

OFFICIAL METHODS
AND
RECOMMENDED PRACTICES
OF THE
AOCS
Sixth Edition

PREFACE

The Sixth Edition of the *Official Methods and Recommended Practices* continues with the more accessible look. New, easier-to-read typefaces and updated typography have been used while maintaining the stand-alone nature of the methods. As with the earlier editions, this reprinting emphasizes modern techniques and recent advances in analytical chemistry using up-to-date instrumentation. The edition contains more than 420 methods. Thanks are due to the associate editors and the AOCS Technical Department staff. Special thanks are due to Dr. Richard Conrill, AOCS technical director, for his leadership and technical assistance in editing this edition.

Dr. David Firestone
Editor of Analytical Methods
March 2009

AOCS Mission Statement

AOCS advances the science and technology of oils, fats, surfactants and related materials, enriching the lives of people everywhere.

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AOCS Recommended Practice Cd 1c-85

Reapproved 2009

Calculated Iodine Value

DEFINITION

This method determines the iodine value for edible oils directly from fatty acid compositions (see Notes, 1 and 2).

SCOPE

Applicable to triglycerides and free fatty acids and their hydrogenated products (see Notes, 3).

APPARATUS

1. Gas chromatograph—to provide fatty acid composition by accepted validated methodology, e.g., AOCS Official Method Ce 1-62, AOCS Official Method Ce 1c-89, etc.

PROCEDURE

1. Proceed as directed in the accepted validated method of choice.
2. Determine the fatty acid composition of the oil or fatty acid mixture.

CALCULATIONS (see Notes, 4)

Iodine values may be calculated according to the potential number of iodine atoms added to each fatty acid or triglyceride according to Table 1. Examples of calculations are given below.

1. Triglycerides, iodine value = (% hexadecenoic acid $\times$ 0.950) + (% octadecenoic acid $\times$ 0.860) + (% octadecadienoic acid $\times$ 1.732) + (% octadecatrienoic acid $\times$ 2.616) + (% eicosenoic acid $\times$ 0.785) + (% docosenoic acid $\times$ 0.723).
2. Free fatty acids, iodine value = (% hexadecenoic acid $\times$ 0.9976) + (% octadecenoic acid $\times$ 0.8986) + (% octadecadienoic acid $\times$ 1.810) + (% octadecatrienoic acid $\times$ 2.735) + (% eicosenoic acid $\times$ 0.8175) + (% docosenoic acid $\times$ 0.7497).

NOTES

1. While this procedure provides an iodine value, it is not intended to be a rapid method, but rather gives two results from one analysis.
2. For oils with an unsaponifiable content greater than 0.5% (e.g., fish oils), the calculation tends to be low.
3. The calculation tends to be low for materials with low iodine value.
4. Calculated IV based on GC fatty acid composition of non-triglyceride lipid materials such as partial esters of glycerol, partial esters of sorbitol/sorbitan/isosorbide esters, partial esters of polyoxyethylene sorbitol/sorbitan/isosorbide or glycerol, etc. will provide the calculated IV of only the fatty acids used to prepare the partial esters. To obtain the actual IV of partial esters with nonfatty acid polyol diluents, the chlorinated Wijs Reagent IV method should be used. IV values of partial esters via the Wijs method are lower than those obtained by GC because of the dilution effect of the polyol material.

Table 1
Conversion factors for triglycerides and free fatty acids

	MW Triglyceride	I	I M.W. 126.9045	Factor Triglyceride	MW Fatty Acid	I	I M.W. 126.9045	Factor Fatty Acid
C12:1	633.01	6	761.4270	1.2029	198.3500	2	253.8090	1.2796
C14:1	717.18	6	761.4270	1.0617	226.3800	2	253.8090	1.1212
C15:1 <i>trans</i>	759.16	6	761.4270	1.0030	240.4000	2	253.8090	1.0558
C15:1	759.16	6	761.4270	1.0030	240.4000	2	253.8090	1.0558
C16:1 <i>trans</i>	801.34	6	761.4270	0.9502	254.4300	2	253.8090	0.9976
C16:1	801.34	6	761.4270	0.9502	254.4300	2	253.8090	0.9976
C17:1 <i>trans</i>	843.42	6	761.4270	0.9028	268.4800	2	253.8090	0.9454
C17:1	843.42	6	761.4270	0.9028	268.4800	2	253.8090	0.9454
C18:1 <i>trans</i>	885.50	6	761.4270	0.8599	282.4800	2	253.8090	0.8985
C18:1	885.50	6	761.4270	0.8599	282.4800	2	253.8090	0.8985
C18:2 <i>trans</i>	879.50	12	1522.8540	1.7315	280.4800	4	507.6180	1.8098
C18:2	879.50	12	1522.8540	1.7315	280.4800	4	507.6180	1.8098
C18:2 CLA	879.50	12	1522.8540	1.7315	280.4800	6	507.6180	1.8098
C18:3 <i>trans</i>	873.50	18	2284.2810	2.6151	278.4800	6	761.4270	2.7342
C18:3	873.50	18	2284.2810	2.6151	278.4800	6	761.4270	2.7342
C20:1	969.66	6	761.4270	0.7853	310.5400	2	253.8090	0.8173