QUATERNARY AMMONIUM COMPOUNDS (QAC)

INTRODUCTION

Quaternary Ammonium Compounds at levels up to 20mg./l. are used as algicides in swimming pools, cooling towers, and in other similar industrial water systems. QAC's are also extensively used at levels around 200mg./l. as germicides in sanitising applications, such as dishwashing rinse water and washing of utensils and equipment.

PRINCIPLE OF THE METHOD

QAC's react with an indicator of the sulphonaphthalein type to give a blue colour in solutions buffered to the correct pH. The solution of the reagent itself is yellow and thus, over the ranges of concentrations covered, the colours show a distinct change from yellow, through green, to blue. The colour produced, which is proportional to the QAC concentration, is measured by comparison against Lovibond permanent colour glass standards. For maximum stability and convenience in practice, the reagents are supplied in tablet form.

Commercial products contain different types of quaternary ammonium compounds, normally in aqueous solutions of varying concentrations, which may be formulated with other ingredients.

For the purpose of disc calibration, a recognised standard QAC was used, consisting of n-alkyl (50% C_{14}, 40% C_{12}, 10% C_{16}) dimethyl benzylammonium chloride. The two discs listed below have been calibrated as mg./l. "Active" QAC (Note 3)

REAGENTS REQUIRED

1. **Lovibond Acidifying GP Tablets**

2. **Lovibond QAC Low Range Tablets (for Disc 3/118)**

3. **Lovibond QAC High Range Tablets (for Disc 3/119)**

THE STANDARD LOVIBOND COMPARATOR DISCS 3/118 and 3/119

Disc 3/118 covers the range 0 to 20mg./l. "Active" QAC in steps of: 0, 2, 4, 6, 8, 10, 12, 15 and 20mg./l. and is used with 40mm. cells.

Disc 3/119 covers the range 0 to 200mg./l. "Active" QAC in steps of: 0, 20, 40, 60, 80, 100, 120, 150 and 200mg./l. and is used with 13.5mm./10ml. moulded cells.

METHOD FOR DISC 3/118

1. Place a 40mm. cell, containing sample only in the left-hand compartment of the Comparator. Rinse a similar cell with the water sample and then fill to the 20ml. calibration mark.

2. Add one Acidifying GP tablet and one QAC Low Range tablet. Crush the tablets thoroughly with a flat-ended stirring rod and then mix rapidly for about 15 seconds to dissolve the remains of the tablets (any undissolved particles should then be allowed to settle out).

3. Place the cell in the right-hand compartment of the Comparator and immediately match the colour, by holding it against a standard source of white light, such as the Lovibond Daylight 2000 Unit, or against North daylight (not fluorescent lighting), then rotating the disc until the nearest colour match is obtained.

4. The figure displayed in the indicator window is the concentration, in mg./l., of "Active" QAC in the sample.

METHOD FOR DISC 3/119

The procedure is similar to that for disc 3/118 above, except that 13.5mm./10ml. moulded cells are used. In using these, first fill the cell to the 10ml. mark, and then add one Acidifying GP tablet and one QAC High Range tablet. Crush tablets, mix rapidly to dissolve and match colours immediately, as before.

NOTES

1. Disc 3/118 was calibrated using a simulated swimming pool water of typical composition (200mg./l. calcium hardness, 120 mg./l. alkalinity, both as calcium carbonate).

2. With disc 3/119, the buffering action of the tablets should be adequate for all solutions likely to be encountered. If not, the sample should be suitably adjusted to a pH within the range 2.5 to 3.0. For solutions of very high alkalinity, this may be achieved simply by using two Acidifying GP tablets, instead of one.

3. The results are given in terms of "Active" QAC. Commercially available products are normally sold as aqueous formulations with a given "Active" QAC content. To calculate the dosage of commercial products from the test result, due regard must be paid to the active content of the product in use.

4. The cells and stirring rod may become tinted blue after prolonged use. This stain can be removed by immersing the articles in a dilute solution of household detergent for a short time. This must be thoroughly rinsed off afterwards, or future test results will be affected.

REVISION HISTORY

Date	Change Note	Issue
19/06/02	36/460	2
13/04/05	CA243	3
02/11/06	JC108	4