

## OZONE METHOD 1

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### PRINCIPLE OF THE METHOD

Ozone reacts rapidly with iodide ions to produce free iodine, which in the presence of DPD gives a stable red colour. Agents able to oxidise iodide ion such as chlorine, bromine, hydrogen peroxide and oxidised manganese must be absent.

In swimming pools Ozone is usually used with a primary disinfectant like chlorine or bromine so a supplementary procedure is provided for the separate determination of these residuals.

### REAGENTS REQUIRED

#### Comparator Tests:

1. Lovibond DPD No. 4 Comparator Tablets (or No.1 and No.3 used together)
2. Lovibond Glycine Tablets (For Chlorine and Bromine separation)

#### Nessleriser Tests:

1. Lovibond DPD No. 4 Nessleriser Tablets (or No.1 and No.3 used together)
2. Lovibond Glycine Tablets (for Chlorine and Bromine separation)

### THE STANDARD LOVIBOND COMPARATOR DISCS 3/67A, 3/67S and 3/67

Disc 3/67A covers the range 0.01 to 0.10mg./l. of Ozone (O<sub>3</sub>) in steps of 0.01, omitting the 0.09 step, and is used with 40mm./20ml. cells.

Disc 3/67S covers the range 0.05 to 0.45mg./l. of Ozone (O<sub>3</sub>) in steps of 0.05, and is used with 13.5mm./10ml. moulded cells.

Disc 3/67 covers the range 0.1 to 1.0mg./l. of Ozone (O<sub>3</sub>) in steps of 0.1, omitting the 0.9 step, and is used with 13.5mm./10ml. moulded cells.

### THE STANDARD LOVIBOND NESSLERISER DISC NOR

Disc NOR covers the range 0.01 to 0.3mg./l. of Ozone (O<sub>3</sub>) in steps of 0.01, 0.02, 0.04, 0.06, 0.10, 0.15, 0.20, 0.25 and 0.30mg./l. and is used with 50ml. Nessler cylinders.

### METHOD

#### Comparator

##### A) Residual Ozone (in absence of Residual Chlorine or Bromine):

1. Select the appropriate disc and cells for the test.
2. Rinse one cell with the sample and leave in a few drops.
3. Add one DPD No. 4 tablet (or a No.1 and No.3 together) and crush with a clean stirring rod. If the 40mm./20ml. cells are being used, two DPD No.4 tablets, or their equivalent, are required.
4. Carefully fill the cell to the correct volume (10ml. or 20ml. as appropriate) with sample and mix thoroughly (gently at first) to dissolve the tablet(s).

5. Place the cell in the right-hand compartment of the Comparator with another containing sample only in the left-hand compartment to compensate for any inherent colour in the sample.
6. Match the colour against the disc using a standard source of white light such as the Lovibond Daylight 2000 Unit, or failing this, North daylight (not fluorescent lighting) and record the reading as residual Ozone in mg./l. - **READING A.**

## **B) Residual Ozone with Total Residual Chlorine or Bromine:**

The first step is carried out as in (A). This now gives **Residual Ozone plus Total Residual Chlorine or Bromine.**

The second step is as follows:-

1. Rinse the test cell with sample and then fill to the correct volume (10ml. or 20ml. as appropriate). Add one Glycine tablet, crush and mix to dissolve.
2. Rinse a second cell with sample and leave in a few drops. Add one DPD No.4 tablet (or two if a 40mm. cell is used) and crush with a stirring rod.
3. Add to this cell the sample from the first cell and mix thoroughly to dissolve the tablet(s).
4. Place the cell in the Comparator and match against the disc as before. The reading on the disc (**READING B**) gives the total residual chlorine or bromine in terms of Ozone, O<sub>3</sub>, in mg./l. (see Note 1).
5. The Ozone residual in mg./l. is obtained by subtracting the second disc reading from the first, i.e. Ozone (mg./l.) = **READING A - READING B.**

## **C) Residual Ozone with Free and Combined Residual Chlorine:**

In addition to the steps carried out in A and B above, the following is required.-

1. Rinse the test cell with sample and add one DPD No.1 tablet (or two if a 40mm. cell is used). Crush the tablet(s)
2. Add sample to the correct volume (10ml. or 20m. as appropriate), and mix thoroughly to dissolve the tablet(s).
3. Match the colour immediately to obtain **Free Chlorine plus a proportion of the Ozone (READING C).**
4. To the same cell now add a DPD No.3 tablet. Mix to dissolve.
5. Match colour immediately to obtain **Total Chlorine plus same proportion of the Ozone (READING D).** The difference between these two readings (i.e. **READING D-C**) gives the **Combined Residual Chlorine.**

This now enables the Total Residual Chlorine from step (B) to be differentiated into Free and Combined Chlorine.

## **Nessleriser**

The same method as for the Comparator is followed, except that 50ml. Nessler cylinders are used instead of cells and DPD Nessleriser tablets in place of Comparator tablets.

## NOTE

When using Glycine, the reading obtained (**READING B**) represents the chlorine or bromine residual in terms of Ozone O<sub>3</sub>. To convert this into mg./l. as chlorine or bromine, multiply by the following factors:

To Convert from Ozone to Chlorine: - Multiply reading by 1.5

To Convert from Ozone to Bromine: - Multiply reading by 3.3

## REVISION HISTORY

<b>Date</b>	<b>Change Note</b>	<b>Issue</b>
17/06/02	36/460	2
01/04/05	CA243	3
19/10/06	JC93	4
13/11/07	JC125	5