

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 417

METHODS FOR DETERMINING THIOSULPHATE AND TETRATHIONATE IN PROCESSED BLACK-AND-WHITE PHOTOGRAPHIC FILM, PLATES AND PAPERS

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BRIEF HISTORY

The ISO Recommendation R 417, *Methods for Determining Thiosulphate and Tetrathionate in Processed Black-and-White Photographic Film, Plates and Papers*, was drawn up by Technical Committee ISO/TC 42, *Photography*, the Secretariat of which is held by the American Standards Association, Inc. (ASA).

Work on this question by the Technical Committee began in 1956 and led, in 1958, to the adoption of a Draft ISO Recommendation.

In August 1961, this Draft ISO Recommendation (No. 392) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies:

Belgium	Germany	Romania
Brazil	Italy	Sweden
Canada	Japan	Switzerland
Chile	Netherlands	U.S.A.
France	New Zealand	U.S.S.R.

One Member Body opposed the approval of the Draft:

United Kingdom.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in March 1965, to accept it as an ISO RECOMMENDATION.

METHODS FOR DETERMINING THIOSULPHATE AND TETRATHIONATE IN PROCESSED BLACK-AND-WHITE PHOTOGRAPHIC FILM, PLATES AND PAPERS

This ISO Recommendation contains two parts:

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PART I

METHOD FOR DETERMINING THIOSULPHATE IN PROCESSED BLACK-AND-WHITE PHOTOGRAPHIC FILM AND PLATES

1. GENERAL

Determination of the amount of thiosulphate in processed black-and-white photographic film and plates is of interest in connection with studies of rate, efficiency and effectiveness of washing, and in connection with the problems of image stability with respect to storage.

The method described in this ISO Recommendation is reasonably accurate and very sensitive to thiosulphate. It is not at all sensitive to sulphite, bisulphite or thionates, such as tetrathionates.

The effectiveness of this test diminishes with elapsed time after the film or plates are processed. Residual thiosulphate decomposes fairly rapidly into substances which are not detected by this test, but which may still cause image deterioration. For this reason, it is prescribed that this test should be performed within 24 hours after completion of the processing steps.

For black-and-white film and plates processed more than 24 hours prior to testing, test methods chosen to indicate the image fading tendency may be used.

The method of this ISO Recommendation is not intended for use with colour film, but experience indicates that it may have some applicability.

2. SCOPE

This ISO Recommendation provides a method for determining quantitatively the thiosulphate content of freshly processed black-and-white photographic film and plates and is intended for use in the control or evaluation of processing.

3. METHOD

3.1 Outline of the test

The test depends upon the production of a degree of turbidity or opalescence in the test solution which is related to the amount of thiosulphate present in the sample. A measured area of the sample is immersed for a sufficient time in a given volume of the test solution. At essentially the same time as the sample is immersed, comparison solutions are prepared by adding known quantities of thiosulphate solution of specified concentration to the required volume of test solution. When thiosulphate is present, a precipitate is formed which rises to the upper part of the test solution. After standing undisturbed for a given period of time, the tubes are agitated to distribute the precipitates uniformly. The turbidity of the sample tube is compared with the turbidity of the comparison tubes, and matching turbidities are found. Since the quantity of thiosulphate in any comparison solution is known, the amount in the sample is thus quantitatively determined.

3.2 Sensitivity of the test

The lower limit of sensitivity of the test is 0.001 mg of anhydrous sodium thiosulphate ($\text{Na}_2\text{S}_2\text{O}_3$) per 10 ml of test solution. The test will therefore indicate down to this quantity in 5 cm^2 (0.78 in^2) of film or plate. The approximate reproducibility is shown in the Table, page 6.

3.3 Test solution

Prepare the following test solution from reagent quality chemicals:

Test solution for thiosulphate

Distilled water (20 to 50 °C)	750.0 ml
Potassium bromide	25.0 g
Mercuric chloride	25.0 g
Distilled water to make in total	1.0 litre

CAUTION: POISONOUS SOLUTION !

Allow the solution to stand overnight, before use. Keep in a glass-stoppered bottle, away from strong daylight or excessive heat. If a precipitate forms, the solution should be decanted or filtered. A completely clear solution is required for use.

3.4 Thiosulphate solutions for preparing comparison solutions

Weigh $1.570 \pm 0.010 \text{ g}$ of crystalline sodium thiosulphate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) of reagent quality. Dissolve in about 750 ml of distilled water at room temperature, then add distilled water to make 1 litre and mix well. This is equivalent to a 1: 1000 solution of anhydrous sodium thiosulphate. Remove a 200 ml portion of this 1: 1000 solution and dilute with distilled water to 1 litre to make a 1: 5000 solution and, similarly, dilute a 50 ml portion of the original solution to 1 litre to make a 1: 20 000 solution. Dilute 500 ml of the 1: 20 000 solution to 1 litre to make a 1: 40 000 solution. For accurate work, volumes should be measured with pipettes and volumetric flasks. The original 1: 1000 solution may be used for 5 or 6 days and should be kept in a glass-stoppered bottle. The more dilute thiosulphate solutions should be prepared within two hours of use.

3.5 Test procedure

- 3.5.1 Test tubes.** Select for uniformity and clarity a number of glass vials or test tubes approximately $18 \text{ mm} \times 150 \text{ mm}$ ($0.71 \text{ in} \times 5.91 \text{ in}$), so that a 10 ml volume of solution gives essentially the same height in each. Ordinarily, to determine an unknown thiosulphate content, 8 tubes are required for the comparison solutions, with an additional tube for each sample tested.