Determination of the Iodine value according to Wijs

Description

The iodine value or number determines the number of double bonds of the fatty acids present in a fat or oil. It is a measure for the unsaturated character of the fat/oil and is used to proof its pureness and quality. The iodine value is expressed in iodine which is added to 100 g of the sample.

Instrumentation

Titrator	TL 5000/50-M1, TL 7000 or higher with WA 50
Sensor	Pt 62, Pt 62 RG or Pt 61
Cable	L 1 A
Stirrer	Magnetic stirrer TM 235
Laboratory instruments	Erlenmeyer flask with ground joint 250 ml
	Glas stopper fitting to the ground joint of the Erlenmeyer flask
	Magnetic stir bar

Reagents

1	$Na_2S_2O_3$ 0.1 mol/L
2	Wijs-Reagent 0.1 mol/L
3	Glacial acetic acid
4	Magnesium acetate tetrahydrate
5	Potassium iodide
6	Deionized water
All reagents should be of analytical grade or better	

Titration procedure

Reagents

Wijs reagent (0.1 mol/L I_2)
Wijs reagent is available as ready-to-use solution from common laboratory suppliers.

Magnesium acetate catalytic solution (3%)
4.5 g of Magnesium acetate tetrahydrate are dissolved in 100 ml of glacial acetic acid.

Potassium iodide solution (15%)
15 g KI are dissolved in 100 ml of deionized water.

Sensor cleaning

The sensor is cleaned with water. Adhering sample can be removed wit acetic acid or other suitable solvents.

Sample preparation

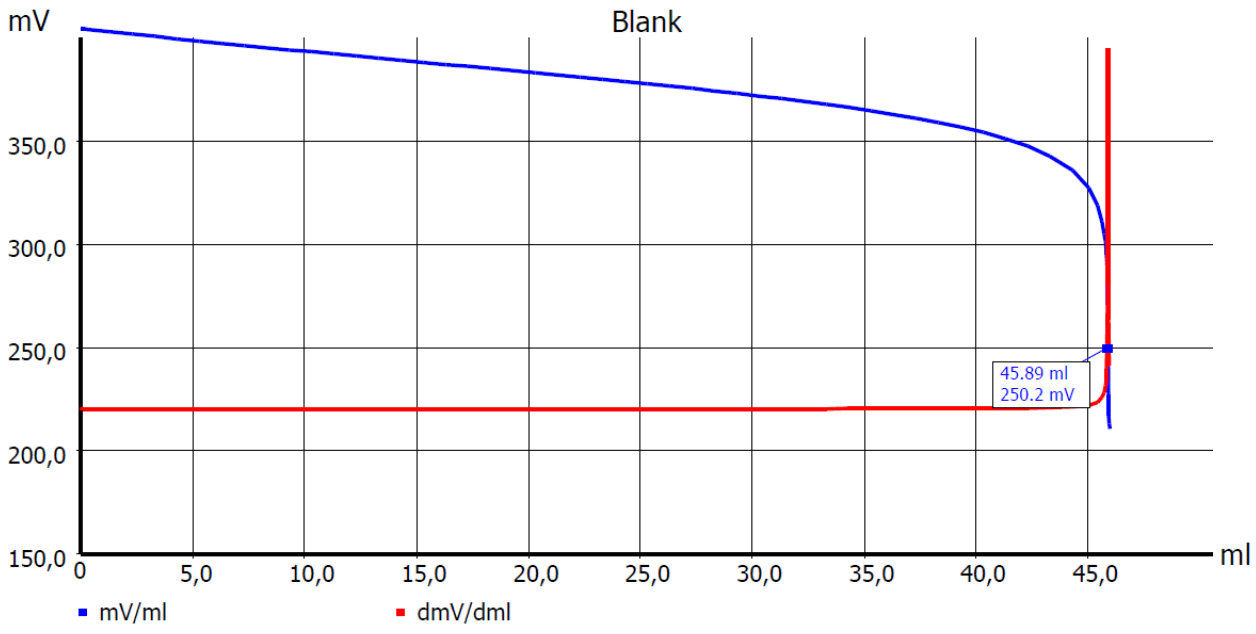
The sample is weighed in into a 250 ml Erlenmeyer flask and 20 ml of glacial acetic acid is added. The sample amount depends on the expected iodine number. Afterwards 25 ml of Wijs reagent and 10 ml of the magnesium acetate catalyst are added. The Erlenmeyer flask is closed with the stopper and kept dark for 8 to 10 minutes.

After the reaction time 10 ml of the KI solution is added. The sample is diluted with 100 ml of deionized water and the excess of iodine is back titrated with $Na_2S_2O_3$-Lösung (0.1 mol/L).

