

Iodine Value of Edible Oils and Fats According to Wijs (AOAC Method

Method for the determination of iodine value (g I₂/100g) of edible oils and fats according to Wijs as indicated by AOAC Official Methods of Analysis (1984), Chapter 28.023

Sample	Fats and oils, approx. 25 g / expected iodine value	<p>Preparation and Procedures</p> <p>1) Dissolve the sample in CCl₄, add 25 mL Wijs solution and keep in the dark for approx. 1 hour to complete the reaction.</p> <p>2) Add deionized water and titrate excess iodine with sodium thiosulphate.</p> <p>Wijs solution, c(ICI) = 0.1 mol/L: Dissolve 16.2 g iodine monochloride (ICI) in a 1 L volumetric flask with glacial acetic acid. Store the Wijs solution in amber bottle sealed with paraffin until it is used.</p> <p>Wijs solution is sensitive to temperature, moisture and light. Slight variations of the temperature considerably affect titer of the Wijs solution. Therefore it is essential that blanks and samples are titrated at the same time.</p> <p>The mean value of the blank determination (method 051b) is automatically stored as auxiliary value H3. Typical results: Blank = 4.94 mmol, srel = 0.04%, n = 5</p>
Substance	C-C double bonds, -CH=CH-	
Chemicals	15 mL carbon tetrachloride, CCl ₄ ; 25 mL Wijs solution; 100mL water; 15 mL 10% potassium iodide, KI	
Titrat	Sodium thiosulphate, Na ₂ S ₂ O ₃ c(Na ₂ S ₂ O ₃)=0.1 mol/L;	
Standard	Potassium iodate, KIO ₃	
Instruments	DL70, ST20A, AT250, Matrix printer EPSON FX800 with serial interface	
Accessories	250 mL Titration beakers ME-23829, Additional burette drive DV90	
Indication	DM140-SC at Sensor 2	
Chemistry	$ICl_3 + I_2 = 3 ICl$ $ICl + KI = I_2 + KCl$ $2(SO_3S)^{2-} + I_2 = 2 I^- + (S_2O_8S_2)^{2-}$	
Calculation	<p>Blank determination (Method 096B): R1 = Q R1 is stored as auxiliary value H3</p> <p>Iodine value det. (Method 096A): R1 = (H3-Q1)*C1/m C1 = M/(10*z)</p>	
Waste disposal	Halogenated organic solvents.	
Author	Ruth von Rotz	<p>Remarks</p> <p>The iodine value is defined as the weight of iodine absorbed by 100 g of an oil or fat.</p> <p>1) The excess of Wijs solution should be 50-60% of the amount added, ie. 100-150% of amount reacted with the sample.</p> <p>2) If the result will be assumed (e.g. in routine quality control) the predispensing can be adjusted accordingly in volume or changed to % nominal content . This also shortens the titration time.</p> <p>3) The addition of 10 mL 2.5% mercury (II) acetate in glacial acetic acid (after Wijs solution is added) shortens the reaction time to 5 minutes</p> <p>Literature: AOAC Official Method of Analysis, 1984, Chapter 28.023</p>

Results

METTLER DL70 Titrator

051a I2-value of oils and fats

Measured 25-June-1991 3:37 pm
User rvr
Titrator PT 2
Version SW 2.0

RESULTS

No	ID1	Weight	Results
1/1	cocofat	2.0267 g	11.85 g I2/100 gI2-value
1/2	cocofat	2.0766 g	11.85 g I2/100 gI2-value
1/3	cocofat	2.0892 g	11.85 g I2/100 gI2-value
1/4	cocofat	2.031 g	11.84 g I2/100 gI2-value
1/5	cocofat	2.0863 g	11.87 g I2/100 gI2-value

STATISTICS

Number results R1 n = 5
Mean value x = 11.85 g I2/100 gI2-value
Standard deviation s = 0.013 g I2/100 gI2-value
Rel. standard deviation srel = 0.107 %

Various Samples

Sample	Weight (g)	n	Iodine value (gI2/100g)	RSD (%)	t (min)
Coconut fat	2.00-2.10	5	11.8	0.11	5
Margarine "light"	0.40-0.45	3	37.3	0.26	5
Lard	0.40-0.45	5	57.6	0.13	5
Olive oil	0.20-0.25	5	82.5	0.16	6
Margarine	0.50-0.55	3	86.1	0.21	3
Rape oil	0.20-0.25	4	113.4	0.15	5
Sunflower oil	0.20-0.25	3	132.7	0.06	4

