INTERNATIONAL STANDARD

ISO 2871-1

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Surface active agents — Detergents — Determination of cationic-active matter content —

Part 1:
High-molecular-mass cationic-active matter

Agents de surface — Détergents — Détermination de la teneur en matière active cationique —

Partie 1: Matière active cationique à haute masse moléculaire

Reference number
ISO 2871-1:2010(E)

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 2871-1 was prepared by Technical Committee ISO/TC 91, *Surface active agents*.

This second edition cancels and replaces the first edition (ISO 2871-1:1988), of which it constitutes a minor revision.

ISO 2871 consists of the following parts, under the general title *Surface active agents — Detergents — Determination of cationic-active matter content*:

— *Part 1: High-molecular-mass cationic-active matter*

— *Part 2: Cationic-active matter of low molecular mass (between 200 and 500)*

Surface active agents — Detergents — Determination of cationic-active matter content —

Part 1:
High-molecular-mass cationic-active matter

1 Scope

This part of ISO 2871 specifies a method for the determination of high-molecular-mass cationic-active materials such as

a) quaternary ammonium compounds in which two of the alkyl groups each contain 10 or more carbon atoms, e.g. distearyl-dimethyl-ammonium chlorides, or

b) salts of imidazoline or 3-methylimidazoline in which long-chain acylaminoethyl and alkyl groups are substituted in the 1- and 2-positions, respectively.

The method is applicable to solids or to aqueous solutions of the active material when the relative molecular mass of the cationic-active matter is known or when it has been previously determined if its content is expressed as a percentage by mass.

The method is not applicable if anionic surface active agents are present.

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 385, *Laboratory glassware — Burettes*

ISO 607, *Surface active agents and detergents — Methods of sample division*

ISO 1042, *Laboratory glassware — One-mark volumetric flasks*

ISO 2271:1989, *Surface active agents — Detergents — Determination of anionic-active matter by manual or mechanical direct two-phase titration procedure*

3 Principle

Titration of an aliquot portion of a standard solution of sodium lauryl sulfate with a solution of the test sample, according to the direct two-phase titration procedure described in ISO 2271.

4 Reagents

During the analysis, use only reagents of recognized analytical grade and only distilled water or water of at least equivalent purity.

4.1 Chloroform, ρ_{20} = 1,48 g/ml, distilling between 59,5 °C and 61,5 °C.

4.2 Propan-2-ol.

4.3 Sodium lauryl sulfate, standard volumetric solution, $c(C_{12}H_{25}NaO_4S)$ = 0,004 mol/l.

See 4.5 of ISO 2271:1989.

4.4 Mixed indicator solution.

See 4.8 of ISO 2271:1989.

5 Apparatus

Ordinary laboratory apparatus and the following:

5.1 Flask or **measuring cylinder**, 100 ml capacity, with ground-glass stopper.

5.2 Burette, 25 ml capacity, complying with the specifications for class A of ISO 385.

5.3 One-mark volumetric flask, 1 000 ml capacity, with ground-glass stopper, complying with class A of ISO 1042.

6 Sampling

The laboratory sample of the detergent shall be prepared and stored in accordance with the instructions given in ISO 607.

7 Procedure

7.1 Test portion

Weigh, to the nearest 1 mg, a sufficient amount of the laboratory sample to contain between 0,002 mol and 0,004 mol of cationic-active matter.

NOTE This will give a titration volume of between 10 ml and 20 ml.

Possible interferences:

- Low relative molecular mass sulfonates of toluene and xylene present as hydrotropes do not interfere when present in concentrations up to and including 15 % (mass fraction) with respect to the active material. At higher levels, their influence should be evaluated in each particular case.
- Non-ionic surface active agents, soap, urea and the salts of (ethylenedinitrilo)tetraacetic acid do not interfere.
- Typical inorganic components of detergent formulations, such as sodium chloride, sulfate, borate, tripolyphosphate, perborate, silicate, etc., do not interfere, but bleaching agents other than perborate shall be destroyed before the analysis, and the sample shall be completely soluble in water.

7.2 Determination

Dissolve the test portion (7.1) in 20 ml of the propan-2-ol (4.2), warming if necessary. Add approximately 50 ml of water and stir. Transfer to the 1 000 ml one-mark volumetric flask (5.3) and dilute to the mark with water. This is test solution A.

By means of a pipette, transfer 10 ml of the standard volumetric sodium lauryl sulfate solution (4.3) into the flask or measuring cylinder (5.1). Add 10 ml of water, 15 ml of the chloroform (4.1) and 10 ml of the mixed indicator solution (4.4).

Fill the burette (5.2) with test solution A.

Titrate the sodium lauryl sulfate solution with test solution A; stopper the flask or measuring cylinder and shake well after each addition.

The lower layer of chloroform will be coloured pink. As the end point approaches, the emulsions formed during shaking tend to break easily and the coloration of the chloroform layer becomes fainter.

From this point, continue the titration drop by drop, shaking after each addition of titrant, until the end point is reached. This is at the moment when the pink colour is completely discharged from the chloroform layer, which turns a faint greyish blue. With excess of test solution A, the chloroform layer turns blue. Note the volume of test solution A required for the titration.

8 Expression of results

8.1 Calculation

The content, expressed as a percentage by mass, of cationic-active matter is given by the formula

$$\frac{cM_\mathrm{r} \times 10 \times 1\,000 \times 100}{1\,000\ Vm_0} = \frac{cM_\mathrm{r} \times 1\,000}{Vm_0}$$

where

c is the actual concentration, expressed in moles of $C_{12}H_{25}NaO_4S$ per litre, of the sodium lauryl sulfate solution (4.3);

M_r is the relative molecular mass of the cationic-active matter;

V is the volume, in millilitres, of test solution A used for the titration;

m_0 is the mass, in grams, of the test portion (7.1).

8.2 Precision

8.2.1 Repeatability

The difference between the results of two determinations carried out on the same sample simultaneously or in rapid succession by the same analyst using the same apparatus should not exceed 1,5 % of the mean value.

8.2.2 Reproducibility

The difference between the results obtained on the same sample in two different laboratories should not exceed 3 % of the mean value.

9 Test report

The test report shall include the following information:

a) all the indications necessary for the complete identification of the sample;

b) the method used (reference to this part of ISO 2871);

c) the results obtained and the way in which they have been expressed;

d) any unusual features noted during the determination;

e) any operation not specified in this part of ISO 2871 or in the International Standards to which reference is made, as well as any operation regarded as optional.