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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 863

POZZOLANICITY TEST FOR POZZOLANIC CEMENTS

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BRIEF HISTORY

The ISO Recommendation R 863, *Pozzolanicity test for pozzolanic cements,* was drawn up by Technical Committee ISO/TC 74, *Hydraulic binders,* the Secretariat of which is held by the Institut Belge de Normalisation (IBN).

Work on this question by the Technical Committee began in 1958 and led, in 1964, to the adoption of a Draft ISO Recommendation.

In March 1967, this Draft ISO Recommendation (No. 1156) 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 :

Argentina	Hungary	Romania
Australia	India	South Africa, Rep. of
Austria	Iran	Spain
Belgium	Ireland	Sweden
Brazil	Israel	Switzerland
Chile	Italy	Turkey
Colombia	Japan	U.A.R.
Czechoslovakia	Netherlands	United Kingdom
Denmark	New Zealand	Yugoslavia
France	Norway	
Greece	Poland	

One Member Body opposed the approval of the Draft :

Portugal

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in October 1968, to accept it as an ISO RECOMMENDATION.

ISO Recommendation October 1968

POZZOLANICITY TEST FOR POZZOLANIC CEMENTS

1. SCOPE

This ISO Recommendation defines the pozzolanicity test to be applied to pozzolanic cements which conform to definition 6.1 of ISO Recommendation R 597, *Definitions and terminology of cements.*

2. PRINCIPLE OF THE METHOD

In the test described, pozzolanicity is assessed by comparing the quantity of calcium hydroxide present in a liquid phase in contact with the hydrated cement, with the quantity of calcium hydroxide capable of saturating a medium of the same alkalinity.

NOTE. – In a pozzolanic cement, the concentration of calcium hydroxide in solution is always lower than the saturation concentration.

Experiment shows that, using 20 g of cement per 100 ml of water at a temperature of 40 °C, equilibrium is practically reached in seven days.

The application of the test thus requires knowledge of the solubility at 40 °C of calcium hydroxide in a solution whose free alkalinity varies from zero to about one hundred milli-equivalents of strong base (OH^-) per litre.

3. REAGENTS

3.1 *Distilled water.*

3.2 *Standard hydrochloric acid* (0.1 N).

3.3 *Ammonium hydroxide solution* (0.5 N).

3.4 *Ammonium oxalate,* in saturated solution.

3.5 *Methyl orange.*

3.6 *Potassium permanganate solution* (0.05 N).

3.7 *About 20 g paraffin wax* (if a glass flask is used).

4. APPARATUS

4.1 *Conical flask,* of 300 ml, in alkali resisting glass or preferably in plastics material, with a stopper of rubber or waxed cork capable of being securely fitted to it so as to permit a vigorous shaking.

4.2 *Funnel,* with wide stem.

4.3 *Filter,* sintered glass.

4.4 *Conical flask,* 250 ml, with ground-glass stopper.

4.5 *Beaker,* 250 ml.

4.6 *Precision pipettes,* 50 ml and 100 ml.

4.7 *Thermostat,* set at 40 ± 2 °C.

5. PROCEDURE

If a conical glass flask is used, coat it inside with about 20 g of melted paraffin wax (3.7) and afterwards allow the surplus to solidify at the bottom of the flask as it stands on a level surface.

With a pipette add 100 ml of distilled water (3.1) and put the stoppered flask into the thermostat until the required temperature is reached (about 1 hour).

Then pour into the conical flask, using the funnel with a wide stem, 20 ± 0.01 g of the cement to be tested. Then close the container and secure the stopper. Shake vigorously for about 20 seconds in order to prevent the formation of cement lumps. Replace the flask in the thermostat, making sure that the bottom is perfectly horizontal so that the layer of cement deposits with the same thickness everywhere. Carry out all the operations outside the thermostat as quickly as possible, to avoid any appreciable lowering of the temperature of the contents of the flask.

After a period of seven days in the thermostat, quickly filter the liquid through sintered glass, collecting the filtrate in a conical flask with a ground-glass stopper. Let the filtrate cool down to room temperature. Mix thoroughly.

Then pipette out 50 ml of the solution and transfer to a 250 ml beaker and determine the total alkalinity with hydrochloric acid (3.2), using methyl orange (3.5) as indicator.

Now precipitate the calcium as oxalate in ammoniacal solution (3.3), filter and wash with cold water. Titrate the calcium oxalate obtained, using the potassium permanganate solution (3.6).

