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**Pulps — Determination of  
chlorine consumption (Degree of  
delignification)**

*Pâtes — Détermination de la consommation en chlore (Degré de  
délignification)*

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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. Each 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword — Supplementary information](#).

The committee responsible for this document is ISO/TC 6, *Paper, board and pulps*.

This third edition cancels and replaces the second edition (ISO 3260:1982), of which it constitutes a minor revision.

ISO edition 1  
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## Introduction

The method specified in this International Standard for determining the degree of delignification of pulp by measuring its chlorine consumption under specified conditions is related to that for determining the degree of delignification of pulp by measuring its potassium permanganate consumption under specified conditions, given in ISO 302, *Pulps — Determination of Kappa number*. Unlike that method, the method for the determination of chlorine consumption has the merit of not being restricted to pulps obtained in yields under 60 %.

It has been shown experimentally that there is a linear relationship between the chlorine consumption and the total lignin content of pulp. This relationship is independent of the method used in the manufacture of the pulp.

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# Pulps — Determination of chlorine consumption (Degree of delignification)

**WARNING** — The method specified in this International Standard involves the use of hazardous chemicals. Appropriate precautions must be taken to ensure the proper use and disposal of these chemicals.

## 1 Scope

This International Standard specifies a method for the determination of the degree of delignification of pulp by measuring its chlorine consumption.

This method is applicable to all kinds of pulp.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 638, *Paper, board and pulps — Determination of dry matter content — Oven-drying method*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

#### **chlorine consumption of a pulp**

amount of active chlorine consumed by a pulp under the conditions specified in this International Standard

Note 1 to entry: The chlorine consumption of a pulp is expressed as a percentage by mass.

## 4 Principle

Treatment of a test portion of pulp for 15 min, at room temperature of  $25\text{ °C} \pm 1\text{ °C}$ , with chlorine generated by acidification of a sodium hypochlorite solution.

Determination of the residual chlorine, which shall be more than 50 % of the amount added (see the note in [Clause 9](#)), by iodometric titration. Correction of the chlorine consumption so obtained to the consumption at constant concentration of available chlorine.

## 5 Reagents

**5.1 Sodium hypochlorite (NaClO)**, solution containing about 20 g of active chlorine per litre and of total alkalinity corresponding to a pH of  $12,0 \pm 0,5$ , measured with a glass electrode.

**5.2 Hydrochloric acid**, 4 mol/l solution, obtained by adding 100 ml of hydrochloric acid (HCl),  $\rho = 1,19\text{ g/ml}$ , to 200 ml of water.

**5.3 Potassium iodide**, 1 mol/l solution, containing 166 g of potassium iodide (KI) per litre.

**5.4 Sodium thiosulfate**, standard volumetric solution,  $c(\text{Na}_2\text{S}_2\text{O}_3) = 0,2 \text{ mol/l}$ . The concentration shall be known to  $\pm 0,000 4 \text{ mol/l}$ .

**5.5 Starch**, 2 g/l indicator solution.

## 6 Apparatus

Ordinary laboratory apparatus, and

**6.1 High-speed wet disintegration apparatus**, for example a kitchen mixer or similar apparatus which disintegrates the pulp completely with a minimum of damage to the fibres.

**6.2 Apparatus for the determination of chlorine consumption**, as shown in [Figure 1](#), consisting of the following.

**6.2.1 Thick-walled conical flask (D)**, of capacity 750 ml, with a standard ground joint (C).

**6.2.2 Separating funnel (E)**, of capacity 50 ml to 100 ml, with standard ground joints (B and C) and a glass stopper (A).

**6.3 Motor-driven coated magnetic stirrer**, providing efficient stirring when the magnet and the motor table are approximately 40 mm apart.

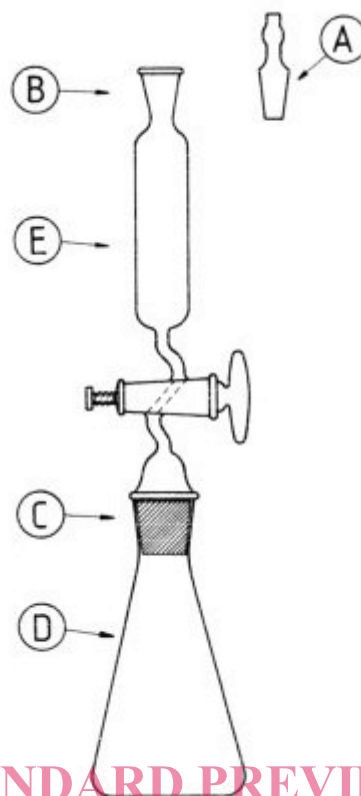
**6.4 Water bath**, capable of maintaining a temperature of  $25 \text{ }^\circ\text{C} \pm 1 \text{ }^\circ\text{C}$  for at least 20 min and provided with a support for the flask.

**6.5 Vacuum-pump.**

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**6.6 Stop-watch.**





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Figure 1 — Apparatus for determination of the chlorine consumption of pulp

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## 7 Preparation of sample

### 7.1 Air-dried pulp sheets.

Tear 3 g to 10 g of pulp into small pieces.

### 7.2 Screened slush pulps.

Make a 3 g to 10 g air-dry pad by filtering on a Büchner funnel, avoiding any loss of fibres. Air-dry the pad and tear it into small pieces.

### 7.3 Unscreened pulps.

If the pulp sample is taken from unscreened pulp, which is normally screened before bleaching or other processing, then the shives and knots shall be removed from the sample by screening. The method of screening shall be stated in the test report and shall be chosen to give results similar to those obtained by the industrial screening of the pulp. Complete the preparation of the screened pulps as described in 7.2.

## 8 Procedure

### 8.1 Test portion

Before weighing the test portions, condition the samples for not less than 20 min in the atmosphere near the balance.

Weigh  $500 \text{ mg} \pm 5 \text{ mg}$  of the pulp. At the same time, weigh a separate test portion for the determination of the dry matter content in accordance with ISO 638.