

DRAFT TANZANIA STANDARD

**TBS/CDC-2(5221) P3 Surface active agents – Methods for performance tests -
Part 2: Relative emulsifying power
(Revision of TZS 224-2: 1984)**

TANZANIA BUREAU OF STANDARDS

Foreword

This part of Draft Tanzania Standard is being developed by the Soap and Detergents Technical Committee under supervision of the Chemical Division Standards Committee and it is in accordance with the procedures of the Bureau.

This Draft Tanzania Standard is the first revision of TZS 224: 1984 Surface active agents – Methods for performance tests - Part 2: Relative emulsifying power. This edition maintains the first approved methods.

Tests for relative dispersing power, foaming power and relative detergency of surface active agents are covered in Part. 2, and Part 3 and Part 4 respectively of this standard.

In the preparation of this Tanzania standard assistance has been derived from:
IS 5785 (Part 2) – 2016 Methods for performance tests for surface active agents – Part 2: Relative emulsifying power; published by the Bureau of Indian Standards.

In reporting the result of a test analysis made in accordance with this Tanzania standard if the final value observed or calculated is to be rounded off, it shall be done in accordance with TZS 4 *Rounding off numerical values*.

Surface active agents – Methods for performance tests – Part 2: Relative emulsifying power

1. Scope

This part of Draft Tanzania Standard prescribed the method of test for evaluating the relative emulsifying power of surface active agents used in the textile industry.

2. Normative references

The following referenced documents are indispensable for the application of this document. The latest edition of the referenced document (including any amendments) applies.

TZS 59 Water for analytical laboratory use – Specification and test method

3. Terminology

Surface active agents

organic compounds or products used for such purposes as washing, scouring, wetting, penetrating, emulsifying, dispersing, etc.

Note 1: These auxiliary products are capable of modifying the surface or the boundary between two phases which maybe entirely different in physical state; for example, between the textile fibre or water insoluble powder and aqueous solution, or between two non-miscible liquids, such as water and oil.

4. Outline of method

The surface tension of a solution of a surface active agent and of oil and the interfacial tension between the oil and the solution are measured with interfacial tensiometer. The spreading coefficient of the system of oil and solution is calculated. The different values for spreading coefficient of systems of oil and different solutions are compared to determine the relative efficiency of different surface active agents.

5. Reagents

5.1 Quality of reagents

Unless specified otherwise, analytical chemicals and water for analytical laboratory use TZS 59 (see clause 2) shall be used in tests.

5.2 Liquid paraffin

6. Apparatus

6.1 Interfacial tensiometer

An instrument which measures the surface tension of oil and of a solution containing the surface active agent, and the interfacial tension between the oil and the solution of surface active agent, shall be used for this test.

6.1.1 The instrument consists essentially of a ring carried on one vertical limb of an articulated parallelogram one corner of which is clamped to the torsion wire. The other three corners have delicate pure jewel bearings. The horizontal arms are independently adjustable in lengths by means of finely threaded screws, the adjusting heads of which are marked such that the measurement may be made accurately on both. This adjustment permits the scale of the instrument to be standardized by means of a liquid whose surface tension at a particular temperature is known. The scale thereby becomes direct reading in dynes per cm for subsequent measurements. The Vernier scale permits the reading of 0.01 dyne and, therefore, estimation of force to 0.15 dyne is possible.

6.1.2 The ring is made of platinum-iridium wire of welded construction so that it may be cleaned by flaming. The scale of the instrument is graduated with the ring of known circumference and the same type of ring shall have to be used for the particular dial. A special clamping device is attached to the frame of the instrument by means of which the parallelogram is firmly clamped when the ring is to be attached or removed from the vertical limb.

6.1.3 The torsion wire is a fine steel piano wire secured at both ends in torsion heads, each of which is driven by a worm gear arrangement which permits very precise adjustment. One arm of the parallelogram is clamped near the middle of the torsion wire. The forward torsion head extends through the scale and carries the Vernier. The graduated dial reads in both the directions and a double Vernier is provided, this enables one to read whether the measured force is due to interfacial tension downward or upward.

6.2 Glass dish of suitable size for holding liquid and large enough so that curvature of the glass has no effect upon the shape of the liquid column raised.

7. Preparation of stock solution

Dissolve separately 10 g of different surface active agents under test in sufficient amounts of water and make up the volume of each to 1 L.

8. Preparation of stock solution

8.1 Level the instrument properly and tighten the torsion wire. Adjust the zero of the scale and Vernier. Adjust the ring until the index level of arm is opposite to the reference line of the mirror.

8.2 Take sufficient amount of water in the dish and measure the surface tension of water on the instrument and note the reading. If the recorded reading is greater than the calculated value of surface tension of water at that temperature, shorten the torsion arm (or lengthen, if the recorded value is less. Repeat the procedure of readjusting to the zero position after each change of torsion arm length until the dial reading corresponds to the surface tension of water.

8.3 Take sufficient amount of liquid paraffin in the glass dish. Immerse the ring in it and note the reading on the scale when the ring is detached from the oil. Repeat the procedure three times more, every time taking liquid paraffin afresh. Calculate the average of all the four values obtained.

8.4 Take a calculated amount of one of the solution (see clause 7) and dilute it with distilled water such that the final concentration of surface active agents is 0.1%. Take sufficient amount of 0.1% solution of surface active agent in the glass dish. Immerse the ring in the liquid and note down the reading on the scale when the ring is detached from the liquid surface. Repeat the procedure three times, using every time fresh solution of the same surface active agent.

Calculate the average of all values obtained in 8.4.

8.5 Take in the dish sufficient amount of 0.1% solution of surface active agent. Immerse the ring in the aqueous layer, then carefully flow a sufficient amount of liquid paraffin over the aqueous surface such that the inverted V-shaped wire of the ring remains immersed in the oil. Determine the interfacial tension between the oil and the aqueous solution of the surface active agent.

Note 2– Because of the preferential wetting of the ring in the oil, it shall be cleaned between each determination by immersing in carbon tetrachloride and dilute hydrochloric acid solution followed by flaming.

8.6 Repeat the test given in clause 8.4 to 8.5 for 0.2, 0.5 and 1% solutions of the same surface active agent.

9. Calculation and report

9.1 Calculate the spreading coefficient of the system by the formula given below:

$$S = A - (B + C)$$

Where

S is the spreading coefficient of the system of oil and solution;
A is the surface tension, in Newton per meter of the oil;
B is the surface tension, in Newton per meter of the solution; and
C is the interfacial tension, in dynes, between the oil and the solution

9.2 Calculate the spreading coefficient of the different systems by the formula given in clause 9.1 for the different concentrations of surface active agent (see clause 8.6).

9.3 Repeat the test as given in clauses 8.3 to 8.6 using the remaining solutions of surface active agents (see clause 7) and calculate the spreading coefficient of the systems as given in clause 9.1.

9.4 If required, compare the results to determine the relative efficiency of different surface active agents bearing in mind that for the same concentration, the higher the spreading coefficient, the more efficient is the corresponding surface active agents.

9.5 The relative efficiency of different surface active agents may also be compared bearing in mind that, for the same spreading coefficient, the lesser the amount of surface active agent used, the more efficient is the corresponding surface active agent