SLOVENSKI STANDARD
SIST EN 18210:2026

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Alge in izdelki iz alg - Ugotavljanje sestave maščobnih kislin

Algae and algae Products - Determination of the fatty acid composition

Algen und Algenprodukte - Bestimmung der Fettsäurezusammensetzung

Algues et produits à base d'algues - Détermination de la composition en acides gras

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English Version

Algae and algae products - Determination of the fatty acid composition

Algues et produits à base d'algues - Détermination de la composition en acides gras

Algen und Algenprodukte - Bestimmung der Fettsäurezusammensetzung

This European Standard was approved by CEN on 13 April 2026.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 18210:2026) has been prepared by Technical Committee CEN/TC 454 “Algae and algae products”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2026, and conflicting national standards shall be withdrawn at the latest by November 2026.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

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Introduction

The European Commission (EC) has requested the European Committee for Standardization (CEN) to draft European standards or European standardization deliverables to support the implementation of Article 3 of Directive 2009/28/EC for algae and algae-based products or intermediates. This request, presented as Mandate M/547, also contributes to the Communication on “Innovating for Sustainable Growth: A Bio Economy for Europe”.

The former working group CEN Technical Board Working Group 218 “Algae” was created in 2016 to develop a work programme as part of this Mandate. The technical committee CEN/TC 454 'Algae and algae products' was established to carry out the work programme that will prepare a series of standards.

The importance of algae and algae-based products or intermediates has increased significantly in Europe as these products have been shown to be a valuable source, including but not limited to, of carbohydrates (comprising, in particular, hydrocolloids with a large commercial importance, such as agar, alginate or carrageenan), proteins, lipids, and several pigments. These materials are suitable for use in a wide range of applications from food and feed purposes to other sectors, such as textiles, cosmetics, cosmeceuticals, pharmaceuticals, biopolymers, biofuel, and fertilizer/biostimulants. Standardization of analytical methods has been highlighted as having an important role in promoting the use of algae and algae products.

The work of CEN/TC 454 should contribute to the reliability of the supply chain, thereby improving the confidence of industry and consumers in algae, which include macroalgae, microalgae, cyanobacteria, Labyrinthulomycetes, algae-based products or intermediates and should promote and support commercialization of products of the European algae industry.

In this context, the fatty acid profile of algae and algal products is an important aspect for assessing the potential nutritional quality and biological activity of algal biomass, thus paving the way for multiple relevant and high added-value applications.

1 Scope

This document encompasses the determination of the fatty acid profile in algae and algae products, thereby including micro- and macroalgae, according to the definitions adopted by CEN. This determination enables that all fatty acids present at a significant level (>1 % of the total fatty acids) in the algal matrix are quantified in an accurate and reproducible way. The concentration of each fatty acid will be available in relative (in %) and, by means of an appropriate internal standard, absolute (mg/g dw) terms. Moreover, the method described in this standard ensures a practical and safe technical approach, whose protocol details and all related know-how will be easily and economically transferrable to all the sector stakeholders. This document ensures this objective by a comprehensive and fully detailed description of all technical steps from the sample itself (including its state and form) to the gas chromatographic technique and the calculation of the fatty acid content. The wording avoids any risk of ambiguity or wrong interpretation. Finally, this methodological standard will be informed by other equivalent standards applied to other matrices and will take into account other standards concerning specific treatment or extractive procedure of the sample prior to the fatty acid analysis itself.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 17399, *Algae and algae products — Vocabulary*

EN 17605:2022, *Algae and algae products — Methods of sampling and analysis — Sample treatment*

EN 17908, *Algae and algae products — Methods of sampling and analysis — Determination of total lipids content using the Ryckebosch-Foubert method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 17399 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

3.1
lipid content
all lipid substances extracted from the test portion under the operating conditions specified, expressed in mg/g or g/kg or percentage relative to dry weight

3.2
transesterification
chemical reaction involving the conversion of fatty acid constituents regardless of their specific chemical form (triacylglycerols, free fatty acids, phospholipids, etc.) into fatty acid methyl esters

3.3
direct transesterification
methodological approach consisting of the transesterification of all fatty acid constituents present in the sample regardless of their specific chemical form (triacylglycerols, free fatty acids, phospholipids, etc.)

