

THE COLOUR GRADING OF LIQUIDS

Using the Chloroplatinate/Cobaltous Chloride Scale (also known as the Hazen or the APHA Scale)

INTRODUCTION

A method for measuring the colour of potable water in terms of an easily reproducible colour standard is essential to water engineers responsible for the distribution of supplies for public consumption.

Colour determinations are useful for detecting any irregular contamination of the supply due to floodwaters etc, checking the efficiency of the filter beds, of the decolourising treatments and maintaining a standard clarity. Turbid or coloured waters are unappetising, and even slight variations in the colour of the supply result in complaints from consumers.

The American Public Health Association in "Standard Methods for the Examination of Water and Wastewater", 1989, specifies that the colour of water shall be expressed by comparison with a series of solutions containing known amounts of platinic chloride and cobalt chloride. These solutions are known as "Hazen Colour Standards", and are adopted in British Standard 2690: 1970 Part 9, British Standard 6068: 1968 Section 2.22 and International Standard ISO 2211: 1973. They are also used for non-aqueous applications in ASTM D1209-52 and D1045-58.

These Hazen Colour Standards have been matched with Lovibond glasses to produce permanent colour standards, and discs containing nine colour standards exactly matching the Hazen standards are available for use with the Nessleriser system. The unit adopted in this method of measurement is the colour produced by 1 milligram of platinum (present as chloroplatinate (hexachloroplatinate (IV)) in association with cobalt (II) chloride) per litre of water.

THE STANDARD LOVIBOND NESSLERISER DISCS

| Disc Type | Range (mg./l. as Pt) | Nessler Cylinders | Type (Matched Pairs) |
|-----------|----------------------|-------------------|----------------------|
| NSH | 10-90 | 50ml. | AF306/P |
| NSB | 70-250 | 50ml. | AF306/P |
| NSX | 50-300 | 50ml. | AF306/P |
| CAA | 0-30 | 250mm. | DB420 |
| CAB | 30-70 | 250mm. | DB420 |

THE STANDARD LOVIBOND COMPARATOR DISC

| Disc Type | Range (mg./l. asPt)l | Optical Cells | Type |
|-----------|----------------------|---------------|------------|
| 4/28 | 50-500 | 40mm. | W680/OG/40 |
| 4/28A | 200-500 | 40mm. | W680/OG/40 |

EQUIPMENT REQUIRED

| Discs | Equipment Required |
|------------------|---|
| NSH, NSB and NSX | Lovibond Nessleriser 2150 with Daylight 2000 |
| CAA and CAB | Lovibond Nessleriser 2250 with Daylight 2000 |
| 4/28 and 4/28A | Lovibond Comparator 2000 with Daylight 2000 or Lovibond Comparator 2000+ with Daylight 2000 |

METHOD

For Discs NSH, NSB and NSX

1. Fill one Nessler cylinder to just above the 50ml. mark with the solution under examination and fit the anti-meniscus plunger.
2. Stand the cylinder in the right hand compartment of the Nessleriser.
3. Fill another in the same way with deionised water and place in the left hand compartment.
4. Insert the appropriate disc into the lid and fit the Nessleriser to the Daylight 2000 unit.
5. Rotate the disc until the closest colour match is obtained, if necessary estimate between the nearest values.
6. Record the value displayed as milligrams per litre (mg./l.) Platinum (Pt) or simply as Hazen units.

For Discs CAA and CAB

1. Fill one Nessler cylinder to just above the 250mm. mark with the solution under examination and fit the anti-meniscus plunger.
2. Stand the cylinder in the right hand compartment of the Nessleriser.
3. Fill another cylinder in the same way with deionised water and place in the left hand compartment.
4. Insert the appropriate disc into the lid and fit the Nessleriser to the Daylight 2000 unit.
5. Rotate the disc until the closest colour match is obtained, if necessary estimate between the nearest values.
6. Record the value displayed as mg./l. Platinum (Pt) or simply as Hazen units.

For Disc 4/28 and 4/28A

IMPORTANT – WHEN USING THE 2000 COMPARATOR IN THE LOVIBOND DAYLIGHT 2000 UNIT THE CELL SPACER/LIGHT DIFFUSER MUST BE REMOVED AND REPLACED BY THE BLACK SPACER WITH THE TWO APERTURES. THE 2000+ IS USED AS SUPPLIED.

1. Fill a 40mm. cell to the 20ml. line with sample and place in the right hand compartment of the Comparator. Leave the left hand compartment empty.
2. Fit the disc into the Comparator and then place it in the Daylight 2000 unit.
3. Rotate the disc until the closest colour match is obtained, if necessary estimate between the nearest values.
4. Record the value displayed as mg./l. Platinum (Pt) or simply as Hazen units.

NOTES

1. It is recommended that the lighting unit is used where possible, with all discs.
2. It must be emphasised that the reading obtained by means of the Nessleriser 2150 and discs NSH, NSB and NSX are only accurate provided Nessler cylinders are used which conform to the specification employed when the discs were calibrated, namely that the 50ml. calibration mark is at a height of 113 ± 3 mm., measured internally.

REFERENCES

1. American Public Health Association, "*Standard Methods for the Examination of Water and Wastewater*", 17th Edtn, 1989.
2. American Society for Testing Materials, Standards D1045-58 and D1209-52.
3. British Standards 2690: 1970 Part 9, 6068, Section 2.22 and 3532: 1962.
4. International Standard ISO 2211: 1973.
5. Standardisation of Tar Products Tests Committee, "*Standard Methods for Testing Tar and its Products*", 6th Edtn, 1967, Test GB 3-67.

REVISION HISTORY

| Date | Change Note | Issue |
|-------------|--------------------|--------------|
| 15/05/02 | 36/460 | 2 |
| 12/01/04 | CA148 | 3 |
| 28/04/05 | CA243 | 4 |
| 02/10/06 | JC43 | 5 |