



Transport
Roads & Maritime
Services

Test method T1021

Soluble phosphorus content of soils

NOVEMBER 2012



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 T1021 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T1021

Soluble phosphorus content of soils

1. Scope

This test method sets out the procedure for determination of the presence and amount of soluble phosphates present in soils proposed for use as topsoils.

2. Apparatus

- (a) Laboratory glassware including pipettes, volumetric flasks etc.
- (b) A balance of 200 g capacity, accurate and readable to 0.0001 g.
- (c) An ultra-violet spectrophotometer capable of reading in the range of 820 - 840 nm.
- (d) 10 mm cells for the spectrophotometer.
- (e) Filter paper, Whatman No. 42.
- (f) A 2.36 mm AS sieve.

3. Reagents

- (a) Extracting Solution
Dissolve 2.22 g ammonium fluoride in approximately 1.5 litres of water. Add 5 mL of 10N HCl. Dilute to 2 litres.
- (b) Sulphuric Acid Solution (5N)
Add 139 mL 36N H₂SO₄ slowly to 500 mL of water with stirring. Dilute to 1 litre.

CAUTION: Sulphuric acid can cause severe burns. Avoid contact with eyes, skin and clothing. Always dilute by carefully adding acid to water - NEVER THE REVERSE. Always wear safety glasses when handling acid.

- (c) Mixed Reagent
Dissolve 12 g ammonium molybdate in 250 mL water and heat to 60°C. Dissolve 0.2908 g potassium antimony tartrate in 100 mL water and add to the ammonium molybdate solution. Add 1 litre of 5N sulphuric acid solution. Dilute to 2 litres. This reagent keeps well and hence can be made up as a stock solution.
- (d) Ascorbic Acid Mixed Reagent
Dissolve 1.056 g ascorbic acid in 200 mL of the mixed reagent on the day that it is to be used.
- (e) Standard Phosphate Solution
Dissolve 0.2195 g of potassium dihydrogen phosphate in 5 mL of 5 N sulphuric acid solution and dilute to 1 litre. This solution keeps well and hence can be made up as a stock solution.

4. Procedure

- (a) Weigh 2.85 g of air dried soil (passing a 2.36 mm sieve) into a 50 mL conical flask.
- (b) Add 20 mL of extracting solution and shake for one minute.
- (c) Filter immediately through No. 42 filter paper.
- (d) Transfer a 10 mL aliquot into a 50 mL volumetric flask and add approximately 25 mL of distilled water.
- (e) Add 8 mL of ascorbic acid mixed reagent.
- (f) Dilute to 50 mL with distilled water, shake and allow the blue colour to develop for one hour at a room temperature above 20°C

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- (g) Dilute 10 mL of the standard phosphate solution to 100 mL. Place 10 mL, 8 mL, 6 mL, 4 mL and 2 mL of the diluted solution in separate 50 mL volumetric flasks and mark 50 ppm, 40 ppm, 30 ppm, 20 ppm and 10 ppm respectively.
 - (h) Add 10 mL of extracting solution to each of these flasks and add approximately 25 mL distilled water.
 - (i) Add 8 mL ascorbic acid mixed reagent.
 - (j) Dilute to 50 mL with distilled water, shake and allow the blue colour to develop for one hour at a room temperature above 20°C.
 - (k) Read the optical density of the sample solution and standard solutions at the wavelength of maximum absorption (about 830) on the spectrophotometer.
 - (l) Plot the optical density against the strength of solution (as ppm phosphorus) for the standards. determine the strength of the sample solution from this graph.

5. Calculations and Reporting

Divide the strength of the sample solution determined from the graph by 2.85. Express this result as "ppm soluble soil phosphorus per gm of soil".

6. Note

- (a) Experience indicates that blue colours develop at a faster rate in the soil solutions than in the standard.
- (b) Gross errors may occur if the optical density of the solutions are measured before proper development of the colours.
- (c) If the optical density of the sample solution is greater than the 50 ppm standard, repeat the test using a smaller mass of soil until that particular mass gives a result between 4 - 10 ppm phosphorus. Divide this result by the mass of soil taken and express this as "ppm soluble soil phosphorus per gm of soil" in the report, stating also that a smaller mass of soil was used in the determination.