International Standard 5937

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Sodium perborates for industrial use — Determination of degree of attrition

Perborates de sodium à usage industriel — Détermination de l'indice d'usure

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Foreword

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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.

International Standard ISO 5937 was developed by Technical Committee ISO/TC 47, *Chemistry*, and was circulated to the member bodies in November 1978.

It has been approved by the member bodies of the following countries :

Australia	Germany, F. R.	South Africa, Rep. of
Austria	Hungary	Switzerland
Belgium	India	Thailand
Bulgaria	Israel	Turkey
Chile	Italy	United Kingdom
China	Korea, Rep. of	USSR
Czechoslovakia	Mexico	Yugoslavia
Egypt, Arab Rep. of	Netherlands	
France	Romania	

No member body expressed disapproval of the document.

This International Standard has also been approved by the International Union of Pure and Applied Chemistry (IUPAC).

Printed in Switzerland

Sodium perborates for industrial use — Determination of degree of attrition

1 Scope and field of application

This International Standard specifies a method for measuring the breakdown by attrition of coarse granular sodium perborates for industrial use.

2 References

ISO 565, *Test sieves — Woven metal wire cloth and perforated plate — Nominal sizes of apertures.*

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

3 Principle

Breakdown of a sample by a high velocity jet of air in a small fluidized bed. Calculation of the amount of breakdown (attrition) from the change in particle size distribution of the test portion before and after fluidization. Expression of the degree of attrition as the increase in the percentage of material which passes through a screen of aperture size 150 µm.

4 Apparatus

4.1 Sample divider, as specified in ISO 607, preferably, of the conical type.

4.2 Automatic shaking device, capable of applying to the test sieve assembly (4.3) with the receiver, and cover plate fitted, combined movements in the horizontal plane and impacts along the vertical axis.

The movement in the horizontal plane is defined as follows (see figure 1) : the centre of the sieves shall follow the same movement as the mid-point C of a straight line AB of length 380 mm. One extremity A of this line describes a circle, of radius r = 20 mm, in a horizontal plane. The other extremity B is constrained to describe a straight line, of length $2r$ = 40 mm, lying on the line passing through the centre O of the circle.

The complete movement shall be repeated about 300 times per minute.

The vertical impacts are produced by a mass of about 1,2 kg falling from a height of 40 mm onto a rubber pad fixed on a plate on the cover.

The frequency of impacts shall be about 150 impacts per minute and these shall not give rise to a vertical displacement of the sieves of greater than 500 µm.

NOTE — A device conforming to the specification is commercially available and information on suppliers may be obtained from national standards organizations.

4.3 Test sieve assembly, comprising sieves of 200 mm diameter and mesh aperture sizes 500 µm and 150 µm, complying with the requirements of ISO 565, and fitted with a cover plate and a receiver.

4.4 Attrition apparatus, connected via a pressure regulator to a cylinder of compressed air, comprising a 25 mm (nominal) diameter glass tube not less than 600 mm in length, with associated gaskets and flanges, capable of accommodating a securely-fitting dust collector (an inverted paper thimble of the Soxhlet type is suitable) in the top. Figure 2 illustrates the apparatus set up for measuring the flow rate of air through the apparatus, the flowmeter (4.6) being fitted, as shown, in place of the dust collector.

4.5 Brass orifice plate, 90 mm diameter and 3 mm thick, with a hole of diameter 0,4 mm drilled centrally. The plate shall be drilled to match the flanges.

4.6 Flow meter, graduated in litres per minute. A floating indicator instrument is suitable.

5 Procedure

NOTE — Although of general application, the procedure may be varied, if required, by agreement between the interested parties.

5.1 Test portion

Take a spot sample of between 295 and 305 g and reduce it in the sample divider (4.1) to give six test portions, each of about 50 g. Use one of these test portions for the sieve analysis (5.2.1) and another for the attrition (5.2.2); weigh each test portion to the nearest 0,01 g.

5.2 Determination

5.2.1 Sieving

Arrange the test sieve assembly (4.3) in the automatic shaking device (4.2), with the coarser sieve uppermost, and adjust the machine so that the sieves rotate slowly during the shaking period. A small clearance gap of approximately 0,75 mm between the cover plate and the retaining shaft is usually sufficient to ensure free rotation.

Transfer one test portion to the uppermost screen of the test sieve assembly (4.3) on the shaker (4.2), set the timer to 10 min and start the shaker. When the shaking has finished, remove the sieve assembly, carefully brush off the bottom of the 150 µm sieve into the receiver and then carefully brush the material in the receiver onto a suitable weighing dish and weigh it to the nearest 0,01 g.

