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Standard Test Methods for ZETA POTENTIAL OF COLLOIDS IN WATER AND WASTE WATER¹

This standard is issued under the fixed designation D 4187; 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 These methods cover the method of measurement and calculation of the zeta potential of colloids in water and waste water from the determination of the electrophoretic mobility of colloidal particles.

1.2 The following three methods are included:

Method	Title	Sections
A	Fiber Optic	7 to 10
B	Blue-White Light	11 to 14
C	Laser Light	15 to 18

1.3 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Applicable Documents

2.1 ASTM Standards:

D 1125 Test Methods for Electrical Conductivity and Resistivity of Water²

D 1129 Definitions of Terms Relating to Water²

D 3370 Practices for Sampling Water²

3. Summary of Methods

3.1 These methods consist of determining the electrophoretic mobility of colloids in water and waste water by measuring the velocity of colloidal particles in an electric field. The zeta potential is calculated from the electrophoretic mobility using the Helmholtz-Smoluchowski equation. The procedures for three different

commercial instruments (Method A: fiber optic light; Method B: blue-white light; Method C: laser light) are provided.

4. Significance and Use

4.1 The zeta potential is a parameter that indicates the stability of colloidal dispersions. The relationship between zeta potential and stability has been found to be:

Stability	Zeta Potential, MV
Strong coagulation-flocculation	+5 to -5
Incipient instability	-10 to -30
Moderate stability	-30 to -40
Good stability	-41 to -60
Excellent stability	-61 and up

4.2 These methods can be used to determine changes in zeta potential that may have occurred as a result of addition of coagulants, flocculants, or stabilizing agents.

4.3 Use of zeta potential can aid in optimizing coagulation-flocculation processes through destabilization or by retarding coagulation-flocculation processes through stabilization.

4.4 These methods give an average value for zeta potential.

5. Terminology

5.1 Descriptions of Terms Specific to This Standard:

5.1.1 *electrophoresis—thermal effect*—a phenomenon related to thermal effects that causes the colloids in an electric field to travel in a

¹ These methods are under the jurisdiction of ASTM Committee D-19 on Water and are the direct responsibility of Subcommittee D19.03 on Sampling of Water and Water-Formed Deposits, and Surveillance of Water.

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² 1982 Annual Book of ASTM Standards, Part 31.