6. EXPRESSION OF RESULTS

Express the total alkalinity and the calcium oxide (CaO) content in millimoles per litre. Report, on a pozzolanicity diagram *, the point representing the calcium oxide (CaO) content as a function of the total alkalinity.

The cement under test is considered to be pozzolanic if the point representing it lies below the solubility isotherm.

If the point obtained is on the isotherm or in the immediate vicinity, re-start the test in the same conditions, but leaving the conical flask in the thermostat for fourteen days. In the case of slow but real pozzolanic activity, the test becomes clearly positive.

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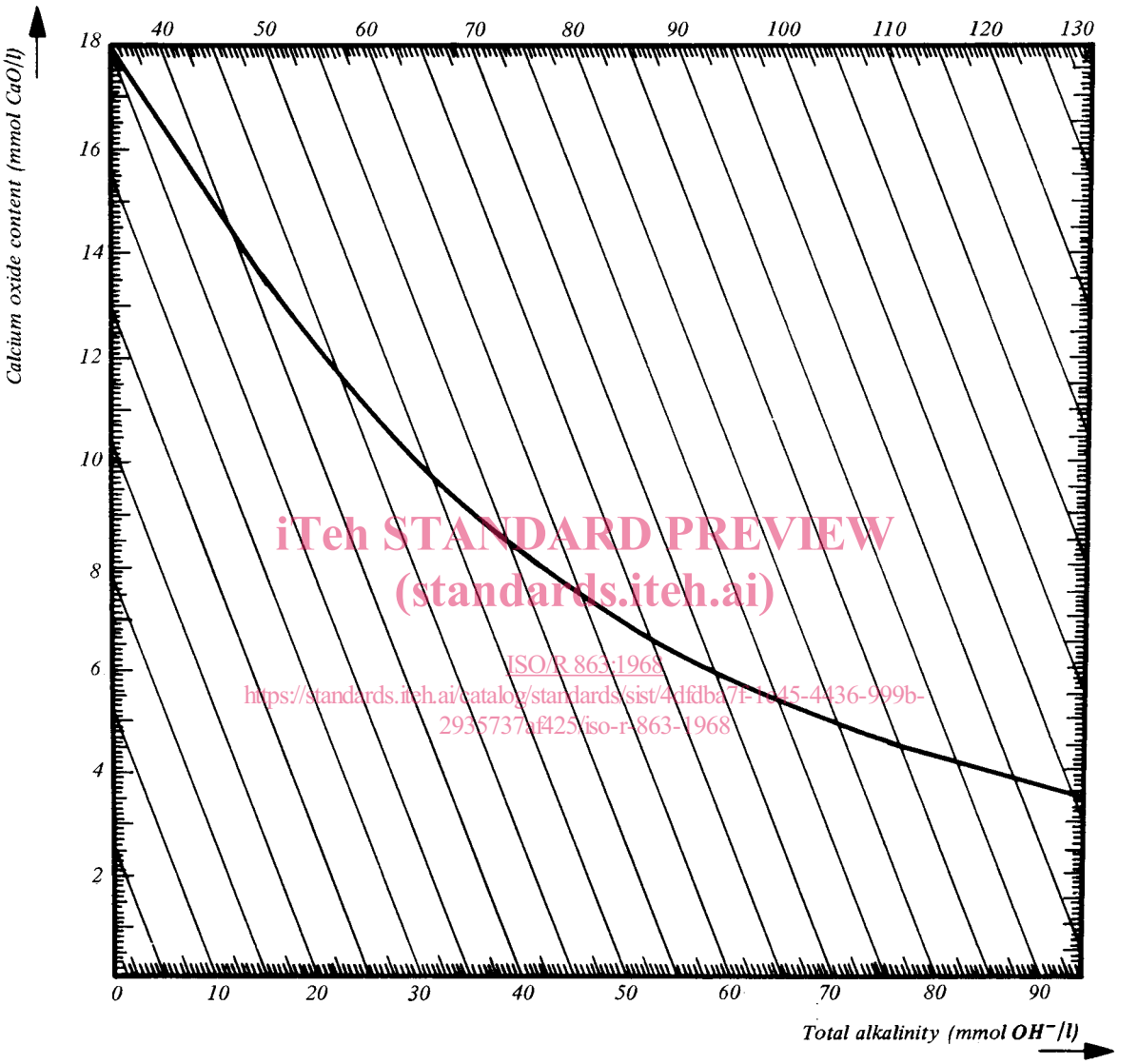
* The pozzolanicity diagram on the opposite page has been established in inclined co-ordinates; it can also be established in rectangular co-ordinates.



Pozzolanicity diagram

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