

ORGANO- PHOSPHONATE (OP)

TEST FOR ORGANOPHOSPHONATE IN COOLING WATER

Photometer Method

**AUTOMATIC
WAVELENGTH
SELECTION**

0 – 20 mg/l PO₄

The use of organophosphonate compounds as inhibitors in cooling systems has become widespread in recent years. It is essential to monitor the active organophosphonate content of the cooling water to ensure the treatment is fully effective.

The Palintest OP test provides a reliable means of monitoring organophosphonate levels over the range 0 - 20 mg/l PO₄. The test has been developed for use with commercially available organophosphonate products such as those based on amino trimethyl phosphonic acid and hydroxyethane diphosphonic acid.

Method

In the Palintest OP test, organophosphonates are first converted to orthophosphate by a catalysed cold oxidation process. Excess oxidising agent is removed from the sample by precipitation and filtration. The orthophosphate formed in the reaction is then determined using the 'molybdenum blue' method. The reagents for the procedure are provided in tablet form and the test is simply carried out by adding the appropriate tablets in sequence to a diluted sample of the water.

The intensity of the blue coloration formed in the test is proportional to the organophosphonate concentration and is determined using a Palintest Photometer.

A separate correction procedure is applied to those samples known or suspected to contain orthophosphate. This compensates for the orthophosphate originally present in the sample so that a true value for organophosphonate concentration can be obtained.

Reagents and Equipment

Palintest Oxidising OP Tablets

Palintest OP-A Tablets

Palintest OP-B Tablets

Palintest OP-AX Tablets

Palintest Automatic Wavelength Selection Photometer

Palintest Test Tube, 20 ml plastic (PT 526)

Round Test Tubes, 10 ml glass (PT 595)

A filtration is required during the course of this procedure. The use of Palintest Filtration Kit (PT 600) is recommended for this purpose. Alternatively, standard laboratory equipment with Whatman GF/B or equivalent papers may be used.

Correction Procedure

The photometer is programmed for both Organophosphonate and correction calibrations, and will automatically calculate the corrected organophosphonate concentration. Use program Phot 44 Organophosphonate, then select the 'Follow On' option on screen to continue test for program Phot 45 Correction Factor.

Sample Preparation and Dilution

- 1 Filter sample if necessary to obtain a clear solution.
- 2 Prepare x5 dilution of the sample using the Palintest dilution tube.

This diluted sample is used for both the Organophosphonate and correction procedures. The test calibrations take this dilution into account - it is not necessary to apply a dilution factor in the result calculation.

Test Procedure - Organophosphonate

- 1 Fill the plastic test tube with **diluted** sample to the 20 ml mark.
- 2 Add one Oxidising-OP tablet. Replace screw cap and shake tube until tablet dissolves.
- 3 Allow the tube to stand for five minutes.
- 4 Add one OP-A tablet. Replace screw cap and shake tube until tablet dissolves.
- 5 Allow the tube to stand for two minutes.
- 6 Filter a portion of the solution into a round glass test tube filling to the 10 ml mark.
- 7 Add one OP-B tablet, crush tablet and mix to dissolve.
- 8 Stand for five minutes to allow full colour development.
- 9 Select Phot 44 on Photometer.
- 10 Take Photometer reading in the usual manner (see Photometer instructions).

The test may be terminated at this stage if the original sample is known not to contain orthophosphate.

Test Procedure - Correction Factor

If it is suspected that the sample contains orthophosphate, carry out the following correction procedure. On the photometer, select the 'Follow On' option on screen to continue the test program.

- 1 Fill a round glass test tube with diluted sample to the 10 ml mark.
- 2 Add one OP-AX tablet. Crush and mix to dissolve.
- 3 Add one OP-B tablet. Crush and mix to dissolve.
- 4 Stand for five minutes to allow full colour development.
- 5 Take Photometer reading in the usual manner.
- 6 The instrument displays the corrected organophosphonate concentration as active PO_4 .

Interferences

Chloride in excess of 350 mg/l will cause low results for organophosphonate. Samples containing chloride levels in excess of this value should be further diluted prior to the start of the test.

Note

The results of this test are expressed in terms of mg/l (ppm) active phosphate content. Commercially available products are normally sold as aqueous formulations with a given active content. To utilise the test results, regard must be paid to the active content of the product in use.
