

Fat and Oil

## POV of Edible Saffron

Redox titration by  
Automatic Potentiometric Titrator

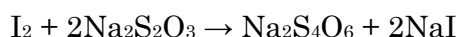
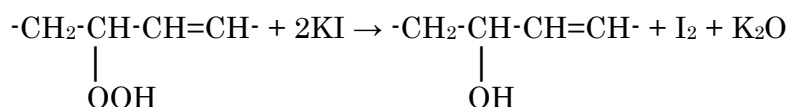
Standard

Standard Test Method  
for Fat and Oil

### 1. Abstract

The degree of oxidization of fat and oil or oiled food is measured by peroxide value (POV).

POV is expressed in meq/kg (equivalent mg/kg) and is measured as follows: the peroxide sample formed by oxidization of fat and oil by ambient oxygen first dissolved in solvent added with potassium iodide is reduced, and thus obtained free iodine is titrated with standard sodium thiosulfate up to the endpoint. The peroxide value is obtained from titration volume.



### 2. Reference

- 1) Standard Test Method for Fat and Oil

### 3. Cautions in measurement

- 1) Do not use water containing carbon dioxide in preparing saturated potassium iodide solution.
- 2) To confirm saturation, add excessive potassium iodide to the saturated potassium iodide solution, and leave crystal in the solution.
- 3) Prepare fresh saturated potassium iodide each time.
- 4) If the sample does not change in color to yellow due to free iodine when saturated potassium iodide is added, add more saturated potassium iodide except when blank test is performed or if peroxide value is very small in number.

## 4. Post-measurement care

Rinse the electrode with pure water, and keep it dipped in water to avoid drying up.

## 5. Test equipment

Main unit : Automatic potentiometric titrator (Standard preamplifier: STD-)

Option : POV titration unit

Electrode : Option Trace type combination Pt. electrode

## 6. Reagent

Solvent : Acetic acid-2,2,4-Trimethyl pentane (Isooctane) mixture  
(3:2) (vol%)

Additive : Saturated potassium iodide

Titrant : 0.01mol/L Sodium thiosulfate (f=1.004)

Inactive gas : Nitrogen gas

## 7. Measurement procedure

—Measurement—

- 1) Deliver approx. 5g sample into a conical flask with ground-in stopper.
- 2) Add 50mL solvent and gently shake to dissolve the sample completely.
- 3) Gently replace the air inside flask with nitrogen to remove remaining oxygen.
- 4) By further flowing nitrogen gas, add 0.5mL saturated potassium iodide, and immediately seal the flask and gently shake it for one minute.
- 5) Add 30mL pure water, and seal it and shake vigorously for 5 to 10 seconds.
- 6) Titrate with 0.01mol/L sodium thiosulfate to measure peroxide value.

※Likewise, obtain blank level in advance by a blank test.

## 8. Formula

Peroxide value ( meq / kg ) = ( EP1 - BL1 ) × TF × R / SIZE

EP1 : Titration volume ( mL )  
BL1 : Blank level ( 0.0016mL )  
TF : Factor of reagent ( 1.004 )  
R : Constant ( 10 )  
SIZE : Sample size ( g )

## 9. Example of measurement

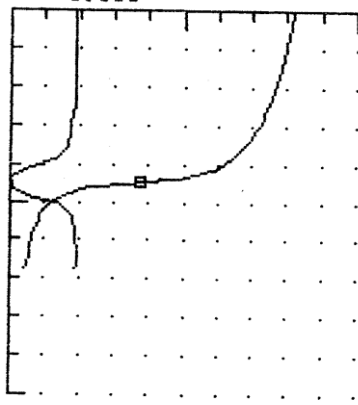
— Ambient condition —

Rom temperature : 25.4 °C	Humidity : 45 %	Weather : Fair
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- Titration parameter -

Model : AT-510	
Method No. : 12	
Titr.mode : Auto	
Intermit	
Titr.form : EP Stop	
[Titration parameter]	[Result parameter]
Form : EP Stop	<Calculation>
APB No. : 1	Calc. Type : Sample
Unit No. : 2	Conc.1 : Set
Detector No. : 1	CO1=(EP1-BL1)*TF*R/SIZ
Unit : mV	E
Max. Volume : 10.0mL	Unit : meq/kg
Wait Time : 0s	EP No. : 1
Direction : Auto	Temp.Comp. : Off
[Control parameter]	<Constant>
End Point No. : 1	R : 10
End sense : Auto	<Titr. Constant>
End Point Area : Off	Factor : 1.004
Separation : Off	Conc : 0.01
Over Titr.Vol. : 0mL	<Blank>
Gain : 10	Blank1 : 0.0016
Data samp.Pot. : 4.0mV	
Data samp.Vol. : 0.1mL	
Stability : 3mV/s	
Delay Time : 0s	
Limit Time : 0s	

- Titration curve -

*** Result ***
Sample No. : 07-01
Date : 2006/06/19 14:18
Sample ID :
Method No. : 12
<Auto Intermit>
Titr. Time : 00:04:24
Size : <u>5.0110g</u>
Conc-1 : <u>1.7926meq/kg</u>
End point-1
Volume : <u>0.8963mL</u>
Potential : 256.7mV
200 [mV] 350
0.000

2.000 [mL]

(The above printout data were obtained from titration by AT-510 unit)

«Titration parameter»

Form: of titration / APB No. the burette used in titration / Unit No.: [APB Unit File number](#)

Detector No.: the detector used in titration / Max Volume: of titration / Wait Time: before titration starts

Direction: of titration

«Control parameter»

End Point No. number of EPs detected / End sense: direction of EP / End Point Area: detection area

Separation: of potential / Over Titr.Vol. over-titration volume / Gain: sensitivity of detection signal

Data samp.Pot.: potential changes of sampling signal / Data samp.Vol.: titration volume of sampling signal

Stability: of titration / Delay Time: before stability check / Limit Time: for stability check

«Result parameter»

Calc.Type: of formula / Conc.1 formula 1 / Unit of result

EP No. for calculation / Temp.Comp. temperature compensation of titration liquid / R: constant

Factor: of reagent / Blank1: blank level 1

—Measurement results—

n	Sample ( g )	Titration ( mL )	POV ( meq / kg )	Peroxide value	
				Mean	SD
1	<u>5.0110</u>	<u>0.8963</u>	<u>1.7926</u>	1.8003 meq/kg	0.0106 meq/kg
2	5.0143	0.9067	1.8123	0.5861 %	
3	5.0213	0.8998	1.7959		

\* The above results were obtained by 3 tests of the same sample.

\* Red underline shows the data from page 3/4.

## 10. Summary

Cooking oil loses flavor as time goes on due to oxidization by ambient light and air. POV can precisely measure the degree of such oxidization.

The measurement results this time shows favorable repeatability with 0.6% relative standard deviation. Precise and reliable measurement is assured by the automated potentiometry.