



Transport
Roads & Maritime
Services

Test method T1031

Determination of total potential acidity of
acid sulphate soils

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Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
		Reformatted and Revision Summary Added	D. Dash	Jun 2001
Ed 2/ Rev 0	All	Reformatted RMS template	J Friedrich	November 2012

Note that Roads and Maritime Services is hereafter referred to as 'RMS'.

The most recent revision to Test method T1031 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T1031

Determination of total potential acidity of acid sulphate soils

1. Scope

This test method sets out the procedure for determining the total potential acidity of acid sulphate soil arising from the presence of pyrite in soil. From these results and the results for total actual acidity, the total sulphidic acidity can be calculated. The method is derived from the procedure given in Technical Report No. 53 (1993), CSIRO Centre for Environmental Mechanics.

2. General

Term	Definition
Total Potential Acidity (TPA)	(a) Is the amount of acid in a sample after peroxide oxidation. it gives a measure of the amount of acid that could be generated if the sample was totally oxidized.
Total Actual Acidity (TAA)	(a) Is the amount of acid in a 1:5 soil: KCl solution extract before peroxide treatment, present in the sample.
Total Sulphidic Acidity (TSA)	(a) Is a quantitative measure of the acid sulphate hazard and is determined by the relationship $TSA = TPA - TAA$

3. Apparatus

- (a) Balance of 200 g Capacity, accurate and readable to 0.0001g
- (b) Thermostatically controlled oven capable of maintaining a temperature of 75-80°C.
- (c) Laboratory glassware such as beakers, conical flasks, volumetric flasks, pipettes etc.
- (d) Buchner funnel and filter flask.
- (e) Filter paper to suit Buchner funnel.
- (f) pH meter
- (g) Auto titrator (optional) Burette, capacity 50 mL
- (h) AS sieves, 2.36 mm and 600µm
- (i) Metal mixing and quartering tray or riffle box
- (j) Magnetic stirrer and bar
- (k) Steam bath

4. Reagents

- (a) Potassium chloride solution 1M; weigh 18.64 g AR grade potassium chloride and make up to volume with deionized water, in a 250 mL volumetric flask.
- (b) Standard sodium hydroxide solution, 0.5M; weigh 10.0 g AR grade sodium hydroxide and make up to volume with deionized water, in a 500 mL volumetric flask. Standardize against standard hydrochloric acid solution using bromophenol blue indicator.
- (c) Hydrogen peroxide, 30% solution.
- (d) Standard buffers of pH4 and pH7.

5. Sample Preparation

- (a) Dry the sample at 75-80°C in the oven. Sieve the material to pass 2.36 mm breaking up aggregations but avoiding breaking up discrete particles.

- (b) By riffing or quartering obtain from the material passing the 2.36 mm sieve about 50 g of material, avoiding the loss of fines.
- (c) Crush or grind this portion to pass 0.600 mm sieve and mix well.

6. Procedure

- (a) Weigh accurately, about 5 g of soil (W) passing 600 μ m sieve into a conical flask (250 mL flask for material with minimal oxidizable material, 500 mL flask for maximal samples)
- (b) Add 25 mL of 1M potassium chloride solution to the flask and mix by swirling.
- (c) Add 20 mL of 30% hydrogen peroxide in increments of about 5 mL to the flask, swirl and place on a warm steam bath. Continue oxidation overnight at low temperature. Care needs to be taken to avoid excessive frothing during initial oxidation of the sample.
- (d) Test for complete oxidation with a few drops of peroxide.
- (e) Filter the sample on a Buchner funnel and transfer the filtrate to a 250 mL beaker.
- (f) Make up to approximately 100 mL with deionized water.
- (g) Standardize the pH meter with pH4 and pH7 buffers following the manufacturers recommended procedure.
- (h) Place the beaker and contents on the magnetic stirrer, immerse the stirrer bar and set to a slow stirring motion.
- (i) Insert the pH electrode into the liquid in the beaker and position the burette filled with standard 0.5M sodium hydroxide solution over the beaker.
- (j) Titrate with standard 0.5M sodium hydroxide solution only adding the next increment when the pH becomes steady. Titrate to pH = 5.5. Alternatively setup the auto titrator according to the manufacturers instructions and titrate to the preset value of pH = 5.5.
- (k) Note the volume of standard sodium hydroxide used for the titration.

7. Calculations

- (a) Calculate the Total Potential Acidity (TPA) of the soil sample as follows

$$TPA = \frac{V \times M}{W} \text{ (mole/kg)}$$

Where

V = volume of standard sodium hydroxide solution, mL

M = molarity of standard sodium hydroxide solution

W = mass of soil sample, grams

- (b) If required the Total Sulphidic Acidity (TSA) which is a quantitative measure of the acid sulphate hazard can be calculated from the following:

$$TSA = TPA - TAA$$

Where

TAA = total actual acidity (Test Method T1030)

8. Reporting

- (a) Report the Total Potential Acidity of the soil in mole/kg to the nearest 0.01 mole/kg.