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# **Standard Practice for Chemical, Biological, and Physical Analysis of Water**

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**AASHTO Designation: R 23-99 (2022)<sup>1</sup>**

**Technically Revised: 1999**

**Reviewed but Not Updated: 2022**

**Tech Subcommittee: 5c, Quality Assurance and Environmental**



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## Standard Practice for

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## 1. SCOPE

- 1.1. This standard practice provides a listing of various parameters used in the analysis of natural waters and wastewaters. The analysis of these waters is becoming an increasing area of concern for environmental reasons. The passage of laws governing the usage of our natural waterways and limiting the discharges into these waterways, along with an increased public awareness, have caused a much greater demand for this information. To ensure that these data are accurate and reliable, it is essential that testing be conducted using standard procedures that are known to have reproducible results. The test methods given for the following parameters are from referenced sources that are used by most transportation departments testing water. They are listed in order of most frequently used parameters to those parameters rarely used.
- 1.2. The values stated in SI units are to be regarded as the standard.

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## 2. METHOD OF DESIGNATION

- 2.1. Each parameter listed contains one or more test methods for the analysis of that parameter. When more than one procedure is listed, the choice is left to the individual laboratory. These alternate methods generally give comparable results and are intended to provide flexibility to the analyst for parameters for which test methods are used fairly equally.

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## 3. TEST METHOD REFERENCE

- 3.1. *Standard Methods for the Examination of Water and Wastewater*, current edition, published jointly by American Public Health Association, Washington, DC; American Water Works Association, Denver, CO; and Water Environment Federation, Alexandria, VA.
- 3.2. *Manual of Methods for Chemical Analysis of Water and Waste*, current edition, published by U.S. Environmental Protection Agency, Office of Technology Transfer, Washington, DC 20460.
- 3.3. American Society for Testing and Materials, Vols. 11.01 *Water* (I) and 11.02 *Water* (II), current editions, published by ASTM, West Conshohocken, PA.

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## 4. HYDROGEN ION CONCENTRATION

- 4.1. pH Value by Electrometric Method, Method 4500 H, Reference 3.1.

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**5. ELECTRICAL CONDUCTIVITY**

5.1. Micro MHOS at 25°C, Method 2510 B, Reference 3.1.

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**6. ALKALINITY**

6.1. Electrometric Method or Color Change Titration, Method 2320 B, Reference 3.1.

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**7. HARDNESS**

7.1. EDTA Titrimetric, Method 2340 C, Reference 3.1.

7.2. Hardness by Calculation, Method 2340 B, Reference 3.1.

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**8. TURBIDITY**

8.1. Nephelometric Method, Method 2130 B, Reference 3.1.

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**9. BIOCHEMICAL OXYGEN DEMAND**

9.1. Five days at 20°C, Method 5210 B, Reference 3.1.

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**10. TOTAL NONFILTRABLE RESIDUE**

10.1. Dried at 103 to 105°C, Method 2540 D, Reference 3.1.

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**11. TEMPERATURE**

11.1. Method 2550 B, Reference 3.1.

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**12. DISSOLVED OXYGEN**

12.1. Modified Winkler with Full Bottle Titration, Storet No. 00300, Reference 3.2.

12.2. Electrode Method, Method 4500-O G, Reference 3.1.

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**13. TOTAL RESIDUE IN WATER**

13.1. Dried at 103 to 105°C, Method 2540 B, Reference 3.1.

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**14. CALCIUM**

14.1. Atomic Absorption, Method 3500-Ca B, Reference 3.1.