5.2.2 Attrition

Assemble the attrition apparatus (4.4) as illustrated in figure 2 and check its operation as follows. Open the air cylinder valve and set the pressure regulator to obtain a pressure of 290 to 330 kPa at the orifice plate (4.5). At this pressure, the air flow through the flowmeter (4.6) should be between 6,75 and 7,25 l/min. If not, adjust the air pressure to give this flow rate and note the pressure. Close the air cylinder valve. Check the flow rate periodically to detect any blockage of the orifice.

Remove the rubber bung, with its flowmeter connector, from the glass tube. Transfer another test portion to the attrition apparatus (4.4). Fix the dust collector securely in the top of the glass tube. Open the air cylinder valve to allow air to enter the bed and adjust the regulator to obtain the required inlet pressure. Tap the tube occasionally to prevent "slugging" of the test portion.

After 10 min, close the air cylinder valve and remove the dust collector. Transfer the test portion to the uppermost (500 µm) sieve of the test sieve assembly (4.3) by inverting and tapping the attrition tube and the dust collector. Sieve the test portion and collect and weigh the material from the receiver as described in 5.2.1.

6 Expression of results

The degree of attrition is expressed as the difference in the percentage by mass passing through the 150 µm test sieve before and after attrition.

7 Test report

The test report shall include the following particulars :

a) an identification of the sample;

b) the reference of the method used;

c) the results and the method of expression used;

d) any unusual features noted during the determination;

e) any operation not included in this International Standard or the International Standards to which reference is made, or regarded as optional.

