

MOLYBDATE METHOD 2

Using 1, 2 Dihydroxybenzene 3, 5 Disulphonic Acid

INTRODUCTION

The use of Molybdates is gaining in popularity as non toxic corrosion inhibitors in cooling towers. Low concentrations are used in closed cooling systems.

PRINCIPLE OF THE METHOD

Molybdates react with 1, 2 dihydroxybenzene 3, 5 disulphonic acid disodium salt (TIRON) in neutral solutions to produce a yellow colour. The intensity of this is proportional to the molybdate concentration measured by comparison with Lovibond permanent colour glass standards.

Any dissolved iron present will interfere and this is prevented by its prior removal using an ion exchange resin.

REAGENTS REQUIRED

1. **Molybdate Reagent MB1**
2. **Molybdate Reagent MB2**
3. **CM Cartridge**
4. **Calcium Hardness Buffer CH2**

THE STANDARD LOVIBOND COMPARATOR DISC 3/162

This disc covers the range 0 - 10mg./l Molybdate as MoO₄ in steps of 0, 1, 2, 3, 4, 5, 6, 8, and 10mg./l. It is used with 40mm.cells.

METHOD

1. Fill two 40mm. cells to the 20ml. mark with sample and place one cell in the left-hand compartment of the Comparator. This acts as a blank for any inherent colour or turbidity present.
2. To the other cell add 10 drops Molybdate Reagent MB1 and mix with a clean stirring rod.
3. Add one heaped scoop (red) of Molybdate Reagent MB2 and mix well until dissolved. If Molybdate alone is present the solution will turn yellow. Allow to stand for 5 minutes for full colour development.
4. If the sample also contains IRON, an orange colour will be given. In this case, the test should be stopped and the supplementary procedure followed: - see below.
5. After the 5 minutes standing period, put the cell in the right-hand compartment of the Comparator. Match the colour produced in the test against the disc by holding the Comparator facing a standard source of white light, such as the Lovibond Daylight 2000 Unit, or against North Daylight (South Daylight in the Southern Hemisphere). Rotate the disc until the nearest colour match is obtained.
6. Read off the concentration of Molybdate in mg./l., as MoO₄, from the bottom right-hand corner of the Comparator.

SUPPLEMENTARY RESIN PROCEDURE (FOR IRON REMOVAL)

1. Rinse out & then fill a 20ml.syringe with deionised water.
2. Pass 5ml. of deionised water through the CM cartridge using this syringe. Discard the water to waste.
3. Rinse out & then fill the syringe with fresh sample and attach the CM cartridge.
4. Push the sample slowly (dropwise) through the cartridge and collect the 'iron-free' sample in a clean 40mm. cell.
5. Fill the cell to the 20ml and proceed from step 2 in the test procedure above.

REGENERATION OF CARTRIDGE

- a) In a cell add 25 drops of calcium hardness buffer (CH2) or 4M sodium hydroxide, to 5ml. of deionised water.
- b) Attach the syringe to the CM cartridge and pour the above liquid into the syringe.
- c) Pass the solution through the cartridge dropwise and discard the effluent to waste.
- d) Rinse the CM cartridge with three or four 5ml. portions of deionised water. The cartridge is now ready for re-use.

Note: Discard the cartridge after 10 tests.

NOTES

1. If the sample is cloudy, filter to remove suspended solids.
2. The test should always be carried out on a fresh sample as molybdate will be absorbed onto the wall of storage containers.
3. If the colour produced in the test is darker than the top step of the disc pour some of the test solution into a 13.5mm./10ml. moulded cell and match again. The concentration of $\text{Mo O}_4 = \text{Disc Reading} \times 3\text{mg /l.}$

REVISION HISTORY

Date	Change Note	Issue
17/06/02	36/460	2
23/03/05	CA243	3
11/10/06	JC76	4