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Surface active agents - Determination of cloud point of nonionic surface active agents obtained by condensation of ethylene oxide

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EESTI STANDARDIKESKUS

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 1890:2001 sisaldab Euroopa standardi EN 1890:1999 ingliskeelset teksti. Käesolev dokument on jõustatud 18.06.2001 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN 1890:2001 consists of the English text of the European standard EN 1890:1999. This document is endorsed on 18.06.2001 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.

Käsitlusala: This European standard specifies methods fot hte determination of the cloud point of solutions of non-ionic surface active agents obtained by the reaction of ethylene oxide with a hydrophobic base molecule.	**Scope:** This European standard specifies methods fot hte determination of the cloud point of solutions of non-ionic surface active agents obtained by the reaction of ethylene oxide with a hydrophobic base molecule.

ICS 71.100.40

Võtmesõnad: cloud point, ethylene oxide, measurements, non-ionic surfactants, surfactants, tests

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Eesti Standardikeskusele kuulub standardite reprodutseerimis- ja levitamisõigus

EUROPEAN STANDARD
NORME EUROPÉENNE
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English version

Surface active agents

Determination of cloud point of non-ionic surface active agents obtained by condensation of ethylene oxide

Agents de surface – Détermination du point de trouble des agents de surface non ioniques obtenus par condensation d'oxydes d'éthylène

Grenzflächenaktive Stoffe – Bestimmung des Trübungspunktes nichtionischer, durch Anlagerung von Ethylenoxid hergestellter grenzflächenaktiver Stoffe

This European Standard was approved by CEN on 1999-02-13.

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 276 "Surface active agents", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 1999, and conflicting national standards shall be withdrawn at the latest by September 1999.

Annex A is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

Solutions of non-ionic surface active agents obtained by the reaction of ethylene oxide with a hydrophobic base molecule, in water or in mixtures of water and organic solvents become turbid at a given temperature as the temperature increases and finally separate into two liquid phases. The process is reversible and the system becomes homogeneous again upon cooling. The temperature at which the solution becomes clear upon cooling is determined as the "cloud point". This temperature is characteristic for a particular surfactant. This temperature increases with the amount of ethylene oxide chemically combined in the surfactant molecule for a given composition of solvents.

This phenomenon is not limited to ethoxylated surfactants and the cloud point can be determined also for other non-ionic compounds.

The knowledge of the cloud point of non-ionic surfactants obtained by the reaction of ethylene oxide with hydrophobic bases is important for their use. For a given base molecule, the cloud point is indeed a simple measure of the amount of the combined ethylene oxide. Moreover, the cloud point suggests directly the temperature at which many functional surfactant properties change dramatically. The curve of cloud point versus degree of ethoxylation is asymptotic, therefore molecules containing high amounts of ethylene oxide show only small differences in their cloud point. In these cases the cloud point loses its significance.

Methods D and E of this European Standard are based on methods described in ISO 1065 and DIN 53917 respectively. The test principle is the same and test conditions are similar but more exactly defined.

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1 Scope

This European Standard specifies methods for the determination of the cloud point of solutions of non-ionic surface active agents obtained by the reaction of ethylene oxide with a hydrophobic base molecule.

This standard primarily applies to surfactants obtained by reaction of ethylene oxide with hydrophobic base molecules, such as fatty alcohols, fatty acids, long-chain alkylphenols, fatty amines, fatty acid esters of sugar derivatives among other ethoxylated non-ionic surfactants, which are by far the most commonly used.

NOTE Other non-ionic surfactants containing other structural units, such as propylene oxide-ethylene oxide block copolymers, have distinctive behaviours that make the determination of the cloud point more difficult. This leads sometimes to a continuous turbidity over a temperature range of several degrees or even to the occurrence of two cloud points at significantly different temperatures.

2 Normatives references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN ISO 862, *Surface active agents – Vocabulary (ISO 862:1984 + Corrigendum 1:1993).*

EN ISO 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696:1987).*

ISO 607:1980, *Surface active agents and detergents - Methods of sample division.*

3 Terms and Definitions

For the purposes of this Standard, the definitions given in EN ISO 862 and the following apply :

3.1
cloud temperature
temperature above which aqueous solutions of certain non-ionic surface active agents become heterogeneous by the separation into two liquid phases (coacervation) [EN ISO 862]

NOTE 1 The value of the cloud temperature depends on the concentration of the solution.

NOTE 2 The temperature at which the system becomes homogeneous upon cooling is called "temperature of clarification". The cloud temperature and the temperature of clarification do not need to coincide for reasons concerned with the measurement procedure. However, for practical reasons, the temperature of clarification is conventionally called the "cloud point"

3.2
cloud point
critical lower phase-separation temperature (lower consolute temperature) above which the system is a cloudy solution and a further temperature rise results in two immiscible phases that are in equilibrium

NOTE 1 The cloud point is measured as the temperature falls.

NOTE 2 The cloud point depends on the number of ethylene oxide units linked to the base molecule and on their statistical distribution. It is also very sensitive to the presence of electrolytes and other organic substances in the aqueous solution. Therefore it should operate under well established conditions.

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