ARIZ 238a
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(3 Pages)

PERCENT CARBONATES IN AGGREGATE

(An Arizona Method)

SCOPE

1. (a) This test method describes the procedure for determining the percentage of carbonates in aggregate. A combination of hydrogen peroxide and nitric acid is used to react with the carbonates.

(b) This test method involves hazardous material, operations, and equipment. This test method does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

(c) See Appendix A1 of the Materials Testing Manual for information regarding the procedure to be used for rounding numbers to the required degree of accuracy.

(d) Metric (SI) units and values are shown in this test method with English units and values following in parentheses. Values given for metric and English units may be numerically equivalent (soft converted) for the associated units, or they may be given as rounded or rationalized values (hard converted). Either the metric or English units along with their corresponding values shall be used in accordance with applicable specifications. See Appendix A2 of the Materials Testing Manual for additional information on the metric system.

APPARATUS AND MATERIALS

2. Requirements for the frequency of equipment calibration and verification are found in Appendix A3 of the Materials Testing Manual. Apparatus and materials for this test procedure shall consist of the following:

(a) Drying apparatus - Any suitable device capable of drying samples at a temperature of 110 ± 5 °C (230 ± 9 °F).

(b) 1000 mL heavy duty beaker.

(c) Hydrogen Peroxide (3% solution) - H_2O_2.

(d) Nitric Acid (concentrated) - HNO_3.

(e) Distilled water.

(f) A balance or scale capable of measuring the maximum weight to be determined and conforming to the requirements of AASHTO M 231, except the readability and sensitivity of any balance or scale utilized shall be at least 0.1 gram.

(g) Neutral Litmus Paper.

(h) Glass or Plastic Stirring Rod.

SAMPLE PREPARATION

3. Prepare the sample according to the following:

(a) For material samples from stockpile(s), obtain a representative 300 ± 10 gram sample of plus 4.75 mm (No. 4) material. Wash the sample over a 4.75 mm (No. 4) sieve and discard minus 4.75 mm (No. 4) material.

(b) For uncrushed material samples, obtain a representative sample and crush to appropriate grading. Obtain a representative 300 ± 10 gram sample of plus 4.75 mm (No. 4) material. Wash the sample over a 4.75 mm (No. 4) sieve and discard minus 4.75 mm (No. 4) material.

(c) The prepared sample shall be oven dried to constant weight at 110 ± 5 °C (230 ± 9 °F).

TEST PROCEDURE

4. (a) Allow sample to cool and place in a tared 1000 mL beaker. Weigh and record the weight of aggregate as the "weight of original sample" or "A" to the nearest 0.1 gram.

(b) Under a fume hood, add approximately 300 mL of H_2O_2 (3% solution) and stir. When the bubbling subsides, begin adding small amounts (approximately 10 mL) of concentrated HNO_3 to the beaker. Bubbling will be vigorous as the carbonates are being dissolved. Stir occasionally.

(c) When the bubbling has ceased and addition of HNO_3 causes no more bubbles, begin to wash by decantation, using distilled water. Care shall be taken not to lose any of the coarse aggregate. Wash by decantation at least 4 times. At this point, neutral litmus paper in the water should show only slight pink.

(d) Decant the water and oven dry to constant weight at 110 ± 5 °C (230 ± 9 °F).

(e) Let cool, weigh, and record the weight of aggregate as the "weight of non-reactive aggregate" or "B" to the nearest 0.1 gram.

CALCULATIONS

5. (a) Calculate the percent of carbonates as follows:

$$\text{Percent of Carbonates} = \frac{A - B}{A} \times 100$$

Where: A = weight of original sample
B = weight of non-reactive aggregate

(b) Report the percent of carbonates to the nearest 1%.