भारतीय मानक

Indian Standard

IS 17614 (Part 3) : 2024
ISO 5667-3 : 2024

जल की गुणवत्ता — नमूने लेना

भाग 3 जल के नमूनो का संरक्षण और संचालन

(पहला पुनरीक्षण)

Water Quality — Sampling

Part 3 Preservation and Handling of Water Samples

(First Revision)

ICS 13.060.45

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Water Quality Sectional Committee, CHD 36

NATIONAL FOREWORD

This Indian Standard (Part 3) (First Revision) which is identical to ISO 5667-3 : 2024 ‘Water quality — Sampling — Part 3 : Preservation and handling of water samples’ issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of Water Quality Sectional Committee and approval of the Chemical Division Council.

The Indian Standard IS 17614 has been published in several parts under the general title ‘Water Quality — Sampling’.This part of IS 17614 specifies the general requirements for sampling, preservation, handling, transport and storage of all water samples for physicochemical, chemical, hydro-biological and microbiological analyses and determination of radiochemical analytes and activities. This standard is particularly appropriate when samples cannot be analyzed on site and have to be transported to a laboratory for analysis. The other parts of this series are:

IS No	*Title*
IS 17614 : 2021	Water quality — Sampling
Part 1	Guidance on the design of sampling programmes and sampling techniques
Part 4	Guidance on sampling from lakes, natural and man-made
Part 5	Guidance on sampling of drinking water from treatment works and piped distribution systems
Part 6	Guidance on sampling of rivers and streams
Part 7	Guidance on sampling of water and steam in boiler plants
Part 8	Guidance on the sampling of wet deposition
Part 9	Guidance on sampling from marine waters
Part 10	Guidance on sampling of waste waters
Part 12	Guidance on sampling of bottom sediments from rivers, lakes and estuarine areas
Part 13	Guidance on sampling of sludges
Part 14	Guidance on quality assurances and quality control of environmental water sampling and handling
Part 15	Guidance on the preservation and handling of sludge and sediment samples
Part 16	Guidance on biotesting of samples
Part 17	Guidance on sampling of bulk suspended solids
Part 19	Guidance on sampling of marine sediments
Part 20	Guidance on the use of sampling data for decision making — Compliance with thresholds and classification systems
Part 22	Guidance on the design and installation of groundwater monitoring points
Part 23	Guidance on passive sampling in surface waters
Part 24	Guidance on the auditing of water quality sampling
Part 25	Microbiological analysis

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Contents

Introduction

This document is intended to be used in conjunction with ISO 5667-1, which deals with the design of sampling programmes and sampling techniques.

Where possible, this document has been aligned with current standards. Where new research or validation results have provided new insights, the latest knowledge has been used.

Guidance on validation protocols can be found in ISO/TS 5667-25 and ISO 17034[87].

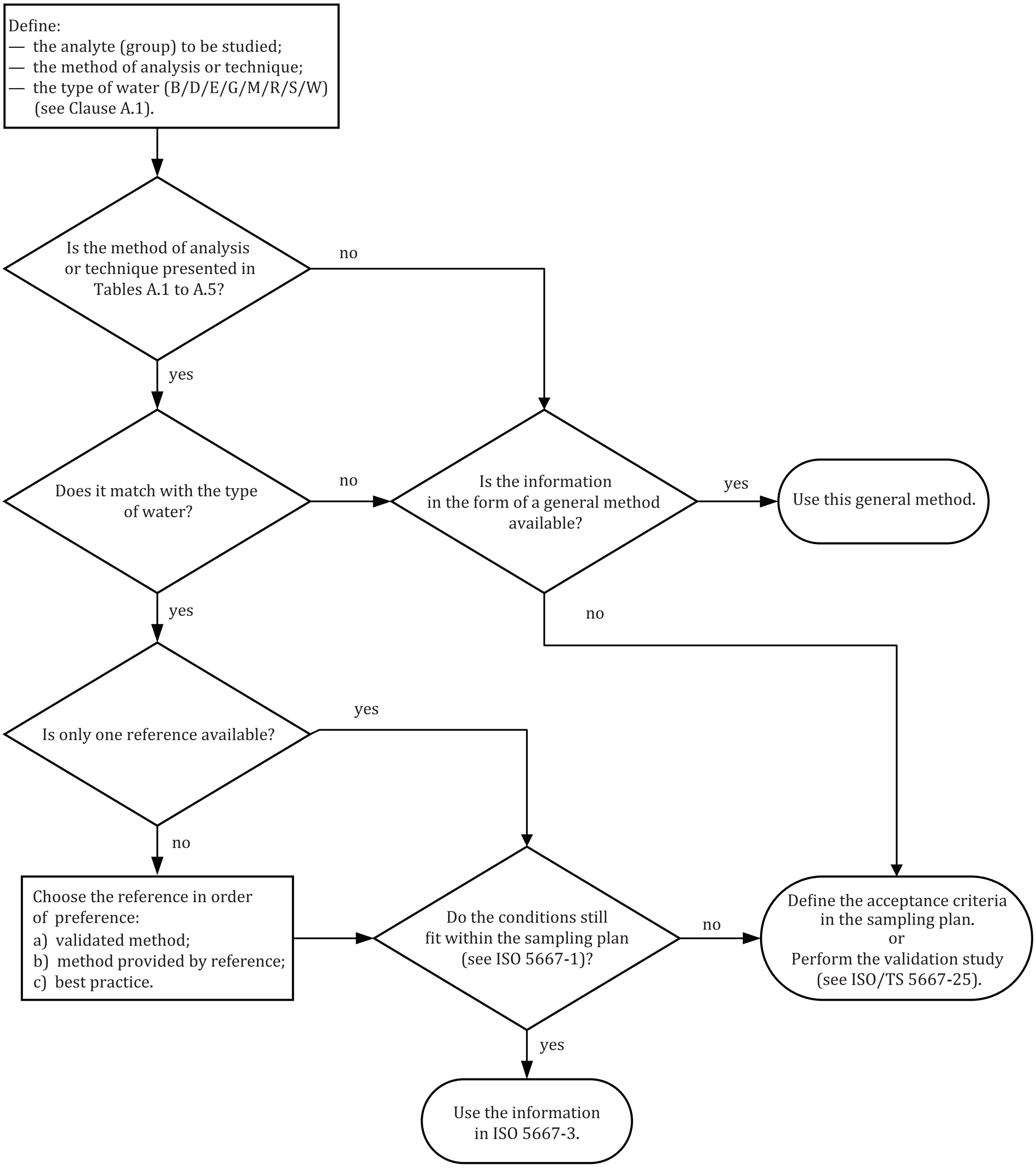
Tables A.1 to A.5 provide the validated preservation times or conditions as well as the descriptions of best practice. Tables A.1 to A.5 also refer, for each analyte, to references available at the time of publication of this document (i.e. ISO 5667-3:2024). This is however not an exhaustive list. Other preservation methods may be used when they have been validated. However, it is strongly recommended that, where a method validation is not available, the preservation times for the analyte listed in Tables A.1 to A.5 for ISO test methods be followed. In case more than one storage time is provided in Tables A.1 to A.5, the order of preferred use is:

- validated method;
- method provided by reference;
- best practice.

The preservation and storage conditions and maximum storage times per analyte as listed in Tables A.1 to A.5 should be regarded as default conditions to be applied in the absence of any other information.

However, if validation of preservation techniques and holding times has been carried out, relative to specific circumstances and matrices, by a laboratory, then, provided that it can produce evidence of this validation where they differ from those set out in Tables A.1 to A.5, these validated preservation and storage conditions and maximum storage times are deemed acceptable for use by the validating laboratories. A national standard can contain information on preservation.

This document and the related analytical references can be used as presented in Figure 1.



WARNING — 'Method provided by reference' and 'validated method' can be based on previous standards and methods and therefore not be in line with ISO/TS 5667-25. This information can be interpreted by a qualified and experienced person.

Figure 1 — Flow diagram for the selection of a method for the preservation and storage of water samples

Attention is drawn to ISO/TS 5667-25, which contains guidelines and the elaboration of the required techniques of how to validate new storage times or preservative methods and details of the techniques described.

Indian Standard

WATER QUALITY — SAMPLING

PART 3 PRESERVATION AND HANDLING OF WATER SAMPLES

(First Revision)

1 Scope

This document specifies the general requirements for sampling, preservation, handling, transport and storage of all water samples for physicochemical, chemical, hydrobiological and microbiological analyses and determination of radiochemical analytes and activities.

Guidance on the validation of storage times of water samples is provided in ISO/TS 5667-25.

This document is not applicable to water samples intended for ecotoxicological assays, biological assays (which is specified in ISO 5667-16), passive sampling (which is specified in ISO 5667-23) and microplastics (which is specified in ISO 5667-27).

This document is particularly appropriate when samples cannot be analysed on site and have to be transported to a laboratory for analysis.

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 19458:2006, *Water quality — Sampling for microbiological analysis*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
best practice
method based upon consensus or general use and that can be referred to in literature

Note 1 to entry: Given the differences in conditions and circumstances as well as the impossibility to validate all parameters from a *validated method* (3.7) or technique or process, a best practice method based upon the corresponding properties of a validated parameter can be used.

3.2
integrity
property of the parameter(s) of interest, information or content of a sample stored in a container that has not been altered or lost in an unauthorized manner or that has been subject to loss of representativeness

3.3
method provided by reference

procedure or technique for the preservation of samples taken from the reference to which it refers

Note 1 to entry: It is not in all cases clear whether the preservation procedure provided by the reference was *validated method* (3.7), a *best practice* (3.1) or which procedure was used for its determination or validation. Where available, the information about the matrices is taken over.

3.4
sample preservation

procedure used to stabilize a sample in such a way that the properties under examination are maintained stable from the collection step until preparation for analysis

Note 1 to entry: Different analytes can require several samples from the same source that are stabilized by different procedures.

[SOURCE: ISO 11074:2015, 4.4.20, modified — Note 1 to entry has been added.]

3.5
sample storage

process and result of keeping a sample available under predefined conditions, usually for a specified time interval between collection and further treatment of a sample

Note 1 to entry: The specified time is the maximum time interval.

[SOURCE: ISO 11074:2015, 4.4.22, modified — Note 1 to entry has been added; “soil sample” has been changed to “sample”.]

3.6
storage time

period of time between filling of the sample container and further treatment of the sample in the laboratory, if stored under predefined conditions

Note 1 to entry: Sampling finishes as soon as the sample container has been filled with the sample. Storage time ends when the sample is taken by the analyst to start sample preparation prior to analysis.

Note 2 to entry: Further treatment is, for most analytes, a solvent extraction or acid destruction. The initial steps of sample preparation can be steps complementary to the storage conditions for the maintenance of analyte concentrations.

3.7
validated method

method for which the validity or correctness has been checked by verification or qualification against a number of predefined requirements

Note 1 to entry: A validated method indicates that a preservation method is capable of delivering the intended results with an acceptable degree of uncertainty for the parameter or group of parameters and water type.

4 Abbreviated terms for plastics

FEP	perfluoro(ethylene/propylene)
PE	polyethylene
PE-HD	high density polyethylene
PET	polyethylene terephthalate
PFA	perfluoroalkoxy (polymer)
PP	polypropylene

PTFE	polytetrafluoroethylene
PVC	poly(vinyl chloride)

5 Sampling and chain of custody

If there is a need to take samples, this is done according to a sampling programme. The first step is to design a sampling programme. Guidance on this topic is given in ISO 5667-1.

Depending on the sample type and matrix, the instruction found in the relevant part(s) of the ISO 5667 series and in ISO 19458 should be consulted.

The process of preservation and handling of water samples consists of several steps. During this process, the responsibility for the samples can change. To ensure the integrity of the samples, all steps involving the sample shall be documented.

6 Reagents and materials

WARNING — Certain preservatives (e.g. acids, alkalis, formaldehyde) need to be used with caution. Sampling personnel should be warned of potential dangers and appropriate safety procedures should be followed.

The following reagents are used for the sample preservation and shall only be prepared in accordance with individual sampling requirements. All reagents and waters used shall be of at least analytical grade. Acids referred to in this document are commercially available “concentrated” acids.

All reagents shall be labelled with a “shelf-life” representing the period for which the reagent is suitable for use, if stored correctly. Any reagents that are unused beyond the shelf-life shall be discarded.

NOTE The shelf-life of reagents is often supplied by the receiving laboratory.

Check reagents periodically, for example, by field blanks, and discard any reagent found to be unsuitable. For reagents that are unlikely to change over time in the specific conditions, check periodically if storage and packaging still meet the requirements.

Between on-site visits, reagents shall be stored separately from sample containers and other equipment in a clean, secure cabinet in order to prevent contamination.

Each sample shall be labelled accordingly, after the addition of the preservative. Otherwise, there is no visible indication as to which samples have been preserved and which have not.

6.1 Solids

6.1.1 Sodium thiosulfate pentahydrate, $Na_2S_2O_3 \cdot 5H_2O$, $w(Na_2S_2O_3 \cdot 5H_2O) > 99\ \%$.

6.1.2 Sodium hydroxide, NaOH, $w(NaOH) > 99\ \%$.

6.1.3 Sodium tetraborate decahydrate, $Na_2B_4O_7 \cdot 10H_2O$, $w(Na_2B_4O_7 \cdot 10H_2O) > 99\ \%$.

CAUTION — Sodium tetraborate decahydrate is known to be a reproductive toxin.

6.1.4 Hexamethylenetetramine (hexamine, urotropine), $C_6H_{12}N_4$, $w(C_6H_{12}N_4) > 99\ \%$.

6.1.5 Potassium iodide, KI, $w(KI) > 99\ \%$.

6.1.6 Iodine, I_2, $w(I_2) > 99\ \%$.

6.1.7 Sodium acetate, $C_2H_3NaO_2$, $w(C_2H_3NaO_2) > 99\ \%$.

6.1.8 Ethylenediamine, $C_2H_8N_2$, $w(C_2H_8N_2) > 99\ \%$.

6.2 Solutions

6.2.1 Zinc acetate solution $C_4H_6O_4Zn{\cdot}2H_2O$ (100 g/l).

Dissolve 10,0 g of zinc acetate dihydrate in approximately 90 ml of water. Dilute to 100 ml with water.

