O·I·Analytical

Methodology

Color in Water by Combined Flow Injection Analysis and Segmented Flow Analysis (FIA-SFA)

(Cartridge Part #319447)

1.0 Scope and Application

1.1 This method is used for the determination of color in water in accordance with *Standard Methods for the Examination of Water and Wastewater, 18th Edition, Method 2120B* (Reference 15.2). Color measurements are performed with respect to a platinum-cobalt reference; therefore, the unit of measure for this method is Pt-Co Color Units (CU).

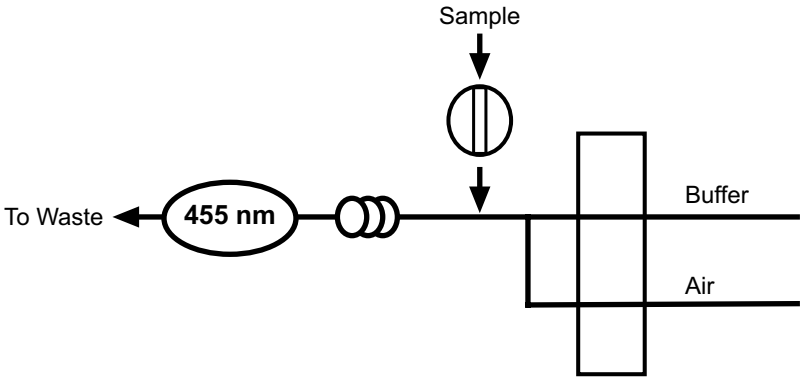
1.2 The Method Detection Limit (MDL) of this method is 0.6 CU. The applicable range of the method is 5.0–25.0 CU. The range may be extended for the analysis of higher concentrations by sample dilution and/or use of higher order curve-fitting techniques.

2.0 Summary of Method

2.1 In this method, a known volume of sample is injected into a segmented reagent stream. The reagent stream contains a sodium phosphate/potassium phosphate buffer that normalizes the pH of the sample. The buffered sample flows to a photometric detector where the absorbance is measured at 455 nm (Reference 15.2).

2.2 The quality of the analysis is assured through reproducible calibration and testing of the Flow Injection Analysis-Segmented Flow Analysis (FIA-SFA) system.

2.3 A general flow diagram of the FIA-SFA system is shown below (see Section 17.0 for a detailed flow diagram).



3.0 Definitions

Definitions for terms used in this method are provided in Section 16.0, “Glossary of Definitions and Purposes.”

4.0 Interferences

4.1 Turbidity will cause significant interferences in this analysis. Turbid samples should be filtered prior to analysis to reduce this effect.

4.2 The color of water is very pH dependent, and significant variances in the pH of samples may interfere with the ability to make accurate comparisons among such samples. This method utilizes a buffer to reduce this effect, but it is highly recommended that the pH of each sample be recorded prior to analysis and reported with the color measurement (Reference 15.2).

4.3 The quality of reagents and cleanliness of glassware is essential to eliminate contamination.

5.0 Safety

5.1 The toxicity or carcinogenicity of each compound or reagent used in this method has not been fully established. Each chemical should be treated as a potential health hazard. Exposure to these chemicals should be reduced to the lowest possible level.

5.2 For reference purposes, a file of Material Safety Data Sheets (MSDS) for each chemical used in this method should be available to all personnel involved in this chemical analysis. The preparation of a formal safety plan is also advisable.

5.3 The following chemicals used in this method may be highly toxic or hazardous and should be handled with extreme caution at all times. Consult the appropriate MSDS before handling.

5.3.1 Cobalt Chloride Hexahydrate, $CoCl_2 \bullet 6H_2O$

5.3.2 Hydrochloric Acid, concentrated (37%), HCl

5.3.3 Potassium Hexachloroplatinate, K_2PtCl_6

5.3.4 Potassium Phosphate Monobasic, KH_2PO_4

5.3.5 Sodium Phosphate Dibasic, HNa_2PO_4

5.4 Unknown samples may be potentially hazardous and should be handled with extreme caution at all times.

5.5 Proper personal protective equipment (PPE) should be used when handling or working in the presence of chemicals.

5.6 This method does not address all safety issues associated with its use. The laboratory is responsible for maintaining a safe work environment and a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method.

6.0 Apparatus, Equipment, and Supplies

6.1 Segmented Flow Analysis (SFA) System (OI Analytical Flow Solution IV) consisting of the following:

6.1.1 Model 502 Multichannel Peristaltic Pump

6.1.2 Random Access (RA) Autosampler

6.1.3 Expanded Range (ER) Photometric Detector with 5-mm path length flowcell and 455-nm optical filter

6.1.4 Data Acquisition System (PC or Notebook PC) with WinFLOW™ software

6.1.5 Color in Water Cartridge (OI Analytical Part #319447)

6.1.6 For FIA, Flow Solution IV must be equipped with the FIA option.

6.2 Sampling equipment— Sample bottle, amber glass, with polytetrafluoroethylene (PTFE)-lined cap. Clean by washing with detergent and water, rinsing with two aliquots of reagent water, and drying by baking at 110°–150°C for a minimum of one hour.

6.3 Standard laboratory equipment including volumetric flasks, pipettes, syringes, etc. should all be cleaned, rinsed, and dried per bottle cleaning procedure in Section 6.2.

7.0 Reagents and Calibrants

7.1 Raw Materials

7.1.1 Brij-35, 30% w/v (OI Analytical Part #A21-0110-33)

7.1.2 Cobalt Chloride Hexahydrate, $CoCl_2 \cdot 6H_2O$ (FW 237.93)

7.1.3 Deionized Reagent Water, ASTM Type I or II

7.1.4 Hydrochloric Acid, concentrated (37%), HCl (FW 36.46)

7.1.5 Potassium Hexachloroplatinate, K_2PtCl_6 (FW 486.01)

7.1.6 Potassium Phosphate Monobasic, KH_2PO_4 (FW 136.09)

7.1.7 Sodium Phosphate Dibasic, HNa_2PO_4 (FW 268.07)