutes.
- (4) Add 1 mL of saturated potassium iodide solution with pipette. Close the flask with stopper and swirl gently for 1 minute.
- (5) Leave the flask to stand for 10 minute in dark place.
- (6) Add 75 mL of DI water to the flask.

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Additionally washed with DI water. Besides

immerse it in DI water during each measurement to activate electrode.

※ The sample size should be changed depending on the peroxide value of sample.

4. Measurement conditions and results

Examples of titration conditions

Measurement of blank

Condition No.1								
Method	Auto		ConstantNo.	1		Mode No.	12	
Buret No.	1		Size	0	g	Pre Int	0	sec
Amp No.	1		Blank	0	mL	Del K	0	
D. Unit	mV		Molarity	0.01	mol/L	Del Sens	0	mV
S-Timer	30	sec	Factor	1.002		Int time	5	sec
CP mL	0	mL	K	0		Int Sens	3	mV
T-Timer	0	sec	L	0		BrT Speed	2	
D.P.mL	0	mL	Unit	mL		Pulse	8	
End Sens	200		Formula	D			0.010	mL
Over mL	0.1	mL	Digits	3				
Max.Vol.	20	mL	Auto input Parameter	None				

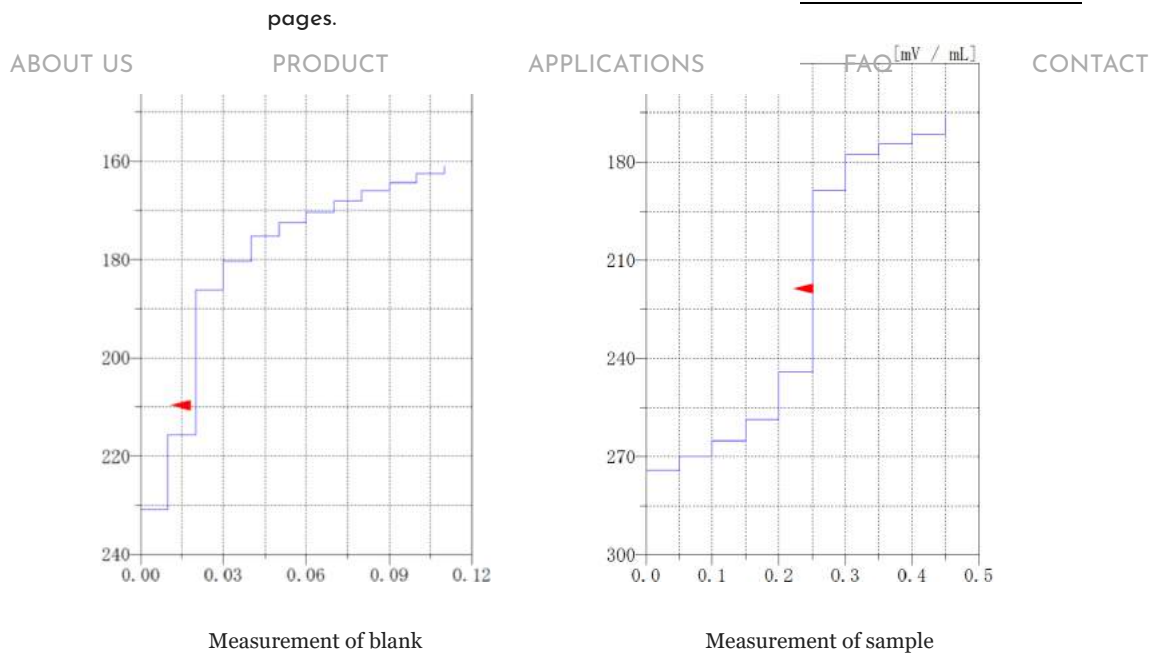
Measurement of sample

Condition No.2								
Method	Auto		ConstantNo.	2		Mode No.	20	
Buret No.	1		Size	0	g	Pre Int	1	sec
Amp No.	1		Blank	0.0115	mL	Del K	5	
D. Unit	mV		Molality	0.01	mol/L	Del Sens	0	mV
S-Timer	30	sec	Factor	1.002		Int time	5	sec
CP mL	0	mL	K	10		Int Sens	3	mV
T-Timer	0	sec	L	0		BrT Speed	2	
D.P. mL	0.1	mL	Unit	meq/kg		Pulse	40	
End Sens	200		Formula	(D-B)*K*F*M/S			0.050	mL
Over mL	0.2	mL	Digits	4				
Max.Vol.	20	mL	Auto input Parameter.	None				

Measurement results

Sample	Measurement No.	Size (g)	Titer volume (mL)	Peroxide value (meq/kg)	Statistical result
BLANK	1	—	0.011	—	Avg. 0.012 mL
	2	—	0.012	—	
SAMPLE	1	1.0463	0.221	2.0063	Avg. 2.00 meq/kg SD 0.02 meq/kg
	2	1.0364	0.220	2.0158	

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5. Note

- (1) Please use Erlenmeyer flask with stopper to avoid sublimation of iodine and entraining of oxygen from air.
- (2) Timely measure the blank because saturated potassium iodide solution is easy to degenerate. Additionally, please periodically prepare fresh solution.
- (3) The electrode's figure that allows direct insertion into Erlenmeyer flasks is preferred for this measurement.
Therefore, long and thin type of platinum reference combination electrode PR-733BZ is recommended.
- (4) Be sure to confirm and follow the measurement procedure described in the standard.

Keywords: Cooking oil, Peroxide value, Redox titration

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

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