6.2.2 Orthophosphoric acid ($\rho \approx 1{,}7$ g/ml), H_3PO_4, $w(H_3PO_4) > 85\ \%$, $c(H_3PO_4) = 15$ mol/l.

6.2.3 Hydrochloric acid ($\rho \approx 1{,}2$ g/ml), HCl, $w(\text{HCl}) > 36\ \%$, $c(\text{HCl}) = 12{,}0$ mol/l.

6.2.4 Nitric acid ($\rho \approx 1{,}42$ g/ml), HNO_3, $w(HNO_3) > 65\ \%$, $c(HNO_3) = 15{,}8$ mol/l.

6.2.5 Sulfuric acid ($\rho \approx 1{,}43$ g/ml), H_2SO_4, $w(H_2SO_4) \approx 49\ \%$, $c(H_2SO_4) \approx 9$ mol/l.

Dilute concentrated sulfuric acid (H_2SO_4), $\rho \approx 1{,}84$ g/ml, $w(H_2SO_4) \approx 98\ \%$ 1 + 1 by carefully adding the concentrated acid to an equal volume of water and mix.

WARNING — Adding the concentrated acid to the water can give violent reactions because of an exothermic reaction.

6.2.6 Sodium hydroxide solution (0,40 g/ml), NaOH.

6.2.7 Formaldehyde solution (formalin), CH_2O, $\varphi(CH_2O) = 37\ \%$ (freshly prepared).

WARNING — Beware of formaldehyde vapours. Do not store large numbers of samples in small working areas.

6.2.8 Disodium salt of ethylenediaminetetraacetic acid (EDTA) (0,025 g/ml), $C_{10}H_{14}N_2Na_2O_8{\cdot}2H_2O$, $w(C_{10}H_{14}N_2Na_2O_8{\cdot}2H_2O) > 99\ \%$.

Dissolve 25 g EDTA in 1 000 ml of water.

6.2.9 Ethanol, C_2H_5OH, $\varphi(C_2H_5OH) = 96\ \%$.

6.2.10 Acidic Lugol's solution, 100 g potassium iodide (6.1.5), 50 g iodine (6.1.6) and 100 ml glacial acetic acid (6.2.16) in 1 000 ml water to pH 2.

6.2.11 Alkaline Lugol's solution, 100 g potassium iodide (6.1.5), 50 g iodine (6.1.6) and 250 g sodium acetate (6.1.7) in 1 000 ml water to pH 10.

6.2.12 Neutralized formaldehyde solution, formaldehyde solution (6.2.7) neutralized with sodium tetraborate (6.1.3) or hexamethylenetetramine (6.1.4). Formalin solution at 100 g/l gives a final solution of $\varphi(CH_2O) = 3{,}7\ \%$.

WARNING — Beware of formaldehyde vapours. Do not store large numbers of samples in small working areas.

6.2.13 Ethanol preservative solution.

Ethanol (6.2.9), formaldehyde solution (6.2.7*)* and glycerol (6.2.17) (100 + 2 + 1 parts by volume, respectively).

6.2.14 Sodium hypochlorite, NaOCl, $w(\text{NaOCl}) = 10\ \%$.

Dissolve 100 g sodium hypochlorite (NaOCl) in 1 000 ml of water.

6.2.15 Potassium iodate, KIO_3, $w(KIO_3) = 10\ \%$.

Dissolve 100 g potassium iodate (KIO_3) in 1 000 ml of water.

6.2.16 Glacial acetic acid, $C_2H_4O_2$, $w(C_2H_4O_2) > 99\ \%$.

6.2.17 Glycerol (glycerin, glycerine), $C_3H_5(OH)_3$.

6.2.18 Sodium hydrogen sulfate, $NaHSO_4$.

6.2.19 Sodium thiosulfate pentahydrate solution, $\rho(Na_2S_2O_3{\cdot}5H_2O) = 18$ mg/ml.

6.3 Materials

6.3.1 Container and cap.

The types of containers and caps are specified in Tables A.1 to A.5.

6.3.2 Membrane filter, with pore size 0,40 µm to 0,45 µm.

7 Containers

7.1 Container selection and preparation

The choice of sample container (6.3.1) is of major importance and ISO 5667-1 provides some guidance on this subject.

Details of the type of container used for the collection and storage of samples are given in Tables A.1 to A.5. The same considerations given to this selection of suitable container material shall also be given to the selection of cap liner materials.

For microbiological analyses, clean sterile bottles shall be used. If the water contains an oxidant, stop the action of the oxidant as soon as the sample is taken by adding a reducing agent. Add a reducing agent such as sodium thiosulfate to the sample bottles. The theoretical mass of sodium thiosulfate (pentahydrate) necessary to inactivate 1 mg of chlorine is 7,1 mg. Thus, 0,1 ml of sodium thiosulfate pentahydrate solution (6.2.19) is added for each 100 ml of bottle capacity. This will inactivate at least 2 mg/l and up to 5 mg/l of free chlorine residual, depending on inactivation dynamics, which is sufficient for the majority of samples.

In certain circumstances, such as foot baths in swimming pools, disinfection measures (e.g. *Legionella* eradication in drinking water distribution systems), higher chlorine concentrations can be found and a proportionately higher dosage of sodium thiosulfate will be necessary. Sodium thiosulfate is not destroyed by autoclaving or dry heat.

For other disinfectants, corresponding inactivation measures need to be taken. If inactivation is not possible or feasible, it has to be reported. Chelating agents have been recommended to protect bacteria from the toxic action of heavy metals such as copper or zinc. Ethylene dinitrilotetraacetic acid (EDTA) or sodium nitrilotriacetate (NTA) ($Na_3C_6H_6NO_6$) can be used as a filter-sterilized solution at a final concentration of about 50 mg/l but should only be added when necessary (e.g. water treated with silver or copper). More information is specified in ISO 19458.

Containers used for microbiological samples shall be tested to ensure sterility. Either by a certificate from the supplier or in-house control. If disinfection agents have been added, the concentration shall also be monitored. Guidance on this subject is provided in ISO 19458.

Sample containers shall be made of a material appropriate for preserving the natural properties of both the sample and the expected range of contaminants. Suitable types of containers for each analyte to be measured are given in Tables A.1 to A.5.

NOTE For very low concentrations of metals, containers prescribed can be different from those used for higher concentrations. Details can be found in Table A.1 or in the analytical International Standards.

If the samples are to be frozen, suitable containers, such as polyethylene (PE) or polytetrafluoroethylene (PTFE), shall be used to prevent breakage.

The use of disposables is preferred due to lower risks of contamination. Some manufacturers supply containers with a certificate of cleanliness. If such a certificate of cleanliness is supplied, it is not necessary to clean or rinse the containers before use.

More information on container preparation can be found in Annex B.

7.2 On-site filtration

On-site filtration using a membrane filter (6.3.2) is required in some cases such as:

- if the dissolved metals need to be analysed, then acidify to pH < 2 after filtration;
- if required according to Tables A.1 to A.5, e.g. ammonium, nitrate, nitrite, phosphate, sulfate and silicates.

If experience has shown that no significant amount of particles occur (e.g. in drinking water), the filtration may be omitted. Those samples shall be colourless and shall have a turbidity <1,5 FNU (formazine nephelometric unit).

If immediate filtration on site is impossible when required (for instance under freezing weather conditions), then the reason and the time between sampling and filtration shall be added to the test report.

7.3 Filling the container

Containers (6.3.1) should be filled as prescribed in Tables A.1 to A.5 or in the analytical International Standard. If there are no instructions regarding the filling of the containers, they should be filled completely, unless the samples are to be frozen as part of their preservation. In this case, the sample containers shall not be filled completely in order to prevent breakage which can arise from the expansion of the water sample during the freezing and thawing process.

For microbiological samples, the filling procedure described in ISO 19458 shall be followed.

If no preservatives are present in the bottle, prerinsing the bottle is advisable. Guidance on prerinsing can be found in ISO 5667-14.

8 Sample handling and preservation

8.1 General

Waters, particularly surface waters, waste waters and groundwaters, are susceptible to changes as a result of physical, chemical or hydrobiological reactions which can take place between the time of sampling and the commencement of analysis. The nature and rate of these reactions are often such that, if precautions are not taken during sampling, transport and storage (for specific analytes), the concentrations determined are different to those existing at the time of sampling.

The extent of these changes is dependent on the chemical and biological nature of the sample, its temperature, its exposure to light, the type of container in which it is placed, the time between sampling and analysis, and the conditions to which it is subjected, e.g. agitation during transport.

8.2 Sample handling and preservation for physical and chemical analysis

Changes to particular constituents vary both in degree and rate, not only as a function of the type of water, but also, for the same water type, as a function of seasonal conditions.

These changes are often sufficiently rapid to modify the sample considerably in a short time. In all cases, it is essential to take precautions to minimize these reactions and, in the case of many analytes, to analyse the sample with a minimum of delay.

Further specific causes of variation are listed in a) to f).

a) The presence of bacteria, algae and other organisms can consume certain constituents of the samples. These organisms can also modify the nature of the constituents to produce new constituents. This hydrobiological activity affects, for example, the concentrations of dissolved oxygen, carbon dioxide, compounds of nitrogen, phosphorus and, sometimes, silicon.

b) Certain compounds can be oxidized either by dissolved oxygen present in the samples, or by atmospheric oxygen [e.g. organic compounds, Fe(II) and sulfides].

c) Certain substances can precipitate out of solution [e.g. calcium carbonate, metals and metallic compounds such as $Al(OH)_3$] or can be lost to the vapour phase (e.g. oxygen, cyanides and mercury).

d) Absorption of carbon dioxide from the air can modify the pH, conductivity and the concentration of dissolved carbon dioxide. The passage of compounds like ammonia and silicon fluoride through some types of plastics (see Table A.1) can also affect pH or conductivity.

e) Dissolved metals or metals in a colloidal state, as well as certain organic compounds, can be irreversibly adsorbed on to the surface of the containers or solid materials in the samples.

f) Polymerized products can depolymerize and, conversely, simple compounds can polymerize.

On-site filtration can be required as a precaution (7.2).

Samples for element analysis that are preserved with acid, can be transported under room temperature.

Details of the sample preservation are given in Tables A.1 and A.2.

8.3 Sample handling and preservation for hydrobiological analysis

The handling of samples for hydrobiological analysis is different from that for samples requiring chemical analysis. The addition of chemicals to the sample for hydrobiological analysis can be used for fixation or preservation of the sample. The term “fixation” is defined as the protection of morphological structures, while the term “preservation” is defined as the protection of organic matter from biochemical or chemical degradation. Preservatives, by definition, are toxic, and the addition of preservatives can lead to the death of living organisms. Prior to death, irritation can cause the most delicate organisms, which do not have strong cell walls, to collapse before fixation is complete. To minimize this effect, it is important that the fixation agent enters the cell quickly.

IMPORTANT — Acidic Lugol's solutions (6.2.10) can lead to the loss of structures in organisms or to the loss of small organisms, e.g. some flagellates. An alkaline Lugol's solution (6.2.11) should be used when silico-flagellates are frequently observed, e.g. during the summer.

The fixing and/or preservation of samples for hydrobiological analysis shall meet the following criteria:

a) the effect of the fixative and/or preservative on the loss of the organism shall be known beforehand;

b) the fixative or preservative shall effectively prevent the biological degradation of organic matter at least during the storage period of the samples;

c) the fixative, and/or preservative, shall enable the hydrobiological analyte (e.g. organisms or taxonomical groups) to be assessed during the storage period of the samples.

Details of the sample preservation are given in Table A.3.

8.4 Sample handling and preservation for radiochemical analysis

WARNING — Radioprotection, such as shielding, can be necessary, depending on the activity of the sample.

There is little difference between the handling of samples for radiochemical analysis and the handling of samples for physicochemical analysis.

The delay between sampling and measurement has to be consistent with the radioactive half-life of the radionuclides of interest. The conditions for adequate storage are independent of the radioactive half-life, but identical to those required for the corresponding stable isotope.

Cooling radiological samples is primarily used to prevent algal growth and biological spoilage. It is not a necessary preservation step for radiochemical analyses.

Details of the sample preservation are given in Table A.5.

9 Sample transport

Cooling or freezing procedures shall be applied to samples to increase the time period available for transport and storage (and if required, by Tables A.1 to A.5). When transport takes place, the sampling plan (e.g. ISO 5667-1) shall consider:

- the time between sampling (end of filling the sample container intended for the laboratory) and start of transport;
- the transport time;
- the time before further treatment in the laboratory.

The sum of these three periods is limited to the maximum storage times according to Tables A.1 to A.5.

If the maximum storage time cannot be met, then the sampling plan shall be reformulated to allow these requirements to be accommodated. In case the requirements cannot be met, instructions are given in ISO/TS 5667-25 to validate the preservation time of specific water samples or sample types.

Containers holding samples shall be protected and sealed during transport in such a way that the samples do not deteriorate or lose any part of their content. Container packaging shall protect the containers from possible external contamination, particularly near the opening, and should not itself be a source of contamination.

Glass containers shall be protected from potential breakage during transport by appropriate packaging. Samples shall be transported as soon as possible after sampling and with cooling (if necessary, according to Tables A.1 to A.5).

Laboratory samples for dispatch or transport by third parties and preserved laboratory samples should be sealed in such manner that the integrity of the sample can be maintained.

During transportation to the laboratory, samples shall be stored in a cooling device capable of maintaining a temperature of 5 °C ± 3 °C, apart from samples for element analysis that are preserved with acid. The samples intended for radiochemical analysis can be placed under room temperature. For proper evaluation of the conditions during transport, a device capable of recording the (maximum) temperature of the air surrounding the sample can be used. The temperature sensor should then be placed in a small container (e.g. 50 ml to 100 ml) filled with a fluid in order to avoid short time fluctuations in temperature.

Cooling and freezing procedures applied shall be in line with instructions from the analytical laboratory. Freezing especially requires detailed control of the freezing and thawing process in order to return the sample to its initial equilibrium after thawing.

Samples should not be in direct contact with the ice packs.

NOTE 1 Devices capable of logging the temperature during the transportation are available.

NOTE 2 For the transport of samples from the field to the laboratory, the preferred fluid for measuring the temperature is glycerol. If samples are transported in the field (e.g. on large locations), the fluid can also be, for example, water.

10 Identification of samples

Container labels should withstand wetting, drying and freezing without detaching or becoming illegible. The labelling system shall be waterproof to allow use on site.

The exact information given in the sampling report and on the sample labels depends on the objectives of the particular measurement programme. In all cases, an indelible label shall be secured to the sample container.

For each sample, at least the following information shall be available.

