xylem

Application Note
YSI, a Xylem Brand • XA00078

Determination of Peroxide Value (POV) in fats and oils

FOOD & BEVERAGE SERIES

Introduction

The Peroxide number (POV) is indicator for the state of unsaturated oils and fats. Unsaturated oils and fats become rancid by oxidation, forming peroxides.

The determination of the POZ is done by titration with sodium thiosulfate after reaction of the sample with potassium iodide, wherein the iodide is oxidized by the peroxides to iodine.

$$R\text{-}OOH + 2I^- \rightarrow R\text{-}OH + I_2$$

$$I_2 + 2\,S_2O_3^{2-} \rightarrow 2I^- + S_4O_6^{2-}$$

The solvent used for the sample is a mixture of glacial acetic acid and chloroform. Depending on the sample, it is also possible to use decanol or hexanol instead of chloroform. The POV is calculated as $mmol_{peroxide}/kg$.

YSI
a xylem brand

Instrument
TL 7000 or higher
Magnetic stirrer TM 235 or similar
WA 10 Exchange Unit

Electrode, Cable, and Electrolyte
Pt 62 oder Pt 61
L 1 A Cable

Lab Accessories
Erlenmeyer flask 100 ml with stopper
Magnetic stirrer bar 30 mm

Reagents	
1	Sodium thiosulfate 0.01 mol/l (for very low POV 0.001 mol/l)
2	Potassium Iodide
3	Glacial acetic acid
4	Chloroform (depending on the sample Decanol or Hexanol are also possible)
All reagents should be in analytical grade or better.	

Procedure

Reagents

The titer determination of the $Na_2S_2O_3$ - solution is carried out as described in the application report "Titer determination of $Na_2S_2O_3$ ".

Solvent mixture
600 ml glacial acetic acid are mixed with 400 ml chloroform.

Potassium iodide solution
10g of Potassium iodide are dissolved in 13g distilled water. The KI solution should be prepared fresh each day.

Cleaning of the electrode

The electrode is rinsed with distilled water and, if necessary, with solvent. The electrolyte solution L300 is suitable for storage.

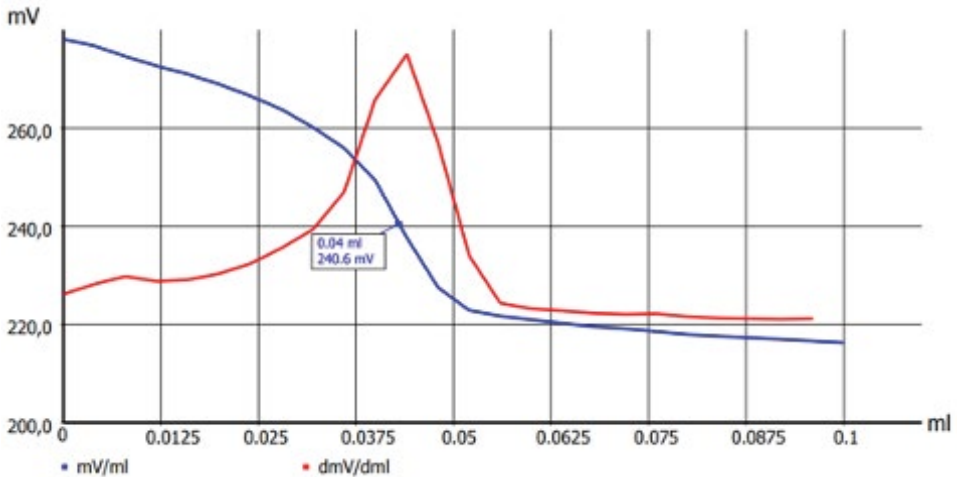
Blank Value

To determine the blank value, 30 ml of solvent mixture are placed in a 100 ml Erlenmeyer flask and 0.5 ml of KI solution are added. The flask is closed and the mixture is stirred for 60 sec. Subsequently, 30 ml of dist. Water are added and titrated with sodium thiosulfate.