Dimensions in millimetres

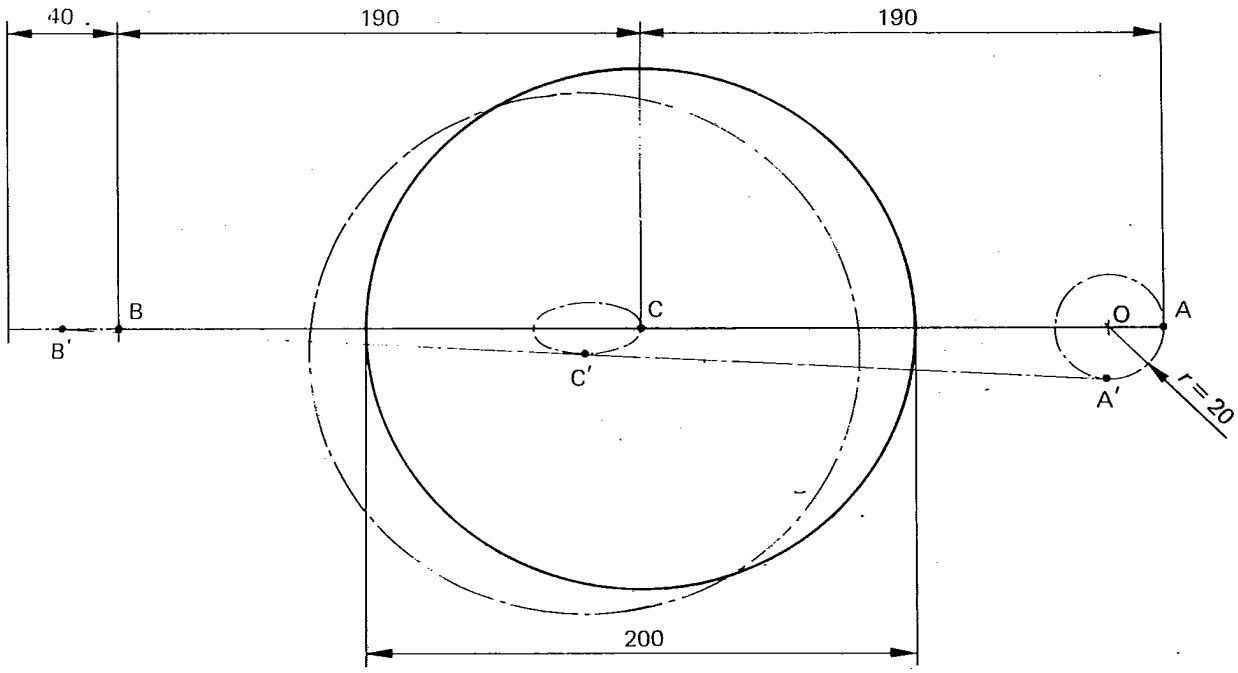

Figure 1 — Diagram of movements in the horizontal plane

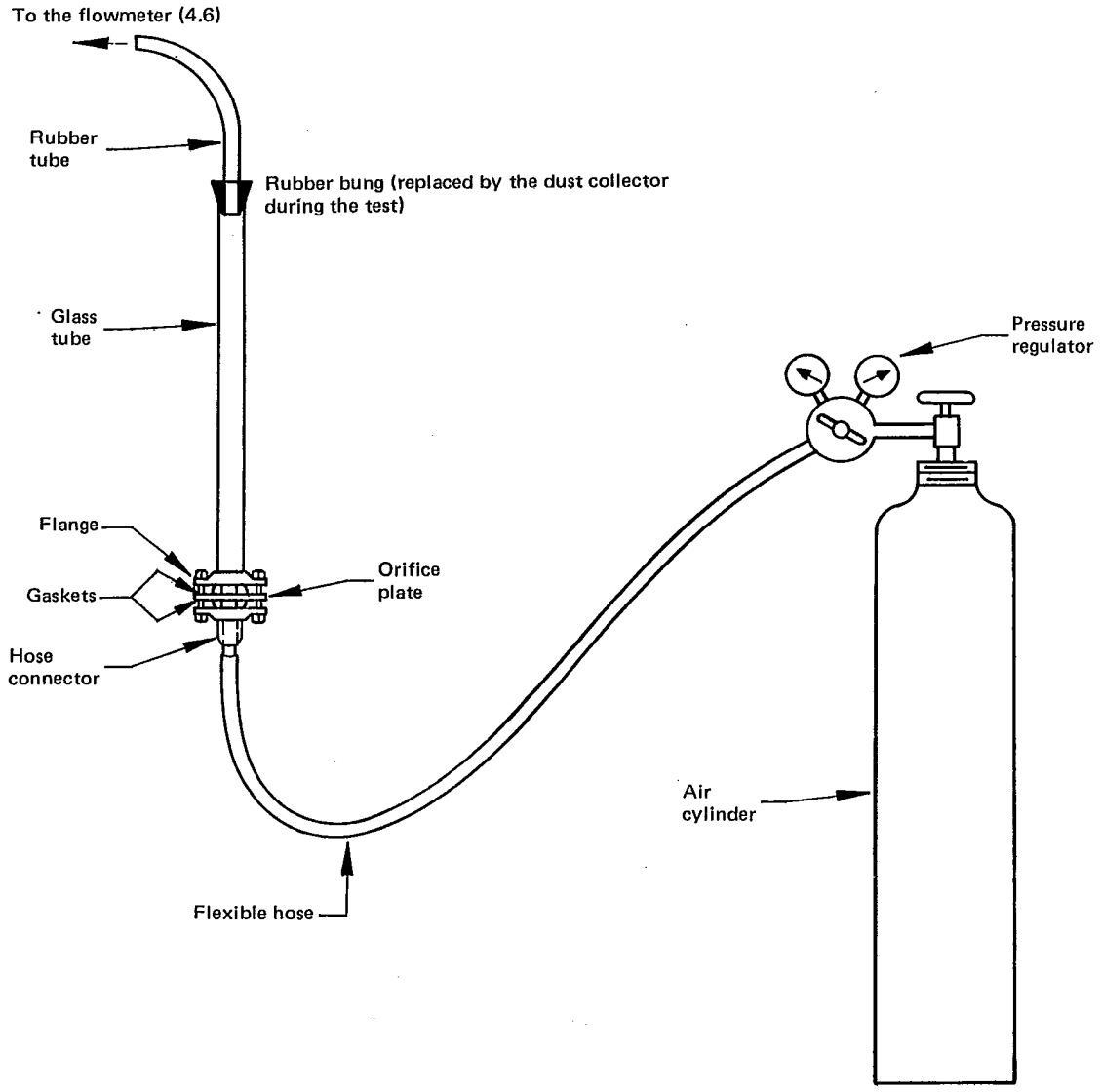

Figure 2 — Schematic drawing of attrition apparatus (assembled to adjust the rate of flow of air through the apparatus)

Annex

ISO publications relating to sodium perborates for industrial use

ISO 1917 — Determination of sodium oxide, boric oxide and available oxygen contents — Volumetric methods.

ISO 3118 — Determination of particle size distribution by mechanical sieving.

ISO 3122 — Determination of iron content — 2,2'-Bipyridyl photometric method.

ISO 3123 — Determination of rate of solution — Conductivity method.

ISO 3424 — Determination of bulk density.

ISO 5937 — Determination of rate of attrition.