- A unique identifier shall be available, traceable to:
  - date, time and location of sampling;
  - unique sample identification;
  - description of sample;
  - name of sampling personnel;
  - details of sample preservation or fixation used;
  - details of sample storage used;
  - any information regarding integrity and manipulation of the sample;
  - any other information, as necessary.
- A unique identifier, traceable to sample date, location and sample number shall appear on the label of the sample container.

All other information is supplementary and should be detailed in the sampling report.

11 Sample reception

All relevant information regarding the sample in accordance with Clause 9 shall be recorded.

The laboratory shall receive and check information on sample preservation and sample transport conditions. If at least one of the conditions is not met, a disclaimer shall be reported along with the results of the sample.

In all cases, and especially when a "chain of custody" process needs to be established, the number of sample containers received in the laboratory shall be verified against the number of sample containers submitted.

12 Sample storage

The storage duration of the water samples is specific to the analyte(s) to be analysed. Samples should be stored no longer than the maximum storage period given in Tables A.1 to A.5. The maximum storage time includes the time between sampling (end of filling the sample container) and start of transport, the time of transport and the starting time of analysis in the laboratory.

The refrigeration conditions within the laboratory shall be 3 °C ± 2 °C. Samples for microbiological analysis shall be stored at 5 °C ± 3 °C. Samples for element analysis that are preserved with acid and those intended for radiochemical analysis can be placed under room temperature. The temperature of samples frozen for preservation shall be maintained below –18 °C, unless otherwise specified. Exceptions to these refrigeration conditions are listed in Tables A.1 to A.5.

When thawing frozen samples, it is recommended that each sample container be placed in a separate secondary container to minimize the risk of liquid loss, should a split become apparent during the thawing process or a rupture occur during initial freezing and storage. A mild impact can cause splitting of some plastics at low temperatures.

With respect to thawing, it is recommended that this be done under ambient conditions.

Annex A

(informative)

Techniques for sample preservation

A.1 General

This document and the analytical International Standards listed in this annex are complementary.

In some cases, the alternative preservation techniques listed contradict each other. It is intended that where an existing analytical International Standard is used, the preservation technique described in that method applies. However, alternative preservation techniques given in this document can also be appropriate. Where no preservation method is described in the analytical International Standard, or no analytical International Standard is used, the technique(s) listed in this document shall be used.

The information presented by line in each table comes from the international reference standard cited in the first cell of the line and the source column (best practice, validated method, method provided by reference) applies to the entire line.

NOTE The term 'raw water' is used for groundwater and surface water (usually, for the production of drinking water).

A validation protocol used for validation studies can be found in ISO/TS 5667-25.

A.2 Physicochemical and chemical analysis

The following general remarks should be noted in relation to the use of Tables A.1 and A.2.

- A preservation time of 1 d means that if 24 h is exceeded, this should be stated in the report.
- The types of containers are identical to those in the analytical International Standards. In some cases, the type of container in the standard is very specific, e.g. PTFE. This is essential when very low concentrations have to be measured. In other cases, when the specific type of plastic is not important, the term plastics is sufficient.

A.3 Hydrobiological analysis

The following general remarks should be noted in relation to the use of Table A.3.

- Plastics used for containers in the laboratory are for instance PE, PTFE, PET, PP, PFA and FEP.
- If a preservation period is not specified, it is generally unimportant. The indication “1 month” represents preservations without particular difficulty.

A.4 Microbiological analysis

ISO 19458 gives more specific information about sampling for microbiological analysis. It is advised to use ISO 19458 whenever necessary. Table A.4 is extracted from ISO 19458:2006, Annex B.

A.5 Radiochemical analytes and activities

The following general remarks should be noted in relation to the use of Table A.5.

WARNING — Radioprotection, such as shielding, can be necessary, depending on the activity of the sample.

- Acidification is carried out to avoid algal growth, biological spoilage and adsorption of metal ions to the inner wall of the sample container.

- Contamination of the sample should be avoided, especially if the sample activity is very low. Some sample sites can have measurable activity in the soil or air, or in waters other than those being sampled. Laboratories, as well as some items of domestic equipment, can contain radioactive material. When sampling precipitation, any special requirements in Table A.5 are additional to those given in ISO 5667-8. As the collection of sufficient samples can require a period of days, both the starting and finishing times and dates should be recorded. A record of precipitation collection for the sample station for the appropriate period should be appended. A stabilizer or carrier may be added if appropriate for the analytes being measured.

- Plastics used for containers in the laboratory are for instance PE, PTFE, PET, PP, PFA and FEP.

NOTE Some plastic bottles slowly concentrate samples over a period of many months by being very slightly permeable to water.

Table A.1 — Techniques for sample preservation — Physicochemical and chemical analysis of inorganic analytes

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Acidity and alkalinity	ISO 9963-1:1994[34] No reference to ISO 5667-3	PE, borosilicate glass	Fill the sample bottle completely and exclude air. Analyse preferably immediately after collection.	Method not provided by reference	Method provided by reference	A
	ISO/TS 15923-2:2017[83] Refers informatively to ISO 5667-3	Method not provided by reference	Method not provided by reference.	Method not provided by reference	Method provided by reference	BDEGSW
	ISO 5667-3 (for acidity)	PE, borosilicate glass	See ISO 9963-1:1994[34] and ISO/TS 15923-2:2017[83].	2 d	Best practice	A
	ISO 5667-3 (for alkalinity)	PE, borosilicate glass	See ISO 9963-1:1994[34] and ISO/TS 15923-2:2017[83].	14 d	Best practice	A
Aluminium	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 12020:1997[54] No reference to ISO 5667-3	Suitable plastics, no polyolefins (can contain traces of Al)	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 10566:1994[43] Refers normatively to ISO 5667-3	PE	For the dissolved fraction of aluminium: Filter on site or as soon as possible after sampling. Acidify by adding 0,30 ml HNO_3 (6.2.4) per 100 ml of sample. For acid-soluble aluminium: Acidify to pH 1,2–1,5 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO/TS 15923-2:2017[83] Refers informatively to ISO 5667-3	Method not provided by reference	Method not provided by reference.	Method not provided by reference	Method provided by reference	BDEGSW
	ISO 5667-3	See ISO/TS 15923-2:2017[83].	See ISO/TS 15923-2:2017[83].	1 month	Best practice	A

Key

A	all water types
B	boiler water (related term: cooling water)
D	drinking water (related term: domestic water)
E	eluate
G	ground water (related term: raw water)
M	marine water (related term: seawater)
R	rain water
S	surface water (related terms: raw water, environmental water)
W	waste water

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Ammonium	ISO 15923-1:2013[82] Refers normatively to ISO 5667-3	Plastics or glass	Waters shall be filtered on site.	1 d	Validated method[132]	BDEGSW
	ISO 14911:1998[70] Refers normatively to ISO 5667-3	PE	Waters shall be filtered on site. Acidify to pH 3 ± 0,5 with HNO_3 (6.2.4).	1 d	Method provided by reference	A
	ISO 11732:2005[51] Refers normatively to ISO 5667-3	Glass, polyolefins, PTFE	Water shall be filtered on site. Acidify to pH 1 to pH 2 with H_2SO_4 (6.2.5). Store samples in the dark or use dark-coloured bottles.	14 d	Method provided by reference	DGSW
	ISO 7150-1:1984[18] No reference to ISO 5667-3	PE or glass	Method not provided by reference.	Method not provided by reference	Method provided by reference	DGW
	ISO 23695:2023[122] Refers normatively to ISO 5667-3	Method not provided by reference	Preliminary filtration on site is necessary.	Only provided as soon as possible for non-preserved samples	Method provided by reference	DGSW
		Method not provided by reference	Acidify to pH < 2 with H_2SO_4 (6.2.5).	Method not provided by reference for acidified samples	Method provided by reference	DGSW
	ISO 5667-3	Plastics	Waters shall be filtered on site. Freeze to below −18 °C.	1 month	Best practice	A
		Plastics or glass	Waters shall be filtered on site. Acidify to pH 1 to pH 2 with H_2SO_4 (6.2.5).	21 d	Best practice	A

Key

A	all water types
B	boiler water (related term: cooling water)
D	drinking water (related term: domestic water)
E	eluate
G	ground water (related term: raw water)
M	marine water (related term: seawater)
R	rain water
S	surface water (related terms: raw water, environmental water)
W	waste water

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Antimony	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17378-1:2014[92] Refers normatively to ISO 5667-3	Borosilicate glass, plastics	Acidify to pH < 2 with HCl (6.2.3).	Method not provided by reference	Method provided by reference	DGRS
	ISO 17378-2:2014[93] Refers normatively to ISO 5667-3	Borosilicate glass, plastics	Acidify to pH < 2 with HCl (6.2.3).	Method not provided by reference	Method provided by reference	DGRS
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52], ISO 17294-2:2016[90], ISO 17378-1:2014[92] and ISO 17378-2:2014[93].	See ISO 15586:2003[74], ISO 11885:2007[52], ISO 17294-2:2016[90], ISO 17378-1:2014[92] and ISO 17378-2:2014[93].	1 month	Best practice	A
Arsenic	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17378-1:2014[92] Refer normatively to ISO 5667-3	Borosilicate glass, plastics	Acidify to pH < 2 with HCl (6.2.3).	Method not provided by reference	Method provided by reference	DGRS
	ISO 17378-2:2014[93] Refer normatively to ISO 5667-3	Borosilicate glass, plastics	Acidify to pH < 2 with HCl (6.2.3).	Method not provided by reference	Method provided by reference	DGRS
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52], ISO 17294-2:2016[90], ISO 17378-1:2014[92] and ISO 17378-2:2014[93].	See ISO 15586:2003[74], ISO 11885:2007[52], ISO 17294-2:2016[90], ISO 17378-1:2014[92] and ISO 17378-2:2014[93].	1 month	Best practice	A (except SW)
				6 months	Validated method[149]	SW

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Barium	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 14911:1998[70] Refers normatively to ISO 5667-3	PE	Only for dissolved barium: Filter through a membrane filter (pore size 0,45 µm) and acidify to pH 3 ± 0,5 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 11885:2007[52], ISO 17294-2:2016[90] and ISO 14911:1998[70].	See ISO 11885:2007[52], ISO 17294-2:2016[90] and ISO 14911:1998[70].	1 month	Best practice	A
Beryllium	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A
Biochemical oxygen demand (BOD)	ISO 5815-1:2019[6] Refers normatively to ISO 5667-3	Plastics or glass	Store samples in the dark or use dark-coloured bottles.	1 d	Method provided by reference	A
		Plastics	Freeze to below −18 °C. Store samples in the dark or use dark-coloured bottles.	1 month (6 months if >50 mg/l)	Validated method[149]	A
Boron	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A
Bromate	ISO 15061:2001[71] Refers normatively to ISO 5667-3	PE	Remove any ozone from the sample, for example, add 50 mg of ethylenediamine (6.1.8) to 1 l of sample immediately after sampling.	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 15061:2001[71].	See ISO 15061:2001[71].	1 month	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Bromide	ISO 10304-1:2007[37] Refers normatively to ISO 5667-3	PE	No preservation required.	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 10304-1:2007[37].	See ISO 10304-1:2007[37].	1 month	Best practice	A
Bromine residual	ISO 5667-3	Plastics or glass, dark coloured	Analyse on site.	5 min	Best practice	A
Cadmium	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	For the total fraction of cadmium: Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 5961:1994[7] Refers normatively to ISO 5667-3	PE, borosilicate glass	For the total fraction of cadmium: Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: FA, FEP	For the total fraction of cadmium: Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: FA, FEP	For the total fraction of cadmium: Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52], ISO 17294-2:2016[90] and ISO 5961:1994[7].	See ISO 15586:2003[74], ISO 11885:2007[52], ISO 17294-2:2016[90] and ISO 5961:1994[7].	1 month	Best practice	A (except SW)
				6 months	Validated method[149]	SW

Key

A all water types
B boiler water (related term: cooling water)
D drinking water (related term: domestic water)
E eluate
G ground water (related term: raw water)
M marine water (related term: seawater)
R rain water
S surface water (related terms: raw water, environmental water)
W waste water

