



Standard Test Method for Volatile Alcohols in Water by Direct Aqueous-Injection Gas Chromatography¹

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1. Scope

1.1 This test method covers a wide range of alcohols with various structures and boiling points that can be separated and detected quantitatively in water and waste water at a minimum detection limit of approximately 1 mg/L by aqueous-injection gas-liquid chromatography.² This test method can also be used to detect other volatile organic compounds qualitatively. Organic acids, amines, and high boiling, highly polar compounds are not readily detectable under this set of conditions. For analysis of organics with similar functionalities, refer to other test methods in Volumes 11.01 and 11.02 of the *Annual Book of ASTM Standards*.

1.2 This test method utilizes the procedures and precautions as described in Practice D 2908. Utilize the procedures and precautions as described therein.

1.3 This test method has been used successfully with reagent grade Type II and natural chlorinated tap waters. It is the user's responsibility to assure the validity of this test method for any untested matrices.

1.4 *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.*

2. Referenced Documents

2.1 ASTM Standards:

D 1129 Terminology Relating to Water³

D 1193 Specification for Reagent Water³

D 2908 Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Gas Chromatography⁴

D 3856 Guide for Good Laboratory Practices in Laboratories Engaged in Sampling and Analysis of Water³

D 4210 Practice for Intralaboratory Quality Control Proce-

dures and Discussion on Reporting Low Level Data³
E 355 Practice for Gas Chromatography Terms and Relationships⁵

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D 1129 and Practice E 355.

4. Summary of Test Method

4.1 An aliquot of an aqueous sample is directly injected into a gas chromatograph by means of a microlitre syringe. The organic compounds in the sample are separated and eluted from a chromatographic column into a flame ionization detector. The compounds are identified by relative retention time or Kovats Index, and measured by direct comparison with corresponding standard responses.

5. Significance and Use

5.1 The major organic constituents in industrial waste water need to be identified for support of effective in-plant or pollution control programs. Currently, the most practical means for tentatively identifying and measuring a range of volatile organic compounds is gas-liquid chromatography.

6. Interferences

6.1 Since the specified column and conditions are applicable to numerous organics, the possibility of one or more components having identical retention times is always present. Therefore, the analyst must determine the qualitative identity of the components of each peak by spectrometric techniques or a multi-column approach, or both, so that proper quantitation for those compounds of interest may be made. Refer to Table 1 for relative retention data.

7. Apparatus

7.1 *Gas Chromatograph and Accessory Equipment*, described in Practice D 2908, Sections 7.1 through 7.6, is used for this analysis.

7.2 *Column: Carbowax 20 M⁶ (5%) on 80/100 Acid Washed Chromosorb W,⁷ 6.1-m (20-ft), 3.2-mm (1/8-in.) in outside diameter, 0.508-mm (0.020-in.) wall thickness, stainless steel.*

¹ This test method is under the jurisdiction of ASTM Committee D-19 on Water and is the direct responsibility of Subcommittee D19.06 on Methods for Analysis for Organic Substances in Water.

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² Sugar, J. W., and Conway, R. A., "Gas-Liquid Chromatographic Techniques for Petrochemical Waste Water Analysis," *Journal of the Water Pollution Control Federation*, Vol 40, 1968, pp 1622–1631.

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

⁴ *Annual Book of ASTM Standards*, Vol 11.02.

⁵ *Annual Book of ASTM Standards*, Vol 14.02.

⁶ Carbowax is a trademark of Union Carbide Corp.

⁷ Chromosorb W is a trademark of Johns-Manville Products Co.