Sample Preparation

Approximately 1 g of sample is weighed into a 100 ml Erlenmeyer flask and dissolved in 30 ml of solvent mixture. 0.5 ml of KI solution are added. The flask is closed and the mixture is stirred for 60 sec. Subsequently, 30 ml of distilled water is added and titrated with sodium thiosulfate to an equivalence point.

Titration parameter - Blank Titration

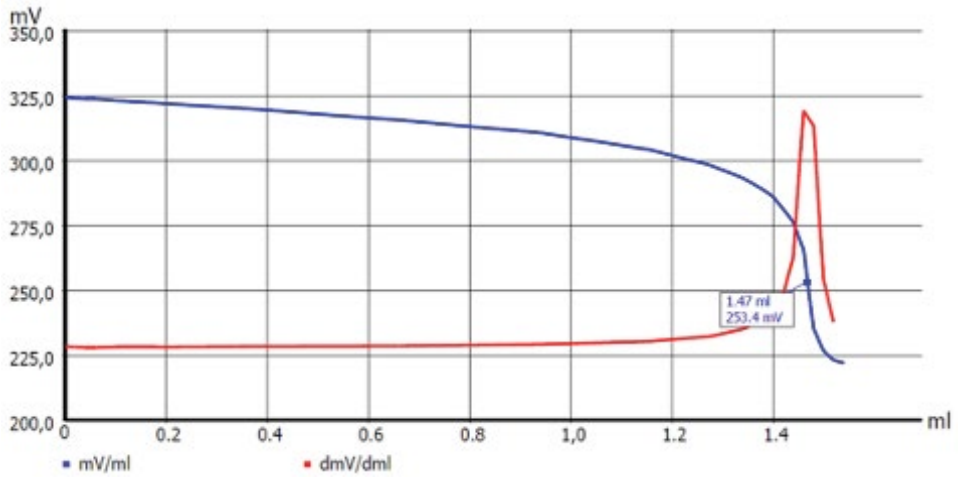


Default Method			
Method type	Automatic titration		
Modus	Linear		
Measured Value	mV		
Measuring Speed / Drift	Individual	Minimum Holding Time	04 s
		Maximum Holding Time	15 s
		Measuring Time	03 s
		Drift	10 mv/min
Initial Waiting Time	5 s		
Linear Steps	0.004 ml		
Damping	None	Titration Direction	Decrease
Pretitration	off	Delay Time	0 s
End Value	off		
EQ	On (1)	Slope Value	120
Max. Titration Volume	0.2 ml		
Dosing Speed	100%	Filling Speed	30 s

Calculation: *ml = EQ1*

The result is saved in a global memory, e.g. M01. We recommend to use statistics = 3.

Sample Titration



Default Method			
Method type	Automatic titration		
Modus	Dynamic		
Measured Value	mV		
Measuring Speed / Drift	Individual	Minimum Holding Time	04 s
		Maximum Holding Time	15 s
		Measuring Time	03 s
		Drift	10 mv/min
Initial Waiting Time	5 s		
Dynamic	Average	Max step size	1.0 ml
		Slope max ml	10
		Min. step size	0.02 ml
		Slope min. ml	120
Damping	None	Titration Direction	Decrease
Pretitration	off	Delay Time	0 s
End Value	off		
EQ	On (1)	Slope Value	120
Max. Titration Volume	5 ml		
Dosing Speed	100%	Filling Speed	30 s

Calculation: $POV = \frac{(EQ1 - B) * T * M * F1}{W * F2}$

B	M01	Blank value, saved in global Memory M01
EQ1		Consumption of titrant until first Equivalence point
T	WA	Actual concentration of the titrant
M	1	Molecular weight
W	man	Sample weight in g
F1	1000	Conversion factor
F2	1	Conversion factor

YSI, a Xylem brand
1725 Brannum Lane
Yellow Springs, OH 45387

+1.937.767.7241
titration.ysi@xyleminc.com
YSI.com

YSI.com/Titration