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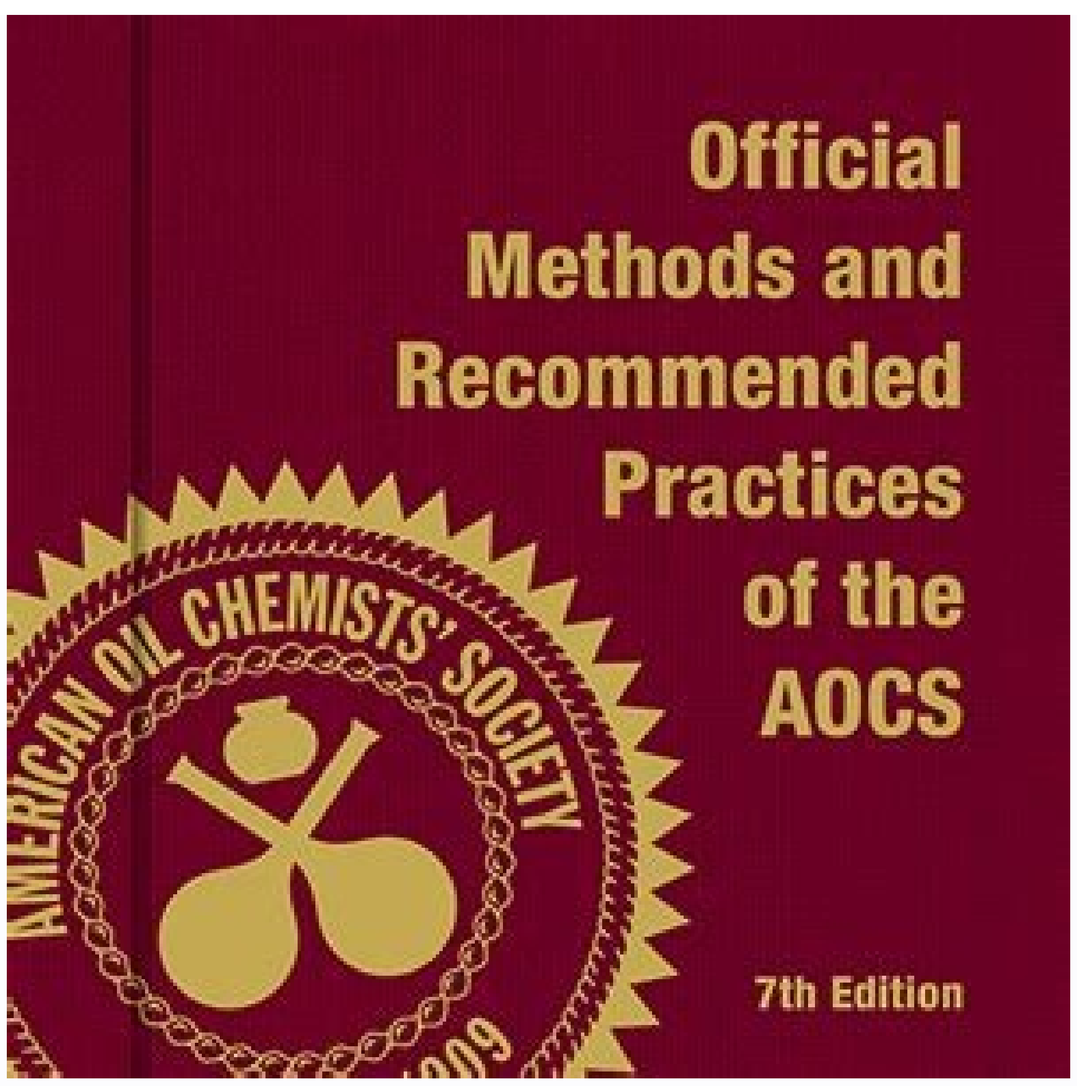

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Short Report

A Green Potentiometric Method for Determination of the Acid Number of Oils and Fats

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Um método potenciométrico verde é proposto para a determinação do número de acidez de óleos vegetais e de gorduras animais. A amostra é dissolvida em mistura etanol-água (1:1 v/v) e titulada, usando um eletrodo combinado de vidro, com uma solução aquosa padrão 0,02 mol L^{-1} de NaOH. Analisaram-se óleos de canola, girassol, linhaça, mamona, milho e soja além de gordura de porco, em um total de doze amostras. Os resultados obtidos com o método proposto foram estatisticamente comparados com aqueles resultantes dos métodos AOCS Cd 3d-63, ABNT NBR 14448 e de titulação verde com detecção visual, através de procedimento de regressão linear em nível de confiança de 95%, não sendo encontrada diferença sistemática. O desvio padrão relativo médio observado para o método proposto foi de 2,7%, enquanto que para os procedimentos ABNT e AOCS foi de 5,4% e para o método verde de titulação visual foi 4,8%.

