

# INTERNATIONAL STANDARD

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## **Paper, board and pulps — Determination of water-soluble sulfates — Titrimetric method**

*Papiers, cartons et pâtes — Détermination des sulfates solubles dans l'eau —  
Méthode titrimétrique*

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Reference number  
ISO 9198 : 1989 (E)

## 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 9198 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*.

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International Organization for Standardization

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# Paper, board and pulps — Determination of water-soluble sulfates — Titrimetric method

## 1 Scope

This international Standard specifies a titrimetric method for the determination of water-soluble sulfates in paper, board and pulps.

The lower limit of the method is 20 mg of sulfate ion per kilogram of material.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 287 : 1985, *Paper and board — Determination of moisture content — Oven-drying method.*

ISO 638 : 1978, *Pulps — Determination of dry matter content.*

## 3 Definition

For the purposes of this International Standard, the following definition applies.

**water-soluble sulfates** (in paper, board and pulps) : The amount of sulfate ion extracted and determined under the conditions specified in this International Standard.

## 4 Principle

Pieces (at least 4 g) of the sample are extracted with hot water (100 ml) for 1 h. The extract is filtered and its sulfate ions are precipitated by an excess of barium ions. The excess of barium ions is determined by conductometric titration with lithium sulfate.

## 5 Reagents

During the analysis, use only reagents of recognized analytical quality and water as specified in 5.1.

**5.1 Distilled or deionized water**, conductivity less than 1 mS/m.

**5.2 Ethanol** ( $C_2H_5OH$ ), 99,5 % (V/V).

**5.3 Barium chloride**, solution,  $c(BaCl_2 \cdot 2H_2O) \approx 5$  mmol/l.

Dissolve 1,25 g of barium chloride dihydrate in water (5.1) and dilute to 1 litre.

**5.4 Hydrochloric acid**,  $c(HCl) \approx 1$  mmol/l.

**5.5 Lithium sulfate**, standard volumetric solution,  $c(Li_2SO_4 \cdot H_2O) = 5$  mmol/l.

Dissolve exactly 0,640 g of dry lithium sulfate monohydrate in water (5.1) and dilute to 1 000 ml in a volumetric flask.

## 6 Apparatus

Ordinary laboratory equipment, and

**6.1 Conductometer**, with a measuring cell for conductometric titration capable of measuring conductivity changes of 1 mS/m.

**6.2 Microburette**, capacity 10 ml, graduated in 0,02 ml.

**6.3 Water bath**, capable of maintaining a temperature of  $25\text{ }^\circ\text{C} \pm 1\text{ }^\circ\text{C}$ . Other temperatures close to room temperature may be chosen and kept constant throughout the titration.

It is essential for the precision of the result that the temperature of the solution is kept constant during the entire titration.

NOTE — If available, an automatic titrator, having a motor-driven burette and chart recorder, may be used.

## 7 Preparation of sample

Since the amount of sulfates in the sample may be very low, take care not to contaminate it during sampling. Clean protective gloves should be worn at all times when handling the sample and the test pieces prepared from it.

Cut or tear the sample into pieces approximately 5 mm  $\times$  5 mm in size, and mix them thoroughly. Keep them protected from dust and fumes.

Determine the dry matter content separately in accordance with ISO 287 (for paper and board) or ISO 638 (for pulps).