INTERNATIONAL STANDARD

ISO 8022

Second edition
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Surface active agents — Determination of wetting power by immersion

Agents de surface — Détermination du pouvoir mouillant par immersion

Reference number
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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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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.

International Standard ISO 8022 was prepared by Technical Committee ISO/TC 91, *Surface active agents.*

This second edition cancels and replaces the first edition (ISO 8022 : 1984), of which it constitutes a minor revision.

Annexes A and B of this International Standard are for information only.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
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Introduction

In many textile operations, for example softening or washing textiles, as well as in the rinsing or the cleaning of hard surfaces — in short in all processes in which a phase (air, oil or soil) has to be replaced by a liquid phase (aqueous or organic) — it is useful to know the wetting agents used. It is also important to know after how long complete wetting is obtained.

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Surface active agents — Determination of wetting power by immersion

1 Scope

This International Standard specifies a method for determining the wetting power of a surface active agent in solution by immersion of a disc of raw cotton cloth in the solution. The method is applicable to all surface active agents, whatever their ionic character, used as wetting agents in neutral, slightly acid or slightly basic baths for textile applications. The method is not applicable to mercerizing assistants (baths highly basic) or to carbonizing assistants (baths highly acid).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 139 : 1973, *Textiles — Standard atmospheres for conditioning and testing.*

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

ISO 2456 : 1986, *Surface active agents — Water used as a solvent for tests — Specification and test methods.*

ISO 3819 : 1985, *Laboratory glassware — Beakers.*

3 Definition

For the purposes of this International Standard, the following definition applies.

wetting power (by immersion) : Degree of ability of a solution of surface active agent to displace the air trapped in a cloth when the cloth is steeped in the solution.

The wetting power of a surface active agent can be evaluated by examination of plots of wetting time of discs of raw cotton cloth immersed in solutions of surface active agents or solutions of standard wetting agents of known concentration, against concentration.

4 Principle

Immersion, while held in a gripper, of a cotton disc of known nature and characteristics, in a solution of surface active agent of known concentration; maintenance of complete submersion in the solution, by means of the specially designed gripper, of the cotton disc, which tends to float to the surface due to air trapped in the cloth. After displacement of air and penetration of the solution into the cloth, the cotton disc starts to sink. Determination of the wetting time by measuring the interval between the moment of immersion of the cotton disc and the moment when it begins to sink.

Determination of the wetting time using two standard solutions, at five concentrations for each, and then using the surface active agent solution under test, also at five different concentrations.

After plotting the three "wetting time/concentration" curves, determination of the wetting power of the surface active agent under test by comparison of the position of its curve with the two standard curves.

5 Reagents and products

5.1 Distilled water, or water of equivalent purity, complying with the specifications of ISO 2456.

Other grades of water may be used provided details are noted in the test report.

5.2 Sodium di-*n*-hexylsulfosuccinate, of recognized analytical grade.

5.3 Sodium di-*n*-heptylsulfosuccinate, of recognized analytical grade.

5.4 Raw cotton control cloth, of known nature and characteristics, conditioned in the standard temperate atmosphere specified in ISO 139, i.e. a relative humidity of 65 % and a temperature of 20 °C. (Various types of commercially available control cloths are described in annex A.)

6 Apparatus

Ordinary laboratory apparatus and, in particular:

6.1 Beaker, low form, of capacity 1 000 ml, complying with the specifications of ISO 3819.

6.2 Cloth-immersion gripper, made of stainless-steel wire of about 2 mm diameter and whose dimensions are given in figure 1 (see also the photo, figure 2, which shows an example of a gripper constructed in accordance with figure 1, with three support arms projecting at right angles from the gripper body). These arms may be mounted on a sliding collar as shown in figure 1. It is important that the design of the gripper is such that, when a raw cotton disc held in the gripper is immersed in 700 ml of test solution in the 1 000 ml beaker (6.1), the cotton disc is held about 40 mm below the surface of the solution. It is also important that the gripper tips only open about 6 mm so that the cotton disc remains nearly vertical in the solution.

