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**Caprolactam for industrial use —  
Determination of absorbance at a  
wavelength of 290 nm**

*Caprolactame à usage industriel — Détermination de l'absorbance à  
la longueur d'onde de 290 nm*

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ISO 7059:2023

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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 document 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)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 5, *Physical-chemical properties*.

This second edition cancels and replaces the first edition (ISO 7059:1982), which has been technically revised.

The main changes are as follows:

- the particular reference to hydrogen or deuterium lamps has been removed due to the existence of other equivalent UV light sources;
- the option to use a flow-through cell for the absorption measurement has been added;
- the temperature of measured solution has been taken into account.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Caprolactam for industrial use — Determination of absorbance at a wavelength of 290 nm

## 1 Scope

This document specifies a spectrometric method for the determination of the absorbance at a wavelength of 290 nm of caprolactam for industrial use.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

## 4 Principle

The absorbance of a solution of 50 % caprolactam in water is measured in a 1 cm path length cell at a wavelength of 290 nm using an ultraviolet spectrometer.

## 5 Reagents

During the analysis, use only distilled water or water of equivalent purity.

## 6 Apparatus

Ordinary laboratory apparatus and the following.

- 6.1 Ultraviolet spectrometer**, capable of measuring the absorbance at a wavelength of 290 nm.
- 6.2 Two quartz cells**, with optical path length 1 cm,  
Or alternatively
- 6.3 One flow-through cell** (quartz –1 cm) in combination with a pump system.

## 7 Procedure

### 7.1 Test portion and preparation of the test solution

Weigh  $(50,0 \pm 0,1)$  g of the test sample, dissolve it in  $(50,0 \pm 0,1)$  ml of water, and mix. Allow the solution to cool down to room temperature in case of preparing the solution with liquid (melted) caprolactam or let it warm to room temperature in case of preparing the solution with solid caprolactam.

## 7.2 Determination

### 7.2.1 Spectrometric measurements using two quartz cells

Fill one of the cells (6.2) with the test solution (see 7.1) and fill the other cell with water. Carry out the spectrometric measurements, using the spectrometer (6.1) set at a wavelength of 290 nm, after having adjusted the instrument to zero absorbance against water.

To determine the correction for the difference in absorbances at 290 nm of the cells, fill the two cells used for the measurements with water and measure the absorbance of each cell at a wavelength of 290 nm. One of the cells will read “zero” since it has been used to adjust the instrument to zero absorbance.

### 7.2.2 Spectrometric measurements using one flow-through cell

Set the instrument for measurements (6.3) at 290 nm. Adjust the equipment to zero absorbance with water and measure the absorbance of the test solution (see 7.1). Rinse cell with water and check the effectiveness of the rinsing with the measurement of another water sample.

NOTE Typically, rinsing with 20 to 30 times the volume of the cell plus connecting tubing will result in sufficient exchange of sample or water.

The difference between parallel measurements should not exceed  $0,001 \cdot l$  of absorbance where  $l$  is the path length in cm.

## 8 Expression of results

For spectrometric measurements using two quartz cells (see 7.2.1) the absorbance at a wavelength of 290 nm, expressed in relation to an optical path length  $l$ , is given by [Formula \(1\)](#):

$$A_n = \frac{(A_1 - A_0)}{l} \quad (1)$$

where

$A_n$  is the absorbance at 290 nm normalised to the optical path length;

$A_0$  is the correction for the difference in absorbances at 290 nm of the cells;

$A_1$  is the absorbance at 290 nm of the test solution (see 7.1);

$l$  is the optical path length, in centimetres, of the cell(s).

For spectrometric measurements using one flow-through cell (see 7.2.2) the absorbance at a wavelength of 290 nm, expressed in relation to an optical path length  $l$ , is given by [Formula \(2\)](#):

$$A_n = \frac{A}{l} \quad (2)$$

where

$A$  is the absorbance at 290 nm of the test solution (see 7.1) after zeroing with water;

$l$  is the optical path length, in centimetres, of the cell.

## 9 Test report

The test report shall include the following information:

- a) an identification of the sample;
- b) the reference to the method used;
- c) the results and the method of expression used;
- d) a reference to this document, including the year of publication;
- e) the manufacturer and the type of instrument used;
- f) any applicable test details such as optical path length, rinsing volume, etc.;
- g) any unusual features noted during the determination;
- h) any operation not included in this document or regarded as optional;
- i) the date of the test.

The test report shall be renumbered accordingly.

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