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Calcium	ISO 6058:1984[8] Refers normatively to ISO 5667-3	PE	Solutions containing sodium cyanide must not be acified. This method does not require preservation of a sample.	Method not provided by reference	Method provided by reference	DGS
	ISO 7980:1986[22] No reference to ISO 5667-3	PE, PP	Acidify to pH 1 to 2 with HCl (6.2.3).	Method not provided by reference	Method provided by reference	DGS
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, PEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: FA, PEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 14911:1998[70] Refers normatively to ISO 5667-3	PE	Only for dissolved calcium: Filter through a membrane filter (pore size 0,45 µm) and acidify to pH 3 ± 0,5 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO/TS 15923-2:2017[82] Refers informatively to ISO 5667-3	Method not provided by reference	Method not provided by reference.	Method not provided by reference	Method provided by reference	BDEGSW
	ISO 5667-3	See ISO 6058:1984[8], ISO 7980:1986[22], ISO 11885:2007[52], ISO 17294-2:2016[90], ISO 14911:1998[70] and ISO/TS 15923-2:2017[82].	See ISO 6058:1984[8], ISO 7980:1986[22], ISO 11885:2007[52], ISO 17294-2:2016[90], ISO 14911:1998[70] and ISO/TS 15923-2:2017[82].	1 month	Best practice	A
Carbon dioxide	ISO 9439:1999[29] No reference to ISO 5667-3	Plastics or glass	Analyse preferably on site.	Method not provided by reference	Method provided by reference	W
	ISO 5667-3	See ISO 9439:1999[29].	See ISO 9439:1999[29].	1 d	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Carbon, total organic (TOC)	ISO 8245:1999[25] Refers normatively to ISO 5667-3	PE or glass	Acidify to pH 1 to pH 2 with H_2SO_4 (6.2.5) or H_3PO_4 (6.2.2). If loss of volatile organic compounds is suspected due to release of carbon dioxide upon acidification, then acidification is not suitable. Cool and analyse within 8 h.	7 d	Method provided by reference	DGMSW
		Plastics	Freeze to below −18 °C.	1 month	Method provided by reference	DGMSW
	ISO 20236:2018[111] No reference to ISO 5667-3	PE or glass	Store the sample in the dark.	2 d	Method provided by reference	A
		PE or glass	Acidify to pH ≤ 2 with H_2SO_4 (6.2.5) or HCl (6.2.3).	8 d	Method provided by reference	A
		PE or glass	Freeze to below −18 °C.	1 month	Method provided by reference	A
	ISO 21793:2020[118] No reference to ISO 5667-3	PE or glass	Store the sample in the dark.	2 d	Method provided by reference	A
		PE or glass	Acidify to pH ≤ 2 with H_2SO_4 (6.2.5) or HCl (6.2.3).	8 d	Method provided by reference	A
Carbon, dissolved organic (DOC)	ISO 8245:1999[25] Refers normatively to ISO 5667-3	PE or glass	Waters shall be filtered on site. Acidify to pH 1 to pH 2 with H_2SO_4 (6.2.5) or H_3PO_4 (6.2.2).	7 d	Method provided by reference	DGMSW
		Plastics	Freeze to below −18 °C.	1 month	Method provided by reference	DGMSW
	ISO 20236:2018[111] No reference to ISO 5667-3	PE or glass	Waters shall be filtered on site. Store the sample in the dark.	2 d	Method provided by reference	A
		PE or glass	Waters shall be filtered on site. Acidify to pH ≤ 2 with H_2SO_4 (6.2.5) or HCl (6.2.3).	8 d	Method provided by reference	A
	ISO 21793:2020[118] No reference to ISO 5667-3	PE or glass	Store the sample in the dark.	2 d	Method provided by reference	A
		PE or glass	Acidify to pH ≤ 2 with H_2SO_4 (6.2.5) or HCl (6.2.3).	8 d	Method provided by reference	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3{\cdot}5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Chemical oxygen demand (CODCr)	ISO 6060:1989[9] No reference to ISO 5667-3	PE or glass	If the samples have to be stored prior to analysis, add 10 ml of sulfuric acid (6.2.5) per litre of sample and store in the dark.	Several months	Method provided by reference	A
	ISO 15705:2002[79] Refers normatively to ISO 5667-3	PP or glass	Acidify to pH 1 to pH 2 with H_2SO_4 (6.2.5).	5 d	Method provided by reference	A
		Plastics	Freeze to below −18 °C.	1 month	Method provided by reference	A
	ISO 5667-3	See ISO 15705:2002[79].	Acidify to pH 1 to pH 2 with H_2SO_4 (6.2.5).	6 months	Validated method[149]	SW
			Freeze to below −18 °C.	6 months	Validated method[150]	SW
Chloramine	ISO 5667-3	Plastics or dark coloured glass	Analyse on site.	5 min	Best practice	A
Chlorate	ISO 10304-4:2022[39] Refers informatively to ISO 5667-3	PE or glass	Add NaOH (6.1.2 or 6.2.6) to pH 10 ± 0,5.	Method not provided by reference	Method provided by reference	A, with low contamination
	ISO 5667-3	See ISO 10304-4:2022[39].	See ISO 10304-4:2022[39].	7 d	Best practice	
Chloride	ISO 9297:1989[27] Refers normatively to ISO 5667-3	Glass	If the pH of the sample is outside the range of 5 to 9,5, adjust the pH using HNO_3 (6.2.4) or NaOH (6.1.2 or 6.2.6) as appropriate.	Several months	Method provided by reference	A
	ISO 15682:2000[78] Refers informatively to ISO 5667-3	Plastics or glass	No preservation required.	1 month	Method provided by reference	
	ISO 10304-1:2007[37] Refers normatively to ISO 5667-3	PE	No preservation required.	Method not provided by reference	Method provided by reference	
	ISO 15923-1:2013[82] Refers normatively to ISO 5667-3	Method not provided by reference	Method not provided by reference.	Method not provided by reference	Method provided by reference	BDEGSW
	ISO 10304-4:2022[39] Refers informatively to ISO 5667-3	PE or glass	Add NaOH (6.1.2 or 6.2.6) to pH 10 ± 0,5.	Method not provided by reference	Method provided by reference	A, with low contamination
	ISO 5667-3	See ISO 10304-4:2022[39].	See ISO 10304-4:2022[39].	1 month	Best practice	A, with low contamination

Key

A all water types
B boiler water (related term: cooling water)
D drinking water (related term: domestic water)
E eluate
G ground water (related term: raw water)
M marine water (related term: seawater)
R rain water
S surface water (related terms: raw water, environmental water)
W waste water

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Chlorine dioxide	ISO 5667-3	Plastics or dark coloured glass	None required, analyse on site.	5 min	Best practice	A
Chlorine, residual	ISO 5667-3	Plastics or dark coloured glass	Analyse on site.	5 min	Best practice	A
Chlorine, free	ISO 7393-2:2017[19] Refers normatively to ISO 5667-3	Plastics or glass	Analyse on site.	5 min	Method provided by reference	A (provided additional halogens and other oxidizing agents are present in negligible amounts)
		Chlorine-demand-free dark coloured glass	If analysis on site analysis is not possible, analyse directly after arrival in the lab.	5 min	Method provided by reference	A (provided additional halogens and other oxidizing agents are present in negligible amounts)
	ISO 5667-3	Plastics or glass	Analyse directly on site.	5 min	Best practice	A

Key

A all water types

B boiler water (related term: cooling water)

D drinking water (related term: domestic water)

E eluate

G ground water (related term: raw water)

M marine water (related term: seawater)

R rain water

S surface water (related terms: raw water, environmental water)

W waste water

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Chlorine, total	ISO 7393-2:2017[19] Refers normatively to ISO 5667-3	Plastics or glass	Analyse on site.	5 min	Method provided by reference	A (provided additional halogens and other oxidizing agents are present in negligible amounts)
		Chlorine-demand-free dark coloured glass	If analysis on site analysis is not possible, analyse directly after arrival in the lab.	5 min	Method provided by reference	A (provided additional halogens and other oxidizing agents are present in negligible amounts)
	ISO 5667-3	Plastics or glass	Analyse directly on site.	5 min	Best practice	A
Chlorite	ISO 10304-4:2022[39] Refers informatively to ISO 5667-3	PE or dark coloured glass	Add NaOH (6.1.2 or 6.2.6) to pH 10 ± 0,5.	Method not provided by reference	Method provided by reference	A, with low contamination
	ISO 5667-3	See ISO 10304-4:2022[39].	See ISO 10304-4:2022[39].	7 d	Best practice	A, with low contamination

Key

A all water types
B boiler water (related term: cooling water)
D drinking water (related term: domestic water)
E eluate
G ground water (related term: raw water)
M marine water (related term: seawater)
R rain water
S surface water (related terms: raw water, environmental water)
W waste water

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Chlorophyll	ISO 10260:1992[35] No reference to ISO 5667-3	Plastics or glass	Filter (6.3.2) preferably on site. Store samples in the dark or use dark-coloured bottles.	8 h	Method provided by reference	MS
			After filtration (6.3.2) and extraction with hot ethanol, freeze to below −25 °C.	extract 30 d	Method provided by reference	MS
			After filtration (6.3.2) and extraction with hot ethanol, store at 4 °C.	3 d	Method provided by reference	MS
	EN 17899[100]c Refers normatively to ISO 5667-3	Plastics or glass	If plant material is present, pre-filtering shall be carried out over plankton gauze of a mesh width of 1 mm. The water samples should be filtered as quickly as possible, at the latest 24 h after the sample was taken. Freezing of the water samples is not permitted.	1 d	Method provided by reference	A
	ISO 5667-3	Plastics or glass	Store samples in the dark or use dark-coloured bottles.	1 d	Validated method[152]	S
			Filter (6.3.2) and store samples in the dark or use dark-coloured bottles.	1 d	Best practice	MS
			After filtration (6.3.2), freeze to below −18 °C.	Filter plus residue 14 d	Best practice	MS
			After filtration (6.3.2), freeze to below −80 °C.	Filter plus residue 1 month	Best practice	MS
Chromium	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A, except SW
				6 months	Validated method[149]	SW

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Chromium(VI)	ISO 23913:2006[127] Refers normatively to ISO 5667-3	Plastics or borosilicate glass	No preservation allowed.	1 d	Method provided by reference	A
	ISO 18412:2005[106] Refers normatively to ISO 5667-3	Plastics or borosilicate glass	No preservation allowed.	4 d	Method provided by reference	D and weakly contaminated GS
	ISO/TS 15923-2:2017[83] Refers informatively to ISO 5667-3	Method not provided by reference	Method not provided by reference.	Method not provided by reference	Method provided by reference	BDEGSW
	ISO 24384[128] Refers normatively to ISO 5667-3	Plastics or borosilicate glass	Samples are filtered through a 0,45 µm filter. The sample preparation shall be completed not later than 24 h after sampling.	1 d	Method provided by reference	DGSW
		Plastics or borosilicate glass	After the chelating pretreatment, the samples shall be stored cool and dark at (3 ± 2) °C.	14 d	Method provided by reference	DGSA
Cobalt	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A
Colour	ISO 7887:2011[20] Refers normatively to ISO 5667-3	Plastics or glass	Store samples in the dark or use dark-coloured bottles.	5 d	Method provided by reference	A
	ISO 5667-3	See ISO 7887:2011[20].	See ISO 7887:2011[20].	5 min	Best practice	A (except G)
			For groundwater rich in iron (II), analyse on site.	5 min	Best practice	G
Conductivity	ISO 7888:1985[21] No reference to ISO 5667-3	Plastics or glass except soda glass	Analyse preferably on site.	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 7888:1985[21].	See ISO 7888:1985[21].	1 d	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Copper	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: FA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: FA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A, except SW
				6 months	Validated method[149]	SW
Cyanide, easily liberated	ISO 14403-1:2012[68] Refers normatively to ISO 5667-3	Plastics or glass	Add NaOH (6.1.2 or 6.2.6) to adjust the pH > 12. Store samples in the dark or use dark-coloured bottles.	7 d	Method provided by reference	A
	ISO 14403-2:2012[69] Refers normatively to ISO 5667-3	Plastics or glass	Add NaOH (6.1.2 or 6.2.6) to adjust the pH > 12. Store samples in the dark or use dark-coloured bottles.	7 d	Method provided by reference	A
Cyanide, free (pH = 6)	ISO 17690:2015[96] Refers normatively to ISO 5667-3	Containers protecting the sample from UV-light	Add NaOH (6.1.2 or 6.2.6) to adjust the pH = 11 ± 0,1. Store samples in the dark or use dark-coloured bottles.	6 d < 1 d if sulfide is present	Method provided by reference	A
Cyanide, total	ISO 14403-1:2012[68] Refers normatively to ISO 5667-3	Plastics or glass	Add NaOH (6.1.2 or 6.2.6) to adjust the pH > 12. Store samples in the dark or use dark-coloured bottles.	7 d	Method provided by reference	A
	ISO 14403-2:2012[69] Refers normatively to ISO 5667-3	Plastics or glass	Add NaOH (6.1.2 or 6.2.6) to adjust the pH > 12. Store samples in the dark or use dark-coloured bottles.	7 d	Method provided by reference	A
	ISO 22066:2020[120] Refers normatively to ISO 5667-3	Containers protecting the sample from UV-light	Add NaOH (6.1.2 or 6.2.6) to adjust the pH = 11 ± 0,1. Store samples in the dark or use dark-coloured bottles.	6 d <1 d if sulfide is present	Method provided by reference	A
	ISO 5667-3	Plastics or glass	See ISO 14403-1:2012[68], ISO 14403-2:2012[69], ISO/TS 17379-1:2013[94] and ISO 22066:2020[120].	14 d 1 d if sulfide is present	Validated method[138]	A
Cyanochloride	ISO 5667-3	Plastics	Method not provided by reference.	1 d	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Dissolved solids (dry residue): See total solids (total residues)						
Fluoride	ISO 10304-1:2007[37] Refers normatively to ISO 5667-3	Plastics, but not PTFE	Method not provided by reference.	Method not provided by reference	Best practice	A
	ISO 10359-1:1992[40] Refers normatively to ISO 5667-3	Plastics, but not PTFE	Not provided (only for dissolved fluoride).	3 d	Method provided by reference	DGSR (low contamination level)
	ISO 10359-2:1994[41] Refers normatively to ISO 5667-3	Plastics, but not PTFE	Not provided (only for total inorganic fluoride).	3 d	Method provided by reference	EW (high levels)
	ISO/TS 17951-1:2016[102] Refers informatively to ISO 5667-3	Plastics, but not PTFE	Method not provided by reference.	1 month	Method provided by reference	A (except D)
	ISO/TS 17951-2:2016[103] Refers informatively to ISO 5667-3	Plastics, but not PTFE	Method not provided by reference.	1 month	Method provided by reference	A (except D)
	ISO/TS 15923-2:2017[83] Refers informatively to ISO 5667-3	Plastics, but not PTFE	Filtration prior to analysis.	Method not provided by reference	Method provided by reference	BDEGSW
	ISO 5667-3	Plastics, but not PTFE	Method not provided by reference.	1 month	Best practice	A
Hydrazine	ISO 5667-3	Glass	Acidify with HCl (6.2.3) to 1 mol/l. Store samples in the dark or use dark-coloured bottles.	1 d	Best practice	A
Hydrogencarbonates: See acidity and alkalinity						
Iodide	ISO 10304-3:1997[38] Refers normatively to ISO 5667-3	PE or glass	Filtrate prior to analysis.	1 month	Method provided by reference	A
		PE	If immediate analysis is not possible, samples can be cooled or freezed (to below −18 °C).	1 month	Method provided by reference	A
	ISO 5667-3	See ISO 10304-3:1997[38].	See ISO 10304-3:1997[38].	1 month	Best practice	A
Iodine	ISO 5667-3	Glass	Store samples in the dark or use dark-coloured bottles.	1 d	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Iron(II)	ISO/TS 15923-2:2017[83] Refers informatively to ISO 5667-3	Method not provided by reference	Filtration prior to analysis.	Method not provided by reference	Method provided by reference	BDEGSW
	ISO 5667-3	Plastics or borosilicate glass	Acidify to pH 1 to pH 2 with HCl (6.2.3).	7 d	Best practice	A
Iron	ISO 6332:1988[10] No reference to ISO 5667-3	Glass	For the total fraction of iron: Acidify the sample immediately after collection to pH 1. For the the total soluble fraction of iron: Filter the sample immediately after filtration.	7 d	Method provided by reference	A
	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 6332:1988[10], ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 6332:1988[10], ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A
Kjeldahl nitrogen	ISO 5663:1984[3] No reference to ISO 5667-3	Plastics or glass or borosilicate glass	Acidify to pH 1 to pH 2 with H_2SO_4 (6.2.5).	Method not provided by reference	Method provided by reference	W
	ISO 5667-3	Plastics	Freeze to below −18 °C.	6 months	Validated method[137]	SW