A Blank value is measured. The procedure is equal to the sample measurement but without adding the sample.

Titration parameter

Blank



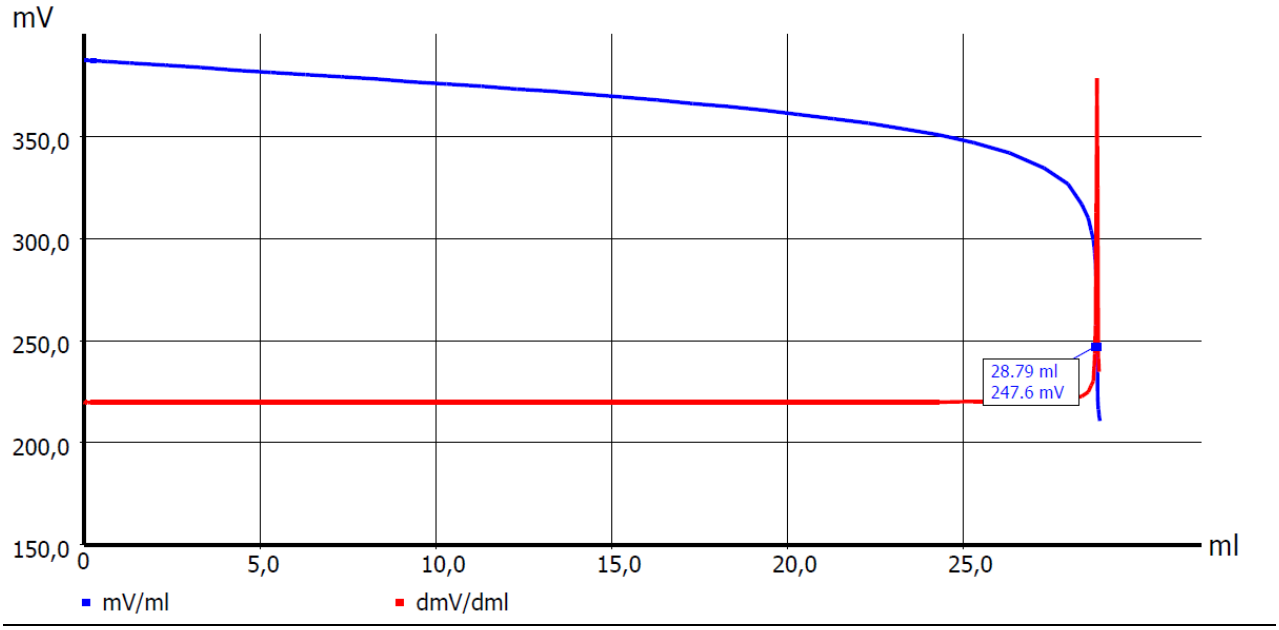
Default method	---		
Method type	Automatic Titration		
Mode	Dynamic		
Measured value	mV		
Measuring speed / Drift	User defined	Minimum holding time	3 s
		Maximum holding time	15 s
		Measuring time	3 s
		Drift	10 mV/min
Initial waiting time	0 s		
Dynamic	average	Max. step size	1.0 ml
		Slope max ml	10
		Min. step size	0.02 ml
		Slope min ml	120
Damping	Off	Titration direction	decrease
Pre-titration	Off	Delay time	0 s
End value	Off		
EQ	On(1)	Slope value	700 (steep)
Max. Titration volume	50 ml		
Dosing Speed	100%	Filling speed	30 s

Calculation:

$$ml = EQ1$$

The result is stored in the Global Memory as for example M01. It is recommendable to determine the mean of three blank titrations (statistic: 3).

Sample titration



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Initial waiting time	0 s		
Dynamic	average	Max. step size	1.0 ml
		Slope max ml	10
		Min. step size	0.02 ml
		Slope min ml	120
Damping	Off	Titration direction	decrease
Pre-titration	Off	Delay time	0 s
End value	Off		
EQ	On(1)	Slope value	350
Max. Titration volume	50 ml		
Dosing Speed	100%	Filling speed	30 s

Calculation:

$$IZ\ [mg/100\ g] = \frac{(B - EQ1) * T * M * F1}{V * F2}$$

B	M01	Consumption of titration reagent of the blank determination
EQ1		Consumption of the the titration reagent at the first EQ
T	WA	Exact concentration of the titration reagent in [mol/L]
M	126,9	Molecular weight of Iodine
W	man	Sample amount [g]
F1	0,1	Conversion factor 1
F2	1	Conversion factor 2

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