Table of measured values

Titration curve

Method

Method	051a	I2 - value of oils and fats
Version	19-June-1991	16:21
Title		
Method ID	051a	
Title	I2 - value of oils and fats	
Date/time		
Date/time	19-June-1991	16:21
Sample		
Number samples	3	
Titration stand	Stand 1	
Entry type	Weight m	
Lower limit [g]	0.02	
Upper limit [g]	1.5	
ID1		
Molar mass M	254	
Equivalent number z	2	
Dispense		
Titrant	KI 10%	
Concentration [mol/L]	10.0	
Volume [mL]	15.0	
Stir		
Speed [%]	50	
Time [s]	45	
Titration		
Titrant	Na2S2O3H2O	
Concentration [mol/L]	0.1	
Sensor	DM140-SC	
Unit of meas.	mV	
Titration mode	EQP	
Predispensing 1	mL	
Volume [mL]	20.0	
Predispensing 2	To slope	
slope [mV,pH, .../mL]	4.0	
Titration addition	DYN	
dE (set) [mV]	0.02	
Limits dV	Absolute	
dV(min) [mL]	0.02	
dV(max) [mL]	0.5	
Measure mode	EQU	
dE [mV]	1.0	
dt [s]	1.0	
t (min) [s]	6.0	
t (max) [s]	30.0	
Threshold	50.0	
Maximum volume [mL]	50.0	
Termination after n EQPs	Yes	
n =	1	
Evaluation procedure	Standard	
Calculation		
Result name	I2 - value	
Formula	$R=(H3-Q)*C/m$	
Constant	$C=M/(10*z)$	
Result unit	g I2/100g	
Decimal places	2	
Record		
Output unit	Printer	
Raw results last sample	Yes	
E - V curve	Yes	
Table of measured values	Yes	
Statistics		
Ri (i=index)	R1	
Standard deviation s	Yes	
Rel. standard deviation srel	Yes	
Outlier test	Yes	
Record		
Output unit	Printer	
All results	Yes	

Method	051b	Blank I2 - value
Version	19-June-1991	16:15
Title		
Method ID	051b	
Title	Blank I2 - value	
Date/time		
Date/time	19-June-1991	16:15
Sample		
Number samples	3	
Titration stand	Stand 1	
Entry type	Fixed volume U	
Volume [mL]	25.0	
ID1	Blank	
Molar mass M	0.0	
Equivalent number z	1	
Dispense		
Titrant	KI 10%	
Concentration [mol/L]	10.0	
Volume [mL]	15.0	
Stir		
Speed [%]	50	
Time [s]	45	
Titration		
Titrant	Na2S2O3H2O	
Concentration [mol/L]	0.1	
Sensor	DM140-SC	
Unit of meas.	mV	
Titration mode	EQP	
Predispensing 1	mL	
Volume [mL]	40.0	
Predispensing 2	To slope	
slope [mV,pH, .../mL]	4.0	
Titration addition	DYN	
dE (set) [mV]	4.0	
Limits dV	Absolute	
dV(min) [mL]	0.02	
dV(max) [mL]	0.5	
Measure mode	EQU	
dE [mV]	1.0	
dt [s]	1.0	
t (min) [s]	6.0	
t (max) [s]	30.0	
Threshold	50.0	
Maximum volume [mL]	60.0	
Termination after n EQPs	Yes	
n =	1	
Evaluation procedure	Standard	
Calculation		
Result name	Blank I2 - value	
Formula	$R1=Q[1]$	
Constant		
Result unit	mmol	
Decimal places	4	
Record		
Output unit	Printer	
Raw results last sample	Yes	
E - V curve	Yes	
Table of measured values	Yes	
Statistics		
Ri (i=index)	R1	
Standard deviation s	Yes	
Rel. standard deviation srel	Yes	
Outlier test	Yes	
Auxiliary value		
ID text	Blank I2 - value	
Formula	H3=x	
Record		
Output unit	Printer	
All results	Yes	