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Lead	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: FA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: FA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A (except SW)
				6 months	Validated method[149]	SW
Lithium	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: FA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: FA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 14911:1998[70] Refers normatively to ISO 5667-3	PE	Acidify to pH 3 ± 0,5 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 14911:1998[70].	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 14911:1998[70].	1 month	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Magnesium	ISO 7980:1986[22] No reference to ISO 5667-3	PE, PP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGS
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 14911:1998[70] Refers normatively to ISO 5667-3	PE	Only for dissolved magnesium: Filter through a membrane filter (0,45 µm) and acidify to pH 3 ± 0,5 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 7980:1986[22], ISO 15586:2003[74], ISO 11885:2007[52] and ISO 14911:1998[70].	See ISO 7980:1986[22], ISO 15586:2003[74], ISO 11885:2007[52] and ISO 14911:1998[70].	1 month	Best practice	A
Manganese	ISO 6333:1986[11] No reference to ISO 5667-3	PE, glass	Acidify the sample with sulfuric acid (6.2.5) until the pH is approximately, but not less than 1.	Method not provided by reference	Method provided by reference	DS
	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 14911:1998[70] Refers normatively to ISO 5667-3	PE	Only for dissolved manganese: Filter through a membrane filter (0,45 µm) and acidify to pH 3 ± 0,5 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 6333:1986[11], ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 6333:1986[11], ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Mercury	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PFA, FEP, quartz, HDPE, PTFE	Add 1 ml HCl (6.2.3) per 100 ml of water to ensure pH < 1.	Method not provided by reference	Method provided by reference	A
	ISO 17852:2006[97] Refers normatively to ISO 5667-3	PTFE, FEP, borosilicate glass, quartz	Add 15 ml HCl (6.2.3) and 2 ml potassium bromide – potassium bromate reagent per 100 ml of sample. Make sure solution stays yellow after addition of acid and oxidator. Otherwise add more potassium bromide – potassium bromate reagent.	7 d	Method provided by reference	DGRS (W after additional step)
	ISO 12846:2012[55] Refers normatively to ISO 5667-3	FEP, glass	Add HCl (6.2.3) 1 ml/100 ml. Particular care is needed to ensure that the sample is free from contamination.	2 d	Validated method[142]	DGRSW
		FEP, glass	Stabilization with digestion step using a potassium bromide – potassium bromate reagent takes place within the laboratory.	1 month	Best practice	DGRSW
	ISO 5667-3	See ISO 17294-2:2016[90], ISO 17852:2006[97], ISO 12846:2012[55].	See ISO 17294-2:2016[90], ISO 17852:2006[97], ISO 12846:2012[55].	1 month	Best practice	A
Molybdenum	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3{\cdot}5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Nickel	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	6 months	Validated method[149]	SW
		See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A (except SW)

Key

A	all water types
B	boiler water (related term: cooling water)
D	drinking water (related term: domestic water)
E	eluate
G	ground water (related term: raw water)
M	marine water (related term: seawater)
R	rain water
S	surface water (related terms: raw water, environmental water)
W	waste water

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Nitrate	ISO 13395:1996[66] Refers normatively to ISO 5667-3	PE or glass	Acidify with HCl (6.2.3) to pH ± 2.	1 d	Method provided by reference	A
			Freeze to below −20 °C.	8 d	Method provided by reference	A
	ISO 15923-1:2013[82] Refers normatively to ISO 5667-3	Method not provided by reference	Method not provided by reference.	Method not provided by reference	Method provided by reference	BDEGSW
	ISO 10304-1:2007[37] Refers normatively to ISO 5667-3	PE	Method not provided by reference.	Method not provided by reference	Method provided by reference	A
	ISO 23696-1:2023[123] Refers normatively to ISO 5667-3	Method not provided by reference	Analyse as soon as possible. Freeze to below −18 °C for longer storage periods. For nitrate in wastewater and surface water on-site filtration is mandatory.	Method not provided by reference	Method provided by reference	DGSW
	ISO 23696-2:2023[124] Refers normatively to ISO 5667-3	Method not provided by reference	Analyse as soon as possible. Freeze to below −18 °C for longer storage periods. For nitrate in wastewater and surface water on-site filtration is mandatory.	Method not provided by reference	Method provided by reference	DGSW
	ISO 5667-3	Plastics or glass	Not provided.	1 d	Best practice	A
		Plastics or glass	Acidify to pH 1 to pH 2 with HCl (6.2.3).	7 d	Best practice	A
		Plastics	Freeze to below −18 °C.	1 month	Best practice	A
		Plastics or glass	Waters shall be filtered on site.	4 d	Validated method[144][150]	SW

Key

A all water types

B boiler water (related term: cooling water)

D drinking water (related term: domestic water)

E eluate

G ground water (related term: raw water)

M marine water (related term: seawater)

R rain water

S surface water (related terms: raw water, environmental water)

W waste water

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Nitrite	ISO 6777:1984[14] No reference to ISO 5667-3	Glass	Analyse as soon as possible within 24 h of collection.	1 d	Method provided by reference	DGW
	ISO 13395:1996[66] Refers normatively to ISO 5667-3	PE or glass	Acidify with HCl (6.2.3) to pH ± 2.	1 d	Method provided by reference	A
			Freeze to below −20 °C.	8 d	Method provided by reference	A
	ISO 15923-1:2013[82] Refers normatively to ISO 5667-3	Method not provided by reference	Method not provided by reference.	Method not provided by reference	Method provided by reference	BDEGSW
	ISO 10304-1:2007[37] Refers normatively to ISO 5667-3	PE	Method not provided by reference.	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	Plastics or glass	Waters shall be filtered on site.	4 d	Validated method[144][150]	SW
Nitrogen total	ISO 20236:2018[111] No reference to ISO 5667-3	Plastics or glass	Store the samples in the dark.	2 d	Method provided by reference	A
			Acidify to pH ≤ 2 with H_2SO_4 (6.2.5) or HCl (6.2.3).	8 d	Method provided by reference	A
		Plastics	Freeze to below −18 °C.	1 month	Method provided by reference	A
	ISO 23697-1:2023[125] Refers normatively to ISO 5667-3	Method not provided by reference	Analyse as soon as possible. Homogenize the sample to avoid any losses of ST-TN_b.	Method not provided by reference	Method provided by reference	GSW
	ISO 23697-2:2023[126] Refers normatively to ISO 5667-3	Method not provided by reference	Analyse as soon as possible. Homogenize the sample to avoid any losses of ST-TN_b.	Method not provided by reference	Method provided by reference	GSW
	ISO 29441:2010[130] Refers normatively to ISO 5667-3	Plastics or glass	Acidify to pH ± 2 with H_2SO_4 (6.2.5).[a]	1 month	Method provided by reference	A
		Plastics	Freeze to below −18 °C.	8 d	Method provided by reference	A
Odour	ISO 5667-3	Glass	A quantitative analysis can be carried out on site.	6 h	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Orthophosphates, dissolved: See phosphate						
Oxygen	ISO 5813:1983[4] No reference to ISO 5667-3	Glass, narrow-mouthed glass flasks	Fix the oxygen on site. Store samples in the dark.	1 d	Method provided by reference	A
	ISO 5814:2012[5] No reference to ISO 5667-3	Plastics or glass	Analyse directly on site. If direct measurement in the water body is not possible, the measurement can also be taken in a gas-tight connected flow-through device or immediately after sampling as a discrete sample.	5 min	Method provided by reference	A (M: correction needed)
	ISO 17289:2014[89] No reference to ISO 5667-3	Plastics or glass	Analyse directly on site. If direct measuring in the water body is not possible, the measuring can also take place in a gastight connected flow-through device or immediately after fit for purpose sampling as a discrete sample.	5 min	Method provided by reference	A
Permanganate index (CODMn)	ISO 8467:1993[26] No reference to ISO 5667-3	Plastics or glass	Acidify to pH 1 to pH 2 with H_2SO_4 (6.2.5).	2 d	Method provided by reference	D (only water for consumption)
		Plastics or glass	Store samples in the dark.	2 d	Method provided by reference	D (only water for consumption)
	ISO 5667-3	Plastics	Freeze to below −18 °C.	1 month	Best practice	A
pH	ISO 10523:2008[42] Refers normatively to ISO 5667-3	PE or glass Exclude air by use of a specially shaped stopper	Analyse preferably on site.	1 d	Validated method[131][147]	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Phosphate	ISO 6878:2004[15] No reference to ISO 5667-3	Preferably glass, otherwise PE, PVC	Filter through a membrane filter (0,45 µm).	Method not provided by reference	Method provided by reference	A
	ISO 15923-1:2013[82] Refers normatively to ISO 5667-3	Plastics	Waters shall be filtered on site.	Method not provided by reference	Method provided by reference	A
	ISO 15681-1:2003[76] Refers normatively to ISO 5667-3	Plastics, glass or borosilicate glass	Filter through a membrane filter (0,45 µm).	1 d	Method provided by reference	A (range for M)
	ISO 15681-2:2018[77] Refers normatively to ISO 5667-3	Plastics, glass or borosilicate glass	Filter through a membrane filter (0,45 µm).	1 d	Method provided by reference	A (range for M)
Phosphorus	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	GSW
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 6878:2004[15] No reference to ISO 5667-3	Preferably glass, otherwise PE, PVC	Acidify to pH ± 1 with H_2SO_4 (6.2.5).	Method not provided by reference	Method provided by reference	A
	ISO 15681-1:2003[76] Refers normatively to ISO 5667-3	Plastics, glass or borosilicate glass	Acidify to pH < 2 with H_2SO_4 (6.2.5).	1 month	Method provided by reference	A (range for M)
		Plastics, glass or borosilicate glass	Freeze to below −18 °C.	1 month	Method provided by reference	A (range for M)
	ISO 15681-2:2018[77] Refers normatively to ISO 5667-3	Plastics, glass or borosilicate glass	Acidify to pH ≤ 2 with H_2SO_4 (6.2.5).	1 month	Method provided by reference	A (range for M)
		Plastics, glass or borosilicate glass	Freeze to below −18 °C.	1 month	Method provided by reference	A (range for M)
	ISO 5667-3	Plastics	Freeze to below −18 °C.	6 months	Validated method[149]	GS

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3{\cdot}5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Potassium	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 14911:1998[70] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH 3 ± 0,5 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 14911:1998[70], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 14911:1998[70], ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A
Selenium	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4) or HCl (6.2.3).	Method not provided by reference	Method provided by reference	A
	ISO/TS 17379-1:2013[94] Refer normatively to ISO 5667-3	Plastics, glass	Acidify to pH < 2 with HCl (6.2.3).	Method not provided by reference	Method provided by reference	DGRS
	ISO/TS 17379-2:2013[95] Refer normatively to ISO 5667-3	Plastics, glass	Acidify to pH < 2 with HCl (6.2.3).	Method not provided by reference	Method provided by reference	DGRS
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52], ISO 17294-2:2016[90] ISO/TS 17379-1:2013[94] and ISO/TS 17379-2:2013[95].	See ISO 15586:2003[74], ISO 11885:2007[52], ISO 17294-2:2016[90] ISO/TS 17379-1:2013[94] and ISO/TS 17379-2:2013[95].	1 month	Best practice	A
Silicates	ISO 16264:2002[84] No reference to ISO 5667-3	Plastics	Waters shall be filtered on site. If filtration on site is not possible then store samples cool but do not freeze.	24 h	Method provided by reference	A
	ISO 15923-1:2013[82] Refers normatively to ISO 5667-3	Method not provided by reference	Waters shall be filtrated on site.	Method not provided by reference	Method provided by reference	BDEGSW
	ISO 5667-3	Plastics	Waters shall be filtered on site. If filtration on site is not possible then store samples cool but do not freeze.	1 month	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Silver	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A
Sodium	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 14911:1998[70] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH 3 ± 0,5 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 14911:1998[70], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 14911:1998[70], ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A
Solids, suspended	EN 872:2005[1] Refers normatively to ISO 5667-3	Plastics or glass	Analyse preferably within 4 h.	2 d	Method provided by reference	GSW
	ISO 5667-3	Plastics or glass	Method not provided by reference.	2 d	Best practice	A
Sulfate	ISO 10304-1:2007[37] Refers normatively to ISO 5667-3	Plastics or glass	Filter on site through a membrane filter (0,45 µm) or as soon as possible after sampling.	Method not provided by reference	Method provided by reference	A
	ISO 15923-1:2013[82] Refers normatively to ISO 5667-3	Method not provided by reference	Filter on site through a membrane filter (0,45 µm) or as soon as possible after sampling.	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	Plastics or glass	Filter on site through a membrane filter (0,45 µm) or as soon as possible after sampling.	1 month	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Sulfide (easily liberated)	ISO 13358:1997[65] Refers normatively to ISO 5667-3	Glass	Fix the sulfide on site by adding 2 ml zinc acetate solution per l (6.2.1). Add NaOH (6.1.2) if the pH is not between 8,5 and 9,0.	3 d	Method provided by reference	A
	ISO 5667-3	Plastics	Fix the sulfide on site by adding 2 ml zinc acetate solution per l (6.2.1). Add NaOH (6.1.2) if the pH is not between 8,5 and 9,0.	7 d	Best practice	A
			If samples are chlorinated, Note b applies.	7 d	Best practice	A
Sulfite	ISO 10304-3:1997[38] Refers normatively to ISO 5667-3	Plastics or glass	Fix the sulfite on site by addition of 1 ml EDTA solution (6.2.8) per 100 ml of sample.	2 d	Method provided by reference	A
	ISO 5667-3	Glass	See ISO 10304-3:1997[38].	3 d	Best practice	A
Surfactants, anionic	ISO 5667-3	Glass	Method not provided by reference.	3 d	Best practice	A
			Add formaldehyde solution (6.2.12, see warning).	4 d	Best practice	A
			Freeze to below −18 °C.	1 month	Best practice	A
Surfactants, cationic	ISO 5667-3	Glass	Method not provided by reference.	2 d	Best practice	A
Surfactants, non-ionic	ISO 5667-3	Glass	Add formaldehyde solution (6.2.12, see warning).	1 month	Best practice	A
Tin	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH 1 to pH 2 with HCl (6.2.3) or HNO_3 (6.2.4). HCl (6.2.3) should be used if the hydride technique is used for analysis.	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3			Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Validated method[137]	A
Total hardness: See calcium						
Total solids (total residues, dry extract)	ISO 5667-3	Plastics or glass	Method not provided by reference.	7 d	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.1 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Turbidity	ISO 7027-1:2016[16] No reference to ISO 5667-3	Glass or plastics	Store samples in the dark or use dark-coloured bottles. Analyse preferably on site.	1 d	Method provided by reference	A
	ISO 7027-2:2019[17] No reference to ISO 5667-3	on site	Analyse on site.	on site	Method provided by reference	A
	ISO 5667-3	See ISO 7027-1:2016[16] and ISO 7027-2:2019[17].	Analyse on site.	on site	Validated method[152]	A
Uranium	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	Plastics or borosilicate glass	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 17294-2:2016[90].	See ISO 17294-2:2016[90].	2 months	Best practice	A
Vanadium	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A
Zinc	ISO 15586:2003[74] Refers normatively to ISO 5667-3	PE, PP, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGSW
	ISO 11885:2007[52] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 17294-2:2016[90] Refers normatively to ISO 5667-3	PE-HD, PTFE For low concentrations: PFA, FEP	Acidify to pH < 2 with HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	6 months	Validated method[147]	SW
		See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	See ISO 15586:2003[74], ISO 11885:2007[52] and ISO 17294-2:2016[90].	1 month	Best practice	A (except SW)

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Not recommended for simultaneous persulfate oxidation/digestion procedures.

