Deleterious clay content of the fines in aggregate (methylene blue adsorption indicator test)
SANS 6243:2008  
Edition 1.2  

Table of changes  

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<td>Amdt 1</td>
<td>2002</td>
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<td>Amdt 2</td>
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Foreword  

This South African standard was approved by National Committee SABS/TC 081/SC 01, Construction materials, products and test methods – Cement, lime and concrete, in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.  

This document was published in October 2008. This document supersedes SABS SM 1243:2002 (edition 1.1).  

A vertical line in the margin shows where the text has been technically modified by amendment No. 2.  

Reaffirmed and reprinted in March 2015.  
This document will be reviewed every five years and be reaffirmed, amended, revised or withdrawn.
Deleterious clay content of the fines in aggregate (methylene blue adsorption indicator test)

1 Scope and field of application

This standard specifies a rapid qualitative means for determining whether the clay content of the fines of an aggregate contains deleterious swelling clay minerals, such as smectites, which are usually results of the weathering of rock. The method also indicates to what extent an aggregate requires to be further investigated to determine its suitability for specific applications.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. All standards are subject to revision and, since any reference to a standard is deemed to be a reference to the latest edition of that standard, parties to agreements based on this standard are encouraged to take steps to ensure the use of the most recent editions of the standards indicated below. Information on currently valid national and international standards can be obtained from the SABS Standards Division.

SANS 197, Preparation of test samples of aggregates.


SANS 5832, Organic impurities in fine aggregates (limit test).

3 Reagents

3.1 Methylene blue, analytical reagent (in the trihydrate form), kept in a dry and dark place.

3.2 Indicator solution, that consists of 0.1 g of methylene blue dissolved in distilled water and made up to 100 mL. The solution will remain stable for 2 weeks, after which it should be discarded.

3.3 Water, distilled or deionized.

3.4 Hydrogen peroxide, 30 % by mass.
4 Apparatus

4.1 Burette, of capacity 25 mL, mounted on a stand.

4.2 Erlenmeyer flask, of capacity 250 mL.

4.3 Filter paper\(^1\), medium textured quantitative.

4.4 Test sieves, of nominal aperture sizes 425 µm and 75 µm, and that comply with the requirements of SANS 3310-1 or SANS 3310-2.

5 Procedure

5.1 Take a sample of aggregate of approximately 1 kg (see SANS 197) and dry-sieve it on a 75 µm sieve protected by a 425 µm sieve.

5.2 If the sample fails the test for organic impurities (see SANS 5832), take a representative specimen of approximately 5 g from the material that passed the 75 µm sieve, boil it for approximately 0.5 h in sufficient hydrogen peroxide in a glass beaker of suitable capacity and height and allow the whole to cool to room temperature. Wash the material in the beaker by adding water almost to the rim and stirring the contents vigorously. Allow the whole to stand undisturbed until the supernatant liquid is clear and contains no solid particles. Carefully decant the clear liquid, ensuring that no solid material is lost. Repeat the process of washing and decanting a further two times. Dry the residue to constant mass at a temperature of 100 °C to 110 °C and cool it to room temperature.

5.3 From the material that passed the 75 µm sieve, take a representative specimen of 1 g (untreated or treated, as relevant (see 5.2)), weighed to the nearest 0.01 g (mass \(M\)), place it in the Erlenmeyer flask, add 30 mL ± 1 mL of water and disperse the specimen by vigorously swirling and shaking the flask.

5.4 Titration

5.4.1 Titrate successions of 0.5 mL of the indicator solution to the dispersion in the Erlenmeyer flask, using the burette. After each addition of the indicator, agitate the contents of the flask for 1 min, remove a drop of the dispersion with a glass rod and dab it carefully on a sheet of filter paper (see 4.3). Initially, a spot that is dark blue in colour, with a distinct edge, surrounded by a ring of clear water, is formed.

5.4.2 When the edge of a spot appears fuzzy or is surrounded by a narrow light-blue halo (or both), agitate the flask for a further 1 min and carry out another spot test.

5.4.3 If the halo disappears, add another 0.5 mL of the indicator solution to the contents of the flask, agitate it as before and carry out another spot test.

5.4.4 If the halo persists, agitate the flask for a further 2 min and repeat the spot test.

5.4.5 Whatever the outcome of the spot test as described in 5.4.1 to 5.4.4, add further volumes of 0.5 mL of indicator solution at a time, followed by agitation for 2 min, spot test and then agitate again for 2 min and spot test. Repeat this sequence, with a total of 4 min of agitation, until a definite blue halo is observed.

\(^1\) Whatman No. 40 or equivalent.
5.4.6 Record each successive addition of indicator solution by appropriate marking of the filter paper on which spot tests are carried out.

5.4.7 By holding the filter paper up against natural light while it is still damp, determine the volume of indicator solution (volume $V$) added that caused a blue halo to appear persistently for the first time.

6 Expression and reporting of results

6.1 Calculate the methylene blue adsorption value MBV (percentage of methylene blue adsorbed), as follows:

$$MBV = \left(\frac{V \times 0.10}{M}\right)$$

where

$V$ is the total volume of indicator solution added, in millilitres (see 5.4.7); and

$M$ is the mass of the sample tested, in grams (see 5.3).

6.2 Report the methylene blue adsorption value (MBV) to the nearest 0.1.