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Caprolactam for industrial use — Determination of colour of 50 % aqueous caprolactam solution, expressed in Hazen units (platinum-cobalt scale) — Spectrometric method

Caprolactame à usage industriel — Détermination de la coloration d'une solution aqueuse à 50 % de caprolactame, exprimée en unités Hazen (échelle platine-cobalt) — Méthode spectrométrique

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Foreword

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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 8112:1984), which has been technically revised.

The main changes are as follows:

— 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.

Caprolactam for industrial use — Determination of colour of 50 % aqueous caprolactam solution, expressed in Hazen units (platinum-cobalt scale) — Spectrometric method

1 Scope

This document specifies a spectrometric method of determining the colour, expressed in Hazen units, of a 50 % aqueous caprolactam solution as a measure of coloured impurities content of the sample.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 2211, *Liquid chemical products — Measurement of colour in Hazen units (platinum-cobalt scale)*

3 Terms and definitions

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

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/

3.1
Pt/Co scale
colour expressed in Hazen units
number which indicates the amount of platinum, in milligrams per litre, in the standard solution the absorbance of which, measured at a wavelength of 390 nm, is equal to that of the 50 % aqueous solution of caprolactam measured at the same conditions

4 Principle

The absorbance of a solution of a 50 % aqueous caprolactam solution is measured at a wavelength of 390 nm and optical path length of 50 mm using a spectrometer, and expressed in Hazen units by multiplying the absorbance measured by a constant factor equal to 150.

This factor is derived from measurements of absorbance of diluted standard solutions of platinum-cobalt scale (Pt/Co scale) in accordance with ISO 2211.

5 Reagents

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

6 Apparatus

Ordinary laboratory apparatus and spectrometer, capable of measuring the absorbance at a wavelength of 390 nm.

6.1 **Spectrometer,** capable of measuring the absorbance at a wavelength of 390 nm.

6.2 **Two cells**, of optical glass or quartz with path length 50 mm.

Or alternatively

6.3 **One flow-through cell**, made of optical glass or quartz with a path length of 50 mm in combination with a pump system.

7 Procedure

7.1 Weigh (50 ± 0,1) g of caprolactam, place in a 250 ml conical flask and dissolve in (50 ± 0,1) ml of water. Allow the solution to stand till the air bubbles disappear. 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 Fill the two cells (6.2) with water. Adjust the spectrometer (6.1) for measuring absorption difference at a wavelength of 390 nm. Measure the possible difference in absorbance of the cells and correct the result obtained by the procedure specified in 7.3.

7.3 Replace the water in the sample cell by the caprolactam solution (see 7.1) and measure the absorbance of the caprolactam solution at a wavelength of 390 nm, after having adjusted the instrument to zero absorbance against water.

7.4 In case of a flow-through cell measurement setup (6.3), set instrument for measurements at 390 nm. Adjust the equipment to zero absorbance with water and measure the absorbance of 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 0,002 5.

8 Expression of results

The colour of the caprolactam solution, expressed in Hazen units (platinum-cobalt scale), is given by Formula (1):

$$A_H = 150 \times A_{390} \quad (1)$$

where

A_H is the absorbance of the caprolactam solution (7.1) at a wavelength of 390 nm expressed in Hazen units;

A_{390} is the absorbance of the caprolactam solution (7.1) at a wavelength of 390 nm in a cell with an optical path length of 50 mm, taking into account the absorption difference of the cells;

150 is the calculation factor for conversion into Hazen units.

Round the result to the nearest whole number.