6.3 Punch, of diameter 30 mm, carefully degreased using a volatile solvent (for example dichloromethane).

6.4 Stopwatch, accurate to 0,1 s.

Dimensions in millimetres

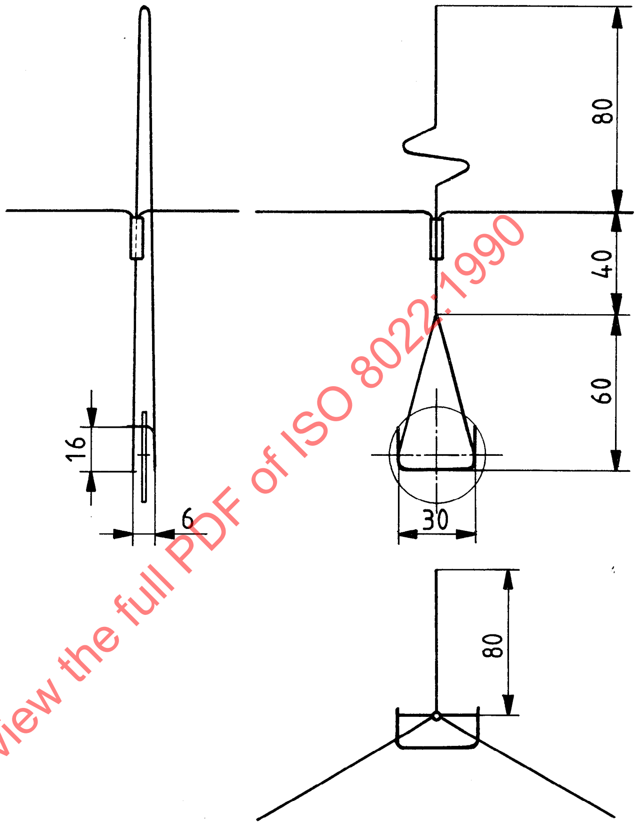

Figure 1 — Cloth-immmersion gripper

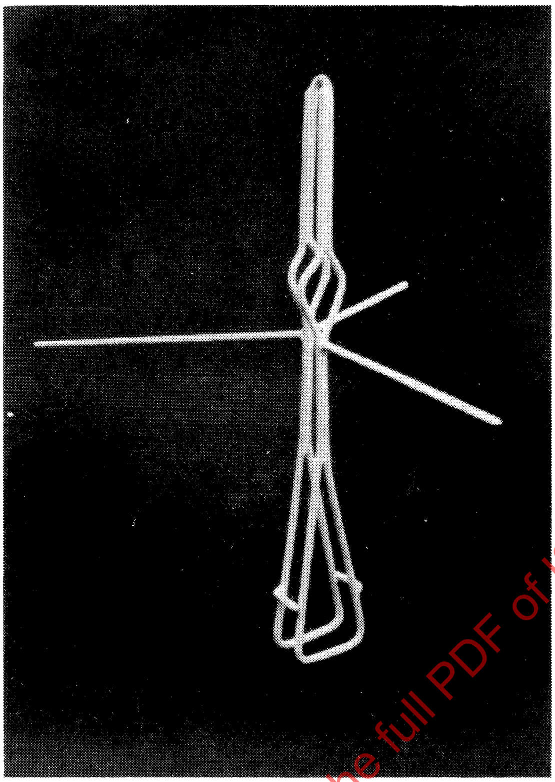

Figure 2 — Photo showing example of gripper constructed in accordance with the requirements specified in 6.2

