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Water quality — Determination of selected organic plant-treatment agents — Automated multiple development (AMD) technique

Qualité de l'eau — Dosage de certains agents organiques de traitement des plantes — Méthode automatisée par développement multiple (ADM)

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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 3.

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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

— an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;

— an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed every three years with a view to deciding whether it can be transformed into an International Standard.

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

ISO/TS 11370 was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical, biochemical methods*.

Annexes A and B of this Technical Specification are for information only.

Water quality — Determination of selected organic plant-treatment agents — Automated multiple development (AMD) technique

1 Scope

The method described in this Technical Specification is applicable to the determination of selected plant-treatment agents and some of their main degradation products (metabolites) in drinking water, with a validated reporting limit of about $>$ 0,05 µg/l (see examples in Table 1). The method may be extended to include additional substances and ground water, provided the method is validated for each individual case.

The selection of the plant-treatment agents and main degradation products in Table 1 and Table A.2 has been made according to the knowledge at the time of the interlaboratory trial (1992). Data for some other substances are given in annex A.

Table 1 — Plant-treatment agents determinable by this method

Name	Molecular formula	CAS No.[a]	Molar mass g/mol	Peak in Figure No.						
				1	2	3	4	5	6	7
Alachlor[b]	$C_{14}H_2OClNO_2$	015972-60-8	269.8	6				6		
Atrazine	$C_8H_{14}ClN_5$	001912-24-9	215,7	2				4		
Chlorfenvinphos[b]	$C_{12}H_{14}Cl_3O_4P$	000470-90-6	359,6	5				3		
Chlortoluron[b]	$C_{10}H_{13}ClN_2O$	015545-48-9	212,7	1						3
Cyanazine[b]	$C_9H_{13}ClN_6$	021725-46-2	240,7				1			4
2,4-D	$C_8H_6Cl_2O_3$	000094-75-7	221,0	4				1		
MCPA[b]	$C_9H_{\ 9}ClO_3$	000094-74-6	200,6				2	2		
Metazachlor	$C_{14}H_{16}ClN_3O$	067129-08-2	277,8			3				5
Metobromuron	$C_9H_{11}BrN_2O_2$	003060-89-7	258,1			5				6
Metolachlor[b]	$C_{15}H_{22}ClNO_2$	051218-45-2	283,8			4				7
Metoxuron	$C_{10}H_{13}ClN_2O_2$	019937-59-8	228,7			1				1
Monuron[b]	$C_9H_{11}ClN_2O$	000150-68-5	198,7			2				2
Parathion[b]	$C_{10}H_{14}NO_5PS$	000056-38-2	291,3	7				7		
Pendimethalin	$C_{13}H_{19}N_3O_4$	040487-42-1	281,3		6				6	
Propazine[b]	$C_9H_{16}ClN_5$	000139-40-2	229,7	3				5		
Sebuthylazine[b]	$C_9H_{16}ClN_5$	007286-69-3	229,7		2				3	
Simazine	$C_7H_{12}ClN_5$	000122-34-9	201,7		1				2	
2,4,5-T[b]	$C_8H_5Cl_3O_3$	000093-76-5	255,5		4				1	
Terbutylazine[b]	$C_9H_{16}ClN_5$	005915-41-3	229,7		3				4	
Trifluralin[b]	$C_{13}H_{16}F_3N_3O_4$	001582-09-8	335,3	8				8		
Vinclozoline[b]	$C_{12}H_9Cl_2NO_3$	050471-44-8	286,1		5				5	

[a] CAS No.: Chemical abstracts system.

[b] Not included in the precision data (Table A.2).

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this Technical Specification. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this Technical Specification are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 5667-1:1980, *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes*.

ISO 5667-2:1991, *Water quality — Sampling — Part 2: Guidance on sampling techniques*.

ISO 5667-3:1994, *Water quality — Sampling — Part 3: Guidance on the preservation and handling of samples*.

ISO 8466-1:1990, *Water quality — Calibration and evaluation of analytical methods and estimation of performance characteristics — Part 1: Statistical evaluation of the linear calibration function*.

ISO 8466-2:1993, *Water quality — Calibration and evaluation of analytical methods and estimation of performance characteristics — Part 2: Calibration strategy for non-linear second order calibration functions*.

ISO/TR 13530:1997, *Water quality — Guide to analytical quality control for water analysis*.

3 Interferences

3.1 Interferences with the extraction

The commercially available RP-C18 materials are often of varying quality. Considerable batch-to-batch differences regarding quality and selectivity of this material, even from one manufacturer, are possible. The recovery may vary with the concentration. Co-extractants eluated from the sorbent material can affect the blank and the recovery. Therefore the calibration and analysis shall be performed on exactly the same batch of sorbent. Also any UV-absorbing material occurring in the water which passes through the procedure and has a similar migration distance to that of the reference standard will interfere. Suspended matter in the water sample may clog the packing. In this case the water sample shall be filtered through a glass fibre filter prior to the extraction.

If the water sample has been acidified to pH 2, humic substances will also be extracted. They may interfere with the determination.

3.2 Interferences with the HPTLC measurement

A contaminated laboratory atmosphere may lead to interferences due to an uncontrolled contamination of the HPTLC-layer. Extremely concentrated solutions may crystallize during sample application, leading to incorrect quantification. Failure of the AMD vacuum will result in poor resolution.

Substances which absorb at the wavelengths of detection and have migration distances similar to those of the compounds to be investigated will interfere with the determination. This shall be taken into account especially when examining samples other than ground- and drinking water.

4 Principle

The substances in the water sample are extracted by solid-liquid extraction on RP-C18 material (RP = reversed phase), eluated with a solvent and then separated by high performance thin layer chromatography (HPTLC), using the Automated Multiple Development (AMD) technique. The detection and determination is performed by diffuse *in-situ* reflection measurement at different UV-wavelengths.