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# International Standard



# 6778

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Water quality — Determination of ammonium — Potentiometric method

*Qualité de l'eau — Dosage de l'ammonium — Méthode potentiométrique*

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

International Standard ISO 6778 was developed by Technical Committee ISO/TC 147, *Water quality*, and was circulated to the member bodies in December 1982.

It has been approved by the member bodies of the following countries:

Austria	Iran	Romania
Belgium	Iraq	South Africa, Rep. of
Brazil	Italy	Spain
Canada	Japan	Sweden
China	Korea, Dem. P. Rep. of	Switzerland
Czechoslovakia	Mexico	Thailand
Egypt, Arab Rep. of	Netherlands	United Kingdom
Germany, F.R.	New Zealand	USSR
Hungary	Norway	
India	Poland	

The member bodies of the following countries expressed disapproval of the document on technical grounds:

Australia  
France

# Water quality — Determination of ammonium — Potentiometric method

## 1 Scope

This International Standard specifies a potentiometric method, using an ammonia-sensing membrane probe, for the determination of ammonium in raw and waste water and sewage.

## 2 Field of application

### 2.1 Range

The method is applicable, without dilution of the test portion, to the determination of an ammonium nitrogen concentration,  $\varrho_N$ , of up to 50 mg/l.

### 2.2 Limit of detection

The limit of detection is defined as the limit of Nernstian response (see clause 3) under the conditions specified, and has a value corresponding to approximately  $\varrho_N = 0,2$  mg/l.

### 2.3 Sensitivity

The potential of the probe changes by approximately 60 mV per decadic change in ammonium concentration, in accordance with the Nernst equation.

### 2.4 Interferences

The ammonia-sensing membrane probe does not respond satisfactorily if it is continually used for determinations on waters having ammonium concentrations exceeding  $\varrho_N = 50$  mg/l; for such waters, it is recommended that the test portions be diluted to bring the concentration to below this value.

The response of the probe is affected by the transfer of water vapour through the semi-permeable membrane if there is an osmotic pressure difference across it. Thus, it is necessary to ensure that the osmotic pressure of a sample, after treatment with the alkaline buffer solution, is closely similar to that of the normal internal filling solution of the probe. For this purpose, unbuffered samples having total concentration of dissolved species (i.e. the sum of the concentrations of all ionic and other

species in solution, in moles per litre) greater than 0,1 mol/l should be diluted before measurement, provided that this dilution does not reduce the ammonium concentration to less than 0,2 mg of nitrogen per litre.

Amines may give positive interferences; the interferences listed in table 1 have been reported.

Table 1

Interferent	Concentration of interferent	Apparent increase in an ammonium concentration of $\varrho_N = 1$ mg/l
	mg/l	mg/l
Hydrazine	4	0,06
Cyclohexylamine	1	0,03
Morpholine	10	0,03
Octadecylamine	0,4	0,14
Methanolamine	3,4	0,15*
Urea	11	0,01

\* Apparent increase in an ammonium concentration of  $\varrho_N = 0,5$  mg/l.

Surface-active agents and some organic solvents reduce the life of the membrane of the probe, and hence increase the frequency with which the probe requires servicing. This effect may be severe, leading to rapid probe failure, in samples containing high concentrations of these interferents.

## 3 Principle

Treatment of the test portion with an alkaline buffer solution containing sodium hydroxide and a complexing agent in order to raise the pH value of the sample to 12 and to sequester metals which could otherwise complex with the ammonia. In the alkaline medium, the ammonium ions are converted to aqueous ammonia. Determination of the ammonia content using an ammonia-sensing membrane probe, the electrode of which senses the partial pressure of ammonia in the solution.