
Standard Method of Test for

Quality of Water to Be Used in Concrete

AASHTO Designation: T 26-79 (2008)



1. SCOPE

- 1.1. This specification covers determination of the acidity or alkalinity in water to be used in concrete.

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards:*

- T 106M/T 106, Compressive Strength of Hydraulic Cement Mortar (Using 50-mm or 2-in. Cube Specimens)
- T 107M/T 107, Autoclave Expansion of Hydraulic Cement
- T 131, Time of Setting of Hydraulic Cement by Vicat Needle
- T 154, Time of Setting of Hydraulic Cement Paste by Gillmore Needles

2.2. *ASTM Standards:*

- D 512, Standard Test Methods for Chloride Ion In Water
- D 516, Standard Test Method for Sulfate Ion in Water

2.3. *Other Documents:*

- *Industrial and Engineering Chemistry*, Vol. V, No. 5, p. 336
- *Scott's Standard Methods of Chemical Analysis, Sixth Edition* (1963), Vol. II, p. 2388

3. ACIDITY AND ALKALINITY

- 3.1. The acidity or alkalinity shall be determined by one of the following methods, A or B. If extreme accuracy is desired, the method under "B" should be used.

3.1.1. *Method A:*

- 3.1.1.1. The acidity or alkalinity shall be determined with standard solutions of one-tenth normal alkali or acid, respectively, using not less than 200 mL of the water under examination. Phenolphthalein or methyl orange should be used as an indicator. Excessive acidity or alkalinity indicates the necessity for further tests.

3.1.2. *Method B:*

- 3.1.2.1. The hydrogen ion concentration shall be determined either by electrometric or colorimetric method in conjunction with the necessary indicator and shall be expressed in pH units ($\text{pH} = \log \frac{1}{[\text{H}^+]}$). When the pH of the water is less than pH 4.5 or more than pH 8.5, further tests should be made. (The pH value of the solution is the logarithm of the reciprocal of the hydrogen ion concentration (H^+) in moles per liter. For example, a solution of 4.5 pH has a hydrogen ion concentration of $10^{-4.5}$).

- 3.1.2.2. The procedure for securing pH values shall be regulated entirely by the method used; that is, either by electrometric or colorimetric methods. The procedure to be followed in making the determinations shall be based on the type of apparatus used and in accordance with the methods and instruction furnished by the manufacturer for the particular type of apparatus in use. The apparatus used, either colorimetric or electrometric, shall have a working range suitable for the test being performed.
- 3.2. *Chloride Ion Concentration*—The chloride ion concentration shall be determined by ASTM D 512.

4. REFEREE METHOD B

- 4.1. *Sulfate Ion Concentration*—The sulfate ion concentration shall be determined by ASTM D 516, Referee method (gravimetric).

5. TOTAL SOLIDS AND INORGANIC MATTER

- 5.1. Evaporate 500 mL of the water to dryness in a dish. For this purpose, a platinum dish of 100 to 200 mL capacity is found most convenient. The dish shall be nearly filled with water and placed on a water bath, additional portions of the sample of water being added from time-to-time until 500 mL have been used. The contents of the dish shall be evaporated to dryness, then placed in an oven at 132°C (270°F) and baked for 1 h. The dish and contents shall then be cooled in a desiccator and the mass determined. The mass of the residue in grams divided by five is the percentage of total solids in the water.
- 5.2. The total solids obtained as described may consist of organic matter, or inorganic matter, or of combinations of organic and inorganic matter. The platinum dish shall be ignited at low red heat; the darkening of the residue during the early stage of the ignition usually indicates the presence of organic matter. The percentage loss on ignition at low red heat will usually be an indicator of the amount of organic matter, but it should be noted that some mineral salts tend to volatilize or partly decompose on heating.
- 5.3. The determination of the composition of the mineral matter in the water requires a complete chemical analysis and is not generally undertaken except when the percentage of total solids is large, or the water appears to give abnormal tests in other respects. When the mineral analysis is desired, the procedure starting on page 2388 of *Scott's Standard Methods of Chemical Analysis* should be used. The results should be reported as the separate constituents in parts per million. If the hypothetical combination into salts is desired, the method given by Scott, or the method given on page 336 of *Industrial and Engineering Chemistry*, should be used.
- 5.4. A comparison of the given water with distilled water can be obtained in accordance with T 107M/T 107, T 131, or T 154 and T 106M/T 106 tests, using the same cement of standard quality with each water. (Suggested limits for the last named tests are as follows: Any indication of unsoundness, marked change in time-of-setting, or a reduction of more than 10 percent in strength from results obtained with mixtures containing the water of satisfactory quality shall be sufficient cause for rejection of the water under test).