



Test method T1020

Colorimetric determination of chromate ion in water where chromate content is 0-2 ppm

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Revision Summary

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Ed 2/ Rev 0	All	Reformatted RMS template	J Friedrich	November 2012

Note that Roads and Maritime Services is hereafter referred to as 'RMS'.

The most recent revision to Test method T1020 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T1020

Colorimetric determination of chromate ion in water where chromate content is 0-2 ppm

1. Scope

This test method sets out the procedure for determination of chromate ion in water by colorimetric analysis. This test is intended as a means to control the addition of chromate to boiler water in air conditioning systems. The method is derived from : Vogel, "Quantitative Inorganic Analysis", 3rd Edition, pp 791-792.

2. Apparatus

- (a) 50 mL Nessler tubes.
- (b) Filter paper, Whatman No. 42.
- (c) Laboratory glassware including burettes, volumetric flasks, measuring cylinders, etc.

3. Reagents

- (a) Diphenylcarbazide Solution.
Dissolve 0.3 g of diphenylcarbazide in 50 mL of A.R. grade acetone and dilute to 100 mL with distilled water. This solution has a short shelf life.
- (b) Standard Chromate Solution
Place 28 mg of potassium dichromate into a one litre volumetric flask and add distilled water. Shake until dissolved and make up to the mark with distilled water. Pipette out a 100 mL aliquot and place in a one litre volumetric flask and add distilled water to the mark on the flask. Shake and use this latter solution.
- (c) 50% Sulphuric Acid Solution
Carefully add 50 mL of concentrated sulphuric acid to 50 mL of distilled water while stirring. Allow to cool.

WARNING: Sulphuric Acid can cause severe burns. Avoid contact with eyes, skin and clothing. Always dilute by carefully adding acid to water - NEVER THE REVERSE. Always wear safety glasses when handling acid.

4. Procedure

- (a) Using a 50 mL burette, measure out 6.0 mL and 10.0 mL of the standard chromate solution into two separate 100 mL volumetric flasks. Mark the flask with 6 mL of solution "0.6 ppm chromate" and the flask with 10 mL of solution "1.0 ppm chromate".
- (b) To each flask first add 30 mL of distilled water and then 2 mL of 50% sulphuric acid and mix well. Then add 2 mL of the diphenylcarbazide solution and make up to the mark on the neck of each flask with distilled water and again mix well. These are the standard solutions and should be red-purple colour.
- (c) Render the sample solution alkaline (pH above 7.5) if necessary by the addition of dilute ammonia. Filter about 120 mL of the solution through the No. 42 filter paper into a clean dry beaker.
- (d) Pipette out a 100 mL aliquot of the filtered solution and place in a beaker. Add first 2 mL of 50% sulphuric acid and mix well. Then add 2 mL of diphenylcarbazide solution and again mix well.
- (e) Fill separate Nessler tubes to the 50 mL mark with
 - (i) the 0.6 ppm standard.
 - (ii) the 1.0 ppm standard.
 - (iii) the prepared sample solution.

- (f) Place the tubes on a piece of thick white paper and compare the depth of colour by looking down the tubes, the sample should lie in colour intensity between the two standards. If it is deeper in colour than the 1.0 ppm standard, then it has more than 1.0 ppm chromate and if it is lighter than the 0.6 ppm standard then it has less than 0.6 ppm chromate.

5. Report

Report the sample as being one of the following:

- (a) Containing less than 0.6 ppm chromate.
- (b) Containing between 0.6 and 1.0 ppm chromate.
- (c) Containing greater than 1.0 ppm chromate.

6. Technique

- (a) The colour standards are not stable, and should be prepared freshly as required.
- (b) As far as possible keep to the same conditions of lighting and background.
- (c) A 2 ppm standard may be prepared by using 20.0 mL of the standard chromate solution if required.
- (d) For high concentration of chromate use the thiosulphate method (Test Method T1006).