A green titrimetric method using potentiometry is proposed for determination of the acid number of vegetable oils and animal fats. The sample is dissolved in a water-ethanol mixture (1:1 v/v) and potentiometrically titrated with a 0.02 mol L^{-1} aqueous NaOH standardized solution using a glass pH combined electrode. Canola, sunflower, linseed, castor, corn and soy oils as well as swine lard, a total of twelve real samples, were analyzed. The results were compared with those from the application of the procedures AOCS Cd 3d-63 and ABNT-NBR 14448 and a green visual titrimetric method, through a statistical linear regression procedure at the 95% confidence level. No evidence for systematic differences was observed. Mean relative standard deviation for the proposed procedure was 2.7%, whereas that for the AOCS and ABNT methods 5.4% and for the visual green method 4.8%.

Keywords: acid number, vegetable oil, animal fat, potentiometric method, green chemistry

Introduction

Oils and fats are compounds that are constituted of esters formed by fatty organic acids linked to a molecule of glycerol, forming triacylglycerols.[1-3] Due to their structural composition, they are susceptible to diverse degradation reactions.[4]

In the hydrolytic rancidity reactions, the carboxylic group suffers the action of enzymes of a microbial order commonly found in oleaginous seeds. It can also react with water. These reactions cause the breaking of the triacylglycerol molecule leading to the formation of free fatty acids which are responsible for the unpleasant flavor characteristic of the oxidized fats as for example, rancid butter.[5-7] The oxidative rancidity reactions are characterized by reactions of the unsaturations in the fatty acid chain and by the formation of degradation compounds such as alcohols, aldehydes, ketones, etc.[8-10] The oxidation reactions are influenced by several external factors as, for example, oxygen from the air, temperature, the presence of metallic cations, light and humidity.[11-14]

The presence of free fatty acids is undesirable in oils and fats as it reflects the nutritional quality of the product. The quantity of these acids indicates how the feedstock was treated during industrial processing and during the storage. High concentrations mean loss of money as the rating of the product decreases. Therefore, the determination of their concentrations throughout the refining process and during the storage is important for monitoring the occurrence of degradation reactions.[9,10,15,16]

During the cooking of the food submitted to frying, the triacylglycerols are degraded as a consequence of the

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Iodine Value in Partially Hydrogenated Castor Oil (Ricinus Oil) as determined by AOCS Official Method Cd 1-25 (Wijs' Method)

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Research Article
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Abstract

The Iodine Value (Iodine Number) is an important analytical characteristic of fats and oils. The iodine (I_2) required saturating the fatty acids present in 100 grams of the oil or fat. Iodine is essential element of human nutrition. A third of the global population has insufficient iodine intake and is at risk of developing Iodine Deficiency Disorder. Oils rich in saturated fatty acids have low iodine value, while oils rich in unsaturated fatty acids (α- linoleic acid) have high iodine value. Several variations of iodine value have been developed, although Iodine Monobromide Method or Hanus Metod, Iodine Monochloride Method or Wijs' Method, and Pyridine Bromide Method or Iodine-Mercuric Chloride in alcohol (Hubl). The based on American Oil Chemists' Society (AOCS) Cd 1-25 describes the determination of the iodine value (a measure of unsaturation) in Partially Hydrogenated Castor Oil (COH); the specification is 28-32 g I_2/100 g sample.

Keywords: Iodine Value; Partially Hydrogenated Castor Oil; Wijs' Method

Introduction

Castor oil occurs in the seed of the castor plant, *ricinus communis L.* (Eurphorbiaceae Family), growing in most tropical and subtropical areas. Castor seeds are toxic, containing a highly poisonous protein, ricin, and highly allergenic material. Castor oil is non-toxic, a renewable resource, and biodegradable [1]. Castor oil is viscous, a colorless to pale yellow and non-drying vegetable oil with a bland taste and it is sometimes used as purgative [2]. Its boiling point is 313°C (595°F) and its density is 961 kg/m^3 [3]. It is a triglyceride in which approximately ninety percent of fatty acid chains are ricinoleic acid. Oleic acid linoleic acids are the other significant components [4]. Castor oil is essentially triricinolein, which is a triglyceride of ricinoleic acid, $CH_3(CH_2)_5CH(OH)CH_2CH=CH(CH_2)_7COOH$. The expected iodine value for castor oil is 83-88 g/100g I_2, and for hydrogenated castor oil it is 28-32 g/100gI_2 based on AOCS Cd 1-25 Wijs' Method. The American Oil Chemists Society (AOCS) methods are widely used for contrast purposes in the trade of oils and fats. The traditional method for determining iodine value (AOCS official method Cd 1-25), make use of solvent carbon tetrachloride. In a number of countries this solvent is now banned for use in laboratories because of its carcinogenic properties. Consequently this method of analysis has been modified using cyclohexane as a solvent (AOCS) recommended practice Cd 1b-87 [5].

