



International
Standard

ISO 21438-2

**Workplace atmospheres —
Determination of inorganic acids by
ion chromatography —**

Part 2:

**Volatile acids, except hydrofluoric
acid (hydrochloric acid,
hydrobromic acid and nitric acid)**

*Air des lieux de travail — Détermination des acides inorganiques
par chromatographie ionique —*

*Partie 2: Acides volatils, sauf acide fluorhydrique (acide
chlorhydrique, acide bromhydrique et acide nitrique)*

**Second edition
2024-01**

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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 document 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).

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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 146, *Air quality*, Subcommittee SC 2, *Workplace atmospheres*.

This second edition cancels and replaces the first edition (ISO 21438-2:2009), which has been technically revised.

The main changes are as follows:

- terms, definitions and references have been updated;
- information on sample preparation and analytical methodology has been updated.

A list of all parts in the ISO 21438 series can be found on the ISO website.

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

The health of workers in many industries is at risk through exposure by inhalation of volatile inorganic acids. Industrial hygienists and other public health professionals need to determine the effectiveness of measures taken to control workers' exposure and this is generally achieved by making workplace air measurements. This document has been published in order to make available a method for making valid exposure measurements for volatile inorganic acids in use in the industry, such as hydrochloric acid, hydrobromic acid and nitric acid, but excluding hydrofluoric acid. This document is intended to be of benefit to:

- agencies concerned with health and safety at work;
- industrial hygienists and other public health professionals;
- analytical laboratories;
- industrial users of hydrochloric acid, hydrobromic acid and nitric acid and their workers, etc.

The execution of the provisions and the interpretation of the results obtained with the use of this document are entrusted to appropriately qualified and experienced people.

The procedure is intended to differentiate between the acids and their corresponding salts. If both are present in the air, particulate salts are trapped on a pre-filter. Co-sampled particulate matter either trapped on the pre-filter or deposited on the walls of the sampler, or both, can be analysed, if desired.

Acids can react with co-sampled particulate matter on the pre-filter, causing interference with the measurement of the acid concentration.

Workplace atmospheres — Determination of inorganic acids by ion chromatography —

Part 2:

Volatile acids, except hydrofluoric acid (hydrochloric acid, hydrobromic acid and nitric acid)

1 Scope

This document specifies a method for the determination of the time-weighted average mass concentration of hydrogen chloride (HCl) gas and hydrochloric acid mist, hydrogen bromide (HBr) vapour and hydrobromic acid mist and nitric acid (HNO₃) vapour and mist in workplace air by collection on an alkali-impregnated quartz fibre filter and analysis by ion chromatography.

For mist sampling, this method is applicable to the personal sampling of the inhalable fraction of airborne particles as defined in ISO 7708 and to static (area) sampling.

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 1042, *Laboratory glassware — One-mark volumetric flasks*

ISO 3585, *Borosilicate glass 3.3 — Properties*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 7708, *Air quality — Particle size fraction definitions for health-related sampling*

ISO 8655-1, *Piston-operated volumetric apparatus — Part 1: Terminology, general requirements and user recommendations*

ISO 8655-2, *Piston-operated volumetric apparatus — Part 2: Pipettes*

ISO 8655-6, *Piston-operated volumetric apparatus — Part 6: Gravimetric reference measurement procedure for the determination of volume*

ISO 18158, *Workplace air — Terminology*

ISO 20581, *Workplace air — General requirements for the performance of procedures for the measurement of chemical agents*

ISO 21832:2018, *Workplace air — Metals and metalloids in airborne particles — Requirements for evaluation of measuring procedures*

EN 13205, *Workplace exposure — Assessment of sampler performance for measurement of airborne particle concentrations*