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JIS

JAPANESE INDUSTRIAL STANDARD

Method for Chemical Analysis of Portland Cement

JIS R 5202—1989

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In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

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Method for Chemical Analysis of Portland Cement

R 5202-1989

1. Scope

This Japanese Industrial Standard specifies the methods for chemical analysis of the portland cement.

Further, these methods of chemical analysis may also be applied to the chemical analysis of the portland blast-furnace slag cement, portland pozzolan cement, portland fly ash cement and the blast-furnace slag to be used in the manufacture of the portland blast-furnace slag cement, as appropriate.

2. Items of Analysis

The items of analysis specified in this Standard shall be as follows:

(1) Ignition loss (ig. loss)

(2) Insoluble residue (insol.)

(3) Silicon dioxide (SiO_2)

(4) Aluminum oxide (Al_2O_3)

(5) Ferric oxide (Fe_2O_3)

(6) Calcium oxide (CaO)

(7) Magnesium oxide (MgO)

(8) Sulfur trioxide (SO_3)

Applicable Standards:

JIS K 0050-General Rules for Chemical Analysis

JIS K 0113-General Rules for Methods of Potentiometric, Amperometric, and Coulometric Titrations

JIS K 0115-General Rules for Absorptiometric Analysis

JIS K 0121-General Rules for Atomic Absorption Spectrochemical Analysis

JIS K 8005-Standard Substances for Volumetric Analysis

JIS R 3503-Glass Apparatus for Chemical Analysis

JIS R 3505-Volumetric Glassware

JIS R 5201-Physical Testing Methods of Cement

JIS Z 8401-Rules for Rounding off of Numerical Values

(9) Sodium oxide (Na_2O)

(10) Potassium oxide (K_2O)

(11) Titanium dioxide (TiO_2)

(12) Phosphorus pentoxide (P_2O_5)

(13) Manganese oxide (MnO)

(14) Sulfur in sulfide (S)

(15) Chlorine (Cl)

Remark: As an alternative, Annex may be applied to the methods for chemical analysis of silicon dioxide, aluminum oxide, ferric oxide, calcium oxide, magnesium oxide, sodium oxide, potassium oxide, manganese oxide and chlorine.

3. Samples

The samples taken and prepared in accordance with 3. of JIS R 5201 shall be used.

4. General Matters of Analysis

General matters of chemical analysis shall as a rule be as specified in JIS K 0050, JIS K 0115, JIS K 0121 and JIS K 0113. Glasswares used for chemical analysis shall be as specified in JIS R 3503 and JIS R 3505.

5. Arrangement of Analysis Results

The analysis values shall be expressed in percentage and arranged as follows.

(1) The values of the nine constituents of ignition loss, insoluble residue, silicon dioxide, aluminum oxide, ferric oxide, calcium oxide, magnesium oxide, sulfur trioxide and sulfur in sulfide shall be rounded off to one place of decimals in accordance with JIS Z 8401.

(2) The values of the five constituents of sodium oxide, potassium oxide, titanium dioxide, phosphorus pentoxide and manganese oxide shall be rounded off to 2 places of decimals in accordance with JIS Z 8401.

(3) The values of chlorine shall be rounded off to 3 places of decimals in accordance with JIS Z 8401.

6. Determination of Ignition Loss

6.1 Summary The loss of mass shall be measured when the sample has been ignited at a temperature of 950 ± 50°C until its mass becomes constant.

6.2 Mass of Sample to Be Weighed Out Approximately 1 g of the sample shall be weighed out correctly to the nearest 0.1 mg.

6.3 Procedure The determination shall be carried out in the following order.

(1) Put the sample in a platinum crucible of No. 15 to 25 or a 15-ml porcelain crucible, cover it leaving a small gap, ignite in an electric furnace controlled to a temperature of 950 ± 50°C ([1]) for 15 min, cool in a desiccator, and weigh its mass.

(2) Repeat ignitions each for about 15 min, and determine the loss of mass when the mass has become constant ([2]).

Notes ([1]) The controlled temperatures shall be 700 ± 50°C for the portland blast-furnace slag cement and blast-furnace slag.

([2]) If any gain in mass has occurred in the determination of the constant mass, the mass before the gain shall be employed. If the mass has gained in the first 15 min of ignition, it shall be noted simply as "+".

6.4 Calculation Calculate the ignition loss of the sample from the following equation:

$$ig.\ loss = \frac{m'}{m} \times 100$$

where, $ig.\ loss$: ignition loss (%)

m : loss in mass (g)

m' : mass of the sample (g).

7. Determination of Insoluble Residue

7.1 Summary Dissolve the sample into hydrochloric acid and sodium carbonate solution, neutralize using hydrochloric acid and filtrate. Ignite the residue and weigh its mass.

7.2 Reagents The reagents to be used shall be as follows.

(1) Hydrochloric acid (1 + 1)

(2) Sodium carbonate solution (5 w/v %)

(3) Methyl red indicator (0.2 w/v % ethyl alcohol solution)

7.3 Mass of Sample to Be Weighed Out Weigh out approximately 1 g of the sample correctly to the nearest 0.1 mg.

7.4 Procedure The determination shall be carried out in the following order:

(1) Put the sample in a dried 200-ml beaker, add approximately 20 ml of water, and further add 10 ml of hydrochloric acid (1 + 1) to dissolve the sample while stirring with a glass rod to disperse the sample. In this case, warm the solution gently if necessary, and mash the undissolved lumps with the tip of the glass rod to dissolve the soluble matter completely.