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British Standard

## Water quality

Part 2. Physical, chemical and biochemical methods

### Section 2.24 Method for the determination of non-ionic surfactants using Dragendorff reagent

[ISO title : Water quality — Determination of surfactants — Part 2 : Determination of non-ionic surfactants using Dragendorff reagent]

Qualité de l'eau

Partie 2. Méthodes physiques, chimiques et biochimiques

Section 2.24 Méthode de dosage des agents de surface non ioniques à l'aide du réactif de Dragendorff

Wasserqualität

Teil 2. Physikalische, chemische und biochemische Verfahren

Abschnitt 2.24 Bestimmung von nicht-ionischen Tensiden mit Dragendorff-Reagenz

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## National foreword

This Section of this British Standard, which has been prepared under the direction of the Environment and Pollution Standards Committee, is identical with ISO 7875/2-1984 'Water quality — Determination of surfactants — Part 2 : Determination of non-ionic surfactants using Dragendorff reagent'. The international standard was prepared by subcommittee 2, Physical, chemical and biochemical methods, of Technical Committee 147, Water quality, of the International Organization for Standardization (ISO) as a result of discussion in which the UK participated.

This British Standard is being published in a series of Parts subdivided into Sections that will generally correspond to particular international standards. Sections are being, or will be, published in Parts 1 to 6 which, together with Part 0, are as follows.

- Part 0. Introduction
- Part 1. Glossary
- Part 2. Physical, chemical and biochemical methods
- Part 3. Radiological methods
- Part 4. Microbiological methods
- Part 5. Biological methods
- Part 6. Sampling

**Terminology and conventions.** The text of the international standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. It is current practice in British Standards to use a full point on the baseline as the decimal marker.

Wherever the words 'part of ISO 7875' appear, referring to this standard, they should be read as 'Section of BS 6068'.

In British Standards it is current practice to use the symbol 'L' for litre (and its submultiples) rather than 'l', and to use the spelling 'sulphur', etc., instead of 'sulfur', etc.

## Cross-references

International standards	Corresponding British Standards BS 6068 Water quality
ISO 5667/2-1982	Section 6.2 : 1983 Guidance on sampling techniques (Identical)
ISO 5667/3-1985*	Section 6.3 : 1986 Guidance on the preservation and handling of samples (Identical)
ISO 7875/1-1984	Section 2.23 : 1986 Method for the determination of anionic surfactants by the methylene blue spectrometric method

NOTE. *Typographical error.* In the note to 6.3, lines 2 and 3, 'subsequently' should be read as 'subsequently'.

**Additional information.** In the UK it is common practice to use a smaller apparatus than that shown in the figure, although the diameter of the sintered disc and cylinder is identical, thereby ensuring a similar efficiency of stripping.

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

\* This Part, referred to in the footnote to clause 3 as being at the stage of draft, has now been published.

## 0 Introduction

Anionic and non-ionic surface active substances, generally called surfactants, are used in synthetic products for general cleaning purposes.

ISO 7875 consists of the following parts:

Part 1: Determination of anionic surfactants by the methylene blue spectrometric method.

Part 2: Determination of non-ionic surfactants using Dragendorff reagent.

## 1 Scope

This part of ISO 7875 specifies a method for the determination of non-ionic surfactants in aqueous media using Dragendorff reagent.

## 2 Field of application

This part of ISO 7875 applies to the determination of low concentrations of bismuth active substances (BiAS), i.e. non-ionic surfactants of the alkylphenol-alkylene oxide and alcohol-alkylene oxide adduct types, as long as they can be stripped and precipitated with Dragendorff reagent (for example ethoxylates with about 5 to 30 ethylene oxide groups per molecule). The method is suitable for influents and effluents of sewage treatment plants and waste water. When investigating surface waters it may be necessary to handle large sample volumes (up to 5 000 ml).

The detection limit is 0,05 mg/l for a 1 litre sample and the optimum range of application is 250 to 800 µg.

## 3 References

ISO 5667, *Water quality — Sampling —*

*Part 2: Guidance on sampling techniques.*

*Part 3: Guidance on the preservation and handling of samples.*<sup>1)</sup>

## 4 Principle

Air stripping of surfactants from the sample and collection in ethyl acetate. Removal of ethyl acetate and precipitation of the non-ionic surfactants with Dragendorff reagent ( $\text{KBiI}_4 + \text{BaCl}_2 + \text{acetic acid}$ ).

Isolation and dissolution of the precipitate, and potentiometric determination of the concentration of bismuth equivalent to the concentration of non-ionic surfactant with sodium pyrrolidin-1-yl dithiocarboxylate solution.

Alternative methods for the determination of the bismuth ion are, among others, atomic absorption and UV spectrometry (see the annex).

## 5 Reagents

During the analysis, unless otherwise stated, use only reagents of recognized analytical grade, and only distilled water or water of equivalent purity.

**5.1 Sodium chloride** ( $\text{NaCl}$ ).

**5.2 Sodium hydrogencarbonate** ( $\text{NaHCO}_3$ ).

**5.3 Ethyl acetate** ( $\text{C}_4\text{H}_8\text{O}_2$ ), freshly distilled.

**CAUTION — Ethyl acetate is flammable and toxic.**

**5.4 Methanol** ( $\text{CH}_3\text{OH}$ ), freshly distilled, stored in a glass bottle.

**5.5 Glacial acetic acid** ( $\text{CH}_3\text{COOH}$ ),  $\rho = 1,05 \text{ g/ml}$ .

Lower concentrations are not suitable.

**5.6 Hydrochloric acid.**

Add 1 ml HCl ( $\rho = 1,12 \text{ g/ml}$ ) to 100 ml water.

1) At present at the stage of draft.