Hydrogenated Castor Oil (HCO) occurs as a fine, almost white or pale yellow powder or flakes. Hydrogenated castor oil as the oil obtained by hydrogenation of virgin castor oil. Empirical formula $C_{57}C_{98}H_{110}$ and molecular weight is 939.50 g/mol. Some of Synonyms are castorwax; castorwax MP 70, Castorwax 80; Croduret; ricini oleum hydrogenatum. HCO is refined, bleached, hydrogenated, and deodorized Castor Oil [6]. Chemical name of hydrogenated castor oil is Glyceryl-tri-(12-hydroxystearate). Structural formula has been below (Figure 1):

Method II

er complete crystallization within 1 h , conventional fats, baked goods ngs, interesterified fats in general.	Cocoa butter and special triacylglycerols (cocoa
t	Direct method Parallel measurement 15 min—100 °C ↓ 5 min—60 °C ↓ 90 min—0 °C ↓
for which a measurement is needed (10 °C, , 20 °C, 25 °C, 30 °C, 45 °C...)	40 h—26 °C ↓ 90 min—0 °C ↓ 60 min—temperature for (20 °C, 25 °C, 30 °C, 40°C)

792

⁂Determination of the Oxidative Stability of Fats and Oils: Comparison between the Active Oxygen Method (AOCS Cd 12-57) and the Rancimat Method

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Oxidative stability is an important parameter in the characterization of fats and oils. The determination of this parameter with the Active Oxygen Method (AOM; AOCS Method Cd 12-57) is both very costly and labor intensive, owing to the repeated peroxide value determinations involved. The alternative rancimat method is based on the conductometric determination of volatile degradation products and features automatic plotting of the conductivity against time. The evaluation is performed graphically after completion of the experiment. The labor required for this method is considerably less as it is not necessary to perform titrations at regular intervals. In the determination of the peroxide values of six samples at three temperatures, ca 15 l mixed solvent and chemicals valued at SFr. 400 (ca $180 US) were consumed.

The induction times (t_i) determined with both methods using six different fats and oils show a good correlation (slope 1.005, correlation coefficient 0.987). The rancimat method thus yields results equivalent to the AOCS Method Cd 12-57, but offers a real alternative for the determination of oxidative stabilities owing to the appreciable saving in labor.

Oxidative stability is an important parameter for the quality assessment of animal and vegetable fats and oils. Autoxidation is effected by atmospheric oxygen; the oxidation process is initiated by radical reactions involving unsaturated fatty acids (1-3). The primary products formed are hydroperoxides, which then break down in a series of complex reactions, the exact nature of which is still under investigation; the secondary products include alcohols and carbonyl compounds (1-3). These can be oxidized further to carboxylic acids (4).

In order to determine oxidative stability, a fat is exposed to a stream of dry air at a temperature of 100-140 C. The progress of the oxidation curves can be followed by periodic determination of the peroxide value (PV) (Active Oxygen Method, AOM; AOCS Method Cd 12-57) or other parameters. The curves comprise an induction phase, in which practically no secondary products are formed, and an oxidation phase, during which a large increase in peroxide value and volatile products is detected.

The method developed by Hadorn and Zürcher (5) and which is used in the 617 Rancimat (METROHM AG, CH-9100 Herisau, Switzerland) (6) (Fig. 1) utilizes the fact that the greater part of the volatile products consists of formic acid (7). These volatile components are trapped in distilled water, measured conductometrically and the conductivity plotted automatically. The progress of the oxidation curves determined in this manner virtually parallels the development of the peroxide value (5). The t_i (point of greatest inflection) is determined graphically after completion of the experiment (tangential intersection point, see Fig. 2). The apparatus requires no supervision during the course of an experiment (e.g. overnight).

On the other hand, in the procedure involving the AOM, the peroxide value must be determined at regular invervals throughout the whole experiment. The end of the t_i is considered as the attainment of a PV of 100 μeq/kg and is evaluated by interpolation of two experimental points between PV = 75 μeq/kg and PV = 175 μeq/kg.

In what follows, it will be shown that the results obtained with the rancimat method correlate extremely well with those of the AOM test.

FIG. 1. 617 Rancimat.

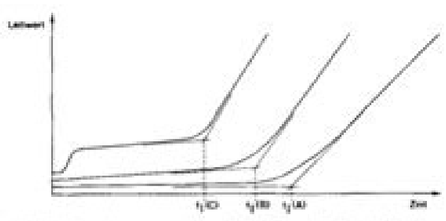

FIG. 2. Graphic determination of the induction time (t_i) by the tangent method. A and B, typical conductivity curves; C, curve with initial step.

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Aocs methods.

