

FOOD

Iodine value measurement for cooking oil

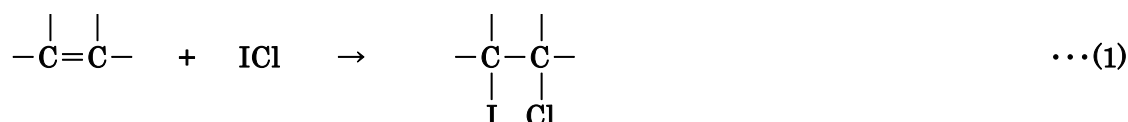
1. Abstract

Fatty acid in cooking oil, for example, oleic acid and linoleic acid absorb one or two of iodine molecules. Other kinds of cooking oils also absorb specific amount of iodine.

Iodine value means the “g” value of halogen which adhere to 100 g of sample; it is defined as indicators for unsaturated bond components of oils and fat in *Pharmacopoeias: JP, USP, and EP*.

There are two kinds of measuring methods such as Hanus method and Wijs method for Iodine value measurement. The former uses iodine bromide and the latter uses iodine chloride as halogen. In this chapter, the measurement example using more popular Wijs method is introduced.

Excess ICl in regard to the number of double bond is added on Wijs method. One halogen molecule binds to double bond of oils and fat as the following formula (1).



The Iodine value is determined by excessively-remained ICl which is titrated with sodium thiosulfate according to the following formula (2).



2. Configuration of instruments and Reagents

(1) Configuration

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

(2) Regents

Titrant	:	0.1 mol/L Sodium thiosulfate standard solution
Additive	:	Wijs solution 25 mL 1 mol/L Potassium iodide solution 20 mL
Solvent	:	Cyclohexane

3. Measurement procedure

- 1) Take about 0.25 g of the sample into an Erlenmeyer flask and weigh it accurately to 0.1 mg digits.
 - 2) Add 20 mL of cyclohexane to dissolve sample.
 - 3) Dispense 25 mL of Wijs solution exactly with volumetric pipette and plug it with a stopper and leave it under dark room for 30 minutes.
 - 4) Add 20 mL of 1 mol/L potassium iodide solution and 100 mL of pure water.
 - 5) Immerse the electrode and titrate with 0.1 mol/L sodium thiosulfate standard solution.
 - 6) Measure the blank value by testing of (2) ~ (5) without sample.
- ※The sample size should be changed depending on the iodine value of sample.

4. Measurement conditions and Results

Examples of titration conditions

Measurement of blank

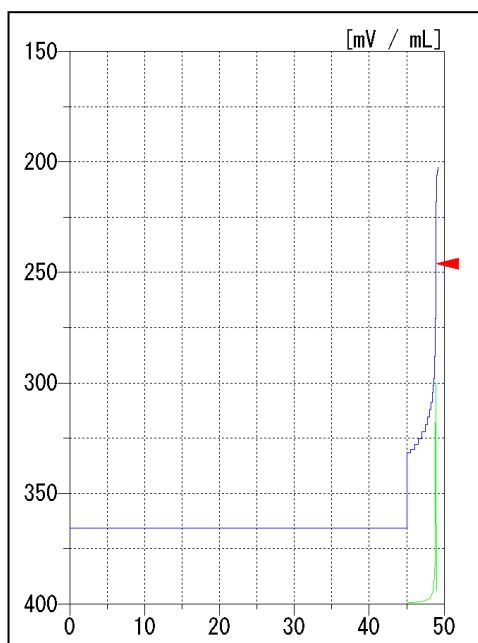
Cndt No.	1	ConstantNo.	1	Mode No.	21
Method	Auto	Size	0.0 g	Pre Int	0 sec
Buret No.	1	Blank	0.0 mL	Del K	5
Amp No.	1	Molarity	0.0 mol/L	Del Sens	0 mV
D. Unit	mV	Factor	0.0	Int Time	5 sec
S-Timer	15 sec	K	0.0	Int Sens	3 mV
C.P. mL	45 mL	L	0.0	Brst Speed	2
T Timer	15 sec	Unit	mL	Pulse	40
D.P. mL	0.10 mL	Formula	D		
End Sens	200	Digits	3		
Over mL	0.20 mL	Auto In Pram.	Non		
Max.Vol.	60 mL				

Measurement of sample

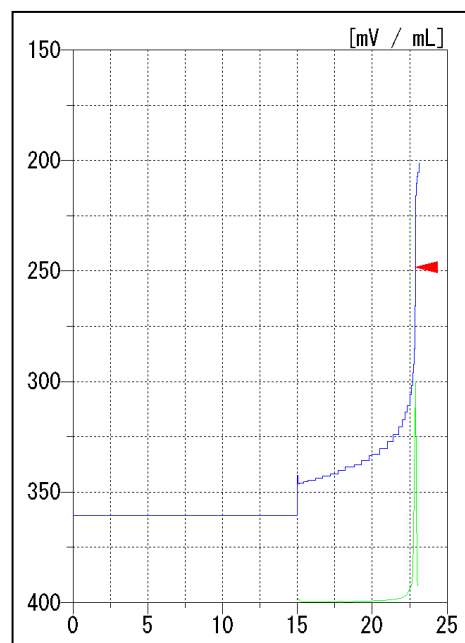
Cndt No.	2	ConstantNo.	2	Mode No.	8
Method	Auto	Size	0.2573 g	Pre Int	0 sec
Buret No.	1	Blank	48.871 mL	Del K	5
Amp No.	1	Molarity	0.1 mol/L	Del Sens	0 mV
D. Unit	mV	Factor	1.004	Int Time	5 sec
S-Timer	15 sec	K	1.269	Int Sens	3 mV
C.P. mL	15 mL	L	0.0	Brst Speed	2
T Timer	30 sec	Unit	g/100g	Pulse	40
D.P. mL	0.1 mL	Formula	(B-D)*K*F/S		
End Sens	200	Digits	4		
Over mL	0.20 mL	Auto In Pram.	Non		
Max.Vol.	60 mL				

Measurement results

Measurement Name	Number of Measurements	Size (g)	Titration Value(mL)	Iodine value (g/100 g)	Statistical calculation results
Blank	1	—	48.873	—	Avg. (Blank) 48.871 mL
	2	—	48.868	—	
Sample	1	0.2573	23.522	125.5210	Avg. 125.82 g/100 g SD 0.28 g/100 g CV 0.23 %
	2	0.2633	22.866	125.8350	
	3	0.2474	24.387	126.0890	



Measurement of blank



Measurement of sample

Examples of measurement curves

5. Note

- (1) Adding volume of Wijs solution is 50~60 % excess of requisite amount for sample. Decrease the sample volume if the Wijs solution is absorbed than above amount.
- (2) Timely measure the blank because Wijs solution is easy to degenerate.
- (3) Please use Erlenmeyer flask with stopper to avoid sublimation of sample and Wijs solution.

Keyword : Cooking oil, Iodine value, Wijs method, Redox titration