
INTERNATIONAL STANDARD



2211

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Liquid chemical products — Measurement of colour in Hazen units (platinum-cobalt scale)

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FOREWORD

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Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2211 was drawn up by Technical Committee ISO/TC 47, *Chemistry*, and circulated to the Member Bodies in February 1972.

It has been approved by the Member Bodies of the following countries :

Austria	India	Sweden
Belgium	Israel	Switzerland
Czechoslovakia	Italy	Thailand
Egypt, Arab Rep. of	New Zealand	Turkey
France	Romania	United Kingdom
Germany	South Africa, Rep. of	U.S.A.
Hungary	Spain	U.S.S.R.

The Member Body of the following country expressed disapproval of the document on technical grounds :

Netherlands

Liquid chemical products — Measurement of colour in Hazen units (platinum-cobalt scale)

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method of measuring the colour in Hazen units of liquid chemical products.

It is applicable only to clear, slightly coloured liquids for which the colour characteristics are close to those of the reference platinum-cobalt scale. Such colour characteristics are generally describable as "brownish-yellow".

This method is applicable whenever specified by an ISO Recommendation or International Standard relating to a given product.

2 PRINCIPLE

Visual comparison of the colour of a sample with that of colour standards, and expression of the result in terms of Hazen (platinum-cobalt) colour units.

For routine control purposes an instrument such as a comparator, colorimeter or spectrophotometer may be used, provided that it has first been established that the results so obtained are identical with those obtained by visual comparison.

3 DEFINITION

Hazen colour unit: The colour of a solution containing 1 mg of platinum per litre in the form of chloroplatinic acid, in the presence of 2 mg of cobalt(II) chloride hexahydrate per litre.

4 REAGENTS

Distilled water, or water of equivalent purity, shall be used in the test.

4.1 Cobalt(II) chloride hexahydrate ($\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$).

4.2 Hydrochloric acid, ρ approximately 1,19 g/ml, about 38 % (m/m) solution, or approximately 12 N solution.

4.3 Chloroplatinic acid

Dissolve 1,00 g of platinum in a sufficient quantity of aqua regia in a glass or porcelain dish by heating on a boiling-water bath. When the metal has dissolved, evaporate the solution to dryness. Add 4 ml of the hydrochloric acid

solution (4.2) and again evaporate to dryness. Repeat this operation twice more. In this way 2,10 g of chloroplatinic acid (H_2PtCl_6) are obtained.

or

4.4 Potassium chloroplatinate (K_2PtCl_6).

5 APPARATUS

Ordinary laboratory apparatus and

5.1 Two colorimetric tubes, flat based if possible, with a graduation mark at least 100 mm above the base and matched especially with respect to colour of glass and height of graduation mark above the base. Suitable tubes are available commercially as 50 ml or 100 ml Nessler cylinders.

For the measurement of low colorations (less than 50 Hazen units), the height of the graduation mark above the base must be greater than for the measurement of deeper colours and must be sufficient that, on looking through this greater depth of liquid, a clear distinction between the standard Hazen matching solutions can be observed.

6 PREPARATION OF STANDARD COLORIMETRIC SOLUTIONS

6.1 Standard colorimetric solution, 500 Hazen units.

Dissolve 2,00 g of the cobalt chloride (4.1) and the equivalent of 1,00 g of platinum, i.e. either

- 2,10 g of the chloroplatinic acid (4.3), or
- 2,49 g of the potassium chloroplatinate (4.4),

in water in a 2000 ml one-mark volumetric flask, add 200 ml of the hydrochloric acid solution (4.2), dilute to the mark and mix.

This solution has a colour of 500 Hazen colour units.

6.2 Standard Hazen matching solutions (diluted solutions)

Into two series of ten 500 ml and fourteen 250 ml one-mark volumetric flasks, place the volumes of standard colorimetric solution (6.1) shown in the following table, dilute to the mark and mix.

500 ml volumetric flasks		250 ml volumetric flasks	
Volume of standard colorimetric solution (6.1)	Corresponding colour	Volume of standard colorimetric solution (6.1)	Corresponding colour
ml	Hazen units	ml	Hazen units
0	0	30	60
5	5	35	70
10	10	40	80
15	15	45	90
20	20	50	100
25	25	62,5	125
30	30	75	150
35	35	87,5	175
40	40	100	200
50	50	125	250
		150	300
		175	350
		200	400
		225	450

6.3 Storage

Store these solutions (6.1 and 6.2) in the dark in stoppered glass bottles. Under these conditions the colour standard solution (6.1) is stable for 1 year. The standard Hazen matching solutions (6.2), although stable for at least 1 month, shall preferably be prepared fresh.

7 PROCEDURE

First check visually that the sample has colour characteristics close to those of the standard Hazen matching solutions (6.2). If not, follow the instructions given in the second paragraph of section 8.

Pour into one of the colorimetric tubes (5.1) a quantity of the sample sufficient to fill it to the graduation mark. Similarly pour the standard Hazen matching solution (6.2) which appears to have a similar colour into the other tube, to the mark.

Compare the colour of the sample with that of the standard, by looking down the tubes from top to bottom against a white background strongly illuminated by daylight or by an electric "daylight" lamp, taking care to avoid any side illumination.

Repeat, if necessary, with other standard Hazen matching solutions until the closest match is obtained.

NOTES

1 Instruments are available which permit visual comparison of a liquid of a given depth, with a moving tinted glass disc corresponding to the different standard Hazen matching solutions. The use of such instruments, whose standards are very stable, is permissible provided that it has been established that using these tinted glass discs gives the same results as do the corresponding standard Hazen matching solutions.

2 For routine control purposes, a colorimeter or spectrophotometer may be used, the instrument being standardized by means of the standard colorimetric solutions (6.1 and 6.2), provided that it has been confirmed that the use of that instrument gives the same results as does visual comparison.

8 EXPRESSION OF RESULTS

Express the colour of the sample as the number of Hazen colour units corresponding to the standard Hazen matching solution having the closest match to the sample.

If the colour of the sample does not correspond with that of any of the standard Hazen matching solutions (brownish-yellow), give, if possible, an estimate of the colour and a description of the observed colour.

9 TEST REPORT

The test report shall include the following particulars :

- a) the reference of the method used;
- b) the result, expressed in Hazen colour units;
- c) any unusual features noted during the determination;
- d) any operation not included in this International Standard or regarded as optional.