
**Foodstuffs — Molecular biomarker
analysis — Immunochemical methods
for the detection and quantification of
proteins**

*Produits alimentaire — Analyse des biomarqueurs moléculaires —
Méthodes immunochimiques pour la détection et la quantification des
protéines*



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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 16, *Horizontal methods for molecular biomarker analysis*.

This third edition cancels and replaces the second edition (ISO 21572:2013), which has been technically revised. The main changes compared with the previous edition are as follows:

- the title has been changed to specify that the document is focused on immunochemical protein detection methods;
- an introduction has been added;
- terms, definitions and references have been updated;
- the text has been modified to improve the document's applicability to general protein analysis applications.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Analytical techniques based on highly specific immunochemical-binding interactions have become key tools for analysing many different chemical and macromolecular analytes, including proteins. Methods utilizing these techniques are widely accepted in the scientific and regulatory communities. Immunochemical assay methods are most commonly used to detect (presence or absence) and/or quantify specific protein analytes such as allergenic proteins, disease marker proteins or newly expressed proteins in biotech crops.

Prior to analysis, samples generally need to be ground or processed in a manner that facilitates extraction of the analyte from the sample matrix. An important step in analytical method development is therefore the selection of a suitable extraction buffer that does not interfere with the analytical method performance and that ensures an appropriate level of analyte stability during the analytical process.

The immunochemical assay process generally incorporates at least two steps:

- binding or capturing the analyte of interest present in samples with an antibody targeted specifically to the analyte;
- detection of the antibody-analyte complex using a technique that signals the specific interaction.

Once an analytical method has been developed and optimized, it should be validated to demonstrate that its performance is reliable and suitable for the intended use and to characterize the method limitations. This involves performing several experiments with real samples to evaluate parameters such as accuracy, precision, sensitivity, selectivity and the detection or quantification limits. Validation also allows for the establishment of method performance criteria, against which routine analytical performance can be compared to ensure that acceptable analytical results are consistently reported.

This document provides a set of general procedures and analytical considerations for using immunochemical techniques to analyse target proteins. It discusses aspects of sample processing, extraction, assay set-up, interpretation and reporting of results, and relevant assay performance parameters. Two annexes are included containing example procedures that can be followed when analysing a protein of interest (POI) in a variety of background matrices using methods based on enzyme-linked immunosorbent assays (ELISAs) and lateral flow devices (LFDs).

Foodstuffs — Molecular biomarker analysis — Immunochemical methods for the detection and quantification of proteins

1 Scope

This document specifies performance criteria for immunochemical methods for the detection and/or quantification of a specific protein or protein(s) of interest [POI(s)] in a specified matrix.

The methods discussed are applicable to the analysis of proteins from a variety of sample types. Some uses for these methods include, but are not limited to, analysing proteins involved in crop and food production, food processing, food marketing, food safety, biotechnology or disease indexing.

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.

ISO 16577, *Molecular biomarker analysis — Terms and definitions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16577 and the following apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

conjugate

material produced by attaching two or more substances together by covalent bond via chemical groups

Note 1 to entry: Conjugates of antibodies with fluorochromes (e.g. chemical entity, such as a molecule or group, that emits light in response to excitation by absorbed incident light), radiolabelled substances, gold or enzymes are often used in immunoassays.

4 Principle

The target protein is extracted according to the procedure described for that specific matrix, and a specific antibody is used to detect or measure the concentration of the POI in the sample. For the detection of specific proteins in ingredients, the basic principle of a protein-based method is to:

- take a representative sample of the matrix;
- extract the proteins;
- detect and/or quantify the specific protein derived from the matrix under study.