

## PHOSPHATE METHOD 7

### Using Vanadomolybdate Single Reagent

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#### PRINCIPLE OF THE METHOD

In the presence of vanadates, phosphates react with molybdates to form yellow phosphovanadomolybdate. The intensity of this yellow colour, which is proportional to the amount of phosphate present, is determined by comparison with a series of Lovibond permanent colour glass standards. If the boiler water is coloured by the presence of organic matter, this is removed before the test by treatment with a suitable oxidising agent.

#### REAGENTS REQUIRED

1. **Vanadomolybdate Reagent**

Solution A: 20g. of ammonium molybdate tetrahydrate ((NH<sub>4</sub>)<sub>6</sub>Mo<sub>7</sub>O<sub>24</sub>·4H<sub>2</sub>O) dissolved in 250ml. of deionised water.

Solution B: 1g. of ammonium metavanadate (NH<sub>4</sub>VO<sub>3</sub>) dissolved in 40ml. of nitric acid (sp. gr. 1.42) and 200ml. of deionised water.

Mix solutions A and B, add 100ml. nitric acid (sp. gr. 1.42) and dilute to 1 litre with water.

This final solution is available ready prepared (Order code for 1 litre: - 468404)

2. **Oxidising Mixture**

Intimately mix, by grinding in a mortar, 100g. of potassium persulphate (K<sub>2</sub>S<sub>2</sub>O<sub>8</sub>) and 60g. of sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>), and sieve through a 40 mesh sieve.

#### THE STANDARD LOVIBOND COMPARATOR DISC 3/60

This disc covers the range 10 to 100mg./l. of phosphate calculated as PO<sub>4</sub>, in 9 steps of 10, omitting 90, and is used with 13.5mm./10ml. moulded cells.

#### METHOD

1. Filter some of the sample through a No.42 Whatman filter paper into a 50ml. stoppered measuring cylinder. Use the first few ml. of filtrate to rinse the cylinder, and then collect between 20 and 25ml. of sample.
2. Add an equal volume of vanadomolybdate reagent (reagent 1). Stopper the cylinder and mix the contents.
3. Rinse a 13.5mm./10ml. moulded cell with this mixture then fill the cell to the 10ml. mark and place it in the right hand compartment of the Comparator.
4. To a second 10ml. moulded cell add 5ml. of reagent 1 and 5ml. deionised water and mix. Place this cell in the left hand compartment of the Comparator.
5. Leave to stand for at least 3 minutes to allow full colour development.
6. Hold the Comparator against a standard white light source such as the Lovibond Daylight 2000 Unit or, failing this North daylight.
7. Rotate the disc until the nearest colour match is obtained. Read off the phosphate concentration in mg./l. from the bottom right hand corner of the Comparator.

8. If the colour is deeper than the top step of the disc, dilute some of the filtered sample by a suitable factor using deionised water, mix well and repeat the test using the diluted sample. Multiply the disc reading by the dilution factor to obtain the phosphate concentration of the undiluted sample.
9. If the original water sample is coloured, measure 50ml. into a 150ml. beaker, add 1-2g. of reagent 2, boil until colourless, cool and make up to the 50ml. with deionised water. Filter through No.42 Whatman filter paper and proceed as above.

## **NOTE**

This test was developed in collaboration with the Water Treatment Section, Technical Service Department of Albright and Wilson (Mfg.) Ltd.

## **REVISION HISTORY**

<b>Date</b>	<b>Change Note</b>	<b>Issue</b>
18/06/02	36/460	2
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