

# Australian Standard®

AS 1289.4.3.1

## Methods of testing soils for engineering purposes

### Method 4.3.1: Soil chemical tests— Determination of the pH value of a soil— Electrometric method

**1 SCOPE** This Standard covers the electrometric determination of the pH value of a soil-suspension (see Notes 1 and 2).

**2 REFERENCED DOCUMENTS** The following documents are referred to in this Standard:

AS

1152 Specification for test sieves

1289 Methods of testing soils for engineering purposes

1289.1 Method 1: Preparation of disturbed soil samples for testing

**3 APPARATUS** The following apparatus is required:

- (a) A pH meter covering the range pH 3.0 to pH 10.0 fitted with a glass electrode and a calomel reference electrode which may be incorporated in one probe (see Note 3) and a scale readable and accurate to 0.05 pH units. The manufacturer's instructions should be followed.
- (b) A balance of at least 100 g capacity with a limit of performance not greater than  $\pm 0.005$  g.
- (c) Three 100 mL glass beakers with cover glasses and stirring rods.
- (d) Two 500 mL volumetric flasks.
- (e) A wash-bottle, preferably plastic, containing deionized, or distilled water.
- (f) Sieve, 2.36 mm, complying with AS 1152.

**4 REAGENTS** The following reagents of recognized analytical reagent quality are required:

- (a) *Buffer solutions*—pH 4.0, pH 9.2 and other pH levels as required (see Note 4).
- (b) *Potassium chloride*—Saturated solution (for maintenance of calomel electrode).

**5 PROCEDURE** The tests shall be performed within the temperature range of 15-25°C and the procedure shall be as follows:

- (a) Obtain a sample which has been prepared in accordance with the procedure prescribed in AS 1289.1 for the preparation of disturbed samples for testing. Sieve this material on the 2.36 mm sieve. From the material passing the sieve obtain, by riffing or quartering, a sample of about 35 g.

- (b) Transfer exactly 30 g of the sample into a 100 mL beaker and add 75 mL of deionized or distilled water. Stir the suspension for a few minutes, then cover the beaker with a cover glass and allow it to stand for several hours (see Note 5). Stir it again immediately before testing.
- (c) Calibrate the pH meter by means of the standard buffer solutions (see Note 4), following the procedure recommended by the manufacturer.
- (d) Wash the electrodes with distilled water and immerse in the soil-suspension. Take two or three readings of the pH of the soil-suspension with brief stirring between each reading. These readings should not differ by more than 0.05 pH units (see Note 6).
- (e) Remove the electrodes from the suspension and wash with deionized or distilled water. Check the calibration of the pH meter against one of the standard buffer solutions. If the instrument is out of adjustment by more than 0.05 pH units, set it to the correct adjustment and repeat the procedure given in Step (d) until consistent readings within 0.1 units, are obtained.
- (f) When not in use leave the electrodes standing in a beaker of deionized or distilled water.

**6 TEST REPORT** Report as follows:

- (a) The pH value of the soil-suspension to the nearest 0.1 pH unit.
- (b) The number of this Standard, i.e. AS 1289.4.3.1.

**NOTES ON TEST:**

- 1 **Soil-to-water ratio** The pH value of a soil-suspension varies with the ratio of soil to water and an increase in dilution will cause an increase in pH. When more water is needed to achieve a workable slurry (e.g. high liquid limit clays) the ratio shall be reported.
- 2 **pH of groundwater** The pH value of a sample of groundwater can be measured in a similar manner to that used for a soil-suspension.
- 3 **Soils with high pH values** With some stabilized soils and some naturally occurring soils having a pH in excess of 10, an electrode reading to pH 13.0 is necessary since other electrodes would be adversely affected.
- 4 **Buffer solution** A buffer solution that has a pH within 2 pH units of the soil being measured should also be used.
- 5 **Standing time limit** For stabilized soils, the standing time should be not more than 2 h; otherwise irreversible changes may take place in the stabilizers.
- 6 **Use of pH meter** The pH readings of the soil-suspension should reach a constant value in about 1 min. No readings should be taken until the pH meter has reached equilibrium.