[b] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[c] Under preparation.

Table A.2 — Techniques for the preservation of samples — Physicochemical and chemical analysis of organic analytes

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Adsorbable organic halides (AOX)	ISO 9562:2004[30] No reference to ISO 5667-3	Plastics or glass Glass is preferred if the concentration is suspected to be low	Acidify to pH 1 to pH 2 with HNO_3 (6.2.4). Store samples in the dark or use dark-coloured bottles.[a]	Method not provided by reference	Method provided by reference	A
			If volatile organic halogen compounds, for example chlorinated solvents, are expected, it is recommended to start analysis within 24 h after sampling.	1 d	Method provided by reference	A
	ISO 5667-3	Plastics or glass	Acidify to pH 1 to pH 2 with HNO_3 (6.2.4). Store samples in the dark or use dark-coloured bottles.[a]	5 d	Best practice	A
		Plastics	In the absence of volatile compounds: Freeze to below −18 °C.	1 month	Best practice	A
Alkanes, short-chain polychlorinated (SCCPs)	ISO 12010:2019[53] Refers normatively to ISO 5667-3	Glass	Rinse bottles with 2 ml isooctane.	Method not provided by reference	Best practice	DGSW
	ISO 5667-3	Glass	Method not provided by reference.	1 month	Best practice	A
Alkylmercury compounds	ISO 21863:2020[119] Refers normatively to ISO 5667-3	Glass, PTFE	Filtration on site, acidify to pH 1,4 with HCl (6.2.3), Alternatively acidify in the lab < 48 h.	6 months	Method provided by reference	A
Chlorinated dibenzo-*p*-dioxins (PCDDs) and dibenzofurans (PCDFs)	ISO 18073:2004[105] No reference to ISO 5667-3	Amber glass with a screw cap, lined with fluoropolymer	Maintain aqueous samples in the dark at 0 °C to 4 °C. If residual chlorine is present in aqueous samples, add 80 mg of $Na_2S_2O_3$ (6.1.1) per litre of sample. If sample pH is greater than 9, adjust to pH 7 to pH 9 with H_2SO_4 (6.2.5).	1 y	Method provided by reference	A (waste waters: containing <1 % mass solids)
Chlorinated solvents: See volatile organic compounds						
Cyclic volatile methylsiloxanes (cVMS)	ISO 20596-1:2018[113] Refers informatively to ISO 5667-3	Glass (no silicon materials)	Method not provided by reference.	4 d	Method provided by reference	A
	ISO 20596-2:2021[114] No reference to ISO 5667-3	Glass (no silicon materials)	Add 8 LDPE particles to each 125 ml uniquely labelled sample jar with lid.	14 d	Method provided by reference	A
Detergents: See surfactants						
Extractable organic halides (EOX)	ISO 5667-3	Glass	If samples are chlorinated, footnote a applies.	1 month	Validated method[146]	DG
			If samples are chlorinated, footnote a applies. Acidify to pH 1 to pH 2 with HNO_3 (6.2.4) or H_2SO_4 (6.2.5).	1 month	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3{\cdot}5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[b] Under development.

Table A.2 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
EOX (inclusive volatiles)	ISO 5667-3	Glass	If samples are chlorinated, footnote a applies.	4 d	Validated method[146]	SW
Hydrocarbons	ISO 17943:2016[101] Refers normatively to ISO 5667-3	Glass with ground glass stopper or with screw cap, lined with PTFE	Store samples in the dark or use dark-coloured bottles.[a]	5 d	Method provided by reference	DGSW
	ISO 9377-2:2000[28] Refers normatively to ISO 5667-3	Glass with ground glass stopper or with screw cap, lined with PTFE	Acidify to pH < 2 with mineral acid.	4 d	Method provided by reference	SW
	ISO 5667-3	Glass	Acidify to pH 1 to pH 2 with HCl (6.2.3), HNO_3 (6.2.4) or H_2SO_4 (6.2.5).	1 month	Best practice	A, except SW
Microcystins	ISO 20179:2005[110] Refers informatively to ISO 5667-3	Method not provided by reference Avoid the use of plastics whenever possible.	Store the samples in the dark.	2 d	Method provided by reference	DG
	ISO 22104:2021[121] Refers informatively to ISO 5667-3	Amber glass, with PTFE screw caps	Preserve with 150 mg/l of sodium thiosulfate (6.1.1) as a neutralizing additive to remove chlorine: add 0,75 ml of sodium thiosulfate preservative solution (6.1.1) to 500 ml sample. Store the samples in the dark.	21 d	Method provided by reference	DS
Monocyclic aromatic hydrocarbons: See volatile organic compounds						
Oil and grease	ISO 5667-3	Glass	Acidify to pH 1 to pH 2 with H_2SO_4 (6.2.5) or HCl (6.2.3) or HNO_3 (6.2.4). Fill bottle to ~90 %, leave sufficient headspace.	1 month	Best practice	A
Organic chlorine: see EOX						
Organotin compounds	ISO 17353:2004[91] Refers normatively to ISO 5667-3	Glass	Store samples in the dark or use dark-coloured bottles.	1 d	Method provided by reference	DMSW
	ISO 5667-3	See ISO 17353:2004[91].	See ISO 17353:2004[91].	7 d	Best practice	A (except DMSW)

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3·5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[b] Under development.

Table A.2 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Perfluoroalkyl and polyfluoroalkyl substances (PFAS)	EN 17892[99][b] Refers normatively to ISO 5667-3	PE, PP	Store the water sample at (4 ± 3) °C.	60 d	Method provided by reference	D
			Store the water sample at ≤ −15 °C.	180 d	Method provided by reference	D
	ISO 21675:2019[116] Refers normatively to ISO 5667-3	PE, PP (glass only for specified compounds)	8:2 FTUCA in seawater less than 4 weeks.	28 d	Method provided by reference	A (up to 2 g/l solid particular material)
Pesticides, carbamates	ISO 5667-3	Glass	If samples are chlorinated, footnote a applies.	14 d	Best practice	A
	ISO 5667-3	Plastics	Freeze to below −18 °C.	1 month	Best practice	A
Pesticides, phenoxyalkanoic herbicides alkylhalogenated phenoxy acids, hydroxybenzonitriles and bentazone	ISO 15913:2000[81] Refers normatively to ISO 5667-3	Glass, dark coloured	Method not provided by reference.	3 d	Method provided by reference	DG
	ISO 5667-3	Glass with PTFE cap liner or septum	If samples are chlorinated, footnote a applies.	14 d	Best practice	A (except DG)

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[b] Under development.

Table A.2 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Pesticides containing organochlorine and chlorobenzenes α-endosulfan, β-endosulfan, endosulfan sulfate, *cis*-chlordane, *trans*-chlordane, *cis*-heptachlorepoxide, *trans*-heptachlorepoxide, heptachlor, α-HCH, β-HCH, γ-HCH, δ-HCH, aldrin, dieldrin, endrin, isodrin, telodrin, hexachlorobutadiene, o,p′-DDD, o,p′ DDE, o,p′-DDT, p,p′-DDD, p,p′-DDE, p,p′-DDT, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,3,5-trichlorobenzene, 1,2,3,4-tetrachlorobenzene, 1,2,3,5, tetrachlorobenzene, 1,2,4,5-tetrachlorobenzene, pentachlorobenzene, hexachlorobenzene	ISO 6468:1996[13] No reference to ISO 5667-3	Dark coloured glass with PTFE cap liner	Sample endosulfan separately keep at pH < 2, others adjust to pH 5,0 to pH 7,5. If pH is outside that range, adjust pH; extract preferably within 24 h.	Preferably 1 d	Method provided by reference	DGS
	ISO 5667-3	Dark coloured glass with PTFE cap liner	See ISO 6468:1996[13].	7 d	Validated method[133][134][136][139][140][143][144][145]	G
Pesticides containing organophosphorus, chlorpyrifos-ethyl, chlorpyrifos-methyl, diazinon, dichlorvos, dimethoate, disulfoton, fenthion, malathion mevinphos, parathion-ethyl, parathion-methyl	ISO 10695:2000[44] No reference to ISO 5667-3	Dark coloured glass with PTFE cap liner	Some organophosphorus compounds can degrade rapidly in an aqueous environment. Therefore, unless stability trials indicate otherwise, extract the sample within 1 d of collection of phosphorus compounds.	1 d	Method provided by reference	DGSW (up to 0,05 g/l solids)
	ISO 5667-3	Dark coloured glass with PTFE cap liner	See ISO 10695:2000[44].	7 d	Validated method[142][144]	W

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[b] Under development.

Table A.2 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Pesticides containing organophosphorus glyphosate	ISO 21458:2008[115] No reference to ISO 5667-3	Plastics, e.g. polyolefin	If samples are chlorinated, footnote a applies.	7 d	Method provided by reference	A
			Freeze to below −18 °C.	1 month	Method provided by reference	A
	ISO 16308:2014[85] Refers normatively to ISO 5667-3	Glass, PE, PP	If samples are chlorinated, footnote a applies.	1 d/7 d after filtration	Method provided by reference	A (except M)
Pesticides containing organonitrogen, atrazine, propazine, simazine, terbutryn	ISO 10695:2000[44] No reference to ISO 5667-3	Dark coloured glass with PTFE cap liner	Some organic nitrogen compounds can degrade rapidly in an aqueous environment. Therefore, unless stability trials indicate otherwise, extract the sample within 2 d of collection of nitrogen compounds.	2 d	Method provided by reference	DGSW (up to 0,05 g/l solids)
	ISO 11369:1997[47] Refers normatively to ISO 5667-3	Dark coloured glass with PTFE cap liner	Water samples are stored in the dark or in dark glass.	7 d	Method provided by reference	D(G)
	ISO 5667-3	See ISO 10695:2000[44] and ISO 11369:1997[47].	See ISO 10695:2000[44] and ISO 11369:1997[47].	1 month	Validated method[142][144]	W
Petroleum and derivatives: See hydrocarbons						
Pharmaceutical ingredients, transformation products and other organic substances	ISO 21676:2018[117] No reference to ISO 5667-3	Glass (coloured), keep dark	If samples are chlorinated, footnote a applies.	21 d	Method provided by reference	DGSW

Key

A	all water types
B	boiler water (related term: cooling water)
D	drinking water (related term: domestic water)
E	eluate
G	ground water (related term: raw water)
M	marine water (related term: seawater)
R	rain water
S	surface water (related terms: raw water, environmental water)
W	waste water

[a] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[b] Under development.

Table A.2 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Phenols	ISO 6439:1990[12] Refers normatively to ISO 5667-3	Glass	Acidify the sample to pH of approximately 4 with H_3PO_4 (6.2.2).	1 d	Method provided by reference	DSW
	ISO 14402:1999[67] Refers normatively to ISO 5667-3	PTFE, glass	Acidify to pH < 2 with HCl (6.2.3) or H_2SO_4 (6.2.5). Store samples in the dark or use dark-coloured bottles.	1 d	Method provided by reference	EGSW
	ISO 8165-1:1992[23] Refers normatively to ISO 5667-3	Glass or borosilicate glass with PTFE cap liner	Acidify to pH < 4 with H_3PO_4 (6.2.2) or H_2SO_4 (6.2.5)[a].	21 d	Method provided by reference	DGS
	ISO 8165-2:1999[24] Refers normatively to ISO 5667-3	Glass, dark coloured	Acidify to pH < 2 with H_2SO_4 (6.2.5)[a].	7 d	Method provided by reference	DGS
	ISO 18857-1:2005[108] Refers normatively to ISO 5667-3	Glass Glass (preferably dark coloured) with ground glass stopper, or with screw cap, lined with PTFE	Acidify to pH < 2 with HCl (6.2.3) or H_2SO_4 (6.2.5).	14 d	Method provided by reference	DGSW
	ISO 18857-2:2009[109] Refers normatively to ISO 5667-3	Glass Glass (preferably dark coloured) with ground glass stopper, or with screw cap, lined with PTFE	Acidify to pH < 2 with HCl (6.2.3) or H_2SO_4 (6.2.5).[a]	14 d	Method provided by reference	DGSW
	ISO 5667-3	Glass	Acidify to pH < 4 with H_3PO_4 (6.2.2) or H_2SO_4 (6.2.5).	21 d	Best practice	A
Phthalates	ISO 18856:2004[107] Refers normatively to ISO 5667-3	Dark coloured glass with PTFE cap liner	Store samples in the dark or use dark-coloured bottles.	4 d	Method provided by reference	DGSW

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3{\cdot}5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[b] Under development.