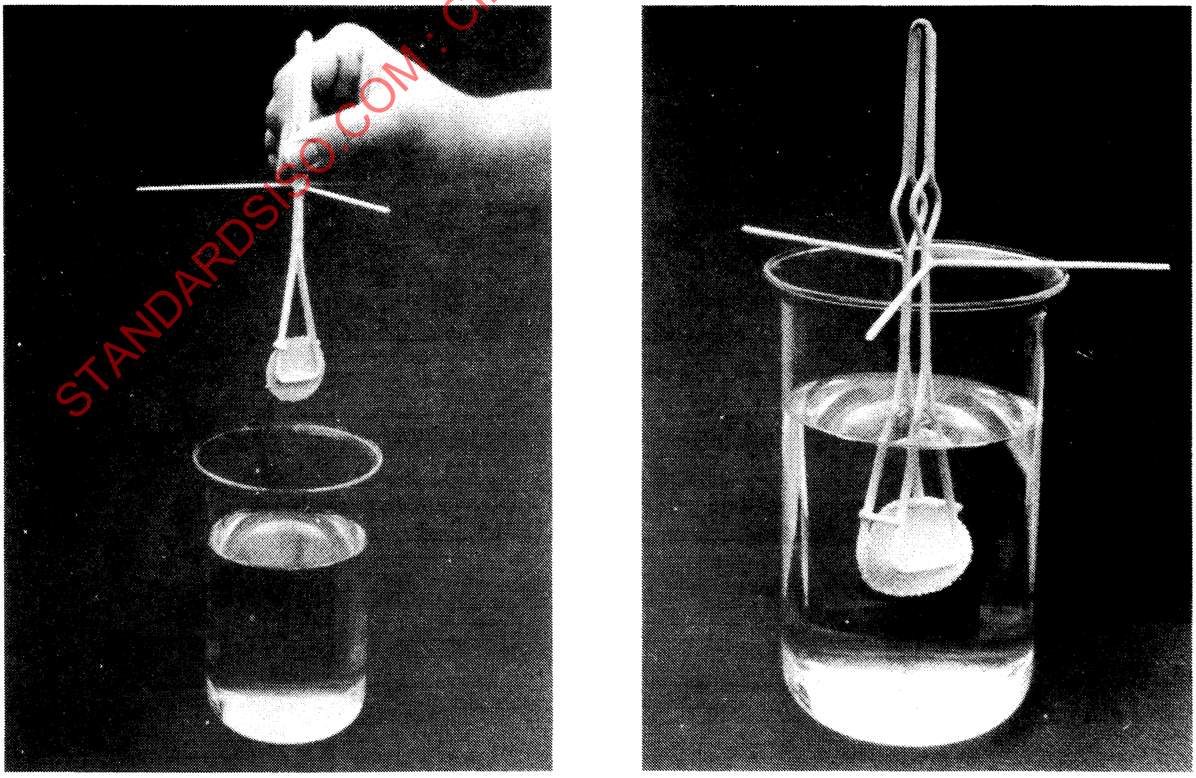

Figure 3 — Illustration of procedure

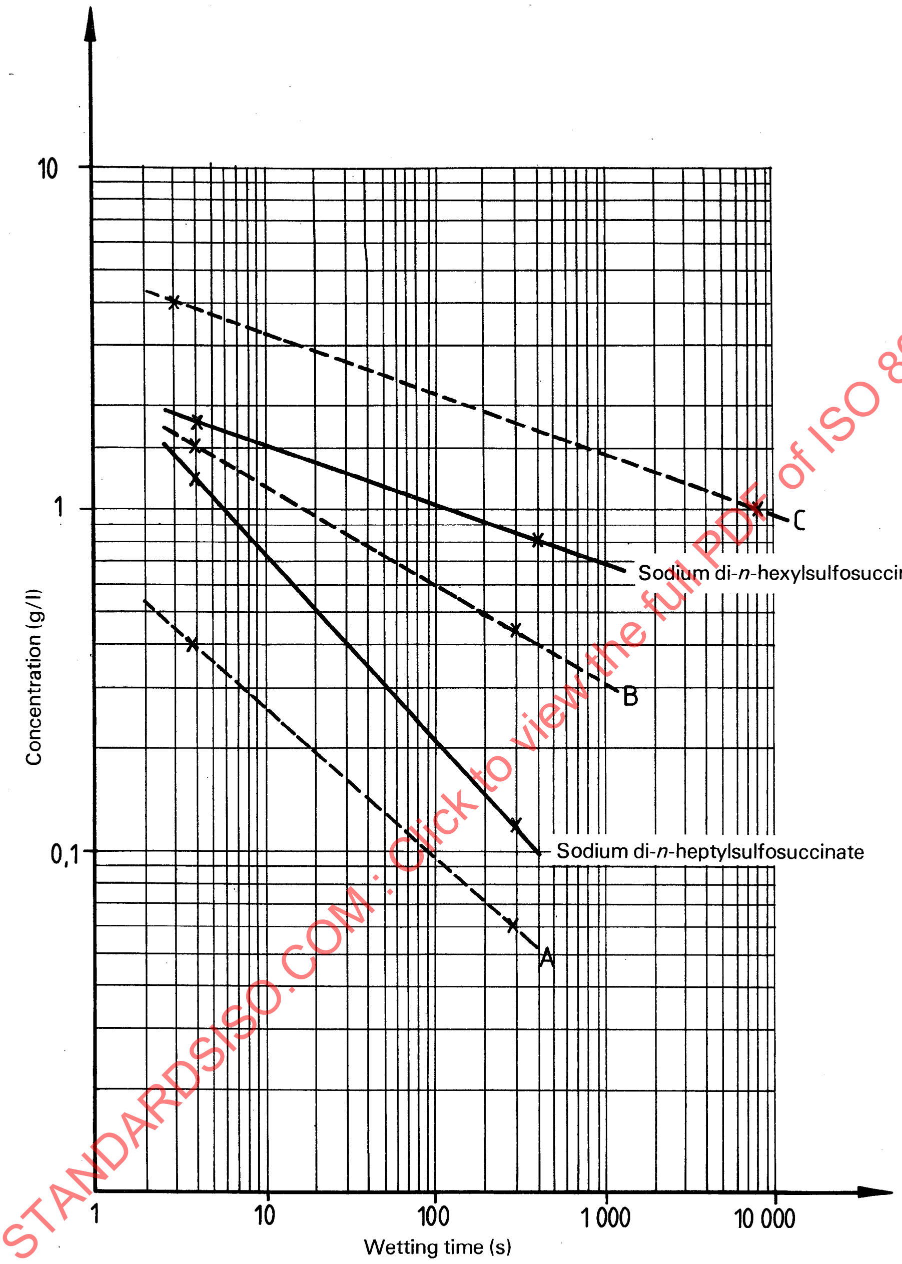

Figure 4 — "Wetting time/concentration" curves for surface active agents A, B and C, with standard curves for comparison

7 Sampling

The surface active agent laboratory sample shall be prepared and stored in accordance with ISO 607.

8 Procedure

8.1 Test portion

Weigh, to the nearest 0,1 g, 5 g of the laboratory sample into a 100 ml beaker.

8.2 Preparation of the surface active agent solution

Dissolve the test portion (see 8.1) in water, if necessary after first making a paste of the surface active agent with water warmed to 40 °C, then diluting with water at about 20 °C. Transfer quantitatively to a 1 000 ml volumetric flask, make up to the mark with water and mix.

Take 200 ml of the solution thus obtained, transfer to a 1 000 ml volumetric flask, make up to the mark with water and mix.

If the Krafft temperature of the surface active agent is higher than 40 °C, make the paste and carry out the dissolution at a temperature at least equal to the Krafft temperature.

Prepare the solution not less than 15 min, but not more than 2 h, before the measurement.

Keep the solution at 20 °C ± 2 °C until the beginning of the test.

Conditions other than those given above (concerning the hardness or pH of the water, temperature, possible assistants) may be chosen provided that they are noted in the test report.

8.3 Preparation of the discs of cotton control cloth

Using the punch (6.3), cut out discs of 30 mm diameter from the raw cotton cloth (5.4). It is very important to avoid touching the cloth with the fingers as the presence of fatty materials or perspiration on the surface of the cloth may affect the results.

8.4 Cleaning the apparatus

The success of the tests depends, to a certain extent, on the cleanness of the apparatus.

Before the test, and if possible overnight, leave a chromic/sulfuric acid mixture[1], prepared by gently stirring sulfuric acid (ϱ_{20} 1,84 g/ml) into an equal volume of a saturated solution of potassium dichromate, to stand in the beaker (6.1). Then rinse the beaker with water (5.1) until all traces of acid have disappeared, finally rinsing with a small quantity of the solution under test.

Clean the gripper (6.2) for 30 min in an azeotropic mixture of ethanol and trichloroethylene, dry, then rinse with a small quantity of the solution under test.

