Designation: D 1385 – 88 (Reapproved 2001)

Standard Test Method for Hydrazine in Water[1]

This standard is issued under the fixed designation D 1385; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers[2] the colorimetric determination of hydrazine in boiler feed waters, condensates, natural, and well waters that have been treated with hydrazine (N_2H_4). This test method is usable in the range from 5.0 to 200 µg/L (ppb) hydrazine. The range is for photometric measurements made at 458 nm in 50 mm cell. Higher concentrations of hydrazine can also be determined by taking a more diluted sample.

1.2 It is the users' responsibility to ensure the validity of this test method for untested types of waters.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary statements, see 5.3, Note 1, and Footnote 8.

2. Referenced Documents

2.1 *ASTM Standards:*

D 1066 Practice for Sampling Steam[3]

D 1129 Terminology Relating to Water[3]

D 1192 Specification for Equipment for Sampling Water and Steam in Closed Conduits[3]

D 1193 Specification for Reagent Water[3]

D 3370 Practices for Sampling Water from Closed Conduits[3]

E 60 Practice for Photometric and Spectrophotometric Methods for Chemical Analysis of Metals[4]

E 275 Practice for Describing and Measuring Performance of Ultraviolet, Visible, and Near Infrared Spectrophotometers[5]

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D 1129.

4. Summary of Test Method

4.1 When a solution of p-dimethylaminobenzaldehyde in methyl alcohol and hydrochloric acid is added to hydrazine in diluted hydrochloric acid solution, a characteristic yellow color of p-dimethylaminobenzalazine is formed. The yellow color formed is proportional to the hydrazine present and is in good agreement with Beer's law in the range from 5.0 to 200 µg/L (ppb) hydrazine.

5. Significance and Use

5.1 Hydrazine is a man-made chemical and is not found in natural waters. The determination of hydrazine is usually made on boiler feedwaters, process waters, and other waters that have been treated with hydrazine (N_2H_4) for the purpose of maintaining residuals to prevent corrosion by dissolved oxygen. This reducing chemical reacts with dissolved oxygen to form nitrogen and water. However, under certain conditions it can also decompose to form ammonia and nitrogen. Hydrazine is used extensively as a preboiler treatment chemical for high-pressure boilers to scavenge small amounts of dissolved oxygen that are not removed by mechanical aeration. It has the advantage over sulfite treatment in that it does not produce any dissolved solids in the boiler water. Hydrazine is often determined in concentrations below 0.1 mg/L. However, in layup solutions for the protection of idle boilers, hydrazine may be present in concentrations as high as 200 mg/L.

5.2 Additionally, hydrazine provides protection to carbon steel by chemically reducing the unprotective layers of ferric oxide (Fe_2O_3) to a more adherent protective layer of magnetite (Fe_3O_4).

5.3 Hydrazine is a suspected carcinogen and a threshold limit value in the atmosphere of 1.0 mg/L has been set by OSHA. When in an aqueous solution, hydrazine will oxidize to nitrogen and water in the presence of air over a relatively short period of time.

6. Interferences

6.1 The substances normally present in industrial water do not interfere with the test; however, the hydrazine content may be diminished by oxidizing agents, such as chlorine, bromine, and iodine, collected with the sample or absorbed by it prior to testing.

6.2 Colors in the prescribed wavelengths also interfere, as do other dark colors or turbidities that cannot be overcome.

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[1] This test method is under the jurisdiction of ASTM Committee D19 on Water and is the direct responsibility of Subcommittee D19.03 on Sampling of Water and Water-Formed Deposits, Surveillance of Water, and Flow Measurement of Water.

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[2] For further information on this test method, the following references may be of interest: Watt, G. W., and Chrisp, J. D.," Spectrophotometric Method for the Determination of Hydrazine," *Analytical Chemistry*, Vol 24, No. 12, 1952, pp. 2006–2008, and Wood, P. R., "Determination of Maleic Hydrazide Residues in Plant and Animal Tissue," *Analytical Chemistry*, Vol 25, No. 12, 1953, pp. 1879–1883.

[3] *Annual Book of ASTM Standards*, Vol 11.01.

[4] *Annual Book of ASTM Standards*, Vol 03.05.

[5] *Annual Book of ASTM Standards*, Vol 03.06.