Table A.2 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Polychlorinated biphenyls (PCBs)	ISO 6468:1996[13] No reference to ISO 5667-3	Dark coloured glass, with PTFE cap liner	Adjust to pH 5,0 to pH 7,5. If pH is outside that range, adapt pH; preferably extract within 24 h.[a]	1 d	Method provided by reference	DGSW
	ISO 17858:2007[98] Refers informatively to ISO 5667-3	Amber glass with a screw cap, with fluoropolymer or metal foil liner	Maintain aqueous samples in the dark ≤ 4 °C. If residual chlorine is present in aqueous samples, add 80 mg of $Na_2S_2O_3$ (6.1.1) per litre of water. If the sample pH is > 9, adjust to pH 7 to pH 9 with 1 mol/l H_2SO_4 (6.2.5). Store sample extracts in the dark until analysed.	1 y	Method provided by reference	A(waste waters: containing <1 % suspended solids)
	ISO 5667-3	See ISO 6468:1996[13] and ISO 17858:2007[98].	See ISO 6468:1996[13] and ISO 17858:2007[98].	7 d	Validated method[133][134][136][139][140][143][144][145]	G
Polychlorinated naphthalenes (PCNs), mono- to octa-	ISO/TS 16780:2015[86] Refers normatively to ISO 5667-3	Dark coloured glass	Store samples in the dark or use dark-coloured bottles. If pH > 9, adjust to pH = 7 with H_2SO_4 (6.2.5). [a]	1 y	Method provided by reference	A (<2 g/l solids)
	ISO 5667-3	See ISO/TS 16780:2015[86].	See ISO/TS 16780:2015[86].	1 month	Best practice	A
Polycyclic aromatic hydrocarbons (PAHs)	ISO 17993:2002[104] Refers normatively to ISO 5667-3	Glass, with PTFE cap liner	If samples are chlorinated, footnote a applies.	1 d (after addition of n-hexane to be stored up to 3 d)	Method provided by reference	DGS(W)
	ISO 28540:2011[129] Refers normatively to ISO 5667-3	Glass, with PTFE cap liner	If samples are chlorinated, footnote a applies.	Method not provided by reference	Method provided by reference	DGSW
	ISO 5667-3	See ISO 17993:2002[104] and ISO 28540:2011[129].	See ISO 17993:2002[104] and ISO 28540:2011[129].	7 d (for naphthalene only 4 d)	Validated method[151]	A
Trihalomethanes: See volatile organic compounds						

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[b] Under development.

Table A.2 *(continued)*

Analyte to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Volatile organic compounds Volatile halogenated hydrocarbons, monocyclic aromatic hydrocarbons and other solvent like organic compounds	ISO 10301:1997[36] No reference to ISO 5667-3	Glass with a solid glass stopper, PTFE	If reaction between free halogens and organic matter in the sample, to produce trihalogenated methanes, is to be eliminated, add an axcess of $Na_2S_2O_3$ (6.1.1) prior to sampling.	If storage is unavoidable, carry out the extraction within 2 d.	Method provided by reference	DGSW
	ISO 17943:2016[101] Refers normatively to ISO 5667-3	Glass with ground glass stopper or with screw cap, lined with PTFE	Store samples in the dark or use dark-coloured bottles. [a]	5 d	Method provided by reference	DGSW
	ISO 15680:2003[75] Refers normatively to ISO 5667-3	Glass, with PTFE cap liner or (head-space) vials with PTFE cap liner	Acidify to pH = 2 with HCl (6.2.3), HNO_3 (6.2.4), H_2SO_4 (6.2.5) or $NaHSO_4$ (6.2.18).[a] For purge-and-trap, HCl (6.2.3) interferes.	5 d	Method provided by reference	DGSM, W (diluted)
	ISO 11423-1:1997[48] No reference to ISO 5667-3	Glass, with PTFE cap liner Longer use: conical shoulder bottle in the dark	No preservation added[a].	Preferably in 2 d	Method provided by reference	A
	ISO 11423-2:1997[49] No reference to ISO 5667-3	Glass, with PTFE cap liner Longer use: conical shoulder bottle in the dark	No preservation added[a].	Preferably in 2 d	Method provided by reference	A
	ISO 20595:2018[112] Refers normatively to ISO 5667-3	Glass, with PTFE cap liner	See ISO 5667-3 or preservation with copper sulfate, sodium azide or the measurement-ready headspace vial shall be frozen horizontally.	Method not provided by reference	Method provided by reference	DGSW
	ISO 5667-3	See ISO 10301:1997[36], ISO 17943:2016[101], ISO 15680:2003[75], ISO 11423-1:1997[48], ISO 11423-2:1997[49] and ISO 20595:2018[112].	See ISO 10301:1997[36], ISO 17943:2016[101], ISO 15680:2003[75], ISO 11423-1:1997[48], ISO 11423-2:1997[49] and ISO 20595:2018[112].	7 d	Validated method[135][148]	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] If the sample is suspected to have been chlorinated, for each 1 000 ml of sample, add 80 mg of $Na_2S_2O_3 \cdot 5H_2O$ (6.1.1) to the container after collection of sample (or after sampling).

[b] Under development.

Table A.3 — Techniques for sample preservation — Hydrobiological analysis

Organism group to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source[a]	Type(s) of water
			Counting and identification			
Benthic macro-invertebrates, large organisms	EN 17136:2019[88] No reference to ISO 5667-3	Plastics or glass	Samples are cooled during transport and are sorted at latest the next day (best practice) into practically defined groups of taxa. Identification can be done when invertebrates are still alive.	48 h (best practice)	Method provided by reference and best practice	S
		Plastics or glass	Samples are cooled during transport and are sorted at latest the next day (best practice) into practically defined groups of taxa. Add ethanol 96 % (6.2.9) to the sample to give a final volume fraction of 70 % to 75 %.	1 y (ISO 5667-3)	Method provided by reference and best practice	S
Benthic macro-invertebrates, small organisms (e.g. reference collections)	ISO 5667-3	Glass	Transfer to ethanol preservative solution (6.2.13; see warning to 6.2.12). Special methods are required for invertebrate groups that are distorted by normal preservative treatment (e.g. platyhelminthes).	Indefinitely (ISO 5667-3)	Best practice	S
Algae and phytoplankton	EN 15204:2006[72] No reference to ISO 5667-3	Glass or plastics with tight fitting lid	Samples need to be cooled gradually.	36 h	Method provided by reference	MS
			Add, as soon as possible but within 24 h after sampling, 0,5 to 1 part (vol) of [acid (6.2.10) or alkaline (6.2.11)] Lugol's solution[a] to 200 parts (vol) of sample. Store samples in the dark and at room temperature.	21 d	Method provided by reference	MS
			Add, as soon as possible but within 24 h after sampling, 0,5 to 1 part (vol) of [acid (6.2.10) or alkaline (6.2.11)] Lugol's solution[a] to 200 parts (vol) of sample. Store samples cooled in the dark.	1 y	Method provided by reference	MS
Microalgae	ISO 5667-3	Glass or plastics with tight fitting lid	See 'algae and phytoplankton'.	1 y	Best practice	MS
		Plastics with tight fitting lid	Freeze to below −18 °C. Special procedures can be necessary with groups which are changed by standard applied preservation methods.	1 y	Best practice	MS

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Alkaline Lugol's solution (6.2.11) is generally applicable in fresh water and acidic Lugol's solution (6.2.10) in marine water with delicate flagellates. For specific determination, see specific standard. Addition of more Lugol's solution can be necessary if decolourization occurs. Oversaturation (deep/brown colouring) should be avoided, yet enough Lugol's solution (6.2.10 or 6.2.11) should be added to turn the sample to a cognac or straw colour. Fill bottle to ~ 90 %, leave sufficient headspace to allow homogenization.

Table A.3 *(continued)*

Organism group to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source[a]	Type(s) of water
Macrophytes	EN 15460:2007[73] No reference to ISO 5667-3	Plastic bags or containers	Analyse preferably on site. Surveys should be undertaken between late Spring and early Autumn (normally May to late September, but this is dependent on local climatic conditions), when macrophyte growth will be optimal. If samples are taken to the laboratory, specimens are best preserved between sheets of newspaper or blotting paper. Also, preservation with ethanol may be used especially for fine-leaved, small species as macrophytes can become brittle when dried.	On site	Method provided by reference	S
		Glass or plastics with tight fitting lid	If analysis is not performed on site, transport to the laboratory. Make sure the macrophytes cannot dry out or decay due to too high humidity.	48 h	Best practice	S
	EN 15460:2007[73] No reference to ISO 5667-3	Glass or plastics with tight fitting lid	Dry preferably on white paper, covered with foil, between regularly refreshed newspapers in a plant press.	Indefinitely	Best practice	S
		Glass or plastics with tight fitting lid	Add ethanol (6.2.9) to the sample to give a final volume fraction of 70 % to 75 %. Fill bottle to ~ 90 %, leave sufficient headspace to allow homogenization.	1 y	Best practice	S
Benthic diatoms/ Pelagic diatoms	EN 15708:2009[80] No reference to ISO 5667-3	Glass or plastics with tight fitting lid	In case of samples from a polluted location.	48 h	Method provided by reference	S
			In normal situation (not too polluted).	5 d	Method provided by reference	S
			Add neutralized formaldehyde solution (6.2.12, see warning) to give a final concentration of 1 %.	1 y or more	Method provided by reference	S
	ISO 5667-3	Glass or plastics with tight fitting lid	Add ethanol (6.2.9) to the sample after cleaning of cell contents (e.g. with hydrogenperioxide) to give a final volume fraction of 70 % to 75 %. Fill bottle to ~ 90 % to leave sufficient headspace to allow homogenization.	6 months	Best practice	S
			Addition of 0,5 part to 1 part by volume of [acid 6.2.10) or alkaline (6.2.11)] Lugol's solution[a] to 200 parts by volume of sample. Cool to (3 ± 2) °C. Store samples in the dark.	6 months	Best practice	S

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Alkaline Lugol's solution (6.2.11) is generally applicable in fresh water and acidic Lugol's solution (6.2.10) in marine water with delicate flagellates. For specific determination, see specific standard. Addition of more Lugol's solution can be necessary if decolourization occurs. Oversaturation (deep/brown colouring) should be avoided, yet enough Lugol's solution (6.2.10 or 6.2.11) should be added to turn the sample to a cognac or straw colour. Fill bottle to ~ 90 %, leave sufficient headspace to allow homogenization.

Table A.3 *(continued)*

Organism group to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source[a]	Type(s) of water
Zooplankton	ISO 5667-3	Glass or plastics with tight fitting lid	Add ethanol (6.2.9) to the sample to give a final volume fraction of 70 % to 75 %. Suitable for crusteaceans and rotiferans.	1 y	Best practice	S
			Add neutralized formaldehyde solution (6.2.12, see warning). It is recommended to add 40 g of saccharose $C_{12}H_{22}O_{11}$ in 1 l of formaldehyde solution.	1 y	Best practice	S
	ISO 5667-3	Glass or plastics with tight fitting lid	Add alkaline Lugol's solution (6.2.10). Addition of more acidic Lugol's solution[a] can be necessary if decolourization occurs.	6 months	Best practice	S
Fresh and dry mass						
Benthic macro-invertebrates, macrophytes, algae, zooplankton	ISO 5667-3	Plastics or glass	Do not freeze to below −18 °C. The analysis should be carried out as soon as possible and not later than 24 h.	24 h	Best practice	S
			Add neutralized formaldehyde solution (6.2.12, see warning). Note that fresh and dry (bio)mass determinations of periphyton and phytoplankton are usually based on the cell volume measurements made during counting and identification procedure from the preserved sample.	3 months minimum preservation time before analysis	Best practice	S
Mass of ash						
Benthic macro-invertebrates, macrophytes, algae	ISO 5667-3	Plastics or glass	Add neutralized formaldehyde solution (6.2.12, see warning). Note that fresh and dry (bio)mass determinations of periphyton and phytoplankton are usually based on the cell volume measurements made during couting and identification procedure from the preserved sample.	3 months minimum preservation time before analysis	Best practice	S
Dry mass and mass of ash						
Zooplankton	ISO 5667-3	Plastics or glass	Freeze to below −18 °C. Sample is filtered through preweighed glass-fibre membrane filters and then frozen to below −18 °C.	6 months	Best practice	S

Key

A	all water types
B	boiler water (related term: cooling water)
D	drinking water (related term: domestic water)
E	eluate
G	ground water (related term: raw water)
M	marine water (related term: seawater)
R	rain water
S	surface water (related terms: raw water, environmental water)
W	waste water

[a] Alkaline Lugol's solution (6.2.11) is generally applicable in fresh water and acidic Lugol's solution (6.2.10) in marine water with delicate flagellates. For specific determination, see specific standard. Addition of more Lugol's solution can be necessary if decolourization occurs. Oversaturation (deep/brown colouring) should be avoided, yet enough Lugol's solution (6.2.10 or 6.2.11) should be added to turn the sample to a cognac or straw colour. Fill bottle to ~ 90 %, leave sufficient headspace to allow homogenization.

Table A.4 — Techniques for sample preservation — Microbiological analysis

Analyte or activity to be studied	Reference	Type of container[a]	Preservation and storage conditions additional to Clauses 8 and 11	Recommended storage times	Maximum storage times	Source	Type(s) of water
Amoebae	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards.	1 d	4 d	Method provided by reference	A
Bacteriophages	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards.	2 d	3 d	Method provided by reference	A
Campylobacter (thermophilic spp.)	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards. Store at 3 °C ± 2 °C in contrast to the refrigerated storage of other microorganisms (5 °C ± 3 °C). Oxygen sensitive.	1 d	—	Method provided by reference	A
Clostridium perfringens (vegetative cells)	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards.	12 h	18 h	Method provided by reference	A
Cryptosporidium oocysts	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards.	1 d	4 d at ambient temperature	Method provided by reference	A
Culturable microorganisms (22 °C, 30 °C or 36 °C)	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards.	8 h	12 h	Method provided by reference	A
Cyanobacteria	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards. Lysis sometimes appears within a few hours.	2 d	3 d	Method provided by reference	A
E. coli (and coliform bacteria)	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards.	12 h	18 h	Method provided by reference	A

Key

A all water types

B boiler water (related term: cooling water)

D drinking water (related term: domestic water)

E eluate

G ground water (related term: raw water)

M marine water (related term: seawater)

R rain water

S surface water (related terms: raw water, environmental water)

W waste water

[a] Use bottles that are sterile inside and outside in case of immersion in clean waters. Use a reducing agent if the water is expected to contain an oxidant (see ISO 19458).

