
**Stationary source emissions —
Determination of gas and particle-phase
polycyclic aromatic hydrocarbons —**

Part 2:

**Sample preparation, clean-up and
determination**

*Émissions de sources fixes — Détermination des hydrocarbures
aromatiques polycycliques sous forme gazeuse et particulaire —*

Partie 2: Préparation des échantillons, purification et détermination



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 11338-2 was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 1, *Stationary source emissions*.

ISO 11338 consists of the following parts, under the general title *Stationary source emissions — Determination of gas and particle-phase polycyclic aromatic hydrocarbons*:

- *Part 1: Sampling*
- *Part 2: Sample preparation, clean-up and determination*

Introduction

This part of ISO 11338 describes procedures for sample preparation, clean-up and analysis of polycyclic aromatic hydrocarbons (PAHs) (collected from stack and waste gases), based on either high performance liquid chromatography (HPLC) (see Annexes A and E) or gas chromatography-mass spectrometry (GC-MS) (see Annexes B, C and D).

PAHs are emitted to the atmosphere primarily by the combustion of fossil fuels and wood. PAHs are considered to be an important class of environmental carcinogens. The identification and quantification of PAHs emitted from stationary sources represent a critical aspect in the assessment of air quality.

Stack and waste gases emitted from stationary sources often contain solid particles. Because of the range of their vapour pressures, PAHs are distributed between gas and particle phases. In the atmosphere, PAHs containing four or more rings tend to adsorb onto particles, while PAHs containing two to four rings tend to be present in gaseous form. However in stack and waste gases, the distribution of PAHs between gas and particle phases depends on the temperature, the mass of emitted particles, particle size, humidity, type and concentration of PAH.

During sampling, sample storage and preparation of the sample, losses of PAH can occur and prevent quantitative analysis. These losses can be the result of the volatility of two- and three-ring PAHs, the physical-chemical instability of PAHs in the presence of light, O₃, NO_x, SO₂, HCl and certain heavy metals.

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Stationary source emissions — Determination of gas and particle-phase polycyclic aromatic hydrocarbons —

Part 2: Sample preparation, clean-up and determination

1 Scope

This part of ISO 11338 specifies procedures for sample preparation, clean-up and analysis for the determination of gas and particle-phase polycyclic aromatic hydrocarbons (PAH) in stack and waste gases. The analytical methods are capable of detecting sub-microgram concentrations of PAH per cubic metre of sample, depending on the type of PAH and the flue gas volume sampled.

The methods described in this part of ISO 11338 are based on either high performance liquid chromatography (HPLC) or gas chromatography-mass spectrometry (GC-MS).

NOTE ISO 11338-1 describes three methods and specifies minimum requirements for the sampling of PAH in stack and waste gases.

2 Normative references

The following referenced documents are indispensable for the application 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 4225:1994, *Air quality — General aspects — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4225 and the following apply.

3.1

polycyclic aromatic hydrocarbon

PAH

compound that contains two or more fused aromatic rings made up of carbon and hydrogen atoms

3.2

stationary source emission

gas emitted by a stationary plant or process and transported to a chimney for dispersion into the atmosphere

3.3

accelerated solvent extractor

ASE

equipment that accelerates the traditional extraction process by using solvent at elevated temperatures

NOTE Pressure is applied to the sample extraction cell to maintain the heated solvent in a liquid state during the extraction.