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International Standard



4311

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

ANSI Internat Doc Sect

Anionic and non-ionic surface active agents — Determination of the critical micellization concentration — Method by measuring surface tension with a plate, stirrup or ring

*Agents de surface anioniques et non ioniques — Détermination de la concentration critique pour la formation de micelles —
Méthode par mesurage de la tension superficielle à la lame, à l'étrier ou à l'anneau*

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 4311 was developed by Technical Committee ISO/TC 91, *Surface active agents*, and was circulated to the member bodies in October 1975.

It has been approved by the member bodies of the following countries :

Austria	Iran	Portugal
Belgium	Italy	Romania
Brazil	Japan	South Africa, Rep. of
Canada	Korea, Rep. of	Spain
France	Mexico	Switzerland
Germany, F. R.	Netherlands	Turkey
Hungary	New Zealand	USA
India	Poland	USSR

The member body of the following country expressed disapproval of the document on technical grounds :

United Kingdom

Anionic and non-ionic surface active agents — Determination of the critical micellization concentration — Method by measuring surface tension with a plate, stirrup or ring

0 INTRODUCTION

Curves showing the variation in the physical properties of aqueous solutions of surface active agents are specific to individual products; in a certain region of concentration, usually very narrow, these curves show a sharp change of slope. This phenomenon has been attributed to the formation of orientated aggregates of molecules, and the concentration at which this change occurs has been termed the "critical micellization concentration" (c.m.c.)¹⁾.

For a given length of hydrophobic chain, the critical micellization concentration is usually higher in the case of ionic surface active agents than in the case of non-ionic surface active agents. Apart from the structure of the surface active agent, the temperature, and the presence, the nature and the quantity of the metallic salts, organic compounds cause the critical micellization concentration to vary, and hence the operational conditions likely to influence the result must be clearly stated, i.e. the purity of the product and, as far as possible, its impurities, which may greatly alter the value of surface tension measurements (it is very useful to know the organic or mineral nature of these impurities and, if possible, their concentrations). On account of these interactions a definite value cannot be obtained for the critical micellization concentration, but generally its range can be defined by the curve showing the variations in the surface tension, which in practice is deemed satisfactory.

1 SCOPE

This International Standard specifies a method for the determination of the critical micellization concentration of anionic and non-ionic surface active agents in solution in distilled water or other aqueous systems, by measurement of the surface tension with a plate, stirrup or ring.

2 FIELD OF APPLICATION

This method is applicable to purified or unpurified non-ionic surface active agents which are soluble in water and have a cloud temperature at least 5 °C above the testing temperature, and to purified or unpurified anionic surface

active agents which are soluble in water and have a Krafft temperature at least 5 °C below the testing temperature.

This method may be used for measurements at temperatures above 35 °C, but very strict precautions shall then be taken to prevent water and other possible solvents from evaporating.

3 REFERENCES

ISO 304, *Surface active agents — Determination of surface tension.*

ISO 607, *Surface active agents and detergents — Methods of sample division.*²⁾

ISO/R 862, *Surface active agents — Glossary.*

ISO 2456, *Surface active agents — Water used as a solvent for tests.*³⁾

4 DEFINITIONS

4.1 **micelle** : See ISO/R 862.

4.2 **critical micellization concentration (c.m.c.)** : See ISO/R 862.

4.3 **Krafft temperature** : See ISO/R 862.

4.4 **surface tension** : See ISO/R 862.

NOTE — The SI unit for surface tension is the newton per metre (N/m). In practice, its submultiple the millinewton per metre (mN/m) is used.*

5 PRINCIPLE

Determination of the surface tension of a series of solutions whose concentrations bracket the critical micellization concentration. Plotting of the graph of surface tension as a function of the logarithm of the concentration : the c.m.c. corresponds to a singular point on this curve.

1) Abbreviation for the critical micellization concentration.

2) At present at the stage of draft. (Revision of ISO/R 607.)

3) At present at the stage of draft.

* 1 mN/m = 1 dyn/cm