3.4
indirect transesterification
methodological approach consisting of the transesterification of all fatty acid constituents present in the oil extracted from the sample by the Ryckebosch method regardless of their specific chemical form (triacylglycerols, free fatty acids, phospholipids, etc.)

3.5
derivatization
first part of the process of preparing samples to be analysed by Gas Chromatography and comprising the steps of sample preparation for transesterification and those corresponding to the transesterification reaction itself

3.6
fatty acid methyl ester extraction
second part of the process of preparing samples to be analysed by Gas Chromatography and comprising the steps of extracting the fatty acid methyl esters from the transesterification reaction mixture into an organic phase and the purification of this phase

3.7
fatty acid methyl ester analysis
final part of the analytical method corresponding to the injection of the prepared fatty acid methyl esters in a Gas Chromatography system for detection, identification, and quantification

3.8
internal standard
fatty acid that is chemically similar to the fatty acids in algae, but it is not present in the sample, being added in the form of methyl ester in a constant known amount to every sample prior to the derivatization process

3.9
fatty acid methyl ester peak area
area of a specific fatty acid methyl ester in a Gas Chromatography chromatogram

3.10
relative fatty acid methyl ester peak area
share in percentage of the area of a specific fatty acid methyl ester within the sum of the areas of all identified fatty acid methyl esters in a Gas Chromatography chromatogram

3.11
total relative fatty acid content
sum of all identified and significant (significant meaning > 1 % of the sum of the areas of all fatty acid methyl esters) relative fatty acid methyl ester peak areas in a Gas Chromatography chromatogram

Note 1 to entry: The significance threshold of 1 % is given as a recommendation according to the chromatographic sensitivity. Relative fatty acid contents below 1 % can still be used but will entail a large error.

3.12
relative fatty acid content
share in percentage of a particular relative fatty acid methyl ester peak area in the total relative fatty acid content in the test portion under the specified operating conditions

3.13
absolute fatty acid content
concentration of a specific fatty acid constituent in the algal sample corresponding to a fatty acid methyl ester identified by Gas Chromatography and expressed in mg of fatty acid methyl ester/g of sample or g fatty acid methyl ester/kg of sample in dry weight terms

4 Principle

The determination of the fatty acid composition (in relative and absolute terms) has two main phases: (i) derivatization and fatty acid methyl ester extraction and (ii) chromatographic separation and quantification. For the first phase, the fatty acids present within larger molecules (such as triacylglycerols and phospholipids) in the sample are trans esterified, thereby forming fatty acid methyl esters (FAMEs). Afterwards, these FAMEs are extracted with an adequate solvent (such as n-heptane), producing an organic solution. In the second phase, this solution in injected and volatilized in a system of gas chromatography with a suitable detector. The interaction of the FAMEs in the gas phase with the inner filling of a specific chromatographic column enables separation of them. Finally, each separated FAME is detected and a detection signal proportional to its amount is proportionately transformed into a chromatogram peak area, enabling quantification.

5 Apparatus

5.1 **Analytical balance**, with a readability of 0,1 mg and preferably 0,01 mg

5.2 **Water bath**, with temperature control and, preferably, high resistance to corrosion

5.3 **Vortex**, with velocity regulation

5.4 **Centrifuge**, with cooling and rotor for tubes

5.5 **Gas chromatograph**, with auto-sampler and an adequate detector presenting signal transduction into a parameter enabling FAME quantification, such as flame ionization detector

6 Reagents and materials

6.1 **Tube rack** for holding 20 ml tubes or comparable glassware

6.2 **Pyrex screw capped tubes**, 20 ml (one unit per 1/test portion) or comparable glassware

6.3 **Beaker** with adequate volumetry for containing the transesterification reagent

6.4 **Bowl or tray** to hold ice slurry used to cool transesterification reagent

6.5 **Measurement cylinder** for measuring necessary amount of reagent

6.6 **Micropipettes** with the necessary volumetric ranges and respective tips

6.7 **Pasteur pipettes**, disposable, 2 ml (one unit per test portion)

6.8 **Pipette tips**, disposable, 5 ml (for cotton and sodium sulphate column preparation)

6.9 **Glass vials** for gas chromatography, preferably amber, 1,5-2,0 ml

6.10 **Methanol** (with a purity not less than a volume fraction of 99,0 %, v/v)