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# International Standard



# 6703/2

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## **Water quality — Determination of cyanide — Part 2: Determination of easily liberatable cyanide**

*Qualité de l'eau — Dosage des cyanures — Partie 2: Dosage des cyanures aisément libérables*

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## Foreword

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

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6703/2 was prepared by Technical Committee ISO/TC 147, *Water quality*.

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# Water quality — Determination of cyanide — Part 2: Determination of easily liberatable cyanide

Attention is drawn to the toxicity of cyanide and to the need to take extreme care when handling cyanides and their solutions.

Carry out all operations in a fume cupboard. Avoid contact with the skin and eyes. When pipetting, always use a safety pipette (pipette by bulb). Detoxify samples and solutions containing cyanides or heavy metals in accordance with local official regulations.

Other chemicals specified in this part of ISO 6703 are also hazardous, for example pyridine.

## 0 Introduction

Cyanides may be present in water as hydrocyanic acid (prussic acid), as cyanide ions and as complex cyanides. They may be determined as total cyanide or as easily liberatable cyanide. If cyanide compounds are chlorinated, cyanogen chloride (CICN) is produced, and this compound has to be determined separately.

This International Standard comprises four parts as follows:

- Part 1: Determination of total cyanide
- Part 2: Determination of easily liberatable cyanide
- Part 3: Determination of cyanogen chloride
- Part 4: Determination of cyanide by diffusion at pH 6<sup>1)</sup>

The method described in parts 1, 2 and 3 are suitable for controlling the quality of water and for the examination of municipal sewage and industrial effluents. They are appropriate to the technology available for the destruction of cyanides in treatment plants, and are based on the separation of liberated hydrogen cyanide (or in the case of ISO 6703/3, of cyanogen chloride) by stripping with a carrier gas.

The method specified in part 4 is suitable for the determination of smaller amounts of cyanide, depending on the concentrations of copper and nickel.

This part of ISO 6703 comprises four sections. Section one deals with the liberation and absorption of hydrogen cyanide. The other three sections deal with alternative methods for the quantitative determination of cyanide ions, as follows:

- photometric method with pyridine/barbituric acid (section two);
- titrimetric method using the Tyndall effect (section three);
- titrimetric method using an indicator (section four).

The specification of three alternative methods is necessary because each of the methods has its advantages and disadvantages. None can be quoted as applicable in all cases.

The applicability of each method is described in clauses 8, 16 and 24.

NOTE — Due to the different chemical behaviour of cyanide-containing or cyanide-producing substances, it is not possible to specify only one method for the quantitative determination of cyanide ions.

## 1 Scope and field of application

This part of ISO 6703 specifies three methods for the determination of easily liberatable cyanide (see clause 2) in water.

The methods are applicable to water containing less than 50 mg of easily liberatable cyanide (as cyanide ions) per litre, and less than 100 mg of total cyanide (as cyanide ions) per litre, but higher concentrations may be determined by suitable dilution of the sample.

The methods and corresponding ranges of easily liberatable cyanide contents for which they are suitable are as follows:

- Photometric method with pyridine/barbituric acid: 0,002 to 0,025 mg of cyanide;
- Titrimetric method using the Tyndall effect: > 0,005 mg of cyanide;
- Titrimetric method using an indicator: > 0,05 mg of cyanide.

A large number of ions and compounds interfere with the determination. These are listed in table 1, together with the concentrations below which they do not interfere. If present singly or in combination, up to limiting concentrations, they do not interfere with the separation of hydrogen cyanide. The list is not exhaustive.

1) At present at the stage of draft.