Table A.4 *(continued)*

Analyte or activity to be studied	Reference	Type of container[a]	Preservation and storage conditions additional to Clauses 8 and 11	Recommended storage times	Maximum storage times	Source	Type(s) of water
Enterococci	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards.	12 h	18 h	Method provided by reference	A
Enteroviruses	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards.	2 d	3 d	Method provided by reference	A
		Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards.	1 month	—	Method provided by reference	A
Giardia cysts	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards.	1 d	4 d	Method provided by reference	A
Helminth eggs	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards.	2 d	3 d	Method provided by reference	A
		Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards. Sample stabilized at pH = 2.	—	7 d	Method provided by reference	A
Legionella spp.	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards. The recommended storage time of 1 d is also acceptable at ambient temperature.	1 d	2 d	Method provided by reference	A
Pseudomonas aeruginosa	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards. Recommended storage time at ambient temperature within 8 h and at 5 °C ± 3 °C within 12 h is allowed.	8 h	12 h	Method provided by reference	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

[a] Use bottles that are sterile inside and outside in case of immersion in clean waters. Use a reducing agent if the water is expected to contain an oxidant (see ISO 19458).

Table A.4 *(continued)*

Analyte or activity to be studied	Reference	Type of container[a]	Preservation and storage conditions additional to Clauses 8 and 11	Recommended storage times	Maximum storage times	Source	Type(s) of water
Salmonella spp. and other *Enterobacteriaceae*	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards.	12 h	18 h	Method provided by reference	A
Spores of sulfide-reducing bacteria (*Clostridium* spp.)	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards. In raw waters die-off is observed after 24 h.	1 d	3 d	Method provided by reference	A
Total bacteria for epifluorescence	ISO 19458:2006 Refers normatively to ISO 5667-3	Plastics or glass	However, the maximum storage times depend on type of water, physiological state of the microorganisms and the analytical method, these maximum storage times shall be followed unless otherwise specified in specific standards. Recommended storage at ambient temperature. Sample to be stabilized in dust-free vial, + formaldehyde (final concentration 3 %) in the dark.	—	1 y	Method provided by reference	A

Key

A	all water types
B	boiler water (related term: cooling water)
D	drinking water (related term: domestic water)
E	eluate
G	ground water (related term: raw water)
M	marine water (related term: seawater)
R	rain water
S	surface water (related terms: raw water, environmental water)
W	waste water

[a] Use bottles that are sterile inside and outside in case of immersion in clean waters. Use a reducing agent if the water is expected to contain an oxidant (see ISO 19458).

Table A.5 — Techniques for sample preservation — Radiochemical analytes and activities

Analyte or activity to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Gross alpha activity	ISO 9696:2017[31] Refers normatively to ISO 5667-3	PE/PE-HD/PP	If the measurement of the activity in the filtered water is required, carry out filtration immediately on collection and before acidification.	Method not provided by reference	Method provided by reference	DG
	ISO 10704:2019[46] Refers normatively to ISO 5667-3	PE/PE-HD/PP	If necessary, concentrated nitric acid (6.2.4) may be used [it is recommended to avoid hydrochloric acid (6.2.3)].	Method not provided by reference	Method provided by reference	A
	ISO 11704:2018[50] Refers normatively to ISO 5667-3	PE/PE-HD/PP	If possible, acidify immediately with nitric acid (6.2.4) to a value not lower than pH 1,7 ± 0,2 or pH 2,7 ± 0,2 if thermal preconcentration is desired.	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	PE/PE-HD/PP	Acidify to pH < 2 with HNO_3 (6.2.4). Do not acidify if the sample is evaporated immediately on a planchette for analysis.	1 month	Best practice	A
			None Without acidification, however, store samples in the dark.	7 d	Best practice	A
Gross beta activity (except iodine radioisotopes)	ISO 9697:2018[32] Refers normatively to ISO 5667-3	PE/PE-HD/PP	If the measurement of the activity in the filtered water is required, carry out filtration immediately on collection and before acidification.	Method not provided by reference	Method provided by reference	DG
	ISO 10704:2019[46] Refers normatively to ISO 5667-3	PE/PE-HD/PP	If necessary, concentrated nitric acid (6.2.4) can be used [it is recommended to avoid hydrochloric acid (6.2.3)].	Method not provided by reference	Method provided by reference	A
	ISO 11704:2018[50] Refers normatively to ISO 5667-3	PE/PE-HD/PP	If possible, acidify immediately with nitric acid (6.2.4) to a value not lower than pH 1,7 ± 0,2 or pH 2,7 ± 0,2 if thermal preconcentration is desired.	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	PE/PE-HD/PP	Acidify to pH < 2 with HNO_3 (6.2.4). Do not acidify if the sample is evaporated immediately on a planchette for analysis.	1 month	Best practice	A
			None Without acidification, however, store samples in the dark.	7 d	Best practice	A
Gamma-emitters	ISO 10703:2021[45] Refers normatively to ISO 5667-3	PE/PE-HD/PP	If radio-iodine is to be determined, HCl (6.2.3) should be used instead of HNO_3 (6.2.4) for acidification of the sample.	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	PE/PE-HD/PP	Acidify to pH < 2 with HNO_3 (6.2.4). If possible, store samples in the dark.	1 month	Best practice	A
			None If a sample is not acidified, storage may be shorter if metals present are easily hydrolysed.	7 d	Best practice	A

Key

A	all water types
B	boiler water (related term: cooling water)
D	drinking water (related term: domestic water)
E	eluate
G	ground water (related term: raw water)
M	marine water (related term: seawater)
R	rain water
S	surface water (related terms: raw water, environmental water)
W	waste water

Table A.5 *(continued)*

Analyte or activity to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Actinides (alpha-emitters such as uranium, plutonium, americium, curium)	ISO 5667-3	PE/PE-HD/PP	Acidify to pH < 2 with HNO_3 (6.2.4). If possible, store samples in the dark.	2 months	Best practice	A
			None	7 d	Best practice	A
^{14}C	ISO 13162:2021[57] Refers normatively to ISO 5667-3	PE/PE-HD/PP, glass	The samples shall not be acidified to avoid the destruction of the carbonic equilibrium (CO_3^{2-}, HCO_3^-, H_2CO_3).	Method not provided by reference	Method provided by reference	A
	ISO 13168:2015[64] Refers normatively to ISO 5667-3	PE/PE-HD/PP, glass	Samples should not be acidified because of the shifting of the equilibrium of carbonated species.	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	PE/PE-HD/PP	Add NaOH (6.2.4) to pH > 10. Fill bottle completely, leave no headspace and do not stir. If possible, store samples in the dark.	1 month	Best practice	A
			None Only if pH > 7, fill the container completely to avoid any exchange between sample and the air above. If possible, store samples in the dark.	5 d	Best practice	A
Iodine (radioisotopes)	ISO 5667-3	PE/PE-HD/PP	Acidify to pH < 2 with HNO_3 (6.2.4). Where iodine-isotopes are measured with gross-beta-detection techniques, add KIO_3 (6.2.15) to prevent losses during evaporation. For gamma-spectrometry, acidification is sufficient. For gross-beta-determination, acidify to pH < 1 with HNO_3 (6.2.4); add 2 ml to 4 ml of NaOCl (6.2.14) per litre of sample, ensuring an excess of free chlorine. If possible, store samples in the dark.	7 d	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

Table A.5 *(continued)*

Analyte or activity to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Radon isotopes	ISO 13164-2:2013[58] Refers normatively to ISO 5667-3	Glass, aluminium metal	The container is filled completely in order to avoid the presence of air in contact with the water sampled. The sample shall be analysed as soon as possible after radioactive equilibrium has been achieved.	2 d	Method provided by reference	D
	ISO 13164-3:2013[59] Refers normatively to ISO 5667-3	Glass	The sample shall be analysed as soon as possible.	2 d	Method provided by reference	D
	ISO 13164-4:2015[60] Refers normatively to ISO 5667-3	Glass	The sample should neither be frozen nor overheated. Its preservation at temperature not higher than that of the sampled water is recommended.	2 d	Method provided by reference	D
	ISO 5667-3	Glass	Fill bottle completely, leave no headspace and do not stir. If possible, store samples in the dark.	1 d	Best practice	A
Radium	ISO 4685[2] Refers normatively to ISO 5667-3	PE/PE-HD/PP	The sample is filtered to remove suspended matter using a 0,45 µm filter. Acidify after filtration to 1 % (v/v) HNO_3 (6.2.4).	Method not provided by reference	Method provided by reference	DGRS
	ISO 13165-1:2022[61] Refers normatively to ISO 5667-3	PE, PTFE	When pre-concentration is desired, acidify the sample to pH 1 to pH 3 with HNO_3 (6.2.4). If necessary, carry out filtration immediately on collection and before acidification. Store samples in the dark.	1 month	Method provided by reference	D
	ISO 13165-2:2022[62] Refers normatively to ISO 5667-3	PE/PE-HD/PP	When pre-concentration is desired, acidify the sample to between pH 1 to pH 3 with HNO_3 (6.2.4). When necessary, carry out filtration immediately on collection and before acidification.	Method not provided by reference	Method provided by reference	A
	ISO 13165-3:2016[63] Refers normatively to ISO 5667-3	PE/PE-HD/PP	When pre-concentration is desired, acidify the sample to between pH 1 to pH 3 with HNO_3 (6.2.4). If required, the filtration is carried out during or immediately after collection and before acidification.	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	PE/PE-HD/PP	Acidify to pH < 2 with HNO_3 (6.2.4). If possible, store samples in the dark.	2 months	Best practice	A
			None Without acidification, however, store samples in the dark.	2 months	Best practice	A

Key

A	all water types	M	marine water (related term: seawater)
B	boiler water (related term: cooling water)	R	rain water
D	drinking water (related term: domestic water)	S	surface water (related terms: raw water, environmental water)
E	eluate	W	waste water
G	ground water (related term: raw water)		

Table A.5 *(continued)*

Analyte or activity to be studied	Reference	Type of container	Preservation and storage conditions additional to Clauses 8 and 11	Maximum storage times	Source	Type(s) of water
Strontium radioisotopes	ISO 13160:2021[56] Refers informatively to ISO 5667-3	PE/PE-HD/PP	Filtration should be done prior to the addition of the tracer or carrier and sufficient time should be allowed to attain chemical equilibrium before starting the test sample preparation.	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	PE/PE-HD/PP	Acidify to pH < 2 with HNO_3 (6.2.4). If possible, store samples in the dark.	2 months	Best practice	A
Tritium	ISO 9698:2019[33] Refers normatively to ISO 5667-3	PE/PE-HD/PP, glass	The sample should not be acidified due to the high chemical quench caused by acids, and the potential presence of tritium in the acid.	Method not provided by reference	Method provided by reference	DGMRS
		Glass	Store the samples in glass containers.	>3 months	Best practice	A
	ISO 13168:2015[64] Refers normatively to ISO 5667-3	PE/PE-HD/PP, glass	Samples should not be acidified because of the shifting of the equilibrium of carbonated species.	Method not provided by reference	Method provided by reference	A
	ISO 5667-3	PE/PE-HD/PP, glass	Fill bottle completely, leave no headspace and do not stir. If samples are analysed without distillation, store samples in the dark.	3 months	Best practice	A

Key

A	all water types
B	boiler water (related term: cooling water)
D	drinking water (related term: domestic water)
E	eluate
G	ground water (related term: raw water)
M	marine water (related term: seawater)
R	rain water
S	surface water (related terms: raw water, environmental water)
W	waste water

Annex B

(informative)

Container preparation

B.1 Reagents

Unless otherwise stated, use only reagents of recognized analytical grade and distilled or demineralized water or water of equivalent purity.

B.1.1 Acetone (propanone).

B.1.2 Hydrochloric acid, 4 % volume fraction and 25 % volume fraction HCl.

B.1.3 Nitric acid, 10 % volume fraction HNO_3.

B.2 Solvent washed glass containers

WARNING — Organic solvents can be hazardous. Provide suitable handling facilities and handle with care.

Non-disposable sample containers and lids for semi-volatile analysis should be washed with a phosphate-free detergent solution, followed by thorough rinses with hot tap-water and analyte-free water. The last step should be an acetone rinse. The lids should be in place on the container during the rinse step (solvent in the container with the lid tightly screwed down) because the solvents can rinse plastic from the interior screw threads onto the PTFE lining.

For analysis of volatile organic compounds, the sample containers, screw caps and septa (silicone vapour barriers) should be washed with a phosphate-free detergent, rinsed once with tap-water, rinsed at least twice with analyte-free water, then dried at greater than 105 °C. A solvent rinse should generally be avoided because it can interfere with the analysis, although a methanol rinse is acceptable.

Alternatively, single use disposable containers and lids can be used for both sample types.

B.3 Acid washed containers

For trace metal analysis, new sample containers should always be used. Sample containers and lids should be thoroughly cleaned with a phosphate-free detergent solution, thoroughly rinsed with metal-free water, soaked for 24 h in approximately 10 % volume fraction HNO_3 or approximately 25 % volume fraction HCl, and rinsed with metal-free water.

B.4 Containers for hydrobiological samples

Containers for the collection of hydrobiological samples should be washed with a phosphate-free detergent solution, triple rinsed with hot tap-water and should be finished with a 4 % volume fraction hydrochloric acid rinse. It is possible to use disposable commercial plastic containers, subject to verification of the absence of interference with the analysis. Manipulation of the samples is often necessary, and the optimal methods depend on the study objectives.

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(*Continued from second cover*)

This standard (Part 3) was published in 2021 as an identical adoption of ISO 5667-3 : 2018 under dual numbering. This first revision has been brought out to adopt the latest version of ISO 5667-3 published in 2024. In this revision, following modifications have been incorporated:

a) ISO/TS 5667-25 has been added as a reference;

b) A flow diagram from preservation and storage of water samples has been added;

c) References in Table A.1 have been updated;

d) References in Table A.2 and A.3 have been added;

e) The previous Table A.1 has been split into Table A.1 on inorganic analytes and Table A.2 on organic analytes;

f) Table A.4 on microbiological analysis has been added;

g) Types of water have been added to Tables A.1 to A.5; and

h) The added terms used in Tables A.1 to A.5 have been explained.

The text of ISO standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Whenever the words ‘this document’; appears referring to this standard, they should be read as ‘this Indian Standard’; and

b) Comma (,) has been used as a decimal marker, while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards where the standard atmospheric conditions to be observed are stipulated which are not applicable to tropical/subtropical countries. The applicable standard atmospheric conditions for Indian conditions are 27 °C ± 2 °C and (65 ± 5) percent relative humidity and shall be observed while using this standard.

In this adopted standard, references appear to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards, which is to be substituted in its respective place, is listed below along with its degree of equivalence for the edition indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 19458 : 2006 Water quality — Sampling for microbiological analysis	IS 17614 Part 25 : 2022/ ISO 19458 : 2006 Water quality sampling: Part 25 Microbiological analysis	Identical

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’.

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