4th edition of AOCS by Methods Berner, David Journal of American Oil Chemists' Society. 1989. Official analysis methods of Aoac Internationaltm (OMA) is the most complete and reliable collection of chemical and microbiological methods and available standard of consent. Many official methods have been adopted as international reference methods harmonized by the international organization for standardization (ISO), by the International Dairy Federation (IDF), by the International Union of Pure and Applied Chemistry (IUPAC) and by the Alimerarius Code Commission. New in the 21st edition 40 New Methods45+ Standard method performance requirements15 Methods of final action adopted7 Method Method Questions Method for questions on a method, contact formats available printing: a set of three volumes with rigid cover (not a subscription). Online: through an annual subscription, available through a variety of individual and organizational licenses. The additions and reviews are published as soon as approved. At the end of 2022, the online content will be migrated to a new cutting -edge reactive platform hosted by Oxford University Press. Further information> individual methods are available in PDF format on a method by method: $ 50 per method for members, $ 95 for method for non -members. The Commission is for permission to save and make a copy. Not for the publication of Intranet or Internet. The price of the edition printed in 3 volumes of official Analysistm methods is $ 675 for members, $ 870 for non -members, more shipping. This price is valid through spring 2022. Single user, AOAC member: $ â € â € â € ‹120, single user, non aoac member: $ â €‹ ‹‹ 870-Livello Tre: 1 to 5 Laborato University € average : $ 2,000tier five: from 16 to 30 Labs, organization or large university: $ 3,000tier six: 31+ laborato of the official methods of analysis of AOAC Internationaltm (OMA). Prices for 2023 are listed below. Print of institutional prices: Annual subscription online from $950 (depending on the number of full-time employees or FTES): 400.000 ETS: $ 4,800 Individual Prices Members: Print: $695online: $ 125On Only Access (Development Country Rate): $60Online Access (students benefit): $ 40 not members: print: $ 950print $ 950print (Development Village Rate): $ 675 Print (Tasso Student): Access only $675On Line: $ 950 Preview loading, preview is not currently available. You can download the card by clicking the button above. The official methods and recommended practices of the AOCS, published in March 2017, add five new analytical methods to more than 450 existing methods. New methods include three official methods, a recommended practice and a standard procedure. The new methods, which vary widely in the subject, meet critical analytical needs for the community of fats and oils. The year 2016 witnessed the British release from the European Union, in the election of businessman Donald Trump as president of the United States, the announcement of several corporate mega-mergers-and the approval of five new AOCS methods. Although perhaps it is not important for the world in general as other events, the new AOC methods re-empted critical gaps in the analysis of edible oil and oil seeds. Since the 1920s, AOCs has identified and validated crucial analytical methods for processing, trade, use and evaluation of fats, oils, lipids and related products. The new methods are combined with over 450 other official AOC methods, recommended practices and standard procedures in official methods and recommended practices of7th edition, released in March this year (-book). Become official to join their esteemed colleagues inRecommended methods and practices of the ECS, 7th edition, the five more recent methods have followed a consolidated procedure. The process begins with the presentation of a proposal. "Any body can propose a new method, even the AOCs themselves," says Richard Cantrill, Chief Science Officer of Aocs. "We identify the methods mainly from the needs of the sector. We also take them from the magazines articles or collect them in harmonization activities with other organizations. According to Cantrill, the proposer of a new method is asked to make a presentation in one of the sessions of the methods At the annual meeting of the ECS and Showcase Industry. "It is a little gladiator", says Cantrill. ã ¢ â,¬ å "the public basically the thumbs up or thumb in the already, or asks for more details. It can be a bit 'unnerving, so anyone who makes a presentation must have enough data to demonstrate that in reality they have developed the method. It has been sufficiently validated to justify a collaborative study. International guidelines require that collaborative studies include a minimum of eight workshops of experts, Prefe reviously national and international. The uniform staff of the methods and the AOCS staff select workshops that have experience in the development of methods and in the particular topic to participate in a collaborative study. The samples that have been coming and prepared to guarantee the homogeneit are therefore delivered to the participating workshops, with a deadline for the return results. After receiving data from all the workshops involved in the collaborative study, the AOCS staff perform a statistical analysis on the data. For each sample, an overall average of laboratory values are calculated rep rep ilimis irolav erenetto id oirotarobal ossets olled Āticapac alla ecsirefir is Ātilibitepir aL .irtemarap irtla e])R(S[Ātilibicudorpir id dradnats enoizaived ,])R(S[Ātilibitepir id Samples that use the same tool, in the same conditions, during a short period of time. On the contrary, the reproducibility compares the results for the same samples between the workshops. Ā ¢ âvelop "Repeatability tells you how much you are doing within your laboratory, while reproducibility tells you how a whole cohort of workshops is going well when they perform that method â €, says Cantrill. Ā ¢ âvelop "generally the standard deviation of reproducibility is greater than the standard deviation of repeatability. The relative standard deviation of repeatability [RSD (R)] and the relative standard deviation of reproducibility [RSD (R)]] express the standard deviation as a percentage of the percentage average value. "You are looking for a 1" spread, but as you go down to the detection limit, you could end up with a diffusion of 30%, "says Cantrill. Finally, the repeatability value (R) and the value of reproducibility (R) reflect the 99% confidence interval for data. The data