For a particular surface active agent under test, the apparatus is only rinsed between measurements with the solution at a new concentration.

8.5 Filling the measurement beaker

Using a measuring cylinder, introduce 700 ml of the test solution prepared in 8.2 into the measurement beaker (6.1).

During these operations, in order to avoid the formation of undesirable foam, it is recommended that the test solution be allowed to flow down the internal walls of the vessels. If necessary, remove any foam formed on the surface of the solution in the measurement beaker with a filter paper.

8.6 Determination (see figure 3)

Measure, to the nearest 1 °C, the temperature of the solution.

Clamp a raw cotton disc (8.3) in the gripper (6.2). Immerse the disc in the solution, starting the stopwatch (6.4) at the moment when the lower part of the disc touches the solution. Rest the support arms on the rim of the beaker and allow the gripper to open.

Stop the stopwatch when the disc begins to sink of its own accord.

In the case of solutions at high temperatures, it is important to wait at least 15 min after stabilization of the temperature before carrying out the measurement.

If the wetting time for the first test solution (concentration 1 g/l) is not about 300 s, adjust the mass of the test portion correspondingly and repeat the procedure until the test solution concentration has been found which gives a wetting time of about 300 s.

When this test solution concentration has been found, repeat the measurement nine times on this solution, but taking a fresh cotton disc for each measurement.

Calculate the arithmetic mean of the 10 measurements and record this as the wetting time for that particular test solution concentration.

Prepare, in the same way as for the first test solution, four further solutions of increasing concentration and determine the wetting time for each, using the procedure specified above. Ensure, by carrying out preliminary measurements if necessary, that the solution of highest concentration has a wetting time of 5 s ± 1 s. If this wetting time cannot be attained, use a saturated solution as the solution of highest concentration.

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[1] Other cleaning solutions may be used provided that they are noted in the test report.