TC 147

International Standard ISO 5961

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Water quality — Determination of cadmium — Flame atomic absorption spectrometric methods

Qualité de l'eau — Dosage du cadmium — Méthodes par spectrométrie d'absorption atomique dans la flamme

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Foreword

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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 5961 was prepared by Technical Committee ISO/TC 147, *Water quality*.

Water quality — Determination of cadmium — Flame atomic absorption spectrometric methods

1 Scope and field of application

1.1 This International Standard specifies three methods for the determination of cadmium in water and waste water

— **method A**, by direct flame atomic absorption spectrometry, which is applicable for the determination of cadmium concentrations in the range from 0,05 to 5,0 mg/l

— **method B**, by flame atomic absorption spectrometry, after chelation with ammonium pyrrolidin-1-yl dithiocarboxylate[1] (APDC) and extraction with methyl isobutyl ketone (MIBK), which is applicable for the determination of cadmium concentrations in the range from 0,001 to 0,010 mg/l

— **method C**, by flame atomic absorption spectrometry after chelation with hexamethyleneammonium hexamethylenedithiocarbamidate (HMA-HMDC) and extraction with di-isopropyl ketone (DIPK), which is applicable for the determination of cadmium concentrations in the range from 0,000 5 to 0,050 mg/l.

The upper limit of determination may be extended by dilution of the sample or by using a smaller volume of sample for the analysis.

1.2 Method A lacks sufficient sensitivity for the analysis of most natural waters and its application is, therefore, restricted to analysis of samples containing cadmium at concentrations greater than 0,05 mg/l. Samples containing cadmium at concentrations lower than this shall be analysed by one of the other methods. Method A is not suitable for the analysis of brines or waste waters with high calcium contents (for example above 1 000 mg/l). Extraction methods are always preferable if analysing samples containing high concentrations of dissolved solids.

1.3 Methods B and C may be used to determine cadmium in samples of most natural waters provided that significant amounts of organic materials are not present. Either method may also be used to determine cadmium in brines and brackish waters.

1.4 Methods B and C are essentially equivalent methods, and both may be expected to provide analytical data of acceptable reliability.

2 Sampling and samples

2.1 Only thoroughly clean bottles shall be used to collect samples to be analysed for cadmium. Both polyethylene and borosilicate glass bottles have been found suitable. The bottles shall be soaked overnight with dilute (1 + 1) nitric acid and then rinsed with water.

2.2 For the determination of total recoverable cadmium, the samples shall be preserved by adding, at the time of collection, concentrated nitric acid (ϱ = 1,41 g/ml) until the pH is 1,5 or less. In the case of fresh waters, 2 ml of concentrated nitric acid per litre of sample is usually sufficient.

2.3 For the determination of dissolved cadmium only, filter the sample at the time of collection through a membrane filter of pore size 0,45 µm, or its equivalent. Acidify the filtrate immediately with concentrated nitric acid (ϱ = 1,41 g/ml) until the pH is 1,5 or less.

NOTE — The membrane filters shall first be soaked in 1 % (V/V) nitric acid solution for 24 h, and then thoroughly rinsed with water.

1) The names ammonium 1-pyrrolidinecarbodithioate and ammonium pyrrolidine dithiocarbamate (ambiguous) are also used.