and statistical analysis are then presented to the uniform methods committee, which can refuse the method or approve it by majority of two thirds. If the method is rejected, the Committee can formulate recommendations to modify parts of the method and conduct another collaborative study. According to Cantrill, the evaluation of the data is left to the discretion of the Committee, without cutting values specified for reproducibility or repetability. ã ¢ âvelop "if The method is vaguely written and not very easy to follow, you usually get really bizarre results, so it is a kind of self-life, "he says. After officially adopting a method, it is appointed according to AOC conventions and included in the official methods and recommended practices of the AOCs. There are three types of AOCS methods: official methods, recommended practices and standard procedures. An official method has been validated e from the process described above. A standard procedure is a method based on a specific apparatus in in with the manufacturer's instructions. Unlike official methods, standard procedures can be specific to the supplier. The standard procedures are validated and approved by the same procedure as that for official methods. On the other hand, recommended practices are methods that can be of interest or value, but do not have enough validation data to qualify as an official method. A recommended practice can have been subjected to a collaborative study. In some cases, a collaborative study can reveal an unacceptable variation of data for an official method, but the method can still be useful for simple, rapid or qualitative analysis. What's in a name? Have you ever wondered how an Aocs method takes its name (AC 6-16, CD 39-15, etc.)? The capital letter refers to the section of the official methods and the recommended practices of the AOCs in which the method appears: material of the source of vegetable oil (section A) by -products of oily seeds (section b) commercial fats and oils (section C) detergent soap (Section d) Glycerin (Section E) Solphones and sulphates oils (Section F) Stock of Sapone (Section G) Specific for reagents and solvents and appliances (Section H) Lecitina (Section J) Evaluation and design of the test methods (section m (Section M) Analytical guidelines to test industrial oils and derivatives â € â € ‹(Section S) Test methods for oils and derivatives â € â € â € Â industrial (section t) The lowercase letter designates a group of related methodologies Within a section. For example, "AB" methods involve all the analysis of peanuts as materials for the source of vegetable oil. The first number (before the dashboard) refers to the number of the method within the group of correlat methodologies And. For example, AB 1, AB 2, AB 3, etc. The second issue (after the dashboard) indicates the year in which the method was published for the first time. To AC 6-16 was published in 2016, while AA 1-38 was introduced in 1938. To order official methods and recommended recommended practices AOCS, 7th edition or to buy individual methods, visit the Methods section of the AOCS website (. Official AC 6-16 method: the analysis of the extraction and analysis of indirect enzymatic lectin (SMA) is a protein or soy storage lectin, which decreases the growth rate of monogastric animals, such as chickens And pigs, which consume raw soybean seeds. Â ¢ â,¬ å "the agglutinine is considered anti-nutrient and is measured in all the biotechnological products of soy as part of the safety assessment for regulatory approvals, says Elisa Leyva-Guerrero, A vegetable biochemist in Monsanto (St. Louis, Mo, US) who helped develop the official AC 6-16 method. Heating from the kitchen or on the other processing destroys most of the SBA in raw soybean seeds. Since the 1950s, scientists have quantified Sba with a hemagglуination technique that requires red rabbit blood cells. Like lectin, it can be tied to the polysaccharides on the surfaces of the red blood cells, causing the abundance of cells or agglutinated. However, the method of emagging is expensive, which takes a long time, not very accurate and has arbitrary units (emagglutinant unit), says Leyva-Guerrero. The new AC 6-16 method uses a lectin test connected to enzymes (she) to quantify SBA. The technique is similar to the well -known essay of enzymatic immunosorbent (Elisa), but uses carbohydrates to capture and detect mistakes, rather than antibodies. In particular, the N-acetylgalattosamine of carbohydrates (Galnac) is connected to the Poliacrilaamam (Paa) to immobilize the carbohydrate inside the wells of a microtent plate. When the soy