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Surface active agents — Determination of interfacial tension — Drop volume method

Agents de surface — Détermination de la tension interfaciale — Méthode au volume de goutte

Reference number
ISO 9101 : 1987 (E)

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.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 9101 was prepared by Technical Committee ISO/TC 91, *Surface active agents.*

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Surface active agents — Determination of interfacial tension — Drop volume method

0 Introduction

Interfacial tension is a fundamental property of the interface between two immiscible or partially miscible liquids. These two liquids may contain surface active agents which reduce the interfacial tension, but it is generally not possible to predict their detergent and emulsifying activities from measurements of the interfacial tension alone.

1 Scope and field of application

This International Standard specifies a test method, by measuring the drop volume, for the determination of the interfacial tension between two liquid phases.

It is particularly suitable for the measurement of the interfacial tension between two solutions of surface active agents in aqueous or organic solvents, and provides some advantages compared with the method by drawing up liquid films (ISO 6889), which are the following :

— determination of interfacial tension between two liquid phases containing all types of surface active agents, including cationic surface active agents;

— accurate measurement of low interfacial tensions of the order of 1 mN/m;

— repeatability standard deviation less than ± 0,5 mN/m (acceptable for control in industrial laboratories);

— determination of interfacial tension of viscous liquids;

— determination of interfacial tension on only small amounts of the solution;

— time dependence of the interfacial tension can be measured using a simple automatic apparatus.

2 References

ISO 758, *Liquid chemical products for industrial use — Determination of density at* 20 °C.

ISO 862, *Surface active agents — Vocabulary.*

ISO 2456, *Surface active agents — Water used as a solvent for tests — Specifications and test methods.*

ISO 6889, *Surface active agents — Determination of interfacial tension by drawing up liquid films.*

3 Definition

interfacial tension : See ISO 862.

NOTE — The SI unit of interfacial tension is the newton per metre (N/m). In practice, the sub-multiple millinewton per metre (mN/m) is used.

4 Principle

Measurement of the volume of a drop of an aqueous phase formed at the end of a vertical capillary tube when it detaches from the tube in contact with the organic phase.

Obtaining the interfacial tension between two liquid phases by balancing the weight of the drop with the interfacial tension force supporting it and applying a correction factor; then calculation of the interfacial tension from the volume of the falling drop, the outer capillary radius, the density difference between the two liquid phases and the acceleration due to gravity.

5 Apparatus

5.1 Measuring instrument (see figure 1) comprising the following elements.

5.1.1 Glass syringe, accurately calibrated, of 0,5 cm^3 volume, driven by a micrometer screw so graduated that the volume of the falling drop may be calculated to an accuracy of ± 0,000 1 cm^3.

5.1.2 Capillary, glass or stainless steel, prepared as in 5.3, connected to the orifice of the syringe, and removable for cleaning.

5.1.3 Jacketed glass vessel having an inside diameter of 2,5 to 4 cm and a height of 5 cm or more, capable of being thermoregulated to the test temperature and of containing the syringe and the capillary.

5.2 Mounting of the apparatus

The syringe (5.1.1) and capillary (5.1.2) shall be mounted on a stand which allows movement in a vertical direction; the tip of the capillary shall be perpendicular to its axis, of uniform diameter and with an edge free from defects.