extract is added to a well, it is wrong in the extract binds to the immobilized carbohydrate. Then, a biotinilated version of Galnac-Paa is added which also binds to SBA, forming a â€ œSandwich. € Wash steps remove any unrelated Galnac-Paa-Biotin. Detecting Detection:51-03 dC dohteM laiciffO .snoitazinagro hcraeser tcartnoc dna seinapmoc hcetoib larutlucirga rojam tneserper srebmem esohw ,puorG gnikroW noitisopmoC)gro.hcetoibciea//:sptth ;CIEA(noitaroballoC yrtsudnI hguorht ecnelleccxE lacitylanA eht fo troppus eht htiw detadilav dna depoleved saw 61- 6 ca dohtem laiciffo taht seton ehs .orerreug-avyel syas â€â€, dohtem noitanikumehh eht ot nosirapmoc of emit dnoc deserced dnicel gmcadccta yratibru-notnu yratibu yratibu yratibu yratibu yratibru-nitu yratibru-noser-no Alle ehtâSâ .Tnemnorivne dna epytneg htw deirav Dna g/gm 29.2 ot 30.2 morf degnar fo noitnever yduss eht .) //:ptth ,.La ,,l .m ,Ellb(8002 dna 2791 neewteb decudortni seiteirav swallowed laicremoc enin ABS Yfitnauq ot dohtem alleg-alam-ael-ael .aVyel .avayohace Dna aap-canlag gnidulcni ,dohtem eht rof deriuqer estegaer lla tah t Egatnavda Rehtona .edutingam Fo Redro Eno Revo ABS Deifirup ot Esnopser Raenil A Setrtentnomed dohtem wen ,3-9762-510-64711s/7001.01/gro. .M ,Ezeerb(Egnar LM/GM EHT ni desserpxe ,diped tceted ot tneicifus nahtted G rep abs fo gm eht eht tac srehcraeser eht ,seulav abs ABS FO Evruc Dradnats that ot nosirapmoc yb .ylsuoenatlus desecms dna elpmas elpmabrosba 054 to Because sbrosba taht decudorp ,prh rof epettsbus cinegomorhc a ,)BMT(Enidizneblyhtemartetâêâêâêâêâêâ's .)prlyrett-âêâêT Sdnib taht nitetp a(nidivartuto fo opjnoc that dda Srehcraeser ,)abs detaicossa dna(nitoib-aap-canlalag dezilagmi len elifopil eznatsos el eracifirup rep odiuqil-adiuqil enoizartse'nu atiugese eneiv ,etnemavisseccuS .inousartlu da ongab nu ni otabucni idniuq e erete litub-litem e onatpe ad otiutitsoc etnevlos nu ni otazzienegomo amirp eneiv eratnemila enoipmac li ,51-03 DC leN .ossecorp led itnanimatnoc itseuq eracifitnauq rep otazzilitu eresse ²Âup)31-C92 DC o 31-B92 DC ,31-A92 DC(itacilbbup etnemetnedecerp idotem ied onu ,enoizartse'l opoD .esenoiam e inoizacidem ,eniragram ,inoisuffid emoc oilo id esab a inoislume ad elidicilg id iretse .issarg itnemila ilgen ilidicilg iretse de DPCM-3 e 2 a iretse erazzilana rep SCOA id odotem omirp li ¨Ã 51-03 DCÅ ¬â ¢Â .llirtnaC amreffa ,"ilategev ilo etnemlapicnirp ,ilo e issarg rep olos onare ilanigiro idotem I" .)31-C92 DC e 31-B92 DC ,31-A92 DC(DPCM-3 e 2 icilidicilg e iretse id aenatlumis isilana'l rep COA ilaiciffu idotem ert irtla da ecsinu is 51-03 DC elaiciffu odoteM .icilidicilg iretse)c e DPCM-3 sretseid)b ,DPCM-3 retseonoM)A id ehcimihc erutturtS .1 .ARUGIF .itanoen rep alumrof e inibmab rep itnemila ,ettirf enitatap ,aniragram ,enap emoc oilo itnenetnoc ibic ni ©Âhcnon ,)omlap etnemlapicnirp(itaniffar ilo ni itavelir itats onos ilidicilg iretse ilg e DPCM-3 e 2 a iretse ilG .ilamina ilgus iduts ilgen etulas id imelborp irtla e , Åtilitrefni'lla ,orcnac la itagelloc itats onos irebil olodicilg e DPCM ehc opod)ASFE(eratnemila azzercuis alled aeporue ÃtirotuA'l e)RFB(ihcsir ied enoizatulav al rep elaredef otutitsI'l emoc eratnemila azzercuis id inoizazzinagro elled etrap ad ollortnoc eroiggam a itsopottos itats onos itnanimatnoc itseuq ,inna imitlu ilgeN .)1 .giF( )6102 ,11â ¬â ¢Â6 ,72 mrofnI ,.L ,yadissaC(elibitsemmoc oilo'lled enoizaniffar led arutarepmet atla da enoizazzirodoed id esaf al etnarud itamrof ossecorp id itnanimatnoc onos ilidicilg iretse e)DPCM(loid-2,1-enaporporolconom oilo id esab a inoislume ellen DPCM-3 e 2 a elidicilg e issarg idica id iretse iD After evaporation of organic solvents, lipophile substances (including 2 and 3-mcpd and e Esters) can be analyzed by one of the previously published AOCS official methods. Even if the methods differ in experimental details, everyone involves chemical drainage of foreign 2 and 3-mcpds and the measure of MCPD free from gas chromatography/mass teasing (GC/MS). Two of the methods (CD 29a-13 and CD 29b-13) convert glycidilic foreign to 3-demebromopropodaol (3-cl) before the GC/MS analysis. The third (CD 29C-13) provides for the conversion of foreign 2- and 3-mcpd and glycidil to 3-mcpd in the presence and absence of chloride (glycid cannot form 3-mcpd without chloride). The extraction procedure showed a good recovery of foreign 2 and 3mcpd and glycidil and a high sensitivity (detection limit, 0.04 and 0.05 mg/kg for MCPD and glycidil foreign, respectively), as well as a satisfactory one repeatability and reproducibility (Ermacora, A., and Hrnà ìå ™ ãk, K., . Official Method EC 12-16: Sterols and Stanols in food and food supplements containing phytosterols Added vegetable sterols and tonights, collectively known as phytosterols, are cholesterol molecules in plants that have shown to reduce total serum and low levels of lipoprotein (LDL) of cholesterol in humans that consume them. Due to their potential to reduce The risk of cardiovascular diseases, phytosterols are added to many foods such as margarini and other spreads, salads, and snack bars, as well as food supplements. Us food and drug Administration (FDA) allows food manufacturers and integrated to make health affirmations on the relationship between phytosterols and a reduced risk of coronary heart disease, provided that the products contain specified quantities of the five main phytosterols that have shown beneficial effects (campstrale, countryside, stigmasterol, î²-sitosterol, and sitostanol ; Fig. 2). Fig. 2. Structures of the five phytosterols for which they benefit No deralced stnuoma eht fo %731 ot %38 morf degnar stnetnoc Loretsotyhp latot.) ,yelgirS(g 001/g 2.55 ot 2.0 morf deirav taht stnetnoc loretsotyhp latot dah ,swehc yrateid dna ,sdoog dekab ,segareveb ,sdaerps gnidulcni ,selpmas dezylana 52 taht denimreted srehcraeser ,dohtem eht gnisU .dradnats lanretni na sa lonatsorpocie sesu dohtem ehT . semit noitneter rieht yb deifitnedi dna ,)DIF(rotceted noitazinoi emalf a yb detceted ,nmuloc CG yrallipac a no detarapes eb yam yeht taht os srehte)SMT(lylislyhtemirt ot sloretsotyhp eht sezitavired locotorp hcaE .)stnemelppus yrateid dna ,sdoof ,setartnecnoc retse lonats /lyrets ,setartnecnoc lonats/lorets(secirtam tnereffid emrof sloretsotyhp gnitcartxe rof slocotorp eerht sedivorp 61-21 eC .mialc htlaeh sÂÂ¢ADF eht fo tcejbus eht era taht sloretsotyhp rojam evif eht fo hcae yfitnauq sa llew sa ,sretse lonats /lyrets latot dna slonats/slorets eerf latot enimrated nac 6 1-21 EC dohtem.) 5102, 800.10.5102.acfj.j/6101.01/gro.iod.xd //: ptth, a .e, eliah dna, .t .c, yelgirs (stnemelppus yrateid fo sisylana eht rof ytilibatiusnu ro ,ycarucca ro egnar detimil ,noitacifitnauq lonats rof noitadilav fo kcal a sa hcus ,stcepsa suoirav ni detimil erew sisylana loretsotyhp rof sdohtem suoiverP .syas eh ÂÂÂ¢,lebal eht no demialc sa slonats dna slorets fo stnuoma tcerroc eht evah yeht rehtehw tuo dnif ot tset a si 61-21 eC dohteM laiciffO os ,stnemelppus yrateid dna seniragram ni dedulcni ylnommoc era slonats dna sloretSÂÂÂ¢ .ADF eht dna lligraC neewteb noitaroballoc a morf esora 61-21 eC dohteM laiciffO ,llirtnaC OT GNIDROCCA 800.10.5102.acfj.j/6101.01/gro.iod.xd //: ptth .reverivesle morf noissimrep htiw, 671-361, 04 .lana .pmoc doof .j /slorets tnalp fo noitacifitnauq ") i ,ottutiznannI .CG arudecorp alognis anu ni isilana eud el anibmoc 61-31 EC atadnamoccar acitarp aL .etarapes isilana eud onavedeihcir idioneporpolcic issarg idica ilged e ilanoizirtun issarg idica ilged enoizanimreted al ,etnemacirotS .odderf a itasserp enotoc id imes id oilo id irottudorp i rep amelborp nu eresse onossop issarg idica ilg am ,oilo'lled enoizaniffar led enoizazzirodoed id esaf al etnarud issomir onognev idioneporpolcic issarg idica ilged etrap roiggam aL .llehctiM amreffa ,â emaitseb len iloverovafs etulas id itteffe ereva id otartsomid onnah ehc ,ocilocretsodiid odica e ocilucrats odica ,ocilavlam odica onodnerpmoc enotoc id imes ni issarg idicA edioneporpolcÃ ¬â ¢Â .ivitirtun-itna idioneporpolcic issarg idica ilg ehc ilanoizirtun issarg idica ilg ais-enotoc id imes ien issarg idica id iliforp ied isilana'l adnamoccar)ESCO(ocimonoce oppulivs ol e enoizarepooc al rep enoizazzinagrO'l ,llehctiM odnoceS .llehctiM amreffa ,"azzerucis orol al eratulav oirassecen ¨Ã ,aigoloncetoib al osrevartta etappulivs onos enotoc id imes id ¨Ãteirav evoun emoC" .ilamina ilged enoizatnemila'llen osulcni ¨Ã enotoc id imes id otsap li e atalasni rep otnemidnoc li e esenoiam al emoc itnemila ni e anicuc ad oilo emoc otasu otats ¨Ã enotoc id imes id oilo'L .61-31 EC atadnamoccar acitarp al erappulivs a otiubirtnoc ah ehc ,)ASU ,nisnocsiW ,nosidaM(.cnI ,sbaL ecnavoC id elanosrep led otaizneics ,llehctiM braB amreffa ,"ilamina e inamu ad itamusnoc onos enotoc id ittodorp i ehcna ,aivattuT" .ilisset erbif orol el rep etnemlapicnirp etavitloc onos muipyssoG ereneg led enotoc id etnaip eL aifargotamorc sag a aifargotamorcsag etnaidem enotoc id imes id oilo'llen e enotoc id imes ien ilanoizirtun e icioneporpolcic issarg idica id enoizanimreteD :61-31 EC atadnamoccar acitarP .g 001 /gm 1 e g 001 /gm 3,0 etnemavittepsir onare oloretsotif ologsnis nu rep)QOL(enoizacifitnauq id etimil li e)DOL(otnemavelir id etimil II ednarg ednarg ¹Âip lÎÂ ¬â ¢Â .DIF nu noc neliteilop ni elocilg led airanoizats esaf anu odnasu CG ad itazzilana onognev iretse ilognis i ,idniuQ .oidos id odissotem etnaidem esab id enoizacifiretsesnart etnaidem ossarg odica id icilitem ni ititrevnoc onognev enotoc id imes id oilo o enotoc id imes id It was to adjust the GC conditions to obtain the best resolution between malvalive and stearic acids and dihydrosterculic and acids î ± -Linlenici, â € says Mitchell. â € œThis who worked better for one couple was worse for the other couple. However, the researchers in the end determined the conditions of GC who allowed an adequate separation of all compounds. The LOQ for various nutritional and cyclopropenoid fatty acids varied from 0.001 to 0.012 mg/ml (Mitchell, B., et al., Http://dx.doi.org/10.1007/s11746-015-2669-5, 2015). Standard CD 12C-16 procedure: accelerated oxidation test for determining the oxidation of food, oils and fats using oxidation Oxidation test reactor lipid oxidation is an important factor that limits the duration of preservation of foods containing fats and oils (Cassiday, L., I, 406â € “411, 2015). There are various methods to evaluate the oxidation rate of lipids in food. However, these techniques require that fat be extracted from food samples before oxidation tests can be carried out. On the contrary, the Oxitest tool (scientific Velp; Usmate, Italy) can analyze fat oxidation in whole food samples, providing a simple and fast method (fig. 3). Fig. 3. Loading of the sample in the Oxitest Rooms Standard CD 12C-16 Details procedure such as using the Oxitest Oxidation Test reactor to analyze the oxidative stability of whole food samples. Two samples can be analyzed simultaneously on the same tool. A food champion, which can be liquid, solid or dough, is placed in one of the two oxidation chambers, where it is subjected to high temperature accelerated oxidation conditions (up to 110 oc) and high pressure oxygen (up at 8 bar). In this way, lipid oxidation can be observed in a period of Reduced (hours) compared to the days, weeks or months for food to naturally become grudged. By monitoring the changes of absolute pressure inside the room, the Oxitest tool measures oxygen oxygen of reactive components in food. The tool generates a value called the induction period (IP), which refers to the time necessary for a sample to show a sudden increase in the oxidation rate. More long, the more resistant is oxidation. CD 12C-16 can be used for a wide range of sample types with at least 2â € “4% of fat content, including meat, oils, mayonnaise and baked goods. The researchers used the Oxitest method to analyze the oxidative establishment of several extra virgin olive oils from two regions of Italy (Caruso, M. C., et al., I, 26â € "29, 2017). They found a strong correlation between the total content of the polyphenols (which are natural antioxidants) in the establishment of oil and oxidation, as measured by the IP. The IP values for all investigated oils varied from 20 to 78 hours. The data do not indicate a direct correlation between geographical origin of olive oil and IP value. Although the five new AOCS methods may not have done the first titles of 2016, they will certainly be appreciated by the members of the Community of Grassi and Oli. The availability of reliable, accurate, validated methods simplify and accelerates research on fats, oils and foods that contain them. Laura Cassiday is an Associated Editor of Inform at AOCS. She can be contacted to laura.cassiday@aocs.org Information Breeze, m.l., valid for a method for the quantification of lectin soy in commercial varieties, J. am. Oil Chem. Soc. 92: 1085â € "1092, 2015, Caruso, M.C. Et al., â € œaccelerated shelf life studies of extra virgin olive oils using the Oxitest method, â € Inform 28: 26â € "29, January 2017. Cassiday, L., â € œminimize process contaminants in oils edibleâ €. Inform 27, 6â € "11, March 2016. Ermacora, A. and K. Hrnà ìå ™ ãk, â € œSviluppo of an analytical method for the simultaneous analysis of ni ni icilidicilg iretse e DPCM FoodStuffs, Food on. Contam. Part to 31: 985â ¢ âvelop â € œ994, 2014, . Mitchell, B., et al., "Determination of nutritional and cyclopropenoid fatty acids in cotton seeds from a single GC analysis, ã ¢ â,¬ j. am. Petrolio chem. Soc. 92: 947 ¢ â € â € œ956, 2015, . Srigley, c.t. and E.A. Haile, ã ¢ â establish "qualification of sterols/vegetable tonals in food and food supplements containing added phytosterols ã ¢ âvelop comp. Anal. 40: 163â ¢ âvelop â € œ176, 2015, . http : //dx.doi.org/10.